ENVIRONMENTAL RISK, FIRM SIZE AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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DECLARATION AND APPROVAL

Declaration

This thesis is my original work and has not been presented for the conferment of a degree or award of diploma in this or any other University.

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DEDICATION

First, I give honor to God. His grace and His mercy are more than sufficient for me. I thank Him for the strength to persevere and health in abundance. I thank Him for surrounding me with an excellent support system.

David Malakwen Kibet Tuwei you are an amazing man to have as a parent and a father at that. You handle your responsibilities as a father, husband, and leader with a lot of ease. I hold onto your many words of encouragement. You let me know that if something is achievable, I could accomplish it, too. Your words and prayers are a fuel within me to keep moving and to win. To my forever loving mother Mary Jeruto Tuwei with whom the only room available is excellence, you have no idea how much you inspire and push me to succeed just to see your genuine joy when good results are presented. Mom your words "Mang'ok Jehovah" loosely translated to "God is not mean" have never allowed me to slip off the road to excellence. My parents I thank you for being my consummate role models without even trying. Your intellect still amaze me and Your prayers continue to cover me.

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ABSTRACT

Financial institutions play a key role in spurring the growth of the economy. However, they operate in a highly volatile environment which threatens their ability to achieve their desired goals. The purpose of this study was to establish the relationship between environmental risk and the financial performance of commercial banks in Kenya as moderated by firm size. The specific objectives of the study were to; establish the relationship between economic risk and financial performance, determine the relationship between reputational risk and financial performance, determine the relationship between technological risk and the financial performance and finally to assess the moderating effect of firm size on the relationship between environmental risks and the financial performance of commercial banks in Kenya. The study was anchored on five theories namely agency, stakeholder, prospect, diffusion of innovation and growth of the firm theories. Longitudinal and cross-sectional research design was used. The population of the study was 42 commercial banks in Kenya. 32 purposively sampled commercial banks which had audited financial accounts for the years 2016 to 2021 were included in the study. Secondary panel data collected using an extraction tool validated by experts from banks and academia was analyzed using R statistical software version 4.3.2. Reliability of the data was ensured by using audited financial reports. Descriptive and inferential data analysis techniques were used. Inferential statistics used were linear mixed effects multiple regression allowing random effects to vary by banks. The study findings showed that economic risk significantly influence financial performance with high liquidity and credit risks associated with lower ROE (beta; -10.36; 95% Confidence Interval (CI): (-18.45 to -2.27), p-value: 0.012) and (beta: -0.29; 95% CI (-0.46 to -0.13), p-value: 0.001.)) respectively. Reputation risk had a significant influence on the financial performance of commercial banks with increase in number of branches being associated with a positive ROE (beta: 0.11, 95% CI; p-value: 0.003). Number of CSR activities showed a positive but insignificant influence on ROE. Technological risk contributed significantly to higher ROE with number of branches showing ROE (beta: 0.15; 95%CI: (0.06 – 0.24); p-value: 0.001) signifying that technological risk influences financial performance of commercial banks in Kenya. Number of ATMs and number of agents showed a positive insignificant relationship. Mixed effects regression model to assess the moderating effect of environmental risk on financial performance of commercial banks showed that firm size significantly moderates the relationship between environmental risk and financial performance of commercial banks in Kenya. The number of branches shows a significant moderating effect in tier 3 banks compared to tier 1, where a higher number of branches negatively affects ROA (beta: -0.22, 95% CI: (-0.31 – -0.14), p-value: <0.01). The study concluded that there is a statistically significant relationship between economic risk, reputational risk, and financial performance of commercial banks in Kenya as well as a moderating effect of firm size on the relationship between environmental risk and the financial performance. Based on the findings from this study, it is recommended that commercial banks may adopt a holistic approach to risk management by emphasizing economic, reputational and technological risks, invest and deploy technology as well as engage in reputational building activities like CSR to attract the market and counter threats. This study may significantly benefit the government, CBK and the commercial bank management in Kenya to inform policy framework as well as the academia and researchers as far as environmental risk, firm size and financial performance of commercial banks is concerned.

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ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
ATM	Automated Teller Machine
BGS	Board of Graduate Studies
CBK	Central Bank of Kenya
CEE	Central and Eastern European
CI	Confidence Interval
CSR	Corporate Social Responsibility
ESG	Environmental, Social and Governance
FP	Financial Performance
GoK	Government of Kenya
ICC	Inter Class Correlation
IQR	Interquartile Range
IT	Information Technology
KDIC	Kenya Deposit Insurance Corporation
KPMG	Klynveld Peat Marwick Goerdeler
NGFS	Network for Greening the Financial System
NPLs	Non-Performing Loans
PESTLE	Political, Economic, Social, Technological, Legal and Environmental
ROA	Return on Assets
ROE	Return on Equity
SBM	State Bank of Mauritius

OPERATIONAL DEFINITION OF TERMS

Economic Risk is the amount of risk an organization is exposed to due to shifts in macroeconomic forces (James & Kepha, 2020) This study used economic risk to mean the possibility of losing money on an investment or business venture due to liquidity risk, credit risk, exchange rate risk and interest rate risk.

Environmental risk is a subset of credit, legal and reputation risk (Kobrin, 2022). The study defined environmental risk as the risk exposure due to economic risks, reputational risks and technological risks.

Financial performance is the ability of a firm to realize its objectives or the level by which a firm's financial goals are met (Wang & Sarkis, 2017). This study defined financial performance as the degree to which a bank uses its assets in generating income. Financial Performance was measured by return on assets and return on equity.

Firm size refers on the total assets owned by a bank (Shafii, 2015). This study operationalized firm size as the total amount of assets owned by a commercial bank including total deposits, total loans and other assets and informed by bank tiers which is a way of categorizing banks based on their relative size to the overall banking market (in terms of total banking assets, as provided by the bank's balance sheet).

Reputational risk is the risk that arises from adverse perception of an institution by its stakeholders, including customers, investors, and regulators (Ivell, Seibert and Marks (2016). This study used reputational risk to mean any loss arising from how stakeholders view the activities of the organization and how the organization impacts the lives of its stakeholders. This study measured reputational risk using

the CSR activities undertaken, loan book size, number of branches and number of agents a bank had.

Return on Assets (ROA) is a measurement of how successful a business is in generating revenue using its assets such as Cash, loans, property, equipment, stock and any other asset expressed as a percentage (Nzuve, 2016). This study operationalized this term to mean financial performance of a commercial bank.

Return on Equity (ROE) is a measure of a company's financialperformance that showwns the relationshipbetween company's profits and investor's return (Warsame, 2016). This study used this term to show the financial performance of commercial banks in Kenya.

Technological risk refers to the existence of a given threat related to information technology with the potential of exploiting the vulnerabilities that exist in an organization's assets or group of assets (ISO/IEC, 2008). This study operationalized technological risk as the risk emanating from an ineffective IT strategy including embracing versus watching new technology and FinTech solutions and important decisions on partnerships and technology adoption. The study measured technological risk by use of number of ATMs, number of branches and number of agency banking.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides the background of the study which comprises environmental risks, firm size and financial performance of commercial banks in Kenya. It outlines the statement of the problem, objectives, significance and justification, scope, assumptions and finally the limitations of the study.

1.2 Background of the Study

The domain of Financial Performance (FP) in commercial banks has been a major focus for management executives and researchers due to its critical role in organizational success. FP is generally understood as the ability of a firm to meet set financial goals, including profitability (Amene, & Alemu, 2019). It is a reflection of how effectively a firm uses its resources to generate revenue, which is vital for its survival and growth (Baba & Nasieku, 2016; Karajeh & Ibrahim, 2017). Indicators such as capital adequacy, liquidity, and profitability (Amene, & Alemu, 2019) have been used to assess financial performance, which is influenced by both internal (capital adequacy, liquidity risk, credit risk) and external factors (inflation, competition, exchange rate fluctuations) (Yulistiani & Suryantini, 2016).

Risk management is crucial in maintaining FP, as economic risks—interest rate, credit, and liquidity risks—can negatively affect performance (Muriithi, 2016). Economic globalization and technological advancements have increased these risks, necessitating

more robust risk management practices in banks (Ali & Oudat, 2020). Various scholars, such as Garcia *et al*. (2017), have also noted that environmental, social, and governance (ESG) factors increasingly influence bank performance, though the relationship between FP and ESG remains debated. The Covid-19 pandemic introduced a new dimension of risk, causing economic disruption that negatively impacted the profitability of banks.

Studies from Kenya (Mathias, 2021) and Europe (Clichici & Zeldea, 2021) showed that while deposits and credit activities increased, profitability suffered due to the pandemic's effects on economic activity. Other risks, such as reputational risk (Fiordelisi, Soana, & Schwizer, 2011) and operational risk (Eckert & Gatzert, 2017), also play significant roles in shaping FP. Technological risks, including cybersecurity and outdated systems, present further challenges to bank performance (Deloitte, 2018), especially as innovation in banking services introduces new forms of risk (Hirtle, 2007). There are several gaps in the literature that present opportunities for further study. This review presents four (4) notable gaps that can help build the study on the relationship between environmental risk, firm size and financial performance of commercial banks in Kenya.

The study gaps include the link between firm size, risk, and FP. Although large firms are generally believed to have better access to funding and resources, the interaction between firm size and various risks—such as economic risk, technological risk, and reputational risks—on FP needs further examination, particularly in the context of Kenyan commercial banks (Ningrum, 2017; Jekwam & Hermuningsih, 2018). The link between technological risk and FP together with that of reputational risk and FP are the another gaps that presented from the revie. Technology's role in banking has grown exponentially, but its risks—

cybercrime, data theft, and technological obsolescence—pose significant challenges. Studies like Sigey (2018) focused on technological risks' effects on Kenyan banks, but more comprehensive research is needed to explore how banks can balance adopting new technologies with mitigating related risks.

The global crises of Covid–19 is equally another risk factor with greyness and the long-term effect on financial performance is not yet clearly shown. Initial studies, such as those by Mathias (2021) and Clichici & Zeldea (2021), indicate that the pandemic hurt banks' profits. However, more research is needed to explore the long-term effects of the pandemic on banks' financial health, especially in developing economies like Kenya. In conclusion, while there is substantial research on FP in commercial banks, there remain gaps in understanding the interactions between firm size, risk management, environmental factors, and technological advancements, particularly in the Kenyan context. Further investigation in these areas will provide deeper insights into improving FP in a dynamic global environment.

1.2.1 Environmental Risks

Businesses operate in a wider environment that comprises of the micro and macro environment. The macro environment encompasses political, economic, socio-cultural, technological, legal and environmental influences on organizations, utilizing the PESTEL framework of analysis. While the micro environment comprises of elements in a firms' immediate environment including suppliers, competitors marketing intermediaries, customers, human resource, organizational culture and structure and the publics. According to Taricha (2022), the macro environment and majorly social-cultural,

economic, technological and political environmental factors have a significant effect on performance of firms. Taricha, (2022) recommends the need to keenly look into the macro environment at policy level to enhance firm performane.

Chege (2021) sought to establish the influence of macro environment on the performance of the business process outsourcing companies in Kenya. Chege enlisted the external environment as political, economic, technological, and legal environments and affirms that no single organization is in charge of the macro environment yet it is key in performance of any organization. From the study results Chege (2021) found out that there is a significant positive relationship between the macro environment and business performance. This study on the influence of macro environment on performance of business process outsourcing companies in Kenya recommended adoption of technology in doing business, more studies on macro environment in other sectors and also studies that combine both the factors of the internal micro environment and those of the external macro environment.

Bwire, & Omagwa, (2019) asserts that environmental risk is, one of the risks that financial institutions must take into account when assessing new lending or investment. The general aim is to focus upon environmental issues associated with lending investments and thus to increase the opportunities for environmentally acceptable or sustainable development and to minimize exposure to environmental or economic risks. Financial decisions are associated with risks and therefore, the overall performance of institutions will majorly depend on the way they manage risks (Cuong, 2019). Firms facing environmental risk may have high loan interest rates, short loan maturity, and restrictive collateral requirements.

Erragragui (2018) confirmed that environmental strengths reduce debt costs, while environmental concerns increase debt costs. Rapidly changing societal views of corporate behaviour relating to many environmental sources of risk mean that financial institutions often highlight reputational risk as a material factor in their decision-making. Environmental risk straddles a number of these risks. In particular, it is a subset of credit, legal and reputation risk (Kobrin**,** 2022). The focus of this study was on economic risks, reputational risks and technological risks. According Jorion (2007), credit risk is the uncertainty of an economic loss due to failure of a counterparty to fulfill their commitment. Credit risk is also influenced by various counterparty characteristics such as reputation, leverage, earnings and collateral (Caouette, Altman EI, Narayanan & Nimmo, 2011)

Environment risk is one of the factors that influence the credit risk in various ways – direct, indirect or reputational. An insolvent borrower may pose a direct risk to a bank as a result of incurring direct legal liability due to clearing up the contamination. A bank may suffer indirect risk if the borrower engages in an activity that damages the environment that results in financial penalties of cost escalation or revenue reduction, because the borrower's ability to repay loans is reduced due to the financial penalties impairing its profitability and cash flows. Any association of a bank to a borrower that is unfriendly to the environment can damage its reputation irrespective of compliance with all the legal requirements (Coulson and Dixon, 1995; Thompson, 1998). The impact of environmental risk can vary by geography, line of business, sector, customer characteristic and other factors. As such, the extent to which environmental risk is relevant and material to a bank will vary depending on the bank's business strategies and activities.

Environmental risk poses potential financial and reputational impact to banks. The financial impact on banks' portfolios and activities can arise through physical and transition risk channels (Monetary Authority of Singapore, 2020). Physical risk arises from the impact of weather events and long-term or widespread environmental changes. Transition risk arises from the process of adjustment to an environmentally sustainable economy, including changes in public policies, disruptive technological developments, and shifts in consumer and investor preferences. This study was primarily concentrated on the analysis of the relationship that subsist between environmental risk, firm size, and financial performance of the listed commercial banks operating in Kenya.

According to the G20 Green Finance Study Group (2017) and NGFS (2019), the environmental and climatic sources of economic risks can be mapped to two key risk categories; physical and transition risks (NGFS, 2019). Transition risks will affect the operations of businesses and the wealth of households, thereby creating economic risks for lenders and investors. They will also affect the broader macro economy through investment, productivity and relative prices' channels, particularly if the transition leads to stranded assets (NGFS, 2020).

From a bank's perspective, Mengze and Wei (2015) stated that a bank may suffer direct risk due to borrowers' legal liability to clean up pollution, indirect risk due to borrowers' cost escalation or revenue reduction resulting from stringent environmental policies, and reputational risk for its financing environmentally unfriendly firms or projects. Poorer environmental performance leads to direct legal liability to clean up pollution and damages firms' reputation, resulting in the uncertainty of a firm's capacity and earnings (Mengze &

Wei, 2015). This study operationalized environmental risk as the economic risk, technology risk and reputation risks that affect the financial performance of listed Commercial Banks in Kenya.

The size of the firm other than risk also affects its performance. This is because the larger the bank the more access it has to internal and external funding sources as well as changes in profit levels earned (Ningrum, 2017). The larger the bank the higher the likelihood of having more assets. Jekwam and Hermuningsih (2018) posit that firm size can be a good moderator on the effect of liquidity on the financial performance of a firm. The firm size depends on the total assets owned and the higher amount of the assets owned by the bank, the greater the bank's financial ability (Shafii, 2015). Size is believed to have a greater influence on the profit earned by the bank. This implies that the larger the bank the higher the profits it will earn.

Institutions face increased business risks from data leakage, asset theft and reputational damage, because of the proliferation of mobile computing, social networking, and cloud-based technology (Carcary, 2013). It is against this backdrop, active reputation management can significantly contribute to safeguarding and increasing the market value of a bank, by means of identifying the reputation risks, prevention and limitation of reputation losses, and preparing measures for generating a reputation gain at the same time.

The Kenyan Central Bank has outlined a reputational risk management framework to guide all financial institutions. This means that firms have to constantly protect their reputation in order to maintain their competitiveness. Epetimeh in and Obafemi (2015) in their research found out that operational risk management has a positive effect on growth and

financial development in the financial sector. The primary data collected could have generated bias. Mwanzia, (2021) did a study on adoption of risk management by Kenyan banks based on 44 commercial banks actively operating Kenyan banking industry based on data from CBK 2010. This study identifies the risks that commercial banks face as well as the strategies that they put in place to mitigate the risks. The study establishes credit risks, reputational damage and compliance risks as the most critical ones affecting the performance of commercial banks.

Jowi & Abade, (2016) study evaluated information security risk assessment for internet banking among Kenyan commercial banks. The study found out that most of them are aware and use the risk management framework. The factors are related to IT either directly or indirectly and greatly hampers the banks' performance. Clichici & Zeldea, (2021). Asserts that Covid-19 crisis severely affected countries causing major economic activities to be blocked during the pandemic, hence shrinking domestic demand and investment. In a study employing both qualitative and quantitative methods aiming to analyse the impact of the pandemic Covid 19 event on Central and Eastern European banking systems, in the light of the most relevant indicators of banking stability, the study results revealed that the pandemic crisis did not affect the quality of banking assets in the CEE, however, extremely low level of interest rates in the pandemic caused a deterioration in asset performance in most banking systems in the CEE. Moreover, the widespread shift to lower interest rates will exert pressure on lending margins. In Kenyan context, adoption of technology is rapidly increasing and financial institutions are increasingly adopting new information technologies, therefore, IT risk is on the rise. Though not much is reported by financial

institutions on cases of technological frauds, financial institutions are losing millions of Kenyan shillings. Considering IT risk in the banking sector, it becomes elusive that the effect of IT risk on performance of commercial banks and is still a green area demanding for extensive research.

From the above synthesis of literature, it is clear that several studies have been done on specific indicators of economic risks like financial risks, credit risks, inflation rates, foreign exchange rates, interest rates and liquidity risks and bank financial performance. Further studies have been conducted on the specific indicators of environmental risks like technological risks and reputation risks singly as opposed to combining them presenting a gap. However, from the empirical review, not much has been done on the relationship between environmental risk on financial performance of commercial banks. This study therefore sought to determine the relationship between environmental risk and financial performance of commercial banks in Kenya by combining various indicators of the micro and macro environment including economic risks, reputational risks and technological risks. It further sought to establish the moderating effect of firm size on the relationship between environmental risks and financial performance in Kenya.

1.2.2 Firm size

Firm size is the categorization of commercial banks by CBK according to weighted composite index which comprise; assets, number of deposit accounts, deposits, bank shareholding, and loan accounts to tiers one, two and three. CBK uses the tier system of classification where commercial banks have been classified in three tiers; tier1 comprising of large banks, tier 2 made up medium-sized lenders and Tier 3 composed of small-scale

lenders, holding 49.9%, 41.7% and8.4%marketshares respectively CBK (2018). Samad (2015) proposes that firm size is indicated by Total asset, Total deposits, and total loans. According to Kinyua, Kiai, & Muriu, (2022) commercial banks in Kenya are categorized based on size. This study operationalized firm size to mean size of the assets owned by the commercial banks and classified as under assets, loans and deposits.

Azhagaiah & Silambarasan (2014) in their study concluded that irrespective of the institution size, there is high volatility in the corporate leverage of these institutions. Olivia, Atahau, & Martono, (2022). reviewed the link between institution size and financial performance. Using the asset of banks to represent firm size, they concluded that large banking organizations enjoyed greater benefits compared to other organizations.

Wahome, Memba, Muturi, (2015) Wahome, Memba, Muturi, (2015). Investigated and empirically tested how firm size and risk affect capital structure of Kenyan insurance firms. It focused on firms that operated continuously from 2003 to 2012, analyzing data from their year-end financial reports over ten years and used panel data. The study found that there was a significant relationship between firm size and capital structure. Appah, & Tebepah, (2021) explored the relationship between corporate size and financial performance of all listed Nigerian deposit money banks from 2010 to 2019 and the findings revealed a positive and significant correlation between bank size and return on assets, indicating that larger banks tend to perform better financially.

Stella, Aggrey, and Eseza (2014) using a descriptive methodology concluded that small institutions are those that employ less than 50 workers, medium institutions employ between 50 and 100 workers, and large institutions employ over 100 workers. This was

also confirmed in the same research by regression. In the year 2016, the Kenyan banking sector comprised of forty two (42) commercial banks, one (1) mortgage finance company and eight (8) authorized non-operating bank holding companies commercial banks branch network has grown from 1,102 in June 2011 to 1,349 branch network in 2016, ATMs increased from 2,021 in 2011 to 2,656 in 2016, number of deposit accounts from approximately 14.2 million with 30,056 staff to slightly over 41.2 million with 34,083 staff over the same period (CBK, 2016).

In a study, Jekwam & Hermuningsih (2018) discovered that liquidity has a positive effect on financial performance and firm size and suggests that this can be moderated by strengthening the influence of liquidity on the financial performance of companies in mining sector. Alsyahrin, Atahau, & Robiyanto (2018) study shows that liquidity risk has a significant positive effect on Islamic financing and exhibits a positive moderating effect on size of the firm. A study by Kinyua, Kiai, & Muriu, (2022) found out that bank size does not moderate the effect of internal equity on the net profit margin of lower-tier commercial banks in Kenya but does greatly affect that of tier 1 and tier two which are considered large firms.

The previous studies have shown mixed results for example on economic risks it is noted that Muathe, & Mwangi (2020) observed that credit risk exhibited an insignificant positive effect on ROE. There was a significantly negative effect on ROE on liquidity risk whereas operational risk had a positive insignificant effect on ROE. Research done by Eneyew (2020) showed that the relationship between interest rate risk and foreign exchange with profitability was insignificantly negative while that of liquidity and credit risk with

profitability was negatively insignificant. Operation risk and liquidity risk had a positive statistical effect on financial performance (ROA) of insurance firms unlike interest rate risk and credit risk which showed negative significant effect on performance (Chipa & Wamiori, 2020).

Liquidity risks as per the study conducted by Muinde (2018) indicated a positive significant relationship with banks' financial performance (ROA and firm size) on the other hand between credit risk and performance it was a negatively insignificant relationship. Muriithi (2016) in a study noted that liquidity and credit risks have significant negative effect on ROE. Ivell, Seibert, & Marks (2016) together with Honey, (2017) agree that reputation is all about perception. Honey, (2017) goes ahead to say reputation risk is amorphous and uncontrollable. Carcary, 2013 says technology and technological advancements have exposed businesses to reputational risk while Economist Intelligence Unit, 2012 believes that technological risk has a direct bearing on financial performance.

Carcary, (2013) saw that institutions face increased business risks due to technological and reputations risk exposure. Jowi and Abade (2016) say commercial banks are aware of risks and have risk management strategies but IT risk among others affect financial performance of commercial banks. The fact that studies have indicated that commercial banks are aware of risks, have mitigating strategies yet are still affected by these risks and yet other studies show that uthese risks do not affect commercial banks could be an indication of existence of a moderator.

The present research is a step towards developing a model which can provide a better understanding of the moderating effect of firm size on the relationship between

environmental risk and financial performance of Kenyan commercial banks. The study measured firm size using the Central Bank of Kenya's tier categorization where CBK came up with this classification system as a means of distinguishing different banks according to their market share, asset base and number of customer deposits. Tier 1 comprises of large banks with hundreds of billions in cumulative assets and millions of depositors and controls 49.9% of the market.

1.2.3 Financial Performance of Commercial Banks

Wang & Sarkis (2017) defines financial performance as the ability of a firm to realize external and internal objectives in other words it is the level to which a firm's financial goals are attained. Le, Shan, and Taylor (2020) says that it can be calculated using liquidity, return on equity (ROE), firm size and return on assets (ROA) just to mention a few. The success of the banks over the years is measured by ROE and ROA (Paul and Musiega, 2020). ROA reveals further how well the resources of a firm can be used in creation of wealth (Nzuve, 2016).

If the company is using its resources efficiently then ROA will be higher which translates to more wealth for stakeholders. A company will use both ROA and ROE as indicators of a healthy business where ROA should be at least 1% while ROE should vary between 15 and 30 %. This study relied on either return on assets or return on equity to make decisions on financial performance of commercial banks in Kenya.

Financial performance is used to describe the extent to which the set objectives of an organization are realized. It refers to the state at which the results of an organization's operations and policies are expressed in monetary terms (Verma, 2017). Warsame (2016) noted that through financial performance, firms show their ability to make good use of the resources they have at stake to ensure the attainment of the objectives and goals set. Financial performance entails the ability that a firm has to utilize available resources, operate in a profitable manner, grow with time and exist in the competitive environment (Kagoyire & Shukla, 2016).

The financial system has far reaching effect on the entire economy and this can be seen in the lack of control of its financial crisis in USA in the year 2008 which then resulted into its downturn and this was transferred to other financial institutions in other economies in the world (Khoon &MahHui, 2010). Globally in the year 2016 commercial banks' performance measured in terms of ROA per country in terms of averages were as follows; France 0.4 Japan 0.7, Greece 0.1, Germany 0.3, Italy 0.7, United States 1.2 and United Kingdom 0.4. Under upcoming economies, financial performance measured as ROA was an average of 0.9 in China, 3.0 in Russia, 0.9 in India, 1.5 in Malaysia, and 3.4 in Brazil (Shukla, 2016). According Nasserinia, Ariff & Fan-tah, (2014) because of the predominant nature of commercial banks all over the world any change in their structure may greatly affect the entire economy.

Aebi, Sabato & Schmid (2012) posits that banks' Performance depends on the level at which it realizes its targets over a specified period of time. In the year 2016 across the Euro area the overall ROA for listed banks was less than 3% and in 2017 there was a slight

decline. As compared to other countries internationally the Euro area lagged behind. The Swedish banks were top with ROE of 12% followed by Nordic at 9% and those in the United States at 8% (Constancio, 2016).

German and Italian banks reported a negative ROE in the year 2016. In the same period, Spanish and French banks recorded a ROA of five and seven percent respectively. In the United Kingdom (UK), conventional banks make more profits than banks in the Islamic region and can successfully attain financial obligations (Onakoya & Onakoya, 2013). Variations also exist among these banks in relation to liquidity, efficiency, solvency, risk and profits. Government owned banks perform poorly in India compared to those privately owned Dash and Das (2013) especially in terms of management of profitability. The large banks in Jordan enjoy a higher profitability compared to other commercial banks (Al-Shatti (2014).

According to CBK (2016) Chase, Imperial and Dubai banks collapsed due to poor performance. The trend on ROE has been on a downwards trajectory as per CBK (2018). In2012 it was (29.8%), 28.9% (2013), 26.6% (2014) 25.2% (2015) and 24.5% in 2016. This means that there has been a consistent poor performance of banks over the years as indicated by the declining ROE.

This has left room for speculation and need for further interrogation. The financial sector in Kenya has generally remained resilient and fairly stable despite the turbulent business environment. Notwithstanding, the sector has faced liquidity risks together with corporate governance challenges and skewed distribution which led to Imperial Bank Ltd and Dubai Bank Ltd to be placed under receivership in 2015; and another bank (Chase Bank Ltd) in

the first half of 2016. Currently, some banks are rebranding in an effort to boost performance while some are experiencing takeovers. Banks which have rebranded include Barclays to ABSA, Transnational to Access, National Bank of Kenya is now managed by Kenya Commercial Bank as a subsidiary and Chase bank has been taken over by SBM. There has been a rise in non-performing loans and credit risks in the banking sector. The private sector was also not spared recording a slowdown of a GDP of 14% (CBK, 2016).

According the Central Bank of Kenya banking supervisory report of 2016, on average there was a rise in liquidity from 40.5 percent to 43.6% in October 2016 while the capital adequacy ratio increased to 19.1% from 18.8%. In September 2016 the Banking amendment act came into force and thereby capping the lending rates and setting the minimum rates on deposits. There was also a decline in the banking industry listed stocks. There was also a decrease in the lending rates from 18% (April 2016) to 13.6% (October 2016) partly reflecting on the ease of monetary policy, and implementation of the amendment Act in 2016. There was also a decline in the average interest rate spread from 11% to 5.8% (CBK, 2016).

This study operationalized financial performance as the ability of a commercial bank to efficiently utilize the available resources, operate in a profitable manner, and grow with time and to thrive in a competitive environment. This study used ROE and ROA as the measure of the bank's financial performance.This research aimed to address a significant gap in the existing literature by examining the relationship between environmental risks, firm size, and the financial performance of commercial banks in Kenya. The overall gap identified is the lack of comprehensive research that combines environmental risks

(economic, reputational, and technological risks) into a single framework and explores how firm size moderates these relationships. While previous studies have focused on individual aspects of risk or specific segments, there is a notable absence of research that integrates these factors holistically and investigates their combined effect on financial performance.

Studies such as Mengze and Wei (2015) and Bwire & Omagwa (2019) focus on how environmental risks, such as legal liabilities and reputational damage, influence financial performance. Mengze and Wei (2015) assert that environmental concerns directly impact banks through legal penalties and indirectly through damage to reputation, which diminishes a firm's capacity and profitability. Similarly, Bwire & Omagwa (2019) emphasize that environmental risks, such as credit and reputational risks, significantly influence financial performance. Sigey, (2018) who looked at technological risk and financial performance also confirmed that technological risk which falls under environmental risk also has a significant relationship with financial perofmence

However, these studies do not consider the moderating role of firm size in the relationship between environmental risk and financial performance, leaving a gap in understanding how different-sized firms may experience and mitigate environmental risks differently. Research by Ningrum (2017), Jekwam and Hermuningsih (2018), and Shafii (2015) suggests that larger firms, particularly banks, tend to perform better financially due to their access to internal and external funding, higher levels of capitalization, and larger asset bases. Firm size is positively correlated with profitability and liquidity, making it a key determinant of financial success. These studies, however, do not incorporate the role of environmental risks, leaving a gap in understanding how firm size interacts with

environmental risks to affect financial outcomes.While some studies address multiple risk factors—such as Mwanzia, (2021), which focuses on operational, credit, and reputational risks—they often fail to include firm size as a moderator or consider the combined effect of environmental risks on financial performance. Similarly, Jowi & Abade (2016) examine IT risks in Kenyan banks but do not integrate the concept of firm size or broader environmental risks.

Chege (2021) and Taricha (2022) examine the macro environment's influence on business performance, particularly political, economic, and technological factors. These studies acknowledge the importance of the external environment but do not delve into environmental risks or the role of firm size as a moderating factor.The reviewed literature reveals a lack of comprehensive studies that simultaneously examine environmental risks, firm size, and financial performance, especially in the context of commercial banks in Kenya. While environmental risks, such as economic, technological, and reputational risks, have been studied individually, few studies have combined these risks and explored their interaction with firm size. Additionally, the moderating effect of firm size on the relationship between environmental risks and financial performance remains underexplored, presenting a significant research gap that this study aimed to address.

1.3 Statement of the Problem

Commercial banks play a pivotal role the world over by bridging the gap between the economy’s surplasses and deficits. This key function of commercial banks is essential not just for the welfare of investors but an economy in its entirety. The financial sector in

Kenya, despite being generally resilient, has experienced significant challenges, particularly in the banking industry. A notable trend is the consistent decline in the Return on Equity (ROE) of commercial banks, which dropped from 29.8% in 2012 to 24.5% in 2016 (CBK, 2018). Furthermore, several mainstream banks, such as Imperial Bank, Dubai Bank, and Chase Bank, faced liquidity risks, corporate governance failures, and were placed under receivership between 2015 and 2016. This period also saw a rise in non-performing loans and credit risks, further complicating the performance of the sector.

In response to these challenges, the industry has witnessed restructuring efforts such as rebranding and mergers, including Barclays bank rebranding to ABSA, the acquisition of National Bank by Kenya Commercial Bank, and other similar moves. Despite regulatory interventions, like the Banking Amendment Act of 2016, which capped lending rates and aimed to stabilize the sector, banks continue to face financial difficulties. This raises concerns about the industry's overall health, especially given the contrasting performance of a few thriving banks and many struggling ones.

Given that banks play a critical role in economic development, the declining performance, persistent financial challenges, and failure of key players indicate deeper underlying issues which if left unchecked could result into a rundown. Environmental risks, firm size, and other factors may significantly influence financial performance. While studies have explored the relationship between risk and financial performance, there remains a gap in understanding how firm size moderates the relationship between environmental risks and financial outcomes in the Kenyan banking sector. This gap necessitates further exploration

to guide policy and strategy formulation aimed at mitigating risks and ensuring the stability and growth of commercial banks in Kenya

1.4 General Objective

The general objective of the study was to analyze the relationship between environmental risk, firm size and financial performance of commercial banks in Kenya.

1.5 Specific Objectives

The specific objectives of the study were:

i. To establish the relationship between economic risk and financial performance of commercial banks in Kenya.
ii. To determine the relationship between reputational risk and financial performance of commercial banks in Kenya.
iii. To establish the relationship between technological risk and financial performance of commercial banks in Kenya.
iv. To assess the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya.

1.6 Hypotheses of the Study

The study was guided by the following research hypotheses

Ho_1: There is no statistically significant relationship between economic risk and financial performance of commercial banks in Kenya.

Ho_2: There is no statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya.

Ho_3: There is no statistically significant relationship between technological risk and financial performance of commercial banks in Kenya.

Ho_4: There is no statistically significant moderating effect of firm size on the relationship between environmental risk and financial performance of commercial banks in Kenya.

1.7 Justification of Study

The financial performance of commercial banks is critical to the stability and growth of the economy. Despite the critical role banks play in economies and development, the Kenyan banking sector has experienced significant challenges, including declining ROE, increasing non-performing loans, and the collapse of key players such as Chase Bank, Imperial Bank, and Dubai Bank. While previous studies have examined the relationship between risk and financial performance, there is a minimal research on how firm size moderates this relationship, especially in the context of environmental risks.

There is also minimal and inconclusive research on the environmental risks (economic risks, reputational risks and technological risks) and the relationship it has with financial performance of commercial banks in Kenya. Given the persistent financial difficulties facing banks, it is crucial to understand the underlying factors that affect their performance and further establish the moderating relationship between environmental risks anf financial performance of commercial banks inkenya.This study is significant because it aims to fill

this knowledge gap and provide insights into how commercial banks can better manage environmental risks to improve their financial outcomes. This research is timely due to the ongoing changes in the sector, such as the Banking Amendment Act of 2016, which capped lending rates, the persistent drop in financial performance of commercial banks, and efforts to restructure through mergers and acquisitions. Despite these initiatives, many banks continue to face rising non-performing loans and credit risks, together with technological and reputational risks leaving the sector's financial health in a vulnerable state.

There is an urgent need to investigate the underlying risk factors, including environmental risks, and assess how firm size moderates their relationship to financial performance because if the problem is left unchecked or is not addressed then banks may face more risks leading to collapse and losses. Addressing these issues is vital for ensuring the long-term stability of Kenya's banking system. The findings will be valuable to bank managers, regulators, and policymakers in designing strategies to mitigate risks and promote financial stability. Furthermore, the study will contribute to the theoretical understanding of risk management in the banking sector, particularly in emerging economies. Ultimately, the research may support the development of more resilient financial institutions, which is essential for sustainable economic growth.

1.8 Significance of the Study

The government stands to benefit from this study in terms of formulation of policies that will improve governance of the banking sector and indeed the financial industry. This is through provision of environmental implications for policy makers when they design environmental risk mechanisms for sustainable financing. Bank managers may also gain

from formulation of policies on environmental risk management by using the findings to improve banks' performance by working on the risks in banks. It may also assist Kenyan government more so the national treasury in sealing the gaps that increase the expenditure for the players in the banking sector. Also in the list is the regulating body by the name Central Bank of Kenya by interrogating the existing regulatory framework to ensure there is a conducive business environment for all the players in the banking industry.

The Management of the Banking sector may benefit by being able to examine tools for measuring performance and come up with a model that maximizes profits and eventually adopt measures to address environmental risks. By undertaking this study banks may be able to evaluate the benefits of utilizing the internal mechanisms which comprise of bank characteristics that relate to their performance thus enhancing profitability. Lastly due to improved performance the rest of the stakeholders including savers and borrowers and even the community will enjoy the benefits of well managed environmental risks therefore a more predictable earning by extension.

Within our context in Africa, commercial banks may benchmark with Kenya and lay focus on those aspects that can benefit them given their context. This might save them the costs of carrying out similar studies that relate to the relationship between environmental risks, financial performance and firm size. The academia and researchers in this area stand to also benefit as this study results adds to a wider knowledge on moderating effect of firm size on relationship between environmental risk and financial performance in commercial bank in Kenya. The study will add value to the current body of firm size characteristics. Future research relating to performance of commercial banks may benefit from this study.

The study will also be benefial to investors, customers, other stakeholders including the publics from a better managed environmental risks thus deriving benefits of investing their resources or enjoying better banking services together with better business deals and an opportunity as stakeholders to thriving economy.

1.9 Scope of the Study

The study analyzed the relationship between environmental risk, firm size and financial performance of commercial banks in Kenya. Environmental risks looked at included economic risk, reputational risk and technological risks. Economic risks were indicated by Credit, Liquidity, Interest rate, and Exchange rate Risks. Reputational risks included CSR activities, Loan book size, Number of branches and Number of agents. Technological risks encompassed the number of ATMs, number of branches and Number of Agency Banking. Financial performance included return on equity (ROE) and return on assets (ROA). Firm size that acts as the moderator included tier one, tier two and tier three.

The focus of the study was on all the commercial banks licensed to operate between 2016 and 2021, and of interest was their audited financial reports for the period under consideration. The choice of this time period was informed by the challenges the industry was facing in this period where reforms and policies had been implemented by CBK to cushion banks from the adverse effects of risk yet some commercial banks performed poorly others were merged, taken over and others were liqudated. Secondary data from published annual and financial reports of CBK and commercial banks that were published between 2016 and 2021 were used in the study.

The limitations of this study were such that, this study zeroed in on environmental risk, firm size and financial performance of commercial banks in Kenya with special emphasis on information forwarded to Central Bank and audited financial books of commercial banks and periodic reports by individual commercial banks. In this study which used secondary data, the major challenge revolved around originality. Authorized sources were utilized by the researcher since the internet has a vast amount of data some of which is misleading. These included commercial banks and Central Bank of Kenya (CBK) official websites which contain the commercial banks' audited financial statements. Given that some study variables were not available on a yearly basis, the research converted them appropriately into yearly basis for the period between 2016 and 2021.

Although mixed effects regression models are powerful statistical tools, their use inherently assumes certain conditions, such as the absence of multicollinearity, normal residuals, and linear relationships between the variables, and deviations from these assumptions may affect the validity of the results. While the study includes various risk factors and business variables, other important factors affecting financial performance in the banking industry may not have been included. The omission of key variables due to the scope of the study may prevent a full understanding of the relationship between risk factors and financial ratios hence financial performance. The analysis takes a correlational approach, which precludes the possibility of a causal relationship between risk factors and financial performance.

Furthermore, dividing banks into tiers may oversimplify the complexities of banking systems and may lead to overlooking subtle differences within these tiers that may affect

the relationship between risks and the financial services network. The stratified design of the study may not incorporate long-term growth and change in the banking sector during a particular period, which may neglect trends on or in the long-term consequences. Identifying and explicitly articulating these limitations is important because it highlights the limitations and contexts in which study data must be interpreted, and it urges further research to address these barriers to achieve a detailed understanding of them.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter used relevant literature from various scholars and researchers in the area of environmental risks and firm size with a specific focus on its effects on financial performance of Kenyan commercial banks. It evaluates the theories, which in this case consist of agency theory, stakeholder theory, prospect theory and diffusion of innovation theory. The empirical literature covered both international and local studies to demonstrate that performance is considerably influenced by environmental risks and firm size. Firm size was used as a moderating variable. By reviewing the literature, the knowledge gap was identified and this knowledge gap formed the basis of the research. This section entails theoretical review, conceptual review, empirical review, conceptual framework and identification of knowledge gaps.

2.2 The Theoretical Framework

The study was anchored on the following four theories: agency theory, stakeholder theory, prospect theory and diffusion of innovation theory.

2.2.1 Agency Theory

Jensen and Meckling (1976) came up with this theory and was initially used in economic theory but currently it has been so much adopted in corporate governance. This theory postulates that that firms must prioritize the interests of the shareholders in order to increase wealth which motivates the shareholders (Ifeanyi, Oge, & Gozie, 2016; Jensen and

Meckling, 1976). According to shareholders, there is need for investment to be done on projects which reduces financial costs but maximize revenue. According to Shleifer and Vishny (1997) the challenge with most organizations is that they try to do this on a short-term basis.

Percy, (2013) posits that agency theory is a set of propositions which governs a modern corporation that is typical of a large number of owners or shareholders who have pulled resources and allowed others to manage on their behalf. It concerns itself with addressing the problem of agency that leads to value addition and attempts link corporate governance and financial performance. A firm consists of a binding arrangement between the agents and the shareholders (Meckling, 1976). There is always a conflict between the agent and the principal which can only be sorted by ensuring a smooth flow of information. Agency theory is hindered by two factors one of which is the simple concept that reduces corporations to two players (owner and managers) and secondly the view that human beings are selfish beings (Daily, Dalton and Canella 2003). This theory offers a solution to the agency problems that may arise from the agent leaving or acting against the interests of the principal.

In relation to this study there are circumstances under which managers may prioritize their own interests and not those of the shareholders who demand that their wealth be maximized. Agency relationship in the context of a bank tries to explain how the parties relate (the managers and those who provide corporate finance). Agency relationship is an agreement between individual(s) or principal(s) who engage another party termed as an agent to act on their behalf (Jensen and Meckling,1976). This theory assumed that the

board of directors was in charge and was forced to delegate as per the incentives of compensation.

In this study the theory was applicable because when the demands of the owner were met it reduced the agency costs. The normal operations of a bank can be hampered if it faces financial constraints leading to liquidity risks arising from agency costs. This theory supports top managements' decision which ensures that commercial banks together with its employees adopt the best financing strategies and use resources prudently thus reducing the negative effects of environmental risks. According to Rowe, (1982) agency theory falls short in two ways one in the sense that it can be overly simplistic, assuming that shareholders and managers are rational actors with well-defined objectives. Additionally, the theory does not take into account other stakeholders, such as employees and customers, who may have a significant impact on organizational performance.

2.2.2 Stakeholder theory

Freeman (1984) authored this theory meant to be managerial instrument to address morals and values in running of organizations. As per the theory there are other players involved in the activities of any enterprise which include customers, employees, government, suppliers and financiers with interests in the enterprise. Stakeholder theory supports the study by identifying the concerned players affected when the economic risks either deprives value or benefits the company.

Companies based on the stakeholders' view, need to exceed the expectations of the shareholder interest, satisfying many stakeholders like customers, employees, suppliers, financiers, government, political groups, communities, trade unions and trade associations

(Ifeanyi *et al*., 2016). Where stakeholder relationships are key, firms benefit more from environmental and social responsibility (Barnett and Salomon, 2012; Sisaye, 2021) this is because the firm is able to reach and touch nearly all who matter to her operations positively hence increased sales and revenues. The expectations that each stakeholder of a firms' performance has differ and this ensures long-term survival and success. Major groups of stakeholders expect more of sustainability of organizations. Organizations are under pressure to excel by their multi-faceted stakeholders together with regulatory compliance (Bodhanwala and Bodhanwala, 2018).

Hill and Jones (1992) argue that stakeholders are groups of constituents who possess rights of claim on the firm when under liquidation. These could be financiers or creditors therefore this theory is associated with resource-based perspective of strategic management theory. Economic risks can therefore affect all the legitimate claimants of firm. Corporate risk management practices decrease the expected costs (Klimczak, 2005). This implies that stakeholders are key in providing a new insight into possible justification for management of risks. It is important for commercial banks to reduce the chances of financial distress by hedging variability in earnings through identifying how the risks are linked to firms' performance.

A responsible financial institution will manage resources in an organized and reliable way on behalf of their owners (Wakaisuka-Isingoma, J., Aduda, J., Wainaina, G.& Mwangi, C.I. 2016). At the same time practices that are sustainable are important for financial institutions as they help to enhance the customers institution's trust thereby ensuring reliability in managing and allocating resources of the organization (Tsifora and

Eleftheriadou, 2007). This means there exist a big dilemma between financial performance and sustainability of the firm while balancing the interests of several players. Phillips, Freeman, & Wicks, (2003) argues that stakeholder theory lacks a clear definition and measurement, and its potential to prioritize certain stakeholders over others. Further, the implementation this theory and its mechanism is not feasible and does not consider all groups.

2.2.3 Prospect Theory

This theory was proposed by Daniel Kahneman and Amos Tversky in 1986. It postulates that individuals treat losses and gains differently and that they get motivated not to increase their expected financial gains but expected utility of their actions (Kahenman& Tversky, 1986). Prospect theory has been useful in behavioral finance because of its application of expected utility theory. Nicholas (2012) argues that integrations of asset a prospect can be accepted if its utility is more than the utility of other assets in terms of monetary terms.

The theory argues that the disutility which arises from a reduction in wealth is more than the utility from increasing wealth of the similar size. Therefore, playersneed a risk premium to participate in trade having an element of risk in return, reference points for dividing losses and gains that vary, depending on set targets and past history. Behavior of individuals in financial markets may be hampered by social influence. Social influence maximizes the empirical pattern of activities on the market. Different behaviors' therefore, can be understood as responses to varying market circumstances that leads to different outcomes (Paul, Mark, Nigel, & Emma, 2001).

Prospects theory acknowledges that the utility curve is never a straight line. It believes that utility is important adds insight and differs in aspects of losses and gains (Plott, Charles, & Kathryn, 2007). Among individuals the shape of the prospects theory value curves is the same. It is S- shaped and therefore its convex is below the reference point. Sensitivity to change is measured at the slope of the curve. It is more sensitive to the origin and its sensitivity progressively reduces shape would mean many people seems to be risk averse when it comes to gains and seeks risk when it comes to losses (Paul *et al.*, 2001).

The usefulness of this theory was on understanding of financial and reputational risks. It therefore helped the banks to justify the importance of engaging in ventures such as corporate social responsibility which do not provide direct benefits to them. However the prospect theory may have some limitations. The existing theoretical model of prospect still has some phenomena inconsistent with the empirical evidence and critically the value function and weight function need to be further studied as there is a clear lack of empirical evidences to back this glaring gap. Nwogugu, (2006).

2.2.4 Diffusion of Innovation Theory

The theory is the work of Rogers who developed it in 1962. Diffusion of innovation theory explains the generation of a new idea, how it gains momentum over time and eventually spreads through a social system. The aftermath of the diffusion ispeopletoadopt the new idea and shift from their previous way of doing things to new one. Interaction of many factors including communicating the idea, time taken by the idea to diffuse through the population and the society in which the idea is being introduced (Rogers, 1995). The diffusion in idea ends up inculcating a culture in people who adopt the idea over time.

The diffusion of innovation theory has been in use extensively in technology and economics for quite some time now. The diffusion theory has played a great role in information technology in development of other theories like developer-based theory and adopter-based theory which are key in explaining the diffusion of various innovations in the society (Surry, 1997). Diffusion in information technology is, however, characterized by risksassociated with technology and internet penetration.

Technological risk occurs in many forms which include simple malfunctioning of computer, physical damage as well as complex malicious acts by attackers like cyber-crime. The risk has heightened costs associated with risk management process whereby financial institutions including commercial banks have to incur huge amount of funds to implement strong IT risk management techniques.

Commercial banks which are considered large in terms of the capital base and market share are capable of implementing the strong IT risk management techniques. The limitations of Diffusion of Innovation theory include its focus on individual adoption rather than organizational change processes. It also fails to fully integrate the overlapping effects of different contexts and domains, such as technological, social, and cognitive differences with previous products Rogers, & Adhikarya, (1979)

2.2.5 Growth of the Firm Theory

The Growth of the Firm theory, introduced by Penrose (1959), outlines fundamental principles that govern the efficient and profitable growth of companies. Penrose highlights the importance of managing a firm's resources effectively, focusing on productive opportunities and diversification strategies. The theory forms the basis for understanding

how firms can leverage their resources and capabilities to gain a competitive edge, offering a foundation for what would later be termed the resource-based theory of competitive advantage. The theory further identifies key relationships between a firm's resources, its potential for growth, and profitability.

Firstly, Penrose (1959) argues that a firm's ability to create economic value depends not solely on the resources it possesses but on how creatively and effectively those resources are managed. In this view, having a large pool of resources does not guarantee profitability. Instead, it is the innovative deployment and management of these resources that drive differences in financial performance and productive opportunities. Moreover, Penrose suggests that the experience and interactions of managers with the firm's resources shape their perception of potential opportunities for growth and innovation. Managers play a crucial role in transforming these resources into firm capabilities and exploring new product applications. This process of resource reconfiguration, reminiscent of dynamic capabilities, is critical to innovation and economic value creation, especially for larger firms with more resources to harness.

Penrose (1959) also discusses the factors that determine the pace and direction of firm growth. According to this theory, the availability of skilled managerial and technical talent can limit a firm's growth rate within a certain period. Additionally, the firm's existing knowledge base and any underutilized resources it holds influence its growth trajectory. Penrose emphasizes that overlooking these constraints can lead to inefficiencies and a loss of competitive advantage. The theory provides a detailed explanation of the relationship between resource-based relatedness and firm performance, asserting that decisions made

about resource management and growth direction directly impact the firm's ability to generate economic rents. As a result, firms with ample resources and strong leadership are expected to outperform their competitors, aligning with the core principles of the Growth of the Firm theory. Pitelis, C. N. (2009) offered a review to the theory of the growth of the firm fifty years later and noted that human motivation and conscious human decision have no place in the process of growth as held by the theory.

2.3 Review of Related Literature

This section reviews literature linked to various variables that were used in this research and depicted in the conceptual framework. The independent variable is environmental risk while firm size was used as a moderator and financial performance was used as a dependent variable.

Environmental risk was studies with the guidance of economic risk, reputational risk and technological risk. Environmental risk may influence the credit risk in various ways, direct, indirect or reputational. A bank may suffer direct risk in some developing countries, due to incurring direct legal liability arising from borrowers who are insolvent. A bank may suffer indirect risk if the borrower gets involved in activities that are damaging to the environment. This may attract penalties which escalates the cost and reduces revenue because the borrower's inability to repay loans caused by penalties that impair its cash flows and profitability. If the bank is seen to be engaging in activities that appear unfriendly to the environment, its reputation will be badly damaged even if the activities comply with the law (Coulson and Dixon, 1995; Thompson, 1998). The impact of environmental risk can vary by geography, line of business, sector, customer characteristic and other factors.

As such, the extent to which environmental risk is relevant and material to a bank will vary depending on the bank's business strategies and activities.

Information Technology (IT) risk is the unavailability of computer software and hardware due to incidents such as denial of service attack, lack of expertise of IT personnel, loss of company's data due to theft; system malfunction or system glitches (Teilans, Romanovs, Merkuryev, Kleins, Dorogovs, & Krasts, 2011). Institutions face increased business risks from data leakage, asset theft, and reputational damage because of the proliferation of mobile computing, social networking, and cloud-based technology (Carcary, 2013). According to Teilans *et al*. (2011), unmanaged technology risks may negatively affect the financial performance of institutions.

The reliance on information technology (IT) is increasing in the dynamic business environment as leaders use IT to strengthen their business strategies (Morales, 2014). Accompanying the benefits of technology in business operations are risks associated with technology (Jackson, 2012). IT risks result from malicious computer attacks, user errors, and IT disasters (Farah, 2011). According to Gill (2012), IT risks can negatively affect an institution's revenue if they remain unmanaged.

Reputation risk is a risk of possible damage to Bank's brand and reputation, and the associated risk to earnings, capital or liquidity arising from any association, action or inaction which could be perceived by stakeholders to be inappropriate, unethical, or inconsistent with the Bank's values and beliefs (Schildbach & Schneider, 2017). The reputation risk in a broader sense refers to a positive or negative deviation from what borrowers expect. Reputational risk is not a new concept, but the efforts to manage it as a

self-standing type of risk, not within an operational risk framework, are quite recent. However, it is more difficult to manage reputational risk than other risk categories as it is difficult to define and quantify, and relies heavily on external perceptions. Moreover, sometimes it is viewed as a "risk of risks" or seen as the impact of other events (ACE 2013). The reputation of a bank refers to a public reputation of the bank in terms of competence, integrity, and trustworthiness, which results from the perception of the stakeholders.

2.3.1. Economic risk and financial performance of commercial banks

Economic risk is the possibility of losing money on an investment or business venture. According to Muriithi and Waweru (2017) economic risks include; credit, liquidity, foreign exchange, interest rate. According to Hunjra, Tayachi, Mehmood & Hussain (2021), economic risk is a key component in business which informs operations and in turn affects performance. Economic risk to a large extent is informed by change in government policies in economic and social aspects. For the purpose of this study, economic risk comprised the following risk indicators; credit risks, exchange rates risk, interest rates risks and liquidity risks.

James & Kepha (2020) defines economic risk as a firm's inability to fulfill the unforeseen cash demands through generated cash flows. In other words, it is when a firm does not have enough cash to use for its operations. It may include reinsurance, liquidity technical provision, foreign exchange, interest rate, solvency, underwriting risk and credit risk among others. It is the possibility of losing money on an investment or business venture. Some more common and distinct economic risks include credit risk, liquidity risk, and

operational risk. Economic risk is a type of danger that can result in the loss of capital to interested parties and incorporates liquidity risk, and credit risk.

In a circumstance where a bank is not able to accomplish its financial obligations in the short-term, the risk is termed as liquidity. It is computed using current ratio and quick ratio (Mamatzakis & Bermpei, 2017). Credit risk on the other hand is the current and prospective risk to earnings and capital as a result of inability of an obligor to meet contractual requirements. Mirie (2018) posits that non-performing loans which are experienced by financial institutions can be used to measure credit risk. Matayo & Muturi, (2018) did a study that examined how market risks influence the financial performance of Nigerian banks, focusing on variables such as interest rate risk (IRSK), foreign exchange rate risk (FXRSK), capital adequacy risk (CARSK), and equity risk (EQRSK).

The study by Matayo & Muturi, (2018) analyzed 15 commercial banks from 2011 to 2020, using secondary data sourced from their financial statements. Employing an ex-post facto research design, the study utilized a panel least square estimation model, alongside descriptive analysis, correlation, and variance inflation factor (VIF), with the Kao Cointegration Test assessing long-term effects. The analysis covered 150 bank-year observations. Findings revealed that IRSK, FXRSK, and CARSK had a negative impact on bank profitability, while EQRSK showed a minimal positive effect in the short term. Long-term, market risks were shown to significantly threaten banks' performance. The study concluded that Nigerian banks must adopt effective risk management strategies, particularly in light of rapid technological advancements in the 4th industrial revolution, to enhance profitability and competitiveness**.** On the other hand, solvency risk can be

computed by using a ratio of total liabilities to total assets and reinsurance risk by using a ratio of premium ceded to total assets (Sisay, 2017).

Abdirahman, (2020) undertook a study aimed to determine the effect of loan quality on the financial performance of commercial banks in Kenya, focusing on variables such as loan quality, bank size, loan loss provision coverage ratio, standard risk costs, write-off ratio, and liquidity. The research targeted all 42 licensed commercial banks in Kenya, using secondary data and panel data analysis to assess multiple units over varying time periods. Methodologically, the study employed inferential statistics, including correlation analysis and panel multiple linear regression, with Ordinary Least Squares (OLS) as the estimation technique.

The findings revealed that loan quality and bank size significantly influence financial performance, with non-performing loans negatively impacting profitability, while bank size has a positive effect. Recommendations were made for policymakers, including the National Treasury and the Central Bank of Kenya (CBK), to implement management control systems, corporate governance codes, and credit risk mitigation frameworks like Basel I and II to improve loan quality and enhance financial performance. Additionally, commercial bank practitioners were advised to focus on improving loan quality and increasing bank size to strengthen financial outcomes.

On a global perspective, Wani and Ahmad (2018) looked at the relationship between economic risk and financial performance of insurance firms in India and concluded that liquidity risk, solvency risk, capital management risk and firm size had a negative

significant relationship with financial performance. Cuong (2019) in a study on assessment of the influence of financial risk as a measure of liquidity risk on the European banks' financial performance noted that a negative significant relationship between liquidity risk and the financial performance of the European banks existed.

The study by Javid, Farooqi, Shoukat, and Rasheed (2020) investigated the relationship between financial risks and the financial performance of conventional banks in Pakistan over the period from 2014 to 2018. The research focused on 22 banks listed on the Pakistan Stock Exchange and employed a quantitative methodology, utilizing panel data regression analysis. Specifically, the Generalized Least Squares (GLS) method, incorporating both fixed and random effects models, was applied. Financial performance was measured using Return on Assets (ROA) and Return on Equity (ROE), while the primary financial risks considered included credit risk, interest rate risk, and liquidity risk.

The results indicated that credit risk had a significantly negative effect on both ROA and ROE, interest rate risk was found to have a positive relationship with financial performance, while liquidity risk did not show any significant relationship with either ROA or ROE. The study conclude that credit and interest rate risks are key influencers of financial performance of conventional banks with firm size significantly moderating this relationship.

Patarai & Mohamad, (2016) in a study examined the relationship between economic risk and the financial performance of Islamic banks in Malaysia from 2008 to 2014, using panel data from fifteen Islamic banks obtained from the Bank Scope database. The study focused

on economic risks including: credit risk, liquidity risk among other risks. The findings revealed that credit risk and liquidity risk had no significant relationship with bank performance. Onsongo, Muathe, and Mwangi (2020) in a study of assessment of implications of economic risk on the performance of commercial banks and service firms indicated that, there was an insignificant positive effect on ROE.

Liquidity risk had a significantly negative relationship with ROE whereas a research study conducted on the relationship between economic risks and firm's performance of banks in Turkey by Arif and Showket (2019) revealed that solvency risk, liquidity risk, and firm size had a positive significant relationship with financial performance. Eneyew (2020) carried out a study on the influence of financial risks including interest rate risks, credit risk and liquidity risks on profitability of commercial banks in Ethiopia. The population of the study was eight commercial banks for a period of twelve years between the years 2000-2011. It was found that interest rate risk had a positive insignificant relationship with profitability. The study found that the relationship between liquidity risks and credit risk was negative and statistically significant to profitability.

Chipa and Wamiori, (2020) carried out a study on economic risks and its influence on financial performance of investment firms listed at the Nairobi Securities Exchange in Kenya and found that operation risk and liquidity risk, had a positive statistical effect on financial performance (ROA) of insurance firms as opposed to credit and interest rate risk which had negative significant relationship with performance according to a study done in Kenya

According to Muinde (2018), liquidity risk has a positive significant relationship with financial performance of banks which is related to firm size and ROA. A negative insignificant link between credit risk and performance of firms was also evident. Muriithi (2016) in a research on financial risk and financial performance of commercial banks in Kenya noted that credit and liquidity risks have significant negative relation to ROE. The other outcome of the research was that the relationship between financial risks and banks' performance in Kenya was inverse. This study focused on the environmental risk and financial performance of commercial banks as a whole as opposed to financial risks and financial performance only where Muriithi, (2016) focused on liquidity and credit risks only.

Wickramasinghe and Gunawardana (2017) conducted a survey on the effect of cash flow risk management methods on long term financial performance in Sri Lanka. Secondary data was collected from 65 firms in Colombo stock exchange. It was observed that there was a relationship between cash flow risk management techniques and financial performance. This study focused on cashflows and was conducted from a global perspective while the current study concentrated on the relationship between environmental risk and commercial bank financial performance in Kenya. Therefore, a gap exists in the above contexts.

Ashraf, Yazid and Remli (2021) did a research that sought to show the relationship that exists between economic risk management operations of Islamic banks and their performance in Pakistan where a descriptive research design was employed and both primary and secondary data was used. Twenty-two Islamic banks were targeted using

census method. Correlation analysis and multiple regression were used. It was established that the operations of Islamic banks in Pakistan expressed a better economic risk management leading to better financial performance. However, a gap exists given that the study was done in a global context and restricted to Islamic banks and economic risk management, unlike the current study which was concentrated on the relationship between environmental risk and financial performance of commercial banks in Kenya as moderated by firm size.

A research that was carried out by Muriithi (2016) which looked at the effect of financial risk on the performance of 43 commercial banks in Kenya and adopted a quantitative research approach using regression and correlation models to analyze panel data concluded that there exists an inverse relationship between economic risk and financial performance of commercial banks in Kenya. From the results of the study it was noted that liquidity and credit have a negative relationship with return on equity. However, there is a gap since the past study focused on the effect of financial risk on financial performance, concentrating on market risk, liquidity risk, credit risk and operational risks unlike the study at hand which sought to examine the relationship between environmental risk, firm size and the financial performance of Kenyan commercial banks.

Kagunda (2018) researched on the effect of liquidity risk management techniques on deposit-taking SACCOs' financial performance in Nairobi, Kenya. Descriptive research design with a target population of 41 SACCOs was used. Secondary data was analyzed using descriptive and inferential statistics. Panel regression analysis model with SPSS version 24 was used. From the findings it was clear that quality management operations,

capital leverage, capital adequacy practice influenced on the financial performance. The study by Kagunda was restricted to liquidity risk management and dwelled on deposit taking SACCOs but the current study examined the relationship between environmental risk and financial performance of commercial banks in Kenya as moderated by firm size.

Mohamed and Onyiego (2018) investigated the relationship between risk management and commercial bank financial performance in Kenya, using commercial banks in Mombasa County. Descriptive research design was used with thirteen commercial banks being sampled for the study. A multiple regression model, ANOVA and correlation analysis was used to analyse the data. Interest rate risk operational, credit and liquidity risks all had a substantial effect on financial performance of commercial banks. There is a gap that exist due to the context of the above study which was only on commercial banks in Mombasa County and the use of primary data. The current study sampled all commercial banks in Kenya and used secondary data.

Kachumbo (2020) studied determinants of financial performance of commercial bank Fintechs in Kenya. The population of the study was thirty-three banking Fintechs and ten commercial banks that used census. Secondary data was used and STATA software was used to analyze the data. The study concluded that there existed a significant relationship number of customer deposits, size of loan and financial performance of commercial banks. However, the study concentrated on Fintechs in Kenya and did not cover the relationships between environmental risks, firm size and financial performance of commercial banks in Kenya. This study sought to fill this gap by looking at the relationship between

environmental risks and the financial performance of commercial banks in Kenya as moderated by firm size.

Kioko, Olweny and Ochieng (2019) did a study on eleven commercial banks listed in the Nairobi stock Exchange between 2014 and 2018. The purpose of the study was to determine the relationship between the risks on financial performance of commercial banks in Kenya. The predictor variables investigated included the following risks; credit, market, liquidity and operational. Financial performance was used as the dependent variable. All the forty-four commercial banks in Kenya operating then were targeted out of which eleven banks listed in Nairobi stock exchange were sampled.

Descriptive research design was adopted with Secondary data being obtained from published bank's financial statements and annual reports. Analysis of the data was done using the multiple regression models. The analyzed data was presented in form of tabulations, mean and standard deviation. The findings of the research revealed that all the risks under study one of which was credit had a significant negative effect on financial performance, while liquidity risk had a negative insignificant effect on financial performance. In conclusion all the four variables were found to have a negative significant effect on performance of commercial banks in Kenya. The Kioko *et al* (2019) study only focused on economic risk adopting descriptive research design and not environmental risk in performance of commercial banks which is an existing gap and this study sought to address together with that of the research design where this study focused on cross - sectional and longitudinal designs.

Gweyi (2018) sought to study the influence of economic risk on financial performance of deposit taking savings and credit co-operatives in Kenya. Among the risks under investigation were liquidity, credit, operational and interest rate risks. The design used was descriptive. One hundred and sixty-four SACCOs were targeted using descriptive research design. One hundred and thirty-five SACCOs that were in operation between 2010 and 2015 were sampled. Both inferential and descriptive statistics were used.

The research findings showed that interest rate, credit, liquidity and operational risks had a negative and significant influence on financial performance. It was also evident that the size of the firm moderated the relationship between economic risk and financial performance of SACCOs in Kenya. This research used economic risk and financial performance of deposit taking Saccos in Kenya as the independent and dependent variables respectively. But this study considered environmental risk as its independent variable, while the financial performance of commercial banks was used as the dependent variable. The study was done in deposit taking SACCOs while this study was done in commercial banks.

The study of economic risks and financial performance in Kenyan commercial banks from 2016 to 2021 stands out for its specific focus on credit, exchange rate, interest rate, and liquidity risks within Kenya. This contrasts with previous research, which has yielded mixed findings across various regions and banking sectors. Supporting studies by Muriithi and Waweru (2017), James & Kepha (2020), Abdirahman (2020), Cuong (2019), Patarai & Mohamad (2016), Eneyew (2020), Chipa and Wamiori (2020), and Kioko, Olweny, and Ochieng (2019) explore various economic risks but report varied results, while studies such

as Hunjra *et al*. (2021), Javid *et al*. (2020), Arif and Showket (2019), Onsongo, Muathe, and Mwangi (2020), Mohamed and Onyiego (2018), and Kachumbo (2020) offer differing perspectives on financial risks in different contexts. The uniqueness of this study lies in its detailed examination of economic risks in Kenyan commercial banks, specifically addressing the role of firm size, thereby filling gaps in existing literature and providing new insights into economic risk management in emerging markets' financial sector.

2.3.2. Reputation risk and financial performance of commercial banks

Ivell, Seibert and Marks (2016) define reputation risk as risk that arises from adverse perception of an institution by its stakeholders, including customers, investors, and regulators. The management of reputational risk starts with understanding that reputation is all about perception. Reputational risk is currently considered as the biggest threat to modern businesses. Reputation is slippery, easily compromised, volatile, amorphous and impossible to control (Honey, 2017).

Commercial bank reputational risk and financial performance is particularly an important subject at such a time when financial performance of commercial banks is seen to be following a downward trend as shown by CBK (2018). Considering the continued policy and strategy advancements by both the regulator Central Bank of Kenya and individual commercial banks. In practice, the reputation risk is the possible damage to Bank's brand and reputation, and the associated risk to earnings, capital or liquidity arising from any association, action or inaction which could be perceived by stakeholders to be inappropriate, unethical or inconsistent with the Bank's values and beliefs (Schildbach & Schneider, 2017).

The impact of reputation risk is directly related to a specific event and to the organization's ability to respond appropriately and solve problems. Reputation risk criteria are formed by factors of capital, financial, operational, social and intangible risks (Nguyen and LeBlanc, 2018). A reputation risk causes reputational loss as to the total financial loss due to loss of current or future customers or a loss of employees due to the injured reputation (Eckert and Gatzert, 2017). Jurevičienė, Skvarciany, & Kravec, (2021) aimed to identify the key factors influencing reputational risk and evaluate its effect on the performance of commercial banks. The researchers employed an expert evaluation method to assess reputational risk.

The study was conducted in two phases: first, unstructured interviews were used to identify relevant factors, and then multicriteria decision-making methods such as simple additive weighting (SAW), complex proportional assessment (COPRAS), and geometric mean were applied to evaluate these factors. The findings revealed that a weaker reputational standing led to a decline in financial performance efficiency, suggesting a direct relationship between a bank's reputation and its financial performance. However, this model was primarily suited for banks working with business clients rather than individual customers. While Jurevičienė *et al.* (2021) used primary data and employed expert multicriteria decision methods to assess reputational risk, the present study relies on secondary data. It uses branch network, loan book size, and corporate social responsibility as indicators to reflect how well a commercial bank is accepted or embraced, demonstrating the bank's reputational standing.

Butt, Ayub, Latif, Asif, Shabbir, & Raja, (2022) carried out a study to explore reputational risk and financial performance of commercial banks, asserting that it is challenging to

measure reputation risk due to its elusive nature and the lack of a definitive definition. This research paper confirmed that previous literature suggests that financial risks may lead to reputational risks, negatively influencing bank performance and cautioned that empirical research in this area of reputational risk and financial performance is still in its early stages. The study utilized a panel dataset covering 24 conventional and Islamic banks from 2007 to 2017, and applied a structural equation model to analyze the data.

The study adopted a two-step approach where the relationship between credit risk, liquidity risk and reputational risk and financial performance of commercial banks was carried out then the mediating relationship between reputational risk and financial performance was tested. The findings revealed that reputational risk has a direct relationship with financial performance and also serves as a partial mediator between financial risks and the financial performance of conventional banks. The study by Butt *et al.* (2022) while this study used reputational risk as a mediator between financial risks and financial performance the current study used reputational risk as a risk factor looking at its relationship with financial performance. The study by Butt *et al*, (2022) used shareholder reputation scores (SRS) model to measure reputation risk but the current study used number of branches, loan book size and CSR activities to measure reputation risk of commercial banks.

Vuong, Dumicic and Kloputan (2017) investigated the relationship between corporate reputation and financial performance in Croatia. This study revealed that some dimensions of corporate reputation could be important predictors of financial performance. A reputational risk of large international banks arises from the intersection between the bank and the competitive environment on the one hand, and from the direct and indirect network

of controls and behavioral expectations within which the bank operates (Walter, 2016). The results of the research are a valid motivation for business executives to consider reputation risk as a critical issue of corporate business strategy.

Research investigating how reputational risk may or may not impact corporate risks, costs, and performance is still in its infancy; it has, however, very relevant implications. A primary consideration relates to the literature on the link between corporate social responsibility (CSR) and corporate performance. An established result in this literature is that minimization of stakeholder risk is one of the potential gains arising from CSR (Freeman, 1983). To understand how significant these gains are and whether they can offset CSR costs, it is necessary to measure, at the opposite end of the spectrum, the cost of reputational risk at the corporate level**.**

Zhou, Sun, Luo, & Liao, (2021) investigated the impact of corporate social responsibility on bank financial performance, and the results of their study show that CSR would harm bank financial performance in the short term but CSR has a positive relationship with financial performance of commercial banks in the long run. El Khoury, Nasrallah & Alareeni (2021) did a study to investigate the impact of Environmental, Social and Governance (ESG) on bank performance (FP) in the Middle East, North Africa and Turkey (MENAT) region. The study sampled 46 listed banks between 2007–2019 and measured financial performance through accounting (Return on Assets & Return on Equity) and market indicators (Tobin's Q Stock Return). They tested the effect of ESG and its quadratic term on FP by controlling for bank-specific, macroeconomic and financial development variables. They concluded that there is a room to embrace social activities in MENAT

banks. This, according to them, will affect the perception of stakeholders and eventually payoff or amount to loss in terms of financial performance. The current study however sought to find out the relationship between environmental risks and financial performance as moderated by firm size in the Kenyan banking industry.

Falk and Hagsten (2019) confirmed that every third European citizen considered environmentally friendly practices when they chose tourism destinations or accommodations. In addition, industry growth accelerates the depreciation of long-live technology investments, such as pollution prevention capital, resulting in a highly prospective return. This means that the perceived action or inaction of a bank or any firm by stakeholders towards issues of interest to them will mostly affect the reputation of a firm and may amount to loss of business hence profits.

According to Fiordelisi, Soana, Schwizer (2011), the reputational risk increases with the scale and profitability of banks, making the subject even more relevant in a global system characterized by highly concentrated banking markets. Fiordelisi *et al* (2011) estimated the reputational risk for a large sample of banks in Europe and the US between 2003 and 2008 and yielded two main results. First, that there is the probability that reputational damage increases as profits and size increase and second, that a higher level of capital invested and intangible assets reduce the probability of reputational damage. Jathurika, (2018) investigated the impact of expanding branches nationwide on the performance of listed commercial banks in Sri Lanka by examining return on assets, return on equity and earning per share for 5 years from 2011 to 2016 and the number of branches year by year.

Jathurika used regression and Correlation analysis and the results of the analysis showed that expansion of branches has a significant effect on the performance of commercial banks. Overall, Jathura found out that the number of branches and firm size has a significant impact on earnings per share and insignificant effect on return on assets (ROA) and also return on equity (ROE). Muchiri, Erdei-Gally, & Fekete-Farkas, (2022) in a quest to bring out an understanding of the effect of corporate social responsibility on the financial performance of financial institutions in Kenya, focused on examining the effect of ethical, charitable, and gender-mainstreaming CSR activities on the financial performance of financial institutions in Kirinyaga County used stratified and systematic sampling techniques to select a sample of one hundred and seventy one (171) participants from a population of three hundred (300) employees. The study adopted a causal research design and used primary data collected using questionnaires that were administered in person and found a strong positive relationship between CSR practices and the financial performance of financial institutions.

Eckert and Gatzert (2017) propose to incorporate reputation risk into an operational risk assessment, representing first steps to obtain a more comprehensive understanding of the impact of operational risks. Their study proposed three different models for reputation risk: a simple deterministic approach, a stochastic model using distributional assumptions, and an extension of the second model by taking into account a firm's ability to deal with reputation events. Their results emphasize that reputational losses can by far exceed the original operational loss and that neglecting reputational losses may lead to a severe underestimation of certain operational risk types and especially fraud events.

Garcia, Mendes-Da-Silva & Orsato (2017) in their paper investigated whether the financial profile of a firm is associated with superior environmental, social and governance (ESG) performance, considering 365 listed companies from Brazil, Russia, India, China and South Africa where they tested hypotheses, by applying linear regressions with a data panel using the Thomson Reuters Eikon database between 2010 and 2012. Their results suggest that companies in sensitive industries present superior environmental performance even when controlling for the firm's size and country. They further indicated that the profitability of the firm's assets is associated with environmental performance and concluded that the companies with the best ESG performance tends to be less profitable. It is important to note that this affects their reputation too. The current research however moved a step towards a more inclined study in the financial sector and more specifically commercial banks in Kenya between 2016 and 2021. There exists a contextual research gap locally and industry-wise.

The studies on reputational risk and its relationship with financial performance reveal mixed findings. Many studies, including those by Ivell, Seibert, & Marks (2016), Jurevičienė, Skvarciany, & Kravec (2021), and Butt *et al*. (2022), consistently show that reputational risk negatively affects the financial performance of banks, emphasizing that a bank's reputation is crucial for maintaining profitability and trust with stakeholders. These studies often link reputational damage to reduced earnings, lost customers, and a decline in financial performance indicators like return on assets and equity. Conversely, some studies, such as Garcia, Mendes-Da-Silva, & Orsato (2017) and Falk & Hagsten (2019),

found either no significant relationship or a negative impact of reputation-related actions (e.g., corporate social responsibility) on short-term financial performance.

These variations suggest that the effect of reputational risk may depend on factors like industry context, regional characteristics, and the measurement methods used. The current study is unique as it applied a localized focus on the Kenyan banking sector between 2016 and 2021, using indicators such as branch network, loan book size, and corporate social responsibility (CSR) activities to measure reputational risk. It also addressed a contextual gap by focusing specifically on commercial banks in Kenya, an underexplored market in terms of reputational risk analysis. This makes it distinct from broader studies focused on other regions or industries.

2.3.3. Technological risk and financial performance of commercial banks

Technology is a great enabler, but it also presents pervasive, potentially high-impact risk. The current environment in which banks operate is marred with constant advancement in technology. This has attracted the attention of regulatory authorities in the banking industry, to put in place measures and constantly warns the stakeholders in the industry of the dynamic technological environment that they operate in and the risks that come with it (CBK 2013). Among the risks posed are cyber-crime risk in the form of data theft, compromised accounts, destroyed files, or disabled or degraded systems. CBK (2021) confirmed that technological advancements have led to a rise in cyber threats in the Kenyan banking sector.

Financial institutions face risk from misalignment between business and IT strategies, management decisions that increase the cost and complexity of the IT environment, and insufficient or mismatched talent. Financial companies' technology may become obsolete, disrupted, or uncompetitive, with legacy systems hindering agility (Deloitte 2018). Technological risk holds strategic, financial, operational, regulatory, and reputational implications that affects financial performance of commercial banks. Deloitte 2018 in their report listed Strategic risk, Cyber security and incident response risk, technological resiliency and continuity risk, technology vendor and third-party risk, data management risk, IT program execution risk, technology operations risk and risk of ineffective risk management as the key technological risks facing the banking industry.

The banking sector in Kenya has adopted technological innovations including use of automated teller machines, agency banking, electronic funds transfers, real time gross settlements and mobile banking in offering banking services to its customers together with fully functional technologically enabled branches that allows for interconnectivity between and among branches and the headquarters. This technological advancements have been embraced by all commercial to a certain level and the sluggish banks which have been slow in their uptake could be facing risks of inefficiencies, errors and loss of business thereby negatively affecting their financial performance (Li & Zhao, 2022; Oburu, 2018).

The technological risk indicators such as cybercrime, loss of data or errors, technological infrastructure and expertise investments as used by most researchers required use of primary data and that limited this study as it relied fully on secondary data as obtained in audited financial statements where information on the said indicators were not captured

an indication of non-disclosure. This study therefore used proxies showing the deployment or otherwise of technology in the operations of commercial bank business activities including deposits, withdrawals, account opening, loan application, processing award and monitoring among many other transactions. Number of branches, loan book size and number of ATMs were used to measure technological risk in commercial banks in Kenya.

The study by Li, & Zhao, (2022) analyzed the impact of fintech on the risk-taking behavior of 37 Chinese-listed commercial banks from 2011 to 2020, focusing on three key areas: operational efficiency, financial innovation, and risk management. The findings revealed that while fintech may pose risk, it plays a significant role in reducing bank risk at the same time. The study identified that operational efficiency, financial innovation, and risk management contributed 8.51%, 7.18%, and 5.77%, respectively, to the reduction of bank risk. It is important to note that these advantages are attained only when a commercial bank embraces the technological developments while the risks are there when a commercial bank fails to adopt technological advancements and often the effects of the risk where a commercial bank has not embraced technology faces greater risks beyond operational inefficiencies touching on errors that may also signal reputational risk.

Strategic technological risk in a rapidly changing world is the risk emanating from an ineffective IT strategy and is among the top threats a financial institution faces. Risk emanating from strategic technological perspective include embracing versus watching new technology where institutions must balance the risk of adopting new technology against that of ignoring it or waiting for things to settle and FinTech solutions which focuses on innovation in financial services thus disrupting the status quo, driving increased

competition and important decisions on partnerships and technology adoption. Oburu, (2018) studied the effect of agency banking on the financial performance of selected commercial banks in Kenya using secondary data transactions done by use of agents. Chi-Square test was used to determine whether there is any association between agency banking and financial performance of commercial banks and the study results showed that there is a considerable positive effect on financial performance in agency banking. He recommended that commercial banks should invest in technological advanacements that supports agency banking.

A study conducted by Sigey, (2018), sought to establish the effect of information technology risk on performance of Kenyan commercial banks. The study used descriptive statistic design and a population of 42 commercial banks registered and licensed by CBK. The study used both secondary and primary sources of data for a period of five years between 2013 and 2017. Analysis of data was done using descriptive statistics, regression analysis and correlation techniques. The study used strategic risk of IT, IT resiliency and continuity risk, cyber security and incidence response risks and technology vendor and third-party risk as indicators of technological risk. From the results, it became evident that technological risk has a negative significant relationship with financial performance of Kenyan commercial banks. This study looked at technological risk only using primary data collected by use of questionnaires and a bit of secondary data while the current study is proposing to find out the relationship between environmental risk and financial performance of commercial banks in Kenya.

Jowi and Abade (2016) covered a study on evaluation of information security risk assessment for internet banking among commercial banks in Kenya where they employed a descriptive research design, a census of forty-three commercial banks, administration of questionnaires departmental staff managers, use of SPSS for data analysis and presented at a using frequency distribution tables and percentages. The study found out that most commercial banks are aware and use the risk management framework. Other variables that Jowi and Abade established include a situation where policies and procedures fail, poor training of employees, inadequate internal audit and unguaranteed supervision of staff, all the factors relate to IT either directly or indirectly affecting the financial performance of commercial banks. Mallinguh, Wasike, & Zoltan, (2020) postulates that the proportion of the capital budget allocated for the acquisition of technology positively and significantly influences sales.

According to Hirtle, (2007) significant technological innovation in retail banking services delivery witnessed in the United States of America has not in any way reduced branches but instead a steady growth of bank branch network is being witnessed. In a research to assess the implications of technological innovations by examining measures of branch performance and branch network sizes found out that banks with less branch network may be disadvantaged in branch activities but not on overall institutional profitability. Baker, Kaddumi, Nassar, & Muqattash, (2023) investigated financial technologies adopted by banks in Jordan and the United Arab Emirates to improve their financial performance using primary data collected by means of questionnaires dropped and picked. The study used multiple linear regression to analyse the data and the results of the study indicated that

financial technology has a positive effect on both deposits and profits of commercial banks in Jordan and United Arab emirates.

Wanalo, Mande, & Ngâ, (2020) conducted a study to assess the effect of technological financial innovations on financial performance of commercial banks in Kenya anchored on Financial Intermediation theory, Innovation Diffusion theory and Silber Constraints theory of Financial Innovations and descriptive research design. The study utilized secondary data from the annual reports from fifteen banks studied and central bank of Kenya. Their study found out that, Agency Banking and use of Automated Teller Machines had positive effect on financial performance of banks and they concluded that technological financial innovations had positive effect on financial performance of commercial banks.

Kemboi, (2018) sought to determine the effect of financial technologies on the Financial Performance of the Commercial Banks in Kenya by undertaking a study census study of the forty three commercial banks in Kenya and utilizing secondary data collected from reports published annually in the period between 2013 and 2016 a time during which technology adoption was being implemented by commercial banks in Kenya. Both descriptive statistics and multiple regressions were used to analyse the data and the study found that adoption of mobile banking, online or internet banking and agency banking impacted the financial performance of banks positively. Kemboi (2018) concluded that banks should invest in financial technology to enhance their operational efficiency and effectiveness and recommended that commercial banks should educate and encourage their clients to adopt banking technology while commercial banks should commit resources to

development and enhancement of technological infrastructure in order to widen the client base, increase transactions and overall increase in revenue and profits.

The relationship between technological risk and financial performance is inconclusive with different scholars presenting varied views, with some emphasizing the benefits of technological adoption (Oburu, 2018; Wanalo *et* al, 2020; Kemboi 2018; Baker, *et al*, 2023; and Mallinguh, *et al,* 2020), while others focus on the risks associated with improper or slow adoption of technology indicating a negative effect of technological risk on financial performance of commercial banks (Sigey, 2018; Jowi and Abade 2016; and Li & Zhao 2022). Clearly showing that there is need for deeper studies on this subject matter to reach a consensus and clear the many gray areas. This study was unique in the sense that technological risk was measured in the level of deployment and management of technology indicated by a bank's number of ATMs, number of agents and number of branches.

2.3.4 Firm Size and financial performance

The size of a bank in the banking sector is used to capture diseconomies and economies of scale. The bank size is a computation of logarithm of all the assets. Financial success of a commercial bank relies on the asset size, the bigger the size the higher the chances of expansion to other geographical areas which are unexplored and with minimal competition (Mwangi, 2018). According to Bwire & Omagwa (2019) a strategy that enhances a client bank's base, would lead to higher customer deposits.

Appah, & Tebepah, (2021) explored the relationship between corporate size and financial performance of all listed Nigerian deposit money banks from 2010 to 2019. Using an ex

post facto and correlational research design, a sample of ten banks was selected through simple random sampling after data filtration. Data were sourced from secondary materials, primarily financial statements of the sampled banks and the Central Bank of Nigeria Statistical Bulletin. The analysis utilized both descriptive and inferential statistics, with multiple regression analysis employed via a parsimonious error correction model. The findings revealed a positive and significant correlation between bank size and return on assets, indicating that larger banks tend to perform better financially. The study concluded that bank size positively influences the financial performance of deposit money banks, recommending that these banks should increase their assets and capitalization to enhance their lending capacity and overall financial performance.

The research by Abbasi, & Malik, (2015). Aimed at determining the moderating effect of firm size on the relationship between firm growth and firm performance through the test of hypotheses. The study employed cross-sectional data from 50 firms listed on the Karachi Stock Exchange, the study applied regression analysis after addressing data stationarity and resolving multicollinearity issues. The findings support the alternative hypothesis, indicating that firm size moderates the relationship between firm growth and performance. These results suggest that management should consider firm size alongside growth to enhance performance. Future research directions were also outlined. Corvino, Caputo, Pironti, Doni, & Bianchi (2019) in a study to investigate the moderating relationship between relational capital and firm performance found out that firm size has a positive moderating relationship on the performance of a firm and that firm size defines the competitive advantage of a firm. The study was based on marketing specifically relational

capital and used interpretative lens of resource dependency theory. The variables looked at were cost of goods sold and earning per share. The study used content analysis to get disclosure tools where a specific disclosure index was developed. Seventy three (73) listed firms in France, Germany, Italy and the UK were picked into the study and data covering the period from 2011 to 2013 were from them and analyzed using six regression models.

While adopting descriptive research design, Mutunga, & Owino, (2017) carried out research aimed to examine the effect of micro factors—such as operational practices, production capacity, and management practices—on the financial performance of manufacturing firms in Kenya. Using agency theory, wealth maximization theory, and resource-based theory as a foundation, primary data was collected from 180 manufacturing firms through questionnaires, with a 95% response rate. The analysis, employing descriptive statistics, correlation, and regression techniques, revealed a positive and significant relationship between micro factors and firm financial performance. It also showed that firm size significantly moderates this relationship, with larger firms performing better. The study recommends considering firm size when assessing the impact of micro factors on financial performance in Kenya's manufacturing sector.

Mushafiq, Sami, Sohail, & Sindhu, (2024) did research to assess the probability of default and explore the relationship between default risk and financial performance, with firm size acting as a moderating factor using a dynamic panel approach. Drawing on 1,500 firm-year observations from 2013 to 2018, the research employed the generalized method of moments (GMM) to analyze the data. The findings indicated that default risk significantly

affects financial performance, and firm size positively moderates the relationship between default risk and financial performance.

Katuku and Dzingirai (2014) carried out a study on the on the determinants of Bank Failures in Multiple- Currency Regime in Zimbabwe, and concluded that size of the bank had a significant negative correlation to chances of failure therefore whenever the size of the bank increases, the probability of failure decreases. It was evident that majority of the affected banks were smaller in size compared to large banks that hold more assets are able to diversify their risks. This is contradictory as compared to research findings by other authors that used firm size as a moderating variable, while focusing on profitability and financial risk for Islamic banks.

Olusanmi, uwuigbe and uwuigbe (2013) in their study examined the relationship between effective risk management and banks' financial performance, drawing on global financial crises examples like Enron and WorldCom, as well as Nigeria's banking sector intervention. Data from annual reports of Nigerian Stock Exchange-listed banks was analyzed using Ordinary Least Squares (OLS) regression. The findings showed a negative but non-significant relationship between risk management practices and bank performance, measured by return on equity (ROE). The study concluded that financial performance is not solely influenced by Basel regulation compliance, but also by operational inefficiencies, emphasizing the need for comprehensive risk management. The outcome of the study never pointed to any moderating effect of bank size on performance.

A study conducted on financial performance of commercial banks in Krygyz republic in Central Asia, revealed that the log of assets as a moderating variable had a negative coefficient which was significant (Adilya and Burulcha, 2015). This meant that as assets of banks increase the profitability decrease. Anila (2015) in a study on factors affecting performance of commercial banks in Albanian banks where size was used as independent variables, the results showed that banks size had a positive non-significant relationship with performance measured by return on assets. These results indicate that the link between bank size and profitability is not very strong hence casting doubt on whether larger banks can achieve higher ROA. Other authors came up with similar results (Frederic, 2014). There were also researchers that found contradictory results showing a significant positive relation of size with ROA (Gul, Faiza, & Khalid, 2011).

In conclusion the relationship between the size of the bank and performance has been a subject by many authors. Most studies have found firm size to have a positive relationship to performance (Gyamera & Amoah, 2015; Tariq, Usman, Mir, Aman, & Ali, 2014; Ayele, 2012; Swarnapaha, 2014). Some studies have also showed contradicting results where the relationship was negative (Amare, 2012). This study was unique compared to the past researches as firm size had been taken as a moderating variable. Natural logarithm of total assets was used to measure Firm size obtained from secondary data.

In addition to risk, the size of the bank is believed to affect financial performance because the bigger the bank, the more external and internal funding sources can more easily enter the market along with the amount of profit earned (Ningrum, 2017). This shows that the firm size describes the size of the assets owned by the bank. Jekwam and Hermuningsih

(2018) show that the company's size can moderate the effect of liquidity on the bank's financial performance. According to Shafii (2015) the firm size is based on the total assets owned and the higher amount of the assets owned by the bank, the greater the bank's financial ability. Size is thought to influence the profit earned by the bank, where the larger the firm size, the greater the profit earned by the bank.

There is a direct link between the size of the bank and the operational costs. In Kenya, CBK which is the banks regulator uses the tier system of classification where commercial banks have been classified in three tiers namely tier1 comprising of large banks, tier 2 made up medium-sized lenders and Tier 3 composed of small-scale lenders and holding49.9%, 41.7% and8.4%marketshares respectively CBK (2018) The size of the firm depends on the amount of assets a firm owns. Larger firms benefit from economies of scale and therefore are more likely to record more profits than smaller banks. Larger banks have a wider base of clientele (Imane, 2020)

AlFadhli and Ali (2021) studied the effect of Firm size on Financial Performance of Kuwaiti Banks. This study was mainly set to examine the effect of bank's assets size on both return on assets (ROA) and return on equities (ROE) as proxies of bank financial performance. Using the data of 10 Kuwaiti banks over the period 2008-2018, results show that banks assets size had an inverse relation with profitability, but that relation was statistically insignificant. On the other hand, results showed a statistically significant direct relation between shareholder's equities and bank profitability. Bank's assets size effect on the financial performance of banks has always been a controversial topic among researchers, where some of them sees that big bank enjoys economy of scale resulting in

less overhead expenses and thus leading to a better financial performance than smaller banks. Others see that large banks suffer from bureaucracy which makes them slower in responding to economic changes resulting in a lower profitability.

Tharu and Shrestha (2019) study on the influence of firm size on profitability of commercial banks in Nepal. This study adopted a panel research design picking a sample of eight commercial banks from a population of twenty eight banks using simple random sampling. The time series data between the period of 2013 and 2018 was collected from Nepal Rastra Bank and analysed using SPSS Version 20. Descriptive and inferential statistics were used as statistical tools. The results of different tests proved that the size of the bank had had no significantly influenced by size of the bank (Assets) on profitability. The size influence does not exist, that is small, medium and large sized banks have no effect on profitability performance.

Mwihaki, Irungu, & Mutwiri (2022) did a study that sought to determine the impact of bank size on commercial bank performance in Kenya using the natural logarithm of total assets as a measure of bank size. The study used pannel data spanning eight year period from 2023 to 2020 analysed using descriptive and multiple regression. The study found out that size of the bank has a statistically significant effect on performance and concluded that there exists a statistically significant relationship between bank size and performance of commercial banks and thus as bank size increases, return on assets also increases.

Muhindi & Ngaba (2018) sought to determinate the effects of firm size on financial performance of commercial banks in Kenya. The specific objectives were to determine the

effect of the number of customer deposit, capital base, loan book and number of branches on financial performance of commercial banks in Kenya. Panel data from 2012 to 2016 of 42 commercial banks was analyzed using multiple linear regressions method. It was concluded that there is a significant relationship between firm size and financial performance of commercial banks in Kenya. The study revealed that banks that have many branches; huge customer deposits, huge capital base and large loan book have positive and high ROA as opposed to banks who have few numbers of branches, small customer deposits, small capital base and small loan book.

In conclusion, the research advocates for consolidation and mergers since there is evidence those large banks perform better than small and medium banks and therefore it finds a positive relationship between firm size and financial performance of commercial banks in Kenya. This research was limited by the operating environment as it was characterized by risks and uncertainties due to its tumultuous nature of banking sector. The research made good use of secondary data; however, the researcher took note of their limitation in terms of rigidity and its historical nature. The study was affected by macroeconomic and microeconomic factors such as regulations and technology.

Empirical results of tests of the relationship between size and profitability of commercial banks are divided and inclusive. For example, Abel and Le Roux (2016) and Onuonga (2014) found positive relationships; Aladwan (2015) found a negative effect; while Shamki, Alulis and Sayari (2016); Dahmash (2015); and Shehzad, Haan and Scholtens (2013) found no relationship. Konya (2018) results indicated that firm size plays a major role in impacting on the financial performance of commercial banks in Kenya. This

differed with AlFadhli and AlAli (2021) who noted that there was an insignificant between firm size and financial performance of commercial bank. Muhindi & Ngaba (2018), found that there was a significant relationship between firm size and financial performance of commercial banks in Kenya. The objective of this study was to establish the relationship between environmental risk, firm size and financial performance of commercial banks in Kenya.

Jekwam and Hermuningsih (2018) studied the role of firm size (Size) as moderating the influence of Corporate Social Responsibility and Liquidity on the Financial Performance of Mining Companies listed in Indonesia Stock Exchange. The data used in this study were financial statements in 2013 to 2016. The data analysis technique used is multiple linear regression analysis. The sample was selected using purposive sampling technique and obtained 33 companies in each year, so that the number of observations used in this research was 132. The results of this study support the hypothesis that CSR and liquidity have a positive effect on the company's financial performance. From the results of this study also shows the role of firm size (Size) is able to moderate the influence of CSR on the company's financial performance. Company size (Size) is able to moderate the influence of Liquidity on the company's financial performance.

Wati, Mulyadi and Rachbini (2019) sought to examine the determinants of financial performance with firm size as moderation. The factors used in this study consist of: total asset turnover, liquidity, net profit margin, leverage, firm age and firm size. Firm size is proportional as the moderating variable of the effect of total asset turnover, liquidity, net profit margin, leverage, firm age on financial performance. Proxy of financial performance

using Return on Assets (ROA). The phenomenon of this study is there are inconsistencies from the results of previous researches and there are fluctuating movement of financial performance in manufacturing industry companies listed on the Indonesia Stock Exchange during the period 2014 - 2017. The data of this study were obtained from 208 manufacturing industry companies listed on the Indonesia Stock Exchange (IDX) for the period 2014-2017. The analysis technique used for hypothesis testing is using the WARP-PLS 6.0 program. The test results showed that total asset turnover, liquidity, net profit margin, leverage, firm age, have a significant effect on financial performance. Firm size has no significant effect on financial performance. Firm size moderates the effect of net profit margin, firm age on financial performance. Firm size does not moderate the effect of leverage on financial performance. Firm size does not moderate the effect of total asset turnover, liquidity, and leverage on financial performance.

2.3.5 Financial Performance of Commercial banks

Mulwa (2015) defines financial performance as a company's level of operations during a specified time period expressed in terms of profits and losses during that particular time. Financial performance serves as monetary indicator which points to how an organization is successfully implementing its policies and attaining its objectives. It refers to a company's financial health comparable to other companies in the same jurisdiction (Frederic, 2014). According to Fatihudin & Mochklas (2018) the financial performance of a firm determines its economic feasibility, competitiveness, trustworthiness of the current and future contracts and also commercial interests of management and this justifies its

importance. This study focused on operations levels of commercial banks in Kenya over the years.

The primary objective of all commercial banks is to succeed financially. The solvency of any bank is automatically under threat if the bank cannot absorb adverse economic conditions which critically affect the economy (Matayo & Muturi, 2018). Odhiambo (2019) posits that financial performance enables commercial banks generate resources from operations over a specific period. When an organization excels financially the shareholders reaps the benefits. This encourages investment that result in economic growth. Banks can collapse due to crisis and underperformance both of which have negative affects economic growth (Mishra & Mohanty, 2018).

Increased financial performance facilitates lenders to regain or to earn a profit, which allows them to establish organizations that can survive for a long period of time without depending subsidy from the government or donors (Wanjohi, Wanjohi & Ndambiri, 2017). Evaluation of a bank's financial performance aims at ascertaining its ultimate financial position and operating efficiently, as well as to assess its quality of assets, efficiency of management and realization of its goals, and to also ascertain its liquidity, solvency position and earning quality and (Fatihudin & Mochklas, 2018). The shareholders and investors normally make judgement at the end of the term by considering the previous performance when they began.

Njeru, (2018) suggest that the calculation is based on income and financial position reports, as well as data on stock prices. Return on equity (ROE), Net Interest Margin (NIM) and return on assets (ROA), are all financial performance indicators (Ngunyu, 2019). Profit

after tax, ROE, earnings per share, ROA and any market value ration that is generally accepted can be used as a measure of financial performance (Mulwa, 2015). Odhiambo, (2019) also confirms that the commercial's bank performance is measured using ROE and ROA. This study also like the previous studies adopted ROA and ROE as a measure of commercial banks in Kenya in the period under consideration between 2016 and 2021.

ROA is calculated by dividing total assets, normally the average value over the year. it measures the ability of the bank management to increase its profits the by using the available company assets. This would mean how efficiently the resources of the company are utilized for company's growth. According to Khrawish (2011), ROA shows the efficiency of the management of a company in increasing the net income from all the resources at their disposal. ROA was measured based on the ratio of net income to average total assets for that bank and for the six-year duration (2016-2021), a simple average ROA was used.

Return on Equity (ROE) is the most popular measure of internal performance of shareholder value. It suggests a direct assessment of the financial return of investment of shareholders. It allows for comparison between different companies and readily available for anyone who wants to do analysis in various economic sectors. Return on Equity is given by the average of net income and average total equity i.e ROE = net income / average total equity while while return on assets is given by the average of annual net income and total assets mathematically shown as :ROA = annual net income / total assets.

The first element represents the net profit margin, while the second is the efficiency of the assets and the remaining one responds to the financial leverage multiplier. ROE shows how

effective a bank is, in managing the funds of shareholders. Therefore, the better the ROE the more effective the management in maximizing the capital shareholders. ROA has prominence as a measure for accounting performance because it is a critical element of loan quality especially when it comes to performance of bank (Naïmy, 2011). ROE is a measure of performance from shareholders view point; therefore, it measures accounting profit for every shilling of book value of equity capital. This value is obtained through division of net income by total equity.

Commercial banks' major objective is to make profits and therefore all efforts revolve around it. Other than profits some managers may prioritize economic and social objectives (Khrawish, 2011). In all cases whichever the priority the net margin (NIM), ROA and ROE are of great interest. Return on equity (ROE) indicate the return on shareholders' equity and therefore is used to show return on assets multiplied by the total assets to the ratio of equity. ROA shows the ability of management of the bank to make profits out of the though there might be biasness on the ratio resulting from other activities. If the banks have a higher equity, then ROA will also be higher and a lower ROE. ROE will tend to disregard the higher risk linked with higher leverage (Gul, Faiza, &Khalid, 2011). This is because ROE measures leverage.

Mwangi (2014) posits that the net interest margin will measure the difference between the interest paid out by banks to the lenders relative to the assets of the banks and interest income received by banks from the other functions.

A banking sector that makes profits may survive a negative shock therefore providing a chance to contribute to a stable system financially. Any Change that affects operating

environment especially credit risk the chances are higher of affecting financial performance. Empirical analysis indicates that macroeconomic factors and those unique to the bank form a crucial factor in profitability of banks (Ross, Westerfield, Jordan & Jaffe, 2007). To measure performance this study used Return on equity (ROE) and return on assets (ROA) from the secondary data where it was determined that either one or both was or were used to show financial performance significance.

2.4 Conceptual Framework

Conceptual framework is a graphical presentation of the relationship between variables in a research based on the researchers thought, idea and viewpoint (Borg, 2005). The current study is using financial performance as the dependent variable and this were measured by return on assets (ROA) and return on equity ROE. The study also had environmental risk as the independent variable and comprised of three indicators namely comprising of economic risk, technological (transition) risk and reputation risk. The economic risks comprised those highlighted by the Basel III including liquidity risk, credit risk, interest rate risk and market risk. The study also had a moderating variable as the firm size which was measured using total assets, total loans and total deposits

A dependent variable was measured in the study and what it affects during the study. The dependent variable in this study is financial performance of commercial banks in Kenya. According to Sigey, (2018), technological risk significantly and negatively affects performance of Kenyan commercial banks. As per Andries *et al*. (2018), there is a need for an institution to define its technological strategy or align it with the business needs in order to succeed in meeting its requirements. Misalignment, however, has the effect of

compromising the achievement of an organization's commercial and financial objectives. Barret (2016) argues that an inverse relationship between technological risk and performance of financial institutions exists. Mallinguh E., Wasike C., & Zoltan Z. (2020), asserts that the proportion of the capital budget allocated for the acquisition of technology positively and significantly influences sales.

Mwai, Memba & Njeru (2018) in their study to determine the relationship between ATM banking and financial deepening of commercial banks in Kenya and used firm size as a moderating variable covered all commercial banks operating in Kenya for a period of ten years and anchored their study on agency theory. The study used descriptive cross-sectional design and considered both secondary data and primary data which was analysed using both descriptive and regression analysis. The study established that there is a statistically significant relationship between financial innovations adoption and financial deepening of commercial banks in Kenya. Bank size as a moderating variable also had a significant influence on the relationship between financial innovations adoption and financial deepening.

A study by Murerwa (2015) sought to evaluate the determinants of banks' financial performance in growing economies in commercial banks in Kenya. It was noted that mobile banking, competition and product innovation significantly affected the profits of banks. All the identified banks were studied using a descriptive research design. There was no theory cited in the above study but the current study filled the gap by using descriptive and inferential statistics while also considering environmental risk as a whole as opposed to technological risk only. Buddhika, (2021) did a research with an objective to investigate

the impact of ATM, Internet banking and Mobile banking on customer satisfaction of Sri Lanka. From the study, Buddhika found out that ATM banking has positive impact on customer satisfaction while internet banking had insignificant positive impact on customer satisfaction and mobile banking has a negative impact on customer satisfaction in Sri Lanka. The study employed a purposive sampling method and used primary data.

Romdhane, (2013) in their paper investigated the performance of information technology (IT) investments in a sample of fifteen banks in Tunisian between the year 1998–2009. The size of the firm was used a mediator. They employed the standard Stochastic Frontier Approach on panel data to generate estimates of cost efficiencies. The empirical findings suggest that the impact of IT investments on Tunisian banks performance is positive and significant. The analysis of the internal determinants of banks efficiency levels shows that size and managerial capacity positively and significantly affect the Tunisian banks cost efficiency, while the share of non-performing loans represents a source of inefficiency. This study used firm size measured by total assets as a mediator for the general performance and efficiency of banks in Tunisia while the current study used firm size as a moderator in the relationship between environmental risks and financial performance of commercial banks.

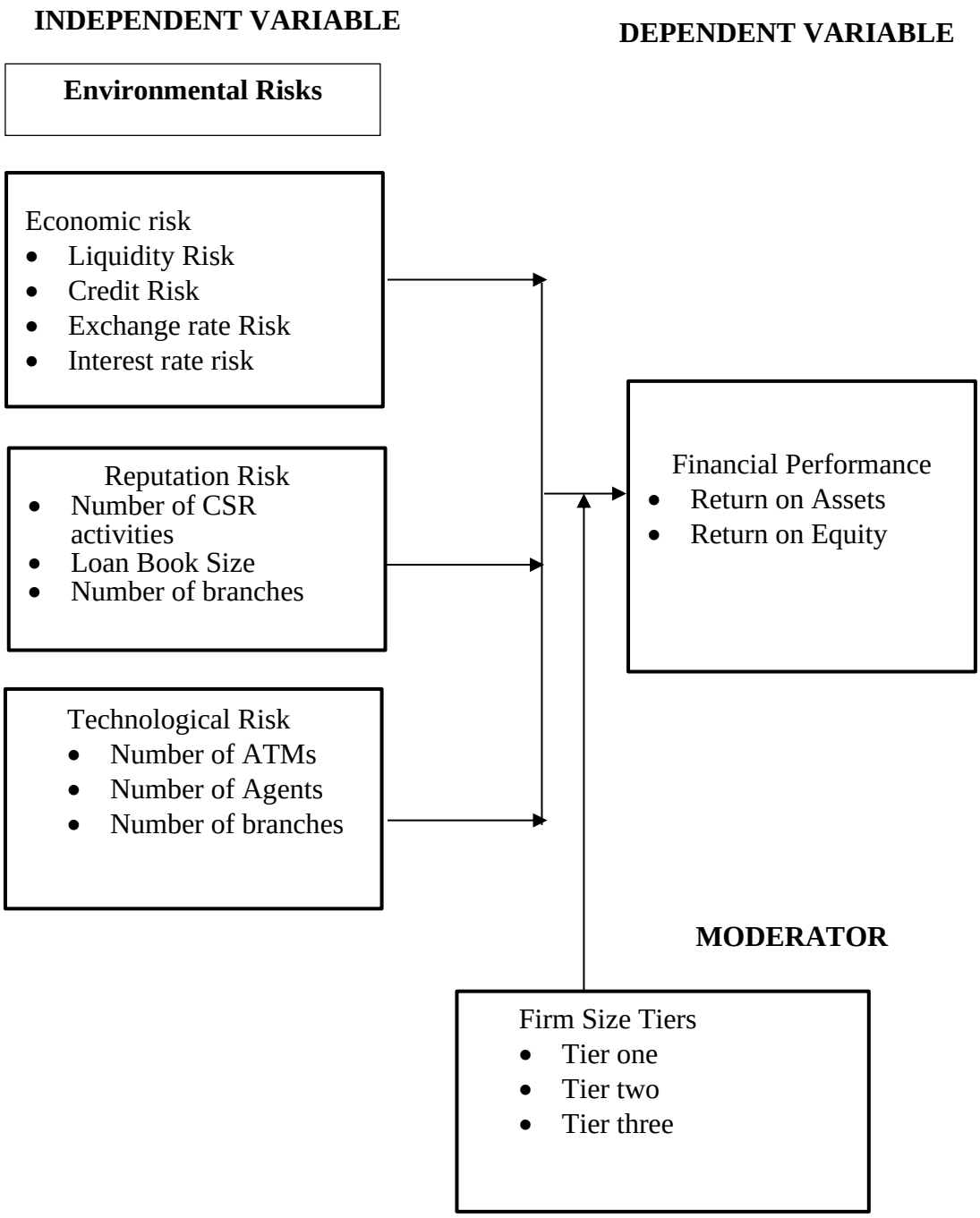

Figure 2.1

Conceptual Framework

Source: Adapted and modified from Hayes (2013)

2.5 Identification of knowledge Gap

The study aimed to address a significant gap in the existing literature by examining the relationship between environmental risks, firm size, and the financial performance of commercial banks in Kenya. The overall gap identified is the lack of comprehensive research that combines economic, reputational, and technological risks into a single framework and explores how firm size moderates these relationships. While previous studies have focused on individual aspects of risk or specific segments, there is a notable absence of research that integrates these factors holistically and investigates their combined effect on financial performance.

Previous research on economic risk and financial performance have studied economic risks, such as credit, liquidity, exchange rate, and interest rate risks, but often in isolation or in different contexts. Many studies have examined these risks separately, or within broader categories, without integrating them into a unified analysis. The gap here is the lack of a study that combines these economic risks to assess their overall impact on financial performance within the specific context of Kenyan commercial banks. Reputational risk has been studied through elements like corporate social responsibility, loan book size, and branch numbers. However, most research has either focused narrowly on corporate social responsibility or explored reputational risk in sectors other than banking. There is a gap in understanding how reputational risk, as defined through these variables, specifically impacts the financial performance of commercial banks in Kenya.

Technological risk has been explored in this study through metrics such as the number of ATMs, branches, and agents. However, the existing studies have often looked at these factors separately or in relation to specific technological challenges, without considering their combined effect on financial performance. This presents a gap in analyzing how technological risk, as represented by these indicators, influences financial performance in the banking sector. Most studies that looked at other indicators of the technological risk majorly used primary data obtained through the use of questionnaires or interviews while this study relied purely on secondary data. The moderating role of firm size on the relationship between environmental risks and financial performance has not been extensively studied. While firm size has been considered in some contexts, there is minimal and inconclusive research that specifically explores how different tiers of bank size (tier one, tier two, tier three) influence the relationships between economic, reputational, and technological risks and financial performance.

Therefore, the moderating effect of firm size on the relationship between environmental risk on financial performance remain unsettled. This study will therefore try to bridge this gap by studying the relationship between environmental risks and financial performance of commercial banks in Kenya as moderated by firm size.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides a detailed description and explanation of the methodological approach used in the study which includes the research design, sample and sampling procedures and target population. It also discusses data collection instruments, procedures, analysis and presentation.

3.2 Research Design

This study research was founded by research phylosopy. A research philosophy relates to a thought on how phenomena is compiled, analyzed and used. This study was grounded on research philosophy pursued by positivist. Positivism adopts Hume's theory of philosophical ontology which focus on every facet of being and affiliations between existents and their way of existence. It scans characteristics of things by virtue of their form and very essence. It needs confirmation by mortal authors in order to make it useful and functional and concludes that reality is well ordered, intertwined, and therefore deductive (Hume, 1993).

Positivism also adopts Descartes's epistemology, a theory of knowledge which believes that intellect is the best method to create new know-how. (Descartes, 1998). Positivist scholars take a controlled method of carrying out studies through identification of research

problem, research hypotheses and a suitable methodology. Positivism allows one to make use of analytical methods to assess data from the survey using quantitative research techniques in proving or disapproving their assumptions. Positivists are of the opinion that reality is constant and can therefore be viewed objectively. They contend that an occurrence can be segregated and observances can be replicated (Creswell, 2006). In order to achieve that, it will require a researcher to manipulate the reality with varied views in the independent variable so as to pick any consistencies and also constitute relationships between member elements of the social world (Wilfred, 2006).

Research design explains the procedures and plans that one has to decide when conducting research this include broad assumptions to specific data collection and analysis methods (Creswell, 2014). The blue print for answering research objectives and testing hypothesis is research design (Saunders, 2010). Research design is a plan which leads the process of the study from the conceptualization of the research questions and hypotheses to dissemination of results (Sekaran & Bougie, 2011). This study adopted a longitudinal and cross-sectional research design and utilized panel data in an attempt to study the trend of environmental risks on performance of commercial banks in Kenya as moderated by firm size for a period of 6 years covering the periods 2016-2021 (inclusive).

This design is deemed apt for the study as it allows collection of data for the variables or observation at regular time intervals and collection of panel data. This design further allows, correlation of variables using time series analysis. Secondary data of publications and audited financial reports were collected from the official websites of the Central Bank

of Kenya (bank regulator) and commercial banks. The study solicited for quantitative data which were analyzed descriptively and inferentially.

3.3 Location of the Study

The study was carried out in all the forty two registered and licensed commercial banks operating in Kenya in the years between 2016 and 2021 (CBK 2016). Appendix one shows the list of commercial banks in Kenya from where a total of thirty-two commercial banks were sampled for the study.

3.4 Target Population

Zikmund, Babin, Carr, & Griffin. (2010) states that population is all items in any field of inquiry while Bougie (2011) defined population as the entire group of people, events or objects of interest that the researcher is to investigate. A population is any infinite or finite collection of individual objects. There were 42 commercial banks in Kenya (CBK, 2016), which account for 2/3 of assets of financial system by 2016. Central Bank identified fourteen banks, whose ownership is foreign, which account for 32.2% net assets and the rest are local. The target population of the study was 42 commercial banks however, a total of 8 banks were excluded for several reasons including liquidation, merging with other banks and their data not being available in the CBK database. The data set was therefore 6 (number of years under consideration) per bank which made204 data sets.

3.5 Sample Size and Sampling Procedures

According to Kombo and Tromp (2009) a sample is a definite part of a statistical whole group in which its features are studied so as to get broad details representative of the entire

study elements. Samples studied, permits a researcher to make deductions that can be extrapolated to the population of interest (Sekaran & Bougie, 2011). According to Zikmund *et al*., (2010) a good quality study sample that will enable a researcher to make the right inferences on the population is one that is representative of the population. From the target population of 42 commercial banks licensed and operating in Kenya in the year 2016 (CBK 2016), purposive sampling method was used to determine the sample size.

Purposive sampling method is a non-random sampling technique used to select specific individuals or cases that possess the desired characteristics or qualities relevant to the study's objectives. It focuses on selecting participants who can provide deeper insights or represent unique perspectives that are crucial for the research questions or goals. This sampling technique was considered more appropriate when the population tends to be small with known features of it and is to be carried out intensively (Kothari, 2004). For this study thirty four (34) commercial banks were sampled as they met the condition that they were in operation and had audited accounts for the years 2016 to 2021(inclusive).

Commercial banks that were either liquidated, or for one reason or another lacked audited financial reports for some or all the six years under study were eliminated. The audited financial reports of the sampled commercial banks were evaluated from 2016 to 2021; six years period that has presented turbulent season for commercial banks where some banks were sold off, others liquidated, others put under statutory management due to persistent losses and still others were experiencing upward growth.

3.6 Data Collection Instruments

This study utilized secondary data which were collected from the databases of Central Bank of Kenya and individual banks under study. Data were extracted from audited financial statements for the period 2016 to 2021 together with other publications like annual reports by banks. According to Dawson (2009) secondary research entails studies that utilize data that is already existent from either studies or reports of other researchers and experts in an area or subject. According to Ember and Ember (2009) secondary data is data collected by others earlier than the study is carried out. Audited profit and loss statements, the balance sheets and consolidated statements of cash flowswereobtained from the websites of the central bank of Kenya and commercial banks together with their annual reports.

In order for a bank to qualify to participate in the study, it was required that it fulfills two requirements; the first one was that the said bank has been in operation for the period under study which is 2016 to 2021 and the second one is that a bank has audited financial statements. A data extraction sheet was used to extract the needed and useful information for analysis.

3.6.1 Validity

Sekaran (2003) argued that validity represents evidence that the instrument, technique or process applied towards measuring whether a concept does indeed measure the intended concept. To achieve content validity of the research instrument, the researcher ensured careful definition of the research phenomena under study, that is, environmental risk, firm size and financial performance of commercial banks in Kenya.Environmental risk experts

from banks and financial institutions and academia validated the data extraction form in which a checklist on the required disclosures to inform environmental risk, firm size and financial performance were contained. Pre-testing the data extraction assured its reliability.

Further, before the data extraction was carried out, the data extraction form was sent to experts in the academic field and also experts in the banking sector. Inputs from all these experts were incorporated and it helped to improve the data extraction form from its initial form to the final form.

3.6.2 Reliability

Aburaya (2012) asserted that the reliability of secondary data is assured through verification or auditing Commercial banks are guided by ISA (International Standards of Accounting) and IFRS (International Financial Reporting Standards) and this ensured reliability of the data extracted from the annual consolidated financial statements and reports. Commercial banks normally publish audited financial statements and reports each financial year and post on their websites. The big four audit firms namely; Ernest and Young, KPMG, PricewaterhouseCoopers (PwC) and Deloitte usually conducts the audits. The study utilized the audited financial reports and financial statements posted on the website. The data was also verified by checking the reports filed with the regulator the Central Bank of Kenya (CBK).

3.6.3 Diagnostic Tests

Diagnostics tests are done in order to find out the suitability of data collected for linear mixed effects regression. The data collected was subjected to diagnostic tests. In this case,

the tests conducted were; normality, multicollinearity, autocorrelation test, stationarity test, Hausman and heteroscedasticity.

a) Multicollinearity Test

According to Shrestha (2020) multi-collinearity occurs in multiple linear regression analysis when there exists significant correlation not only between independent and dependent variables but also among independent variables. In a case where multi-collinearity occurs, it results to erroneous result from the regression model. It is important to detect if there exist multi-collinearity to avoid such an error affecting the results. Multi-collinearity was examined using Variance Inflation Factor (VIF). The decision rule, was that VIF should be 0<VIF< 5 for lack of multi-collinearity and all the models met this criteria as shown in Table 3.1. Multiple linear regression analysis should not have multi-collinearity which is an error developed when two or more independent variable have strong correlation with each other.

Table 3.1

Multicollinearity test

Model	VIF	Recommendation
Liquidity risk	0.058	No autocorrelation
Credit risk	0.639	No autocorrelation
Exchange rate	0.564	No autocorrelation
Interest rate risk	0.122	No autocorrelation
CSR	1.334	No autocorrelation
Total loans	0.892	No autocorrelation
Number of branches	1.342	No autocorrelation
Number of agents	1.009	No autocorrelation
ATMS	0.213	No autocorrelation

b) Normality Test

Normality assumption is crucial for regression model to be used. Lack of normal distribution affect not only regression models but also reliability of simple estimates. The common non-normal errors are skewed or leptokurtic or platykurtic distribution (Alejo, Galvao, Montes-Rojas, & Sosa-Escuudero, 2015). In order to avoid problems associated with non-normality there is need to test normality and the kurtosis and skewness values should be between -2 and +2. Table 3.2 shows the normality test for the data. The data met the normality assumpsion. Normal QQ plots were also used to access for normality in model residuals and all the assumptions were met as shown in appendix 4.

Table 3.2

Normality Test

	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
Liquidity risk	-0.535	0.237	-1.247	0.267
Credit risk	-0.613	0.167	-1.456	0.321
Exchange rate	-0.425	0.122	-.897	0.453
Interest rate risk	-1.491	0.156	-0.273	0.332
CSR	-1.023	0.186	1.492	0.216
Total loans	-0.825	0.134	-0.639	0.111
Number of branches	-0.452	0.176	-1.487	0.234
Number of agents	-1.321	0.188	1.920	0.341
ATMS	-0.682	0.176	-0.462	0.432

c) Autocorrelation Test

Ebtisam, Ahmed, & Baydaa (2018) defines autocorrelation as random error variable that affects the independent variable in relation with dependent variable. Autocorrelation which are error values develop while regressing independent variables over dependent variables. This was measured using Durbin-Watson coefficient, where the coefficient should be between 1.5 to 2.5 denoting no autocorrelation and the dataset met the assumptions as shown in table 3.3.

Table 3.3
Autocorrelation test

Variable	Durbin-**Watson`** statistic	**Recommendation**
Liquidity risk	1.562	No autocorrelation
Credit risk	2.019	No autocorrelation
Exchange rate	1.975	No autocorrelation
Interest rate risk	1.843	No autocorrelation
CSR	1.662	No autocorrelation
Total loans	1.921	No autocorrelation
Number of branches	2.095	No autocorrelation
Number of agents	1.841	No autocorrelation
ATMS	1.730	No autocorrelation

d) Heteroskedasticity Test

Heteroskedasticity tests if the variance of the errors from a regression is reliant on the independent variables. Breusch-Pagan test was used in order to determine if the residual is constant. If the p-value is less than 0.05 then the null hypothesis should not be rejected because it means the residual is heteroskedastic (Knaub, 2007). If the test results reveal a coefficient which is more than 0.05 then the null hypothesis will be accepted meaning homoscedasticity exists. If heteroskedasticity exists, the population used in the regression contains unequal variance, the analysis results may be invalid. Tests for heteroskedasticity in the data showed no violations as shown in table 3.4.

Table 3.4
Breusch-Pagan test for heteroskedasticity

	ROE			ROA		
Variable	statistic	p-value	Recommendation	statistic	p-value	Recommendation
Liquidity risk	1.984	0.286	No heteroskedasticty	1.557	0.312	No heteroskedasticty
Credit risk	0.583	0.142	No heteroskedasticty	0.634	0.237	No heteroskedasticty
Exchange rate	0.840	0.102	No heteroskedasticty	0.899	0.398	No heteroskedasticty
Interest rate risk	1.297	0.445	No heteroskedasticty	0.512	0.445	No heteroskedasticty
CSR	1.266	0.361	No heteroskedasticty	1.496	0.398	No heteroskedasticty
Total loans	0.492	0.683	No heteroskedasticty	0.523	0.150	No heteroskedasticty
Number of branches	1.602	0.239	No heteroskedasticty	1.459	0.222	No heteroskedasticty
Number of agents	1.00	0.233	No heteroskedasticty	1.036	0.182	No heteroskedasticty
ATMs	1.008	0.274	No heteroskedasticty	1.334	0.203	No heteroskedasticty

Diagnostics for the all-regression models was also done and showed that the homoscedasticity assumptions were not violated as shown in Appendix v.

e) Interclass correlation (ICC)

Nakagawa & Schielzeth, (2010) guides that in mixed-effects regression models, the intraclass correlation coefficient (ICC), also known as the intraclass correlation is necessary. They define intraclass correlation coefficient as a measure that quantifies the proportion of the total variance in the dependent variable that is attributed to between-group variation compared to within-group variation. Intraclass correlation coefficient is a useful statistic when the researcher has hierarchical or nested data, such as individuals within groups, and would like to assess how much of the variability in the outcome is due to group-level differences. The decision rule is that when ICC is >0.1 then a mixed effects model is warranted (Nakagawa & Schielzeth, (2010)). The data in this study varies by banks and ICC for each model is reported in table 3.5. All ICCs were above 0.1 and therefore mixed effects regression models were fitted.

Table 3.5
Interclass correlations

Model	ROE	ROA	Recomendation
Economic risk	-0.69	-0.51	Mixed effects model necessary
Reputational risk	-0.52	-0.32	Mixed effects model necessary
Technological risk	-0.54	-0.47	Mixed effects model necessary
Firm size	-0.45	-0.24	Mixed effects model necessary

3.7 Data Collection Procedures

The study utilized data mined from individual banks' websites and the Central Bank of Kenya website. The key source documents were financial statements. Ratios were calculated and utilized in the course of the study. The financial statements were gotten from the Central Bank of Kenya website and individual banks' websites. The banks were required to have audited financial statements for six years that is from 2016 to 2021. Central Bank of Kenya being commercial banks' together with other finance institutions regulator and licensing body was used as a reliable source information from the banking industry. The researcher logged into the CBK website and individual banks' websites checked for the audited financial statements and annual reports for the years 2016, 2017 2018, 2019, 2020 and 2021.

The researcher downloaded audited financial reports together with annual reports then extracted audited accounts for six years from 2016 to 2021. From the reports data on economic risk, reputational risk, technological risk, firm size and financial performance were extracted and recorded in the data extraction form for further processing and analysis. This was done with the guidance of the approved data extraction sheet to ensure all the needed information from every participating commercial bank was captured for the period between 2016 and 2021 inclusive.

3.8 Data Analysis and Presentation

According to Orodho (2013), data analysis technique is the investigation of what has been collected in research and making deductions and inferences. The choice of analysis

procedures depends on how well the techniques are suited to the study and scale of measurement of the variable in question. Data collected were screened, coded, entered and analyzed with the use of R statistical software version 4.3.2. Inferential analysis together with descriptive statistics were utilized in the analysis of data.

The descriptive statistics were utilized to help in outlining the study variables generally and show the mean, maximum and minimum number of observation and the standard deviation. Descriptive statistics were used to come up with the statistical properties of the model in order to pick the most proper functioning form of the model, statistical analysis technique including the mean, standard deviation, maximum and minimum were calculated for secondary data. The data was subjected to normality test and transformed into natural logarithm before regression undertaken. Presentation of results was done by use of graphs and tables.

Inferential statistics used were linear and mixed effects multiple regression analysis and moderated regression model so as to determine the moderating effect of firm size on the relationship between environmental risk and financial performance of commercial banks while allowing random effects to vary by bank. Inferential statistics determined the rejection or acceptance of null hypothesis at 95 percent level of confidence (CI). The presentation of findings has been done in graphical or in table form.

3.8.1 Direct Effects

To achieve objectives 1, 2 and 3 being direct relationships, linear mixed effects regression model was used to test hypotheses H_{O1}, H_{O2} and H_{O3}. The test statistics was computed and derived for comparison and to confer judgment on the hypotheses included the regression

coefficient (Beta coefficient) and the p-values were generated. The Inter Class Correlation (ICC) was also used to assess if a mixed effects model is necessary.

The significance level (p-value) for each of the variables should be less than 0.05 to demonstrate that the variable is making a statistically significant contribution to the prediction of the dependent variable (Field, 2009). To determine the influence of the independent variables on the dependent variable, linear mixed effects regression models was used to test H_{01}, H_{02} and H_{03} hypotheses as follows:

H_{01}

$$Y_{jt} = \beta_0 + \beta_1 X_{1jt} + \beta_2 X_{2jt} + \beta_3 X_{3jt} + \beta_4 X_{4jt} + \mu_j + \boldsymbol{\varepsilon}_{jt} \quad (3.1)$$

Where:

Y_{jt}: Financial performance of bank j at time t

X_{1jt}: Liquidity risk for bank j at time t

X_{2jt}: Credit risk at for bank j at time t

X_{3jt}: Exchange rate risk for bank j at time t

X_{4jt}: Interest rate risk for bank j at time t

$\boldsymbol{\varepsilon}_t$:is the residual error term for the *j*-th bank at time t

μ_j : represents the random effects associated with the banks. They account for the within-bank correlation or variability.

H_{02}

$$Y_{jt} = \beta_0 + \beta_1 X_{1jt} + \beta_2 X_{2jt} + \beta_3 X_{3jt} + \mu_j + \boldsymbol{\varepsilon}_{jt} \quad (3.2)$$

Where:

Y_{jt}: Financial performance of bank j at time t

X_{1jt}: number of CSR activities fro bank j at time t

X_{2jt}: Number of branches for bank j at time t

X_{3jt}: Loan book size for bank j at time t

$\boldsymbol{\varepsilon}_t$: is the residual error term for the *j*-th bank at time t

μj : represents the random effects associated with the banks. They account for the within-bank correlation or variability.

H_{03}

$$Y_{jt} = \beta_0 + \beta_1 X_{1jt} + \beta_2 X_{2jt} + \beta_3 X_{3jt} + \mu_j + \boldsymbol{\varepsilon}_{jt} \quad (3.3)$$

Where:

Y_{jt}: Financial performance of bank j at time t

X_{1jt}: ATM network for bank j at time t

X_{2jt}: Number of agents for bank j at time t

X_{3jt}: number of branches for bank j at time t

$\boldsymbol{\varepsilon}_t$: Is the residual error term for the *j*-th bank at time t

μ_j : represents the random effects associated with the banks. They account for the within-bank correlation or variability.

3.8.2 Moderation effects

According to Hayes (2017), the effect of an independent variable X on a dependent variable Y is moderated by the variable M if its size, sign or strength depends on or can be predicted by M. In that case, M is said to be a moderator of X's effect on Y or that X and M interact

in their influence on Y". When there is moderation of a variable (which is M) on the relationship between two others (which we called X and Y in this study), it is said that the effect of X on Y is conditional to the level of the moderating variable M.

An algebraic device that allows this moderation effect to be modeled (and tested) is the incorporation of a term corresponding to the multiplication of X by M in the regression equation, as shown in Equation 4. This term is called interaction between X and M.

$E(Y) = \beta_0+\beta_1X+\beta_2M+\beta_3XM$

$E(Y) = \beta_0+\beta_1X+\beta_2M+\beta_3XM$……(3. 4)

Where

Y is the dependent variable, X the independent variable and M the moderating variable.

E(Y) is the expected value of Y for given values of X and M.

$\beta_{0,1},\beta_2,\beta_3$ are the coefficients of the multiple linear regression model

With sample data, the following estimated regression equation 5 is obtained

$\hat{y}= b_0+b_1X+b_2M+b_3XM$ ……(3.5)

This simple moderation model can be represented by the conceptual and statistical diagrams shown in Figure 3.1.

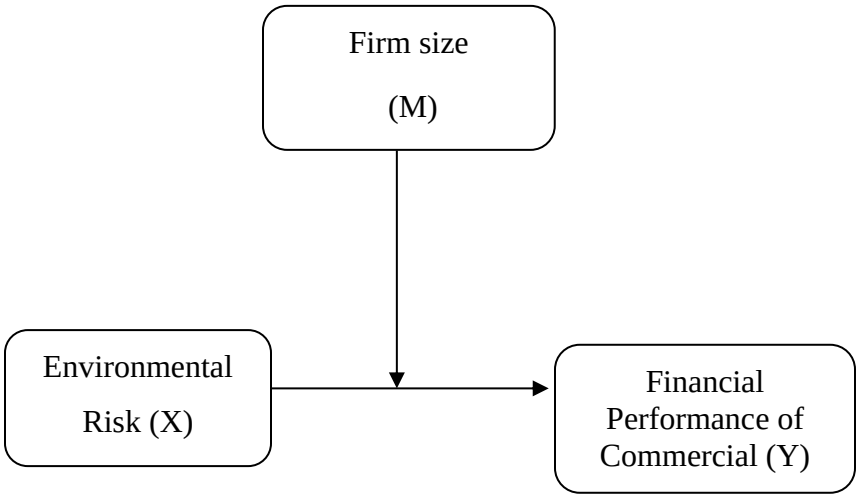

Figure 3.1

Moderation conceptual model (Model 1)

Source: Adapted and modified from Hayes (2013)

The moderation process was examined by deriving the following equations.

Step 1: Model 1: $Y_{jt} = \beta 0 + \beta_j X_{jt} + \mu_j + \boldsymbol{\varepsilon}_{jt}$

Step2: Model 2: $Y_{jt} = \beta 0 + \beta_j X_{jt} + \beta_i X_{jt} + \mu_{ij} + \boldsymbol{\varepsilon}_{ij}$

where:

Y_{jt}: Financial Performance at time t

$\beta 0$, βj and βi: Constants to be estimated

X_{jt}: Environmental risk at time t

X_{it}: Firm size at time t

$\boldsymbol{\varepsilon}_{jit}$: Error term

μ_{jit} : represents the random effects associated with the banks.

step3

Model 3: $Y_{jit} = \beta_0 + \beta_j X_{jt} + \beta_i X_{jit} + \beta_{ji} X_{jt} X_{jt} + \boldsymbol{\varepsilon}_{jit}$

where:

Y_{jt}: Financial performance of bank j at time t

β_0, β_i and β_j: Constants to be estimated

X_{jt}: Environmental risk for bank j at time t

X_{it}: Firm size at time t

$X_{jt}X_{it}$: Interaction between environmental risk and firm size at time t

$\boldsymbol{\varepsilon}_{jit}$: Error term

μ_{jit} : represents the random effects associated with the banks.

In order to confirm a third variable making a moderation effect on the relationship between the two variables X and Y, we must show that the nature of this relationship changes as the values of the moderating variable M change. This is in turn done by including an interaction effect in the model and checking to see if indeed such an interaction is significant and helps explain the variation in the response variable better than before.

In this study, it was more informative to interrogate the degree and direction Firm size exerts its influence on financial performance given the environmental risk. This lays the basis for testing the moderation hypothesis as given by Mackinnon (2011). The study hypothesized that there is no statistically significant moderating effect of firm size on the relationship between environmental risk and financial performance of commercial banks in Kenya.

The null hypothesis that firm size does not moderate the relationship between environmental risk and financial performance. Accordingly, if the effects of environmental risk become less significant in model III compared to model I, this is evidence of moderation.

3.9 Ethical Issues

The anticipated ethical problems in most studies include research process, conduct of individual researcher and the nature of research subjects. Before embarking on collection of data from the commercial banks in Kenya, clearance from the University of Kabianga Board of Graduate Studies (BGS) was obtained, as well research permit from National Commission for Science, Technology and Innovation (NACOSTI), the body mandated with regulating and ensuring quality research. Further, throughout this study, confidentiality of the commercial bank information was maintained. The data collection instrument was coded to eliminate use of names of the commercial banks and to maintain anonymity. The study utilized secondary data and did not use subjects, therefore the ethical issues relating to informed consent and voluntary participation were not applicable.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussions of the analysis and findings conducted to examine the relationship between environmental risk, firm size and the financial performance of commercial banks in Kenya. The results are presented in three approaches; first the results of the descriptive studies for the study variables are presented. This is then followed by results of the relationship between economic risk, reputation risk, technological risk and the financial performance of commercial banks. Thirdly, moderating effect of firm size on environmental risk and the financial performance of the commercial banks.

4.2 Descriptive Statistics

In this section, descriptive analysis for the study specific objectives; economic risk, reputational risk, technological risk and the moderating effect of firm size is discussed. Descriptive statistics summarized the main characteristics of each of the study variables.

4.2.1 Economic Risk.

Economic risk was determined using liquidity risk, credit risk, exchange rate and interest rate risk of commercial banks in Kenya. Economic risk factors are crucial indicators for assessing the financial stability and performance of businesses and markets and the analysis in this subsection seeks to provide the basic information about the liquidity, credit,

exchange rate and interest rate risks as per the findings of the study in terms of the mean, standard deviation and the median of the risks across the six year period of study.

Table 4.1

Distribution of economic risk factors from 2016 to 2021

	Year						
Economic risk factor	2016 (N=34)	2017 (N=34)	2018 (N=34)	2019 (N=34)	2020 (N=34)	2021 (N=34)	Overall (N=204)
Liquidity risk							
Mean (SD)	0.396 (0.179)	0.428 (0.171)	0.492 (0.215)	0.436 (0.206)	0.517 (0.214)	0.454 (0.177)	0.455 (0.197)
Median [Min, Max]	0.363 [0.144, 0.948]	0.392 [0, 0.854]	0.499 [0, 0.812]	0.440 [0, 0.793]	0.500 [0.170, 0.855]	0.440 [0.170, 0.850]	0.429 [0, 0.948]
Credit risk							
Mean (SD)	23.10 (7.77)	21.00 (8.11)	19.90 (8.56)	19.40 (8.86)	18.10 (7.55)	3.63 (11.10)	17.60 (10.70)
Median	20.9	19.60	18.90	18.80	17.70	4.10	18.40
[Min, Max]	[7.90, 45.70]	[1.00, 37.30]	[0.70, 36.00]	[3.80, 50.90]	[4.40, 38.61]	[-16.21, 49.60]	[-16.20, 50.90]
Exchange rate risk							
Mean (SD)	101.5 (0.328)	103.41 (0)	101 (0)	101 (0)	106.5 (1.11)	110 (0)	104 (3.25)
Median	102	103	101	101	107	110	103
[Min, Max]	(102, 103)	(103, 103)	(101, 101)	(101, 01)	(107, 110)	(110, 110)	(101, 110)
Interest rate risk							
Mean (SD)	8.62 (0)	8.37 (0)	13.20 (0)	12.50 (0)	12.00 (0)	12.10(0)	11.10 (1.91)
Median	8.62	8.37	13.20	12.5 0	12.0	12.1	12.1
[Min, Max]	(8.62, 8.62)	(8.37, 8.37)	(13.2, 13.2)	(12.5, 12.5)	(12.0, 12.0)	(12.1, 12.1)	(8.37, 13.2)

Table 4.1 presents a comprehensive overview of the distribution of economic risk factors over a six-year period, from 2016 to 2021, with a focus on liquidity risk, credit risk, exchange rates, and interest rate risk. This analysis aims to provide insights into how these factors evolved during this time frame. Liquidity risk is a critical aspect of financial management, representing the ease with which assets can be converted into cash without significant loss. In Table 4.1 and figure 4.1, liquidity risk is assessed through mean (SD) and median values for each year, along with the overall summary.

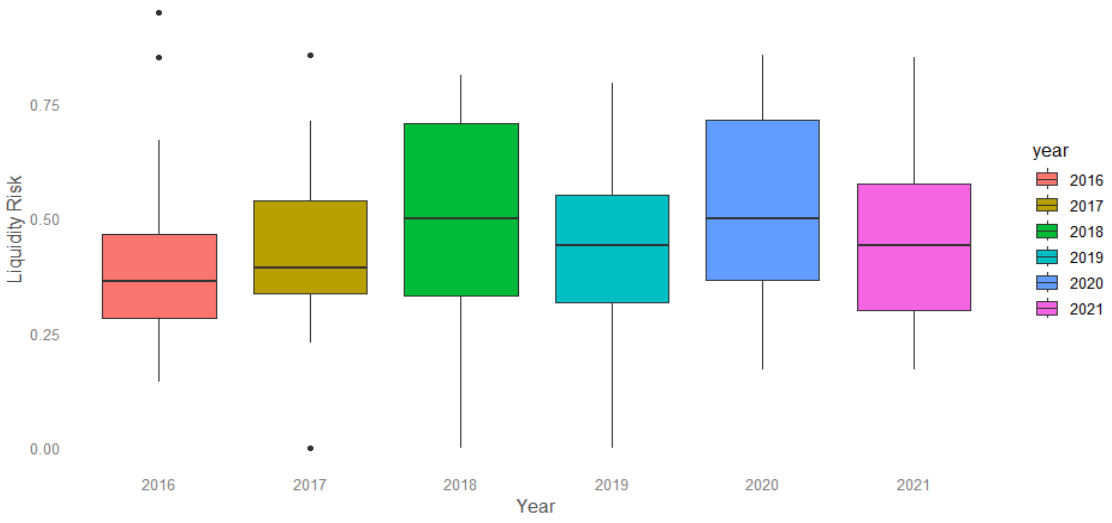

Figure 4.1

Trends in liquidity risk from 2016 to 2021

The mean values indicate a notable trend in liquidity risk. In 2016, the mean liquidity risk stood at 0.396 (SD 0.179), reflecting a moderate level of risk. Over the next four years, there was a consistent increase in liquidity risk, reaching 0.517 (SD 0.214) in 2020.

However, there was a slight decrease in 2021, with a mean of 0.454 (SD 0.177). A closer look at the median values, which are less influenced by extreme values or outliers, shows a similar pattern. In 2016, the median liquidity risk was 0.363, with a range of values from 0.144 to 0.948. As the years progressed, the median risk score generally increased, reaching 0.500 in 2020. However, the decrease in 2021 brought the median value back to 0.440. The overall summary for liquidity risk, considering data from 2016 to 2021, reveals an overall median of 0.429, with a range spanning from 0 to 0.948. This suggests that while liquidity risk increased over the years, it remained within a manageable range, though it warrants close monitoring to ensure financial stability.

Next, credit risk, which is a measure of the likelihood of borrowers defaulting on their financial obligations, such as loans or bonds shows a consistent decline over the six-year period (See Table 4.1 and Figure 4.2).

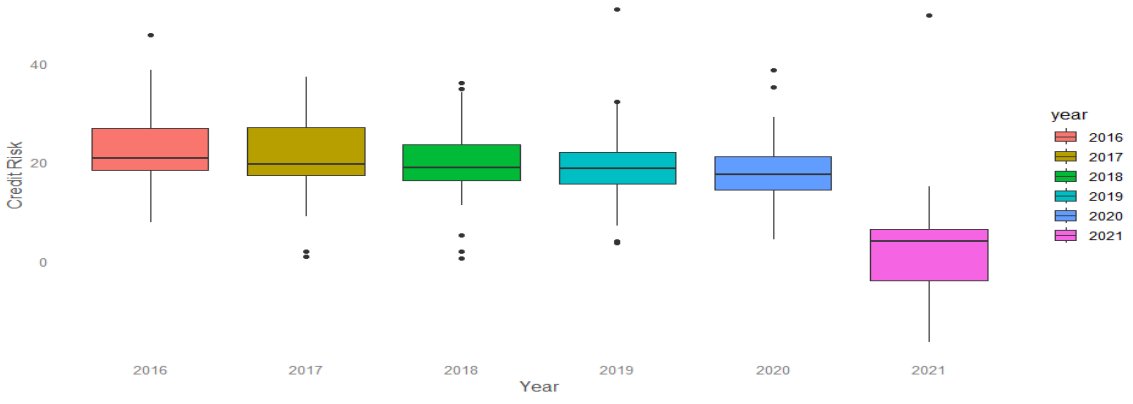

Figure 4.2

Trends in Credit risk from 2016 to 2021

In 2016, the mean credit risk was relatively high at 23.10 (SD 7.77), indicating a substantial level of risk in the financial environment. However, by 2021, there was a significant reduction in credit risk, with a mean score reducing to 3.63 (SD 11.10). The median values for credit risk support this downward trajectory. In 2016, the median credit risk was 20.9, with a range of values from 7.90 to 45.70. As the years progressed, there was a notable reduction in median credit risk, reaching 4.10 in 2021, despite a wide range of values, including negative scores. The overall summary for credit risk, considering data from 2016 to 2021, highlights an overall median of 18.40, with a range spanning from -16.20 to 50.90. This indicates a substantial reduction in credit risk, signifying improved creditworthiness and a decreased likelihood of defaults within the financial landscape.

Furthermore, the data on exchange rates risk reveals a relatively stable picture over the six-year period. Exchange rates remained within a narrow range, fluctuating from 101 to 110. This stability suggests that despite global economic uncertainties and geopolitical events, exchange rates did not experience significant volatility during this time frame. Such stability can provide businesses with a predictable environment for international trade and investment.

The data on interest rate risk likewise demonstrated a consistent and steady pattern. Mean values remained almost unchanged, hovering around 8.5 throughout the six-year period. The median values also remained stable, resulting in an overall median of 12.1. The narrow range of values for interest rate risk, with minimal variation, suggests that organizations were not significantly affected by fluctuations in interest rates during this time. It indicates

a robust risk management strategy in place to mitigate the potential adverse effects of interest rate changes.

4.2.2 Reputational Risk.

To assess the relationship between reputational risk and financial performance, the study used the availability of CSR activities, total loans and total number of branches. Table 4.2 provides a detailed distribution of reputation risk factors across the years 2016 to 2021.

Table 4.2

Distribution of Reputation Risk Factors from 2016 to 2021

Year							
Reputational risk factors	2016 (N=34)	2017 (N=34)	2018 (N=34)	2019 (N=34)	2020 (N=34)	2021 (N=34)	Overall (N=204)
Availability of CSR activities							
No	9 (26.5%)	9 (26.5%)	8 (23.5%)	7 (20.6%)	5 (14.7%)	3 (8.8%)	41 (20.1%)
Yes	25 (73.5%)	25 (73.5%)	26 (76.5%)	27 (79.4%)	29 (85.3%)	31 (91.2%)	163 (79.9%)
Total loans (millions)							
Mean (SD)	62200 (87600)	58000 (85600)	60200 (102000)	57800 (113000)	139000 (318000)	120000 (318000)	82800 (200000)
Median [Min, Max]	16000 [0, 373000]	19500 [3240, 412000]	13100 [0, 456000]	11300 [0, 540000]	21000 [4.37, 1660000]	21600 [0, 1800000]	17200 [0, 1800000]
total number of branches							
Mean (SD)	39.9 (48.8)	39.0 (49.3)	39.2 (49.5)	38.9 (50.8)	40.8 (52.9)	40.8 (52.9)	39.7 (50.1)
Median [Min, Max]	19.0 [3.00, 198]	19.5 [3.00, 199]	18.0 [2.00, 196]	18.0 [0, 203]	18.0 [2.00, 203]	18.0 [2.00, 203]	18.0 [0, 203]

Over the six-year period, the data shows a gradual shift towards entities engaging in CSR activities. In 2016, 73.5% of the entities (25/34) reported having CSR activities, while 26.5% (9/34) did not. This trend continued to strengthen each year, reaching 91.2% in 2021 for entities with CSR activities, and only 8.8% without the CSR activities. The overall distribution for the entire period indicates that 79.9% (163/ 204) of the entities engaged in CSR activities, showing a growing focus on corporate social responsibility as an integral part of reputation risk management.

Table 4.2 also reveals fluctuations in the mean and median values of total loans, indicating changing financial conditions within the banks. In 2016, the mean total loans stood at Ksh 62.2 million (with a standard deviation of Ksh 87.6 million), while the median was Ksh 160 million, with loan values ranging from Ksh 0 to Ksh 373 million. As the years progressed, there were variations in these statistics, culminating in 2020 with a substantial surge in both mean and median values. In 2020, the mean total loans skyrocketed to Ksh 139 million (with a significant standard deviation of Ksh 318 million), while the median value was Ksh 21 million, ranging from Ksh 4.37 million to a staggering Ksh 166 million. However, 2021 saw a slight decrease in the mean to Ksh 120 million, with a median value of Ksh 216 million. This wide range in loan values reflects the financial diversity and dynamism among the banks in the study.

The final reputational risk aspect explored is the total number of branches maintained by the banks. This provides insights into the geographical reach and scale of operations, which can impact reputation risk. The mean and median values fluctuated slightly over the years.

In 2016, the mean was approximately 39.9 branches (with a standard deviation of 48.8), and the median was 19 branches, ranging from 3 to 198 branches. These numbers remained relatively stable, with subtle variations each year, ultimately resulting in a mean of approximately 40.8 branches in 2020 and 2021 (with a standard deviation of 52.9), and a consistent median of 18 branches (ranging from 0 to 203 branches). This data suggests that the banks in the study maintained a similar scale of operations, with only marginal changes in the number of branches, indicating a degree of stability in their geographical presence over the years.

4.2.3 Technological risk

Technological risk was measured using the number of ATMs and number of agents a bank had. Descriptive analysis of the two variables showed varied results with some banks having zero ATMS and zero agents while others had more than 500 agents and ATMs.

Table 4.3

Distribution of Technological Risk Factors from 2016 to 2021

Year							
Technological risk factors	2016 (N=34)	2017 (N=34)	2018 (N=34)	2019 (N=34)	2020 (N=34)	2021 (N=34)	Overall (N=204)
Number of ATMS							
Mean (SD)	44.8 (63.8)	43.4 (67.8)	74.4 (129)	68.5 (123)	70.9 (122)	69.6 (119)	62.0 (107)
Median [Min, Max]	18.0 [1.00, 250]	16.0 [1.00, 251]	27.0 [2.00, 580]	15.0 [0, 583]	17.5 [0, 581]	19.5 [0, 561]	19.0 [0, 583]
Missing	1 (2.9%)	0 (0%)	0 (0%)	1 (2.9%)	0 (0%)	0 (0%)	2 (1.0%)
Number of agents							
Mean (SD)	656 (2660)	1750 (5970)	1330 (5680)	2220 (7570)	2610 (8810)	1710 (6100)	1710 (6370)
Median [Min, Max]	0 [0, 13600]	0 [0, 31300]	0 [0, 31300]	0 [0, 35000]	0 [0, 40800]	0 [0, 26000]	0 [0, 40800]

4.2.4. Firm Size

Environmental risk was determined jointly using economic risk, reputational risk and technological risk. These factors were all combined to assess the relationship between environmental risk and financial performance moderating for firm size. Firm size was taken as the logarithm of total assets and the results are as summarized in table 4.4. From the table, mean total assets in billions were lowest in 2016, reached its peak in 2020 thereafter dropped dramatically.

Table 4.4

Distribution of Firm Size from 2016 to 2021

Year	2016 (N=34)	2017 (N=34)	2018 (N=34)	2019 (N=34)	2020 (N=34)	2021 (N=34)	Overall (N=204)
Value of assets in billions							
Mean (SD)	102 (143)	118 (140)	115 (174)	113 (178)	528 (1650)	114 (191)	182 (701)
Median [Min, Max]	26.9 [0.0610, 505]	53.8 [0.764, 556]	28.2 [0.285, 714]	27.2 [0.0440, 674]	41.4 [0.00129 , 8580]	33.5 [0.0143, 826]	32.0 [0.00129 , 8580]

Preliminary visualization of how ROE and ROA were associated with firm size is as shown in Figure 4.3 and Figure 4.4 respectively.

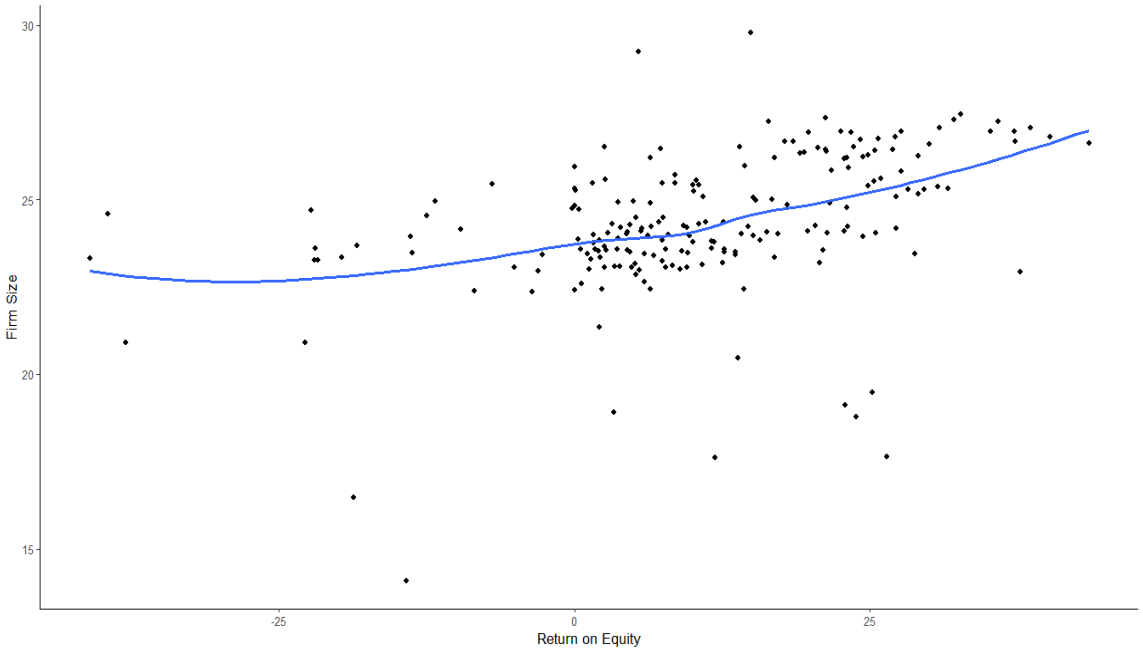

Figure 4.3

Relationship between return on equity and firm size

As seen in figure 4.3, as the firm size increased, ROE also increased. In other words Firm size is seen to positively influence return on Equity.

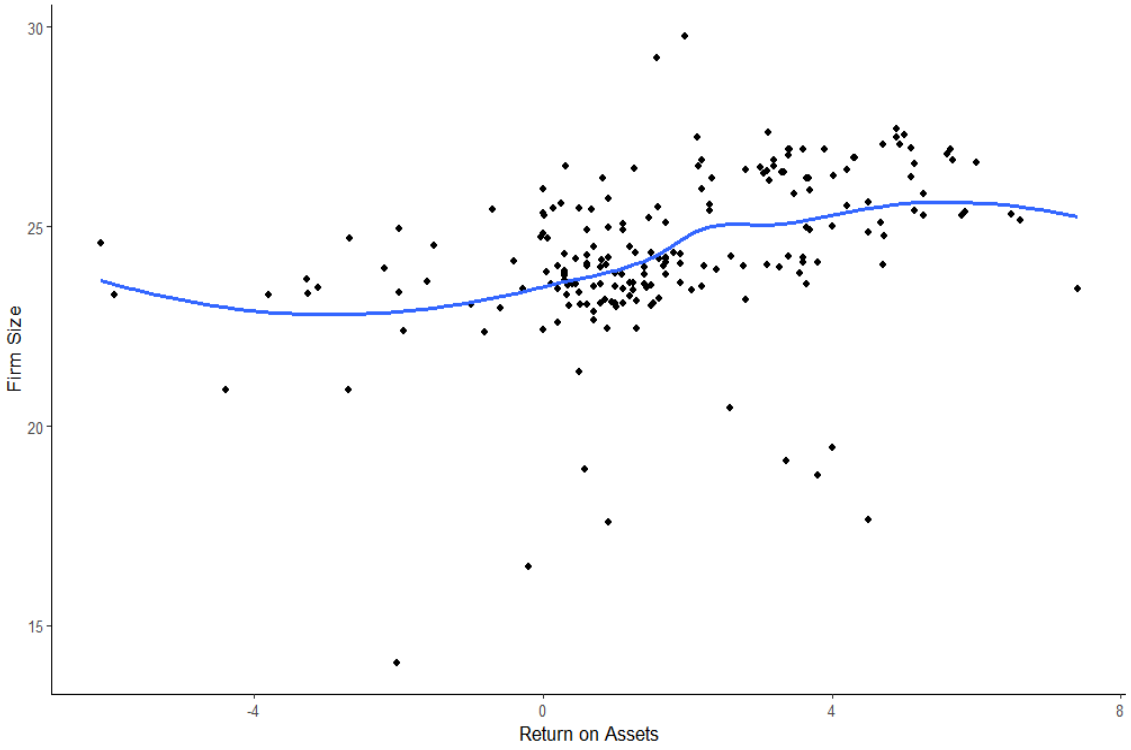

Figure 4.4

Relationship between return on assets and firm size

As seen in figure 4.4, the increase in firm size is positively associated with increase in ROA. This is especially true for banks that had a positive ROA value.

4.3. Inferential Statistics

4.3.1 Relationship between economic risk and financial performance of commercial banks in Kenya.

The first specific objective of the study was to establish the relationship between economic risk and financial performance of commercial banks in Kenya. Mixed effects regression was used to determine this relationship and the results were as presented in table 4.5.

Table 4.5

Mixed effects regression model fitted to determine the relationship between economic risk and financial performance

	Return on Equity			Return on Assets		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*P*
(Intercept)	61.36	12.11 – 110.60	0.015	11.52	-0.95 – 23.98	0.070
Liquidity risk	-10.36	-18.45 – -2.27	0.012	0.42	-1.59 – 2.43	0.680
Credit risk	-0.29	-0.46 – -0.13	0.001	-0.03	-0.07 – 0.01	0.172
Exchange rate	-0.38	-0.82 – 0.07	0.100	-0.08	-0.19 – 0.03	0.164
Interest rate risk	-0.13	-0.79 – 0.53	0.695	-0.11	-0.28 – 0.06	0.208
ROE model Interclass correlation (ICC)-0.69 ROA model ICC- 0.51						

As seen in Table 4.5, for ROE, the intercept is 61.36 with a 95% confidence interval (CI) ranging from 12.11 to 110.60. This suggests that, on average, the expected ROE is 61.36% for the banks included in the analysis when other factors are not considered. For ROA, the

intercept is 11.52 with a 95% CI ranging from -0.95 to 23.98, although the p-value is 0.070, indicating marginal statistical significance. This means that when other predictors are held constant, the expected ROA is 11.52%. The first economic risk factor examined is liquidity risk. For ROE, the estimate for liquidity risk is -10.36 with a 95% CI ranging from -18.45 to -2.27. The associated p-value of 0.012 demonstrates a statistically significant negative relationship between liquidity risk and ROE. In practical terms, this implies that higher liquidity risk is associated with lower ROE. Conversely, for ROA, the estimate for liquidity risk is 0.42 with a wide 95% CI ranging from -1.59 to 2.43, and a p-value of 0.680, which is not statistically significant. This suggests that liquidity risk does not appear to have a significant impact on ROA.

Next, the analysis examines credit risk, another crucial economic risk factor. For ROE, the estimate for credit risk is -0.29 with a 95% CI ranging from -0.46 to -0.13, and a highly significant p-value of 0.001. This indicates a robust and statistically significant negative relationship between credit risk and ROE. In other words, higher credit risk is strongly associated with lower ROE. For ROA, the estimate for credit risk is -0.03 with a 95% CI ranging from -0.07 to 0.01 and a p-value of 0.172. While this result does not reach the conventional threshold for statistical significance ($p < 0.05$), it still suggests a negative association between credit risk and ROA.

Furthermore, for exchange rate risk, the analysis shows that for ROE, the estimate for exchange rate risk is -0.38 with a 95% CI ranging from -0.82 to 0.07, and a p-value of 0.100, indicating no statistically significant relationship with ROE. Similarly, for ROA, the

estimate is -0.08 with a 95% CI ranging from -0.19 to 0.03, and a p-value of 0.164, again suggesting no statistically significant relationship with ROA. These results imply that exchange rate risk does not appear to significantly impact either ROE or ROA in the model. The final economic risk factor considered is interest rate risk. For ROE, the estimate for interest rate risk is -0.13 with a 95% CI ranging from -0.79 to 0.53 and a p-value of 0.695. This result indicates no statistically significant relationship between interest rate risk and ROE. Similarly, for ROA, the estimate for interest rate risk is -0.11 with a 95% CI ranging from -0.28 to 0.06, and a p-value of 0.208, implying no statistically significant relationship with ROA. These findings suggest that interest rate risk does not appear to significantly influence either ROE or ROA in the model. The fitted model was therefore was:

$$ROE = 61.36 - 10.36X_1 - 0.29X_2 - 0.38X_3 - 0.13X_4 + \mu_j + e_{jt} \quad \text{.....(4.1)}$$

$$ROA = 11.52 - 0.42X_1 - 0.03X_2 - 0.08X_3 - 0.11X_4 + \mu_j + e_{jt} \quad \text{.....(4.2)}$$

Where :

$X_{1:}$ Liquidity risk

$X_{2:}$ Credit risk

$X_{3:}$ Exchange rate

X_4: Interest rate risk

The study on environmental risk, firm size and financial performance of commercial banks was guided by four specific objectives. The first objective of the study was to establish the relationship between economic risk and financial performance of commercial banks in

Kenya. The economic risk was determined using liquidity Risk, Credit Risk, Exchange rate risk, and interest rate risk of commercial banks in Kenya.

From the results presented earlier, for economic risk factors, liquidity risk exhibited a dynamic trend with a slight decrease in 2021, while credit risk showed a substantial decline, indicating improved creditworthiness. Despite the slight decrease in 2021, liquidity risk had generally increased over the six-year period suggesting that while liquidity risk increased over the years, it remained within a manageable range, and thus warranting close monitoring to ensure financial stability. On the other hand, credit risk exhibited a consistent decline over the period indicating a decrease in the likelihood of defaulting in loans. Finally, exchange rates remained within a narrow range, fluctuating from 101 to 110. This stability suggests that despite global economic uncertainties and geopolitical events, exchange rates did not experience significant volatility during this time frame. Such stability can provide businesses with a predictable environment for international trade and investment.

The findings of this study are similar to global trends on the financial performance of commercial banks over the period. According to Clinichi et. al. (2021), commercial banks were performing better from 2016 to early 2021 when covid hit the world. Banks started reducing the lending practices and people sold their forex shares. However, there are mixed findings as individual banks in different countries reacted differently to the pandemic. The findings of this study are also similar those of Mathias, (2021). According to the study, which was descriptively evaluating how the covid 19 pandemic affected the performance

of commercial banks in Kenya, there was an increase in mean deposits to banks indicating that people were able to repay their loans on time.

Mamatzakis and Bermpei (2017); Muhindi and Ngaba (2018) also found that exchange rates remained stable, offering a predictable environment for international trade, and interest rate risk remained steady, reflecting effective risk management practices. These findings exhibit the importance of monitoring and managing economic risk factors to ensure financial stability and resilience in a dynamic economic landscape. From the analysis, liquidity risk and credit risk are significant factors affecting financial performance (return on equity and return on assets), while exchange rate and interest rate risk do not appear to have a significant impact based on the provided data.

There were four key indicators of economic risk and the first was liquidity risk in relation to financial performance of commercial banks in Kenya. The economic risk analysis in Table 4.1 for Kenya's commercial banking sector from 2016 to 2021 reveals an increasing level of risk, peaking in 2020 but falling slightly in 2021, perhaps indicating a turnaround developed in the process. This is similar to what was found by Mathias (2021) where many banks saw increasing risks in the face of the COVID 19 pandemic. The findings underline the ongoing financial condition of Kenyan banks. Consistently higher economic risk through 2020 suggests a fiscal challenge, while a slight deflation in 2021 could indicate a reaction to increased growth, possibly due to market developments or legislative changes.

These factors emphasize the importance of sound liquidity management for banks and emphasize the need for careful management and adaptation to economic changes especially

during natural calamities. Maintaining adequate liquidity is essential for banks to be able to navigate volatile situations and meet their financial commitments without undue stress. While declining standards indicate manageable levels of risk, challenges continue to require continued vigilance and proactive measures for economic recovery.

From Table 4.2, findings from the mixed effects regression model indicate that liquidity risk has significant negative associations with ROE which is similar to what Mwangi et. al (2014) found. In their study, liquidity risk was negatively associated with financial performance of commercial banks in Kenya. The study aimed to evaluate how liquidity risk management influences the financial performance of Commercial Banks in Kenya, using a descriptive study design and analyzing data spanning from 2010 to 2013 for the 43 listed Commercial Banks in the country. Their findings indicated that an increase in the ratio of liquid assets to total assets by one unit corresponds to a 1% decrease in return on assets (ROA), while a similar increase in the ratio of liquid assets to total deposits leads to a 2.2% decrease in ROA (Mwangi 2014).

The second indicator of economic risk was credit risk and financial performance of commercial banks in Kenya. From the results, the credit risk assessment of Kenya's commercial banking sector from 2016 to 2021 provides an encouraging case. There was a remarkable improvement from a high credit risk score of 23.10 in 2016 to a score of 3.63 in 2021, indicating that this decline in credit conditions and risk management measures adopted by banks reflects loan practices and improved borrower risk management (Muinde, 2018). In contrast to the presence of credit risk, an analysis of the exchange rate

for the same period shows remarkable stability, between 101 and 110. This level creates a favorable environment for international trade, enabling businesses to forecast cross-border transactions in the face of global uncertainty. When exchange rates appreciate, interest rate risk prices exhibit stability, with low volatility averaging about 8.5 basis points over six years. In essence, it reflects effective risk management strategies adopted by banks to mitigate the potential negative impact of interest rate changes (Central Bank of Kenya, 2016). The mixed effects regression analysis (Table 4.2) aims to reveal the complex relationship between various economic risk factors and financial performance indicators such as asset returns and investments. These findings provide a deeper understanding of how risk factors interact with financial performance metrics and provide valuable insights for strategic decision-making in the banking industry.

The third and fourth indicators of economic risk was the exchange rate and interest rate risk. These two were also studied in their relation to financial performance of commercial banks in Kenya the results show that exposure to exchange rate and interest rate risk in Kenya's commercial banks for six years signals a favorable environment for industry and improved risk management. Muriithi, 2016) affirms that this stability in the midst of global economic uncertainty increases confidence and facilitates policy implementation. Moreover, the mixed effects regression analysis in Table 4.2 provides the necessary framework to understand the complex relationship between economic risk and business decisions, which contributes to informed decision-making in the banking industry.

The intercept analysis reveals the initial values of ROE (61.36%) and ROA (11.52%), which reflect the expected profitability when no other predictors are considered (Mwangi, 2018); (Central Bank of Kenya, 2016). Still, although the ROE intercept is fixed, the confidence interval of the ROA intercept includes zero, indicating some uncertainty. Indicators of economic risk exhibit interesting associations with financial performance. Currency risk reveals a significant negative relationship with ROE (-10.36), indicating that higher equity risk is associated with lower ROE.

Conversely, credit risk demonstrates a strong negative relationship with ROE and a negative relationship with ROA, emphasizing its impact on bank profitability. However, volatility and interest rate risk do not show a statistically significant association with Return on Equity or ROA, indicating that these factors do not significantly influence financial performance in the model. Mwangi (2018) elucidates that the study highlights the considerable impact of economic and credit risks on ROE, emphasizing their importance for a bank's profitability. However, this study results suggests that exposure to currency risk and interest rate risk do not show any significant relationship with ROE or ROA, providing insights into the marginal relationships between currency risk and the performance of Kenyan commercial banks.

From the results presented on the relationship between economic risk and financial performance of commercial banks in Kenya as informed by liquidity risk, credit risk, interest rate risk and exchange rate risk, commercial bank managers should incorporate risk mitigation measures into their strategic decisions, including liquidity, improved

lending practices, and revised lending policies to reduce risk exposure. Muriithi (2016) and Ouma, Sang, & Kinoti, (2020) posit that reducing liquidity and credit risk can strengthen a bank's financial health, build investor confidence, and potentially attract more investment opportunities. The findings highlight the importance of complying with risk management policies established by governing bodies to ensure industry stability and resilience. Recognizing potential limitations, the study may not include macroeconomic variables affecting overall performance. Muinde (2018) ascertained that further research could examine multiple risk factors' outcomes beyond ROE and assess the long-term sustainability of relationships. The significant association found between liquidity, credit risk, and ROE in Kenyan commercial banks reinforces the evidence against the null hypothesis and highlights the importance of tightly managing risk to ensure the continued profitability and stability of the industry.

In conclusion, since we have liquidity and credit risk having a significant relationship with ROE it provides sufficient evidence to reject the null hypothesis and conclude that there is a statistically significant relationship between economic risk and financial performance of commercial banks in Kenya.

4.3.2 Relationship between reputational risk and financial performance of commercial banks in Kenya.

Table 4.6 presents the results of a mixed effects regression model aimed at determining the relationship between reputational risk and financial performance, with a specific focus on

Return on Equity (ROE) and Return on Assets (ROA). The analysis tested the hypothesis that:

Ho_2: There is no statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya.

Table 4.6

Mixed effects regression model fitted to determine the relationship between reputational risk and financial performance

	Return on equity			Return on assets		
Predictors	Estimates	CI	p	Estimates	CI	P
(Intercept)	7.13	-1.38 – 15.64	0.100	-0.26	-2.20 – 1.69	0.794
CSR						
No	Ref					
Yes	0.85	-4.49 – 6.19	0.754	0.65	-0.60 – 1.90	0.306
Total loans	-0.15	-0.84 – 0.54	0.671	0.09	-0.08 – 0.25	0.300
Total number of branches	0.11	0.04 – 0.18	0.003	0.01	-0.00 – 0.02	0.185
ROE model Interclass correlation (ICC)-0.52 ROA model ICC- 0.32						

The intercept represents the baseline estimate for ROE and ROA in the absence of any other predictors. For ROE, the intercept is 7.13 with a 95% confidence interval spanning from -1.38 to 15.64. This suggests that, without considering other factors, the baseline ROE

falls within this range. Similarly, for ROA, the intercept is -0.26 with a confidence interval of -2.20 to 1.69, indicating that the baseline ROA hovers around this interval. The p-values for both intercepts are relatively high (0.100 for ROE and 0.794 for ROA), implying that these baseline values are not statistically significant, and other predictors may have a more substantial influence.

The regression analysis also includes the presence of CSR activities as a predictor of reputational risk and financial performance. Entities engaged in CSR activities are represented as "Yes," while those without CSR activities are the reference category labeled "No." For ROE, the presence of CSR activities (Yes) yields an estimate of 0.85, suggesting a slight positive effect on ROE. However, this effect is not statistically significant, as indicated by the relatively high p-value of 0.754. Similarly, for ROA, the presence of CSR activities (Yes) corresponds to an estimate of 0.65, also implying a modest positive effect. However, like ROE, this effect is not statistically significant, with a p-value of 0.306. This indicates that, within the scope of this model, CSR activities do not exhibit a statistically significant direct impact on ROE or ROA.

Total loans, representing the financial magnitude of loans held, was also included as a predictor for both ROE and ROA. For ROE, the estimate is -0.15, suggesting a negative relationship, though not statistically significant (p-value of 0.671). This implies that an increase in total loans may be associated with a slight decrease in ROE, but the effect is not strong enough to be considered statistically significant. Likewise, for ROA, the estimate is 0.09, indicating a positive relationship between total loans and ROA. However,

this positive effect is also not statistically significant, as the p-value stands at 0.300. These findings imply that, within this model, total loans do not exhibit a significant direct impact on either ROE or ROA.

The total number of branches maintained by entities is another predictor considered in the model. This variable had a more substantial and statistically significant impact on both ROE and ROA. For ROE, the estimate is 0.11, indicating that an increase in the total number of branches is associated with a positive effect on ROE. This effect is statistically significant, with a p-value of 0.003, suggesting that a larger branch network contributes to higher ROE. Similarly, for ROA, the estimate is 0.01, implying a positive relationship between the total number of branches and ROA. While the effect is positive, it is not statistically significant, as the p-value is 0.185. This indicates that, within the model's scope, the total number of branches has a statistically significant impact on ROE but not on ROA. The fitted model was therefore:

$$ROE = 7.13 + 0.85X_1 - 0.15X_2 + 0.11X_3 + \mu_j + e_{jt} \ldots\ldots \quad (4.3)$$

$$ROA = 0.100 + 0.754X_1 + 0.671X_2 + 0.03X_3 + \mu_j + e_{jt} \ldots\ldots \quad (4.4)$$

Where :

X_1 : CSR

X_2 : Total loans

X_3 : Total number of branches

The study objective number two was to determine the relationship between reputational risk and financial performance of commercial banks in Kenya. The reputational risk of commercial banks in Kenya was estimated using the availability of CSR activities, total loans, and total number of branches per bank in every year under study. In summary, over the six-year period, the data shows a gradual shift towards entities engaging in CSR activities. The overall distribution for the entire period indicates that 79.9% of the banks engaged in CSR activities, showing a growing focus on corporate social responsibility as an integral part of reputation risk management. There were fluctuations in the mean total loans with substantial increase in 2020 and a decrease in 2021. Overall, total loans ranged from Ksh 0 – Ksh 373 million. This wide range in loan values reflects the financial diversity and dynamism among the banks in the study. The final reputational risk aspect explored is the total number of branches maintained by the banks. This provides insights into the geographical reach and scale of operations, which can influence reputation risk. The mean and median values fluctuated slightly over the years. In 2016, the mean was approximately 39.9 branches (with a standard deviation of 48.8), and the median was 19 branches, ranging from 3 to 198 branches. The data suggests that the banks in the study maintained a similar scale of operations, with only marginal changes in the number of branches, indicating a degree of stability in their geographical presence over the years.

The study does not find a significant effect of participation in CSR activities on Return on Equity or Return on Asset. The estimated impact of both indicators is positive but not statistically significant, with high p-values (0.754 for ROE and 0.306 for ROA). As for the

total loans and financial performance in as far as reputation is concerned, Total loans shows a negative relationship between Return on Assets and Return on Equity, but this relationship is not statistically significant ($p = 0.671$ for ROE and 0.300 for ROA). However, the overall number of branches exhibits a meaningful positive relationship with ROE ($p = 0.003$), indicating its potential influence on financial performance.

The original estimates (intercepts) for ROE and ROA were not statistically significant, indicating the presence of other influencing factors in these metrics. Although corporate social responsibility activities and total loan did not have a substantial direct impact on Return on Equity or Return on Assets, the physical presence of banks (all branches) played a more significant role in determining Return on Equity.

The study found out that there has been a remarkable shift in CSR activities through the six years under study, showing a greater emphasis on reputational risk management in Kenya's commercial banks, with 91.2% commercial banks committed to CSR from 2021 onwards. Significant changes in median and average loan rates highlight financial diversification and market dynamics, reflecting changes in economic conditions that affect lending policy and currency fluctuations. Geographical presence and size illustrate that the growing number of branches indicates a consistent approach to maintaining an operational footprint. Data from Tables 4.3 and 4.4 shed light on the evolution of reputational risk in Kenyan commercial banks. Although increasing emphasis is being placed on CSR activities, the study highlights the volatility of total costs and the stability of branch numbers, suggesting strategic adaptation to market fluctuations.

From the mixed effects regression analysis focusing on reputational risk and financial performance measures in Kenyan commercial banks reveals no direct statistically significant relationship between CSR activities or total credit and ROE/ROA (Chipa & Wamiori, 2020). However, the overall number of branches shows a significantly positive relationship with ROE, emphasizing its role in determining financial performance.

Furthermore, from the results on reputational risk, there is a growing emphasis on CSR activities as a part of reputation risk management over the years. Additionally, the results showcase the financial diversity among the banks, with significant fluctuations in total loans. Data from Central Bank of Kenya (2014) shows that the number of branches remains constant, reflecting consistency in geographical reach and operational scale. CSR and total loans do not significantly affect financial performance as indicated by return on equity and return on assets (ROE and ROA), while the total number of branches has a statistically significant positive impact on ROE but not on ROA. This coincides with the findings of Monetary Authority of Singapore, 2020. Even though CSR activities have been shown by previous studies as contributing to improved financial performance (Sameer, 2021), most banks in Kenya do not explicitly report them in their financial reports.

The second objective had three indicators and the first of those indicators was the Impact of CSR activities on Financial Performance of commercial banks in Kenya. The regression analysis in the analysis includes the presence of CSR activities as a reputational risk predictor of financial performance. Entities engaged in CSR activities are represented as "Yes," while those without CSR activities are the reference category labeled "No."

However, the effect of CSR activities is not statistically significant for both ROE and ROA. This findings conflicts with other studies which found strong statistical relationship between banks engaging in CSR activities and improved financial performance. For example, according to Muchiri *et. al*. (2022), CSR activities was strongly associated with improved financial performance. The study, conducted among financial institutions in Kirinyaga County and aimed at examining how engaging in charitable, ethical and gender mainstreaming activities impacted how financial institution performed, found a very strong association.

In another study, which was conducted by Zhou *et. al*. (2021), CSR activities had a negative impact on financial performance of financial institutions in the short run but positive impact in the long run. The study was conducted among banks listed in China between 2008 and 2018 and the mediating effect of green credit on financial performance evaluated. However, for the Kenyan Setting, it is important to note that most banks engage in unrecorded CSR activities. Most banks only mention the activities but does not give the exact value of these activities in their annual or quarterly financial reports. CSR activities therefore remains as a crucial activity in improving the financial performance of banks.

It is also important to note that the nature of CSR activities offered by financial banks in Kenya includes giving scholarships to top performing students who are from poor families and therefore not able to pay for their own education. Such programs include the Equity Group Foundation Scholarship, KCB Foundation Scholarship, Co-operative Bank Foundation Scholarship, Standard Chartered Bank Kenya Scholarships, Barclays Bank of

Kenya Scholarships, Family Bank Foundation Scholarship, NIC Bank Foundation Scholarship, Stanbic Bank Foundation Scholarship, Chase Bank Kenya Foundation Scholarship and the Diamond Trust Bank (DTB) Foundation Scholarship. Banks also have initiatives where they assist the community by providing sanitation facilities and the fact that these programs benefit the less fortunate in the society is of great importance.

The second indicator of the second objective was the impact of total loans on financial performance of commercial banks in Kenya. Total loans on the other hand, as a predictor of financial performance, suggested a negative relationship, though not statistically significant. Increase in total loans could either be due to the fact that banks have increased their lending abilities or most people have failed to pay their loans. In the first case, it would imply better performance and worse performance in the second case. However not statistically significant, the findings of this study are similar to findings from other studies where increase in loans had a negative impact on financial performance as it showed that more people were defaulting in their loans.

Abdirahman (2020) found that non-performing loans had a detrimental impact on the financial performance of financial institutions while performing loans had a strengthening positive impact. The study was conducted across 42 commercial banks in Kenya. This finding underscores that financial institutions should ensure that they have a robust system for ensuring that the give loans to individuals who are able to pay on time to ensure sustainability and growth. The government of Kenya has put in place measures to ensure

that loan defaulters are listed and the information available to lenders to use while making decisions on lending money.

The influence of number of branches on financial performance of commercial banks in Kenya served as the third indicator of reputational risk on financial performance of commercial banks in Kenya.The total number of branches maintained by these banks emerged as the most influential predictor in the model. An increase in the number of branches was associated with a statistically significant positive effect on ROE (statistic: 0.11, p-value: 0.003), indicating that a branch size contributes inversely to an increase in ROE on, although the result was positive for ROA (statistics: 0.01). However, it was not statistically significant (p-value: 0.185), indicating that the total number of branches had little effect on ROA in the model.

An analysis of global findings according to Hirtle (2007), which are similar to the finding of this study, indicates medium sized banks have fewer branches and thus disadvantaging them when competing with larger banks. According to Jathurika (2018), having branches, nationwide gave banks an advantage compared to those who had fewer or localized branches and this better financial performance.

4.3.3 Relationship between Technological Risk and Financial Performance of Commercial Banks in Kenya.

Mixed effects regression analysis to determine the relationship between the technological factors and financial performance is as summarized in Table 4.5.

Table 4.7

Mixed Effects Regression Model Fitted to Determine the Relationship between Technological Risk and Financial Performance

	ROE			ROA		
Predictors	*Estimates*	*CI*	*P*	*Estimates*	*CI*	*P*
(Intercept)	8.58	1.91 – 15.24	0.012	0.33	-1.07 – 1.72	0.646
Number of ATMS	0.68	-1.12 – 2.47	0.459	0.38	-0.02 – 0.78	0.062
Number of agents	0.00	-0.06 – 0.07	0.935	0.00	-0.01 – 0.02	0.864
Total number of branches	0.15	0.06 – 0.24	0.001	0.00	-0.02 – 0.03	0.635
ROE model Interclass correlation (ICC)-0.54 ROA model ICC- 0.47						

From the mixed effects regression analysis with random effect for different banks, the intercept for ROE is 8.58, with a 95% confidence interval spanning from 1.91 to 15.24. This suggests that, without considering other factors, the baseline ROE falls within this

range. Similarly, for ROA, the intercept is 0.33, with a confidence interval of -1.07 to 1.72, indicating that the baseline ROA hovers around this interval. The p-values for both intercepts are relatively low with return on assets recording p-value of 0.012, implying that these baseline values are statistically significant.

The number of ATMs was included as a technological risk predictor the number of ATMs and ROE. However, this effect is not statistically significant, as indicated for both ROE and ROA. For ROE, the estimate is 0.68, suggesting a positive relationship between by the relatively high p-value of 0.459. Similarly, for ROA, the estimate is 0.38, implying a positive relationship between the number of ATMs and ROA. This effect is statistically insignificant, with a p-value of 0.062, indicating that the relationship between the number of ATMs and ROA approaches statistical significance but does not reach the conventional threshold.

The number of agents was another predictor considered in the model. For both ROE and ROA, the estimates are close to zero (0.00), indicating that the number of agents does not have a substantial direct impact on either financial performance indicator. Additionally, the p-values for both ROE and ROA are relatively high (0.935 for ROE and 0.864 for ROA), reinforcing the notion that the number of agents is not a statistically significant predictor of financial performance.

The total number of branches maintained by financial entities was the final predictor in the model. This variable is a statistically significant positive impact on both ROE and ROA. For ROE, the estimate is 0.15, indicating that an increase in the total number of branches

is associated with a positive effect on ROE. This effect is statistically significant, with a low p-value of 0.001, suggesting that a larger branch network contributes significantly to higher ROE. Similarly, for ROA, the estimate is 0.00, implying a positive relationship between the total number of branches and ROA. However, this effect is not statistically significant, as the p-value stands at 0.635. This indicates that, within the model's scope, the total number of branches has a statistically significant impact on ROE but not on ROA. The regression model fitted was therefore as shown below:

$ROE = 8.58 + 0.68X_1 + 0.15X_3 + \mu_j + e_{jt}$……..(4.5)

$ROA = 0.33 + 0.38X_1 + \mu_j + e_{jt}$……..(4.6)

Where :

X_1 : Number of ATMS

X_3 : Total number of branches

The third objective of the study was to establish the relationship between technological risk and financial performance of commercial banks in Kenya. This objective examined the relationship between technological risk as measured by the number of ATMs a commercial bank had, the total number of agents managed by a commercial bank, the total number of branches and financial performance metrics ROE and ROA This sub-section attempts to determine whether there is a statistically significant relationship between technological risks and the financial performance of these banks. Regression analysis provided baseline values of ROE and ROA in the absence of other predictive data. The intercept for ROE is

8.58, with a 95% confidence interval ranging from 1.91 to 15.24, while the cutoff ROA is 0.33, with a confidence interval ranging from -1.07 to 1.72. This intercept indicates that if the factors are not considered, basic ROE and ROA fall within these areas. The p-values of ROE (0.012) and ROA (0.646) show statistical significance for initial ROE but not ROA. For technological risk, the number of ATMs and the number of agents do not exhibit substantial direct effects on either ROE or ROA, as their estimates are not statistically significant. However, the total number of branches emerges as a statistically significant predictor with a positive impact on ROE but not on ROA.

The third objective like the second objective also had three indicators and the first of those indicators was number of ATMs and financial performance of commercial banks in Kenya**.** The study includes the number of ATMs as an indicator of both ROE and ROA. ATM volume estimates showed a positive correlation with both ROE (0.68 estimate) and ROA (0.38 estimate). However, these effects were not statistically significant, with p-values of 0.459 for ROE and 0.062 for ROA. The relationship between the number of ATMs and ROA is close to statistical significance but falls short of the traditional threshold. Things findings are however not statistically significant, are similar to what previous studies have found.

According to Mwai *et al* (2018), number of ATMs had a positive statistically significant relationship with financial performance of commercial banks. This was moderated by the size of the banks. The lack of statistical significance for the current study could be explained by the rise of mobile banking where customers are able to access the funds

anytime and anywhere on a higher capacity compared to using ATMS. Use of ATMs can sometimes be insecure and thus people have embraced mobile banking as opposed to having to physically travel to withdraw money from an ATM which typically have lower capacity. According to Buddhika (2021) the use of ATMs is significantly associated with improved performance of financial banks in addition to the use of mobile and internet banking. A recent report by Statista indicated that over 63.9 million sim cards were registered by January 2024 in Kenya. This implies that the use of mobile banking is most likely increasing and thus reducing the use of ATMs. Mobile banking has been shown to contribute significantly to the growth of commercial banks (Buddhika, 2021).

The second indicator of technological risk on financial performance of commercial banks in Kenya was the number of branches and financial performance of commercial banks in Kenya. From the results the number of branches was another predictor considered in the model. The estimates for ROE and ROA were close to zero (0.00), indicating that the number of representatives does not have a significant direct effect on any of the financial performance indicators. Besides, the p-value was quite high for ROE (0.935) and ROA (0.864), which again indicates that representativeness is not a statistically significant predictor of economic performance.

In summary, the findings show that the number of ATM employees, as a measure of technical risk, did not show a statistically significant direct effect on financial performance metrics (ROE and ROA) in this sample, although a positive relationship was found with number. The ATM and ROE relationship failed to reach statistical significance, indicating

that these technical factors may not play a significant role in the variation in the financial performance of commercial banks in Kenya. Thus, based on this study, there is no relationship between economic performance (ROE and ROA) and technical risk (number of ATM operators) and financial performance (ROE and ROA) of commercial banks in Kenya.

The third and final indicator of technological risk was the number of agents and financial performance of commercial banks in Kenya. From the results, the number of agents **f**or both ROE and ROA, the estimates are close to zero, indicating that the number of agents does not have a substantial direct influence on either financial performance indicator. This is in contrast with what has been found previously by other studies. For instance, Oburu (2018) found that agency banking improved the performance of commercial banks contributed by 33%. The insignificant impact reported by the current study could be explained by the current rise in the use of mobile and internet banking.

4.3.4. The moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya.

To assess the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya, banks were grouped according to the central bank of Kenya tiers categorization and mixed effects regression models fitted (Table 4.6). From the categorization, 17.6%, of the banks included in this study fell under tier 1, while 38.2% and fell under tier 2 and 44.1% were in tier 3.

Table 4.8

Linear Mixed Effect Model to Determine the Moderating Effect of Firm Size on the Relationship between Environmental Risk and the Financial Performance of Commercial Banks

	ROE			ROA		
Predictors	*Estimates*	*CI*	*P*	*Estimates*	*CI*	*P*
(Intercept)	168.06	52.35 – 283.77	0.005	35.03	-4.85 – 74.90	0.085
Liquidity risk	-10.10	-31.18 – 10.98	0.345	-1.00	-6.22 – 4.23	0.707
Bank tiers						
Tier 1	Reference					
Tier 2	-109.39	-245.95 – 27.17	0.116	-11.75	-46.11 – 22.62	0.500
Tier 3	-159.27	-297.90 – -20.64	0.025	-18.94	-53.56 – 15.68	0.281
Credit risk	-0.41	-0.83 – 0.02	0.059	-0.00	-0.11 – 0.11	0.972
Exchange rate	-1.40	-2.47 – -0.33	0.011	-0.34	-0.72 – 0.04	0.077
Interest rate risk	-1.01	-2.69 – 0.68	0.239	-0.09	-0.75 – 0.57	0.791
CSR activities						
No	Reference					
Yes	0.45	-7.80 – 8.70	0.915	1.93	-0.10 – 3.95	0.062
Total loans	-0.09	-1.62 – 1.44	0.908	0.02	-0.36 – 0.40	0.924

Total number of branches	0.01	-0.14 – 0.17	0.867	0.00	-0.04 – 0.04	0.999
Number of ATMS	5.33	-3.60 – 14.27	0.240	0.71	-1.50 – 2.92	0.526
Number of agents	-0.02	-0.09 – 0.04	0.482	-0.00	-0.02 – 0.02	0.836
Moderating effect of firm size						
Liquidity risk (tier 1)	Reference					
Liquidity risk: tier 2	10.51	-13.90 – 34.93	0.396	1.92	-4.13 – 7.97	0.532
Liquidity risk: tier 3	-2.06	-25.96 – 21.84	0.865	2.28	-3.64 – 8.19	0.448
Credit risk: tier 1	Reference					
Credit risk: tier 2	0.25	-0.23 – 0.74	0.305	0.01	-0.11 – 0.14	0.856
Credit risk: tier 3	0.17	-0.31 – 0.66	0.476	0.05	-0.07 – 0.17	0.382
Exchange rate: tier 1	Reference					
Exchange rate: tier 2	1.13	-0.13 – 2.38	0.077	0.15	-0.17 – 0.46	0.357
Exchange rate: tier 3	1.29	0.01 – 2.56	0.049	0.18	-0.14 – 0.50	0.272
Interest rate risk: tier 1	Reference					
Interest rate risk: tier 2	0.69	-1.28 – 2.65	0.492	0.09	-0.40 – 0.58	0.720

Interest rate risk: tier 3	2.02	0.04 – 3.99	0.046	-0.18	-0.68 – 0.32	0.470
CSR: tier 1	Reference					
CSR: tier 2	-2.39	-12.78 – 8.01	0.651	-2.30	-4.89 – 0.28	0.080
CSR: tier 3	-0.21	-1.82 – 1.40	0.797	-0.04	-0.44 – 0.36	0.854
Total branches: tier 1						
Total branches: tier 2	-0.07	-0.31 – 0.18	0.596	-0.01	-0.07 – 0.05	0.698
Total branches: tier 3	0.32	-0.04 – 0.68	0.086	-0.22	-0.31 – -0.14	<0.001
ATMS: tier 1	Reference					
ATMS: tier 2	-5.86	-15.18 – 3.46	0.216	-0.85	-3.16 – 1.46	0.467
ATMS: tier 3	-8.78	-18.18 – 0.63	0.067	1.03	-1.32 – 3.38	0.389
ROE model Interclass correlation (ICC)-0.45 ROA model ICC- 0.24						

From the table, ROE intercept is 168.06 with a 95% confidence interval (CI) of 52.35 to 283.77 and a statistically significant p-value of 0.005. This suggests a strong starting point for ROE. The ROA intercept is 35.03 with a wider CI (-4.85 to 74.90) and a p-value of 0.085, indicating no statistical significance. Firm size, categorized into three tiers (Tier 1, Tier 2, and Tier 3), moderates the relationship between risk factors and financial performance. For both ROE and ROA, tier 1 serves as the reference category. The results show that in tier 2 banks, there is a negative impact on ROE, with an estimate of -109.39 and a p-value of 0.116. However, the impact on ROA is less pronounced, with an estimate of -11.75 and a p-value of 0.500, indicating that tier 2 banks may face challenges in maintaining high ROE when compared to tier 1 banks. In tier 3 banks, there is a significant negative impact on both ROE (-159.27) and ROA (-18.94), suggesting that the smallest banks face hurdles in achieving favorable financial performance.

The results also indicate that liquidity risk does not significantly impact ROE or ROA across all tiers, with p-values ranging from 0.345 to 0.707. This suggests that banks manage liquidity risk consistently, irrespective of their size. Credit risk on the other hand, exhibits a minimal impact on financial performance, with p-values ranging from 0.059 to 0.972 across different tiers. The estimates are close to zero, indicating that credit risk has a negligible influence on ROE and ROA. Exchange rate risk shows a negative impact on both ROE and ROA in tier 1, with p-values of 0.011 and 0.077, respectively. In tier 2, the effect is less pronounced, with p-values of 0.077 and 0.357. In Tier 3, exchange rate risk has a significant positive impact on ROE (estimate of 1.29) but still negatively affects ROA (estimate of -0.34). Interest rate risk does not significantly affect ROE or ROA, with p-

values ranging from 0.239 to 0.791 across different tiers. The estimates are close to zero, indicating that interest rate risk has a minimal influence on financial performance.

CSR activities have a positive impact on ROE in tier 2, with an estimate of 1.93 and a p-value of 0.062, suggesting that smaller to medium-sized banks in tier 2 benefit from engaging in CSR activities. However, CSR activities do not significantly affect ROA, with p-values ranging from 0.482 to 0.999 across tiers. In addition, total loans have a negligible impact on financial performance, with p-values ranging from 0.908 to 0.924. The estimates are close to zero, indicating that the size of the loan portfolio does not significantly influence ROE or ROA.

Furthermore, the number of branches affects financial performance differently across tiers. In tier 1 and tier 2, the impact is not statistically significant, with p-values ranging from 0.596 to 0.698. However, in tier 3, a higher number of branches has a negative impact on ROA, with a significant p-value of <0.001. The number of ATMs and agents maintains a consistent but modest impact on financial performance across tiers, with p-values ranging from 0.240 to 0.836. These variables have a relatively stable influence on ROE and ROA.

The analysis further explores the moderating effects of firm size within each risk factor category. For instance, within liquidity risk, tier 2 banks exhibit a positive moderation on ROE (estimate of 10.51), while Tier 3 banks show a positive moderation on ROA (estimate of 2.28), indicating that firm size moderates the relationship between liquidity risk and financial performance differently. Similarly, within credit risk, no significant differences are observed in the moderating effect of firm size, as p-values range from 0.305 to 0.856.

This suggests that credit risk impacts financial performance consistently across tiers. Within exchange rate risk, the moderating effect of firm size varies, with tier 3 banks experiencing a positive impact on ROE (estimate of 1.29). In contrast, tier 2 banks show a positive impact on ROA (estimate of 0.15). This suggests that larger banks may have distinct strategies for managing exchange rate risk.

Interest rate risk also exhibits varying effects across tiers, with tier 3 banks experiencing a positive impact on ROE (estimate of 2.02). However, interest rate risk does not significantly impact ROA across tiers. For CSR activities, the moderating effect of firm size is evident in tier 2, where engagement in CSR activities positively impacts ROE (estimate of 1.93). This highlights the strategic advantage of CSR for smaller to medium-sized banks. The total number of branches also shows a significant moderating effect in tier 3, where a higher number of branches negatively impacts ROA (estimate of -0.22). This underscores the challenges that smaller banks face in managing extensive branch networks efficiently. The regreression equations for both ROE and ROA are as follows:

For ROE

$$ROE = 168.06 - 10.10\ X1 - 109.39X_2 - 159.27X_3 - 0.41X_4 - 1.40X_5 - 1.01X_6 + 0.45X_7 - 0.09X_8 + 0.01X_9 + 5.33X_{10} - 0.02X_{11} + 10.51M_1 - 2.06M_2 + 0.25M_3 + 0.17M_3 + 1.13M_4 + 1.29M_6 + 0.69M_7 + 2.02M_8 - 2.39M_9 - 0.21M_{10} - 0.07M_{11} + 0.32M_{12} - 5.86M_{13} - 8.78M_{14} + b0j + \epsilon \quad \text{.....(4.7)}$$

For ROA

$$ROA = 35.03 - X_1 - 11.75X_2 - 18.94X_3 - 0.34X_5 - 0.09X_6 + 1.93X_7 + 0.02X_8 + 0.71X_{10} + 1.92M_1 + 2.28M_2 + 0.01M_3 + 0.05M_4 + 0.15M_5 + 0.18M_6 + 0.09M_7 - 0.18M_8 - 2.30M_9 - 0.04M_{10} - 0.01M_{11} - 0.22M_{12} - 0.85M_{13} + 1.03M_{14} + b0j + \epsilon \quad \text{.....(4.8)}$$

Where:

$X_{1:}$ Liquidity Risk

X_2: Bank tier 2 (dummy variable)

X_3: Bank tier 3 (dummy variable)

X_4: Credit Risk

X_5:Exchange Rate

X_6: Interest Rate Risk

X_7: CSR (dummy variable)

X_8: Total loans

X_9: Total number of branches

X_{10}: Number of ATMs

X_{11} : Number of Agents

And $M_1 - M_{14}$ represents the interaction between a variable and firm size (represented by bank tiers)

The last objective of this study sought to examine the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya. Environmental risk was determined jointly using economic risk, reputational risk and technological risk. These factors were all combined to assess the relationship between environmental risk and financial performance moderating for firm size. From the analysis conducted, increase in firm size is positively associated with increase in ROA. To access the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya, banks were grouped according to the central bank of Kenya tiers categorization which resulted in 17.6% of the banks being categorized as tier 1, 38.2% as tier 2 and 44.1% as tier 3.

Findings indicated that firm size, categorized into three tiers (Tier 1, Tier 2, and Tier 3), moderates the relationship between environmental risk factors and financial performance. Environmental risk consists of economic risk, reputational risk, and technological risk. There are two distinct relationships clearly relating to the moderation variable. The first relationship was that of firm Size and financial performance of commercial banks in Kenya. From the results of the study, figure 4.1 shows the relationship between firm size and return on equity (ROE). The figure shows a positive relationship between company size and ROE. As organization size increases, so does ROE, indicating that larger banks, as measured by total assets, tend to have higher returns on investment.

Similarly, Figure 4.2 shows the relationship between firm size and return on assets (ROA). The graph shows a positive relationship between company size and ROA. Fund size, across

all assets, is found to have a positive impact on ROA, especially for funds with positive ROA values. This finding is similar to what Mwihaki *et. al*. found (2022). According to the study, larger banks performed better than smaller banks. The study further indicated the short-term and long-term equilibrium exhibited by firm size and ROA. The study was conducted by scanning annual reports of 32 commercial banks in Kenya from 2013 to 2020.

The second moderating relationship from the model is that of moderating effects of firm size on environmental risk and financial performance. The study used a mixed effects regression model to examine the moderation of environmental risk (economic risks, technological risks) and financial performance (ROE and ROA) and found that in commercial banks in Kenya, the rate is 38.2% and 44.1%, respectively. The results of this analysis are presented in Table 4.6. It seeks to examine how the effect of environmental risk on financial performance may vary among banks based on their size. This approach aims to understand whether firm size, as represented by banks, moderates the relationship between environmental risk and financial performance.

It will be important to examine specific and significant coefficients from mixed-effects regression models. Analysis of the interaction effects between environmental risk and firm size at different levels provides insights into how environmental risks to financial performance vary by bank size. Besides, it is vital to understand micro-environmental relationships between environmental risk, firm size, and financial performance under commercial banks in Kenya and explain how these results contribute to the extension of any statistically significant findings.

Table 4.6 shows the results of a linear mixed-effects regression model aimed at understanding the moderating effect of firm size on the relationship between environmental factors (such as liquidity risk, credit risk, exchange rate, interest rate risk, CSR activities, and number), and commercial banks in Kenya's Financial performance index at various levels (ROE and ROA). The preliminary observations reveal that the intercept for ROE is 168.06 with a significant p-value of 0.005, indicating a strong baseline for ROE among the analyzed banks. For ROA, the intercept is 35.03 with a wide confidence interval (ranging from -4.85 to 74.90) and a p-value of 0.085, indicating the statistical significance of a variable.

The relationship between environmental risk and economic performance is that individual predictors (economic risk, credit risk, exchange rate, interest rate risk, CSR activities, total loans, number of branches, number of ATMs, and number of agents) do not show a statistically significant relationship with ROE and ROA, because neither falls below the common threshold of 0.05. Moderating effect of firm size (investment level): The regression model examines the moderating effect of savings levels (Tier 1, Tier 2, and Tier 3) on the relationship between environmental risk and financial performance measures. The moderator effect analysis identifies characteristics of different risk factors among banks (Tier 1, Tier 2, and Tier 3) in terms of ROE and ROA.

Notably, some predictors demonstrate statistically significant differences in their effects across stock markets. For example, currency risk has a statistically significant impact on ROE for Tier 3 banks, which means that there is a potential change in volatility risk in the

overall profitability of banks. Hence, while private environmental risk did not show a significant direct impact on financial performance, the study reveals nuances in banks considering. Certain risks, such as exchange rate risk in Tier 3 banks and interest rates of risk in Tier 3 relative to ROE, exhibit notable changes in impact.

The findings in Table 4.6 highlight the importance of considering the moderating firm size, as determined by banks, in the relationship between environmental risk and financial performance. While not showing significant direct main effects from most individual factors, the differential results across banks suggest the need for a nuanced understanding of how these risks affect financial performance in commercial banks differing from each other or their respective positions in relation to Kenya. Further interpretation of these unique results and their implications for risk management strategies and regulatory frameworks in the banking industry may provide valuable insights.

The classification of banks into tiers (Tier 1, Tier 2, and Tier 3) based on their size has provided interesting insights into the effects of risks on financial performance at these tiers. Level-dependent effects on ROE and ROA in Tier 2 banks exhibit a significantly negative impact on ROE (-109.39) compared to Tier 1, indicating difficulties in maintaining high profitability. However, the impact of ROA in Tier 2 banks is small (-11.75), meaning a relatively moderate impact on efficiency. Tier 3 banks show a particularly negative impact on both ROE (-159.27) and ROA (-18.94), highlighting the major barriers to smaller banks' achieving better financial performance metrics. The findings indicate that economic risk management does not significantly affect ROE or ROA at different levels, suggesting a

consistent pattern regardless of bank size, specifically on liquidity and credit risk impact. Credit risk exhibits a negligible impact on financial performance at the various levels, with estimates close to zero, indicating little effect on ROE and ROA.

Exchange rates riskand interest rate risk under economic risk affects Level 1 negatively in terms of both ROE and ROA, with Tier 3 having a different influence, which is a significant positive relationship on ROE but also a negative relationship on ROA. This outcome shows a strong relationship between exchange rates of risk and financial performance at different levels due to moderation. Interest rate risks appear to have a negligible effect on ROE and ROA, with estimates close to zero, indicating little effect on financial performance indices.

CSR Activities and Credit Impact*:* CSR activities show a positive impact on ROE in Tier 2 banks, suggesting potential benefits for small and medium-sized banks engaging in CSR. However, these activities do not significantly affect ROA at the different levels (Baraza, 2020). Loan bank size does not appear to have a significant effect on ROE or ROA across banks, suggesting that total loans have a negligible impact on financial performance. These findings highlight the subtle effects of risks and strategic decisions on banks' financial performance, especially when considered in terms of their size or position (Mohamed & Onyiego, 2018). Tier 2 and Tier 3 banks are synchronized to maintain high benefits in comparison to Tier 1, whose purpose is banks of banks. It is to ensure its financial stability amidst various challenges.

An analysis of various levels of the classification of banks into a particular tier (tier 1, tier 2, and tier 3) based on their size sheds light on how risks and strategic decisions are taken

if the business affects financial performance at these levels. Butt, Ayub, Latif, Asif, Shabbir, & Raja, (2022) postulate that these Tier 2 banks exhibit a negative impact on ROE, indicating difficulties in maintaining high profitability, while the impact on ROA is small. Tier 3 banks face a significant negative impact on both ROE and ROA, showing barriers to smaller banks' achieving positive financial performance. Economic risk has no significant impact on ROE or ROA at different levels, indicating a consistent economic risk strategy regardless of bank size these results are same as those of (CBK, 2018 and Onuonga, 2014).

There is a negligible relation on financial performance at various levels, meaning a relatively small impact on ROE and ROA. Different effects between levels, with column 1 showing a negative impact on ROE and ROA and column 3 having a positive effect on ROE but a negative effect on ROA, reflecting different approaches to managing exchange rate risk handled in banks of various sizes. The study exhibits different effects across levels, with phase 3 having a positive relation on ROE but no significant relation on ROA.

CSR activities affect ROE in tier 2 banks positively, indicating the benefits for small and medium-sized banks to engage in CSR activities, but does not affect ROA in tier 2 significantly. Total debt quantity has a negligible effect on economic growth. According to James & Kepha (2020) ;(Imane, 2020), the increase in the number of branches at Tier 3 has a negative impact on ROA, highlighting the challenges for smaller banks in effectively managing extensive branch networks. The number of ATMs and the influence of employees consistently have a low impact on financial performance at different levels and

show a stable but weak impact on ROE and ROA. The findings illustrate a low effect of firm size on risks as Tier 2 funds exhibit a positive effect on ROE, while Tier 3 funds exhibit a positive effect on ROA, reflecting the unique impact of firm size (Ouma *et al.,* 2020) ;(Mishra & Mohanty, 2018). No significant differences in the moderation of the effect were found between different levels of credit risk. The impact of exchange rates varies across positions, suggesting that central banks may have different ways of managing this risk. Interest risk on Tier 3 funds has a positive impact on ROE. Tier 2 banks benefit from engaging in CSR, reflecting the systemic benefits for small and medium-sized banks (Ifeanyi *et al.,* 2016); (Mallinguh *et al*., 2020).

Significant moderating effects in Level 3 which illustrate the challenges that small banks face in effectively managing extensive branch networks. These findings highlight the need for flexible approaches to risk management and strategic decisions based on capital and market conditions to ensure economic growth. Analysis of the relationship between risk factors and financial performance of commercial banks in Kenya provided valuable insights into the nature of risk management and its impact on financial metrics such as

Return on Equity (ROE) and Return on Assets (ROA). The study incorporated financial, reputational, and technical risks, providing a comprehensive view of the impact on banks' performance. In analyzing economic risks, especially currency and credit risks, Chipa & Wamiori (2020) and James & Kepha (2020) assert that it was clear that although they individually did not show a direct and statistically significant impact on ROE or ROA, they played an important role in shaping the overall financial position in the 1990s.

Despite their immediate impact, the pattern of liquidity and credit risk management in banks of different sizes reflects the disciplined risk management framework of the Kenyan banking sector. Butt *et al*. (2022) contends that turnover risk, typically associated with corporate social responsibility (CSR) activities, revealed an interesting trend. Although involvement in CSR activities showed a slight positive effect on ROE, it was not statistically significant. However, a significant positive impact on ROE was observed among Tier 2 banks, highlighting the strategic value of CSR for small and medium-sized banks in Kenya (Imane, 2020). The findings suggest that a focus on CSR can significantly improve the financial performance of these banks.

Technological risk measured by the number of ATM employees did not show a strong and direct relationship with ROE and ROA. However, it highlighted the need for banks to use technology strategically to improve their efficiency, customer service, and accessibility. The effect of firm size in the risk categories revealed interesting changes in the impact on financial performance measures (Baraza, 2020). Tier 3 banks representing smaller institutions faced significant challenges, manifested mainly in the negative implications for ROE and ROA of risks (Muriithi & Waweru, 2017). For example, branch density has been shown to have a negative effect on ROA for Tier 3 banks, highlighting the difficulties these smaller banks have in managing their sprawling branches effectively (Kiriatha, 2014); (Mishra & Mohanty, 2018).

Exchange rate risk also known as currency risk showed different results at different levels, suggesting that larger banks may have more specific strategies to manage this risk

compared to smaller banks, and interest rate risk showed a positive impact on ROE for Tier 3 banks, indicating that there are different risk management strategies in banks of various sizes.

In summary, this study clarifies the complex relationship between environmental risks and financial performance in the Kenyan commercial banking sector. While some risks, such as liquidity and credit risk management, remained consistent across levels, others, such as reputational risk, technological risks, and branch network effects, maintained constant patterns of different performance based on firm size this result is in line with those of Onsongo, Muathe, & Mwangi, 2020. Thus, just as Khrawish, (2011) suggests,it highlights the importance of standardized approaches to reducing risk and improving financial performance. However, the study acknowledges several limitations, particularly barriers to complete data collection and the dynamic nature of the banking sector, which could have affected analyses and interpretations, therefore future studies should examine these areas and go into the details.

Investment and Credit Risk enhance sustainable performance. Similar to previous studies, the study showed that financial and credit risk does not have a significant direct impact on ROE or ROA. Karoney (2022) established that this is consistent with existing research that suggests that although these risks are important to banks, their direct impact on financial statements may be limited, highlighting the importance of disciplined risk management in banks emphasizes the importance of the cycle, a phenomenon commonly found in the literature. On reputational risk and CSR activities, the findings of the study showed a

moderate positive impact of CSR activities on ROE, especially in small and medium-sized banks (section 2).

Ashraf *et al*. (2021) and Onsongo *et al*. (2020) illustrated that this result is consistent with a previous study showing that CSR activities can positively impact a number of financial metrics, although not consistently or significantly across banks. The lack of a significant effect on ROA is consistent with the literature suggesting that the impact of reputational risk on financial performance can be subtle and not universally substantial. Technical Risk has indirect effects on these companies' performance (CBK, 2018); (Kioko *et al*., 2019). Similar to a previous study, the study showed that ATM staffing levels did not have a strong direct effect on ROE or ROA. This factor is the finding that technological improvements can affect operational efficiency and customers' indirect service correlation with improved economic growth.

The study revealed how firm size, broken down into different levels, differentially alters the relationship between risk and financial performance. This outcome is consistent with existing literature suggesting that large and medium-sized banks may be exposed to risks differently. For example, Ashraf *et al*. (2021) and Mohamed & Onyiego (2018) contend that smaller banks may face challenges in managing extensive branches, negatively affecting ROA, which is consistent with findings that smaller banks struggle more with cost management. According to Kioko *et al*. (2019) the study revealed different effects of exchange rate and interest rate risks at the bank level. This indication is consistent with a previous study suggesting that larger banks may have different strategies for managing

these risks compared to smaller banks, leading to other effects on financial ratios (CBK, 2018); (Mishra & Mohanty, 2018). Overall, although the specific nuances and scope of findings may vary, the general trends in the analysis are patterns and understandings from previous research on risks and economic performance in the banking sector.

The findings presented in the study are important on multiple scales, contributing to the advancement of knowledge on risk factors and economic performance in the banking sector. These findings have practical, theoretical, and methodological implications and provide insights that can influence future research, practices, policies, and initiatives (Butt *et al*., 2022); (Gachigo, Ondigo, Aduda, &Onsomu, 2023). The results highlight the importance of risk management in banks. Understanding how institutions influence financial performance at different levels can guide banks to develop risk mitigation strategies based on their size and structure.

Findings provide guidelines for strategic decision-making in banks (Olivia, Atahau, &Martono,2022). For example, small and medium-sized banks may consider engaging in CSR activities because they appear to positively affect ROE, providing a potential mechanism for enhancing financial performance. Studies on the impact of technology factors (such as ATMs, agents, etc.) show that although they cannot directly influence financial metrics if these areas are optimized, they can increase efficiency and customer service and indirectly affect performance.

The findings suggest ways to refine models used in the study of financial performance. By measuring the moderating effect of firm size, future models can be enhanced to capture the

impact of risk factors on financial ratios. Revealing the statistically significant impact of the total number of branches on ROE and ROA suggests that future research should analyze different business components together to understand the impact on finance in the operation of the well-understood. Olivia et al. (2022); Wachira (2021); Gachigo *et al.* (2023) reveal the functional and system specifications underpin the regulatory considerations in the banking sector.

Examining how risks affect financial ratios can inform the regulatory framework. Regulators can tailor guidelines and supervisory practices to align the risk profiles of banks of different sizes. Banks can use these data to fine-tune their strategic planning, focus on areas that show potential for improving financial performance, and measure their performance and risk management environment of a particular (Khrawish, 2011). In conclusion, these findings provide a detailed understanding of how risks affect financial performance in the banking industry and address a comprehensive risk management perspective. Implications, theories, and methodologies pave the way for future research to help refine models and practices while guiding decision-making processes in the banking industry.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter outlines the summary of findings, conclusion of the study following the findings and the recommendations thereon. The general objective of this study was to find the relationship between economic risk and the financial performance of commercial banks in Kenya. The study was guided by four specific objectives and these are dealt with in respect to the summary, conclusion and recommendations below.

The study further sought to find evidence for the following hypothesis:

H01: There is no statistically significant relationship between economic risk and financial performance of commercial banks in Kenya.

H02: There is no statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya.

H03: There is no statistically significant relationship between technological risk and financial performance of commercial banks in Kenya.

H04: There is no statistically significant moderating effect of firm size on the relationship between environmental risk and financial performance of commercial banks in Kenya.

As demonstrated in subsequent subsections, significant conclusions can be drawn from numerous statistical analyses.

5.2. Summary

This section provides summary of for the specific objectives which are four in number and includes: to establish the relationship between economic risk and financial performance of commercial banks in Kenya, to determine the relationship between reputational risk and financial performance of commercial banks in Kenya, to establish the relationship between technological risk and financial performance of commercial banks in Kenya and to assess the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya.

5.2.1 Relationship between economic risk and financial performance of commercial banks in Kenya.

Objective one was to establish the relationship between economic risk and financial performance of commercial banks in Kenya. Economic risk was determined using liquidity risk, credit risk, exchange rate and interest rate risk of commercial banks in Kenya. The study findings provided evidence to reject the null hypothesis and conclude that there is a statistically significant relationship between economic risk and financial performance of commercial banks in Kenya.

Over the years, credit risk illustrated a fluctuating trend in the market. The fluctuation of the risks is attributed to the external and internal environmental factors that might affect the running of the banking institution. For instance, in 2021, it demonstrated a drastic drop but later showed a significant increase. However, the economic factors did not illustrate the impact on financial performance like Return on Equity and Return on Assets despite

stability demonstration in the exchange rates and the effective interest rate risk management. The credit risk dynamics examination showed a concerning trajectory. The examination indicated a substantial increase in credit risk over time. It emphasizes the imperative intricate risk management approaches in the commercial banking field. Firstly, the exchange rates need to remain stable to foster a predictable environment for international trade in the macroeconomic sector. Further, the evaluation showed that the interest risk stability suggested effective risk management strategies within the banking industry. Consistent checking of the Risk ensures that the management makes a rational decision to stabilize operations to manage the credit risk dynamic in the banking field. Therefore, credit risk dynamic evaluation is essential in getting a company's trajectory by considering its increased trends over time.

5.2.2. Relationship between reputational risk and financial performance of commercial banks in Kenya.

The second objective was to determine the relationship between reputational risk and financial performance of commercial banks in Kenya and sought to provide evidence for or against the null hypothesis that there is no statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya.

This study in addressing the environmental risks and financial performance of commercial banks scrutinized the relationship between banking reputational risks and financial performance using corporate social responsibilitieactivities engaged in by the commercial banks uner study over the six year period. The evaluation demonstrated a

non-significant relationship between CSR activities and financial performance in the banking field. It highlighted the increasing importance of effective management in reputational risks in the banking industry over the years in alignment with Coulson and Dixon (1995) who found that any association of a bank to a borrower that is unfriendly to the environment can damage its reputation irrespective of compliance with all the legal requirements.

Nevertheless, the study demonstrated that the corporate social responsibility behaviours and the costs involved did not significantly affect the returns on assets and equity. The results show that credit and economic risks emerged as critical factors in influencing financial performance in the financial industry, significantly impacting ROA and ROE. The findings showed that banking institutions need to prioritize risk mitigation strategies by monitoring financial performance and risk management to achieve the required stability of the institution. There were fluctuations in the mean and median values of total loans, indicating changing financial conditions within the banks. For number of branches, the data suggested that the banks in the study maintained a similar scale of operations, with only marginal changes in the number of branches, indicating a degree of stability in their geographical presence over the years.

5.2.3 Relationship between technological risk and financial performance of commercial banks in Kenya.

The third objective was to establish the relationship between technological risk and financial performance of commercial banks in Kenya and sought to find evidence for or

against the null hypothesis that there is no statistically significant relationship between technological risk and financial performance of commercial banks in Kenya. Technological risk relationship with financial performance was measured using the number of ATMs and number of agents a bank had together with the number of branches.

Banking diversification and stability were demonstrated in the banking industry's operations. The diversification ensured that the banks had an alternative source of income to maintain their operations. For instance, total loans given to clients had a considerable variation that illustrated a financial diversification among its clients. On the other hand, numerous branches remained stable, indicating consistency in the operational areas in their respective geographical locations. Besides, the number of branches was significantly balanced with the loan revenues as the disbursement depended on the risk and financial management. For instance, factors like the number of Automated Teller Machines and the banking employees played a significant role in revealing the impact of financial management on the ROE and ROA. Therefore, the study results provided substantial information on the existing technological aspects of operational efficiency and translated to the considerable impact of essential financial management on the performance of banking industries.

5.2.4 The moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya

The fourth specific objective of the study was to assess the moderating effect of firm size on the relationship between environmental risk and the financial performance of

commercial banks in Kenya. To achieve this, commercial banks were grouped according to Central Bank of Kenya tiers categorization with commercial banks in tier one considered large size firms and those in tier two considered as medium sized firms while those in tier three were considered as small firms. From the categorization, 17.6% of the banks included in this study fell uner tier one, while 38.2% of the commercial banks fell in tier two and another 44.1% were in tier three. From this study results, firm size as categorized into three tiers (tier 1, tier 2 and tier 3) moderates the relationship between environmental risks and financial performance of commercial banks.

5.3. Conclusions

This section gives the conclusion of the research findings based on the study objectives and hypothesis. The study had one general objective and four specific objectives. The general objective of the study was to analyze the relationship between environmental risk, firm size and financial performance of commercial banks in Kenya. This was tested using four distinct and independent variables forming specific objectives namely economic risk, reputational risk, technological risk and firm size which was a moderator. From the various statistical findings, several conclusions were drawn and are shown in the subsequent sub sections.

5.3.1. Relationship between Economic risk and Financial Performance of Commercial Banks in Kenya

The first objective sought to Relationship between Economic risk and Financial Performance of Commercial Banks in Kenya. For Objective one, the study results provided evidence to reject the null hypothesis that there is no statistically significant relationship between economic risk and financial performance of commercial banks in Kenya and conclude that there exists a statistically significant relationship between economic risk and financial performance of commercial banks in Kenya. This is exhibited by the fact that economic risk, measured using liquidity risk and credit risk of commercial banks in Kenya had a significant impact on financial performance of financial banks.

Credit risk showed a fluctuating trend, decreasing slightly in 2021. In contrast, credit risk still showed a significant decrease, indicating that credit risk increased over time. Exchange rates remained stable, providing a predictable environment for international trade, while interest rate risk exhibited stability, reflecting effective risk management. Liquidity and credit risk had a significant relationship on financial performance (ROE and ROA) of commercial banks, while exchange rate and interest rate risk did not show a significant relationship on financial performance of commercial banks in Kenya based on the available data. This study clearly showed that economic risk influences financial performance of commercial banks and if it is not properly managed it may lead to enormous losses.

5.3.2. Relationship between Reputational Risk and financial performance of commercial Banks in Kenya

The second objective of the study sought to determine the relationship between reputational risk and financial performance of commercial banks in Kenya. For this objective too, the study results found evidence against the null hypothesis there is no statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya and concluded that there is a statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya. Reputational risk was measured by availability of CSR activities, total loans and total number of branches. In conclusion, since the total number of branches emerges as a predictor with a statistically significant positive impact on ROE but not on ROA.

These findings highlight the complexity of reputational risk management in the financial sector, emphasizing the multifaceted nature of factors influencing financial performance and reputation risk. This finding provides evidence against the null hypothesis, meaning the study proceed to reject the null hypothesis and therefore conclude that there is a statistically significant relationship between reputational risk and financial performance of commercial banks in Kenya.

The study further confirmed that there has been increasing emphasis on CSR activities, indicating that they have become increasingly important in managing reputational risk over the years. Total loans exhibited considerable variation, reflecting financial diversification among banks, while branch numbers remained relatively stable, highlighting the consistency of geographical reach and operational level. Both CSR activities and costs had

no significant impact on financial performance (ROE and ROA). However, the total number of branches had a statistically significant positive effect on ROE but not on ROA.

5.3.3 Relationship between technological risk and financial performance of commercial banks in Kenya.

The third objective of the study was to establish the relationship between technological risk and financial performance of commercial banks in Kenya. The study results found evidence against the null hypothesis that there is no statistically significant relationship between technological risk and financial performance of commercial banks in Kenya and therefore concluded that there is a statistically significant relationship between technological risk and financial performance of commercial banks in Kenya. This is exhibited by the finding that the total number of branches maintained by financial entities was had a statistically significant positive impact on both ROE and ROA.

In conclusion, the statistically significant positive relationship between total number of branches and ROE provides evidence against the null hypothesis, indicating a statistically significant relationship between reputational risk and the financial performance of commercial banks in Kenya. This finding highlights the importance of considering various measures of reputational risk, such as physical presence, in assessing the financial performance of a bank.

5.3.4. Moderating effect of firm size on the relationship between environmental Risk and the Financial Performance of commercial banks in Kenya

The last objective of the study was to assess the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya. From the study findings evidence was found to reject the null hypothesis there is no statistically significant moderating effect of firm size on the relationship between environmental risk and financial performance of commercial banks in Kenya and concluded that there is a statistically significant moderating effect of firm size on the relationship between environmental risk and financial performance of commercial banks in Kenya. This was shown by the finding that firm size, categorized into three tiers (Tier 1, Tier 2, and Tier 3), moderates the relationship between environmental risk factors and financial performance.

This study makes significant contributions to the available body of knowledge in various ways by extending the conceptualization of the linkages between the three research variables environmental risks, firm size and financial performance of commercial banks in Kenya. It is particularly key in the research constructs picked namely economic risks, reputational risks, technological risks and the moderating effect of firm size on environmental risks and financial performance of commercial banks in Kenya.

The study findings contributes critical knowledge to the existing body of knowledge in numerous key areas. The study findings illustrate the essential aspects of the operational

strategies and the risk management experience in the banking sector as concerns economic risks, reputational risks and technological risks. Further, the stud results confirms that firm size moderates the relationship between environmental risks and financial performance of commercial banks in Kenya.. Therefore, the study provides valuable information to the practitioners, academics, and policymakers on the existing risk management approach in the banking field.

5.4. Recommendations

This section provides the recommendations based on research findings for the four specific objectives of the study including: to establish the relationship between economic risk and financial performance of commercial banks in Kenya, to determine the relationship between reputational risk and financial performance of commercial banks in Kenya, to establish the relationship between technological risk and financial performance of commercial banks in Kenya and finally to assess the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya.

5.4.1. The Relationship between Economic risk and Financial Performance of Commercial Banks in Kenya

Founded on the conclusion that there was significant relationship between economic risk and financial performance of commercial banks in Kenya, the study recommends that commercial banks and other financial institutions should invest in a continuous

development, monitoring and improvement of economic risk management models and strategies together with training and development of dedicated staff towards economic risk monitoring and management.

This study also emphasized liquidity risk management in maintaining financial performance stability in the banking industry. The management of liquidity risk will ensure the banks operate within a mutual framework with the other stakeholders to avoid being indebted. Thus, further assessment of the liquidity risk management dynamics can illustrate a robust view of the possible challenges of the practices related to adequate liquidity and their impact on the banking industry's financial environment. Therefore, the liquidity risk assessment provided a robust insight into explaining the interconnection between liquidity risk and financial stability.

In general, the study provided a significant understanding of the relationship between economic risk and the financial performance of commercial banks in the Kenyan context. From the study findings, this research recommends a holistic approach to risk management by emphasizing macroeconomic variables, credit risk, reputational risks, and operations considerations. The study further highlights recommendation for future studies provides a specific opportunity to address the research gaps essential to the researchers, policymakers, and banking stakeholders.

5.4.2 Relationship between Reputational Risk and financial performance of commercial Banks in Kenya

Based on objective two conclusion that there was also a significant relationship between reputational risk and financial performance of commercial banks in Kenya, the study recommends that commercial banks must start to critically consider reputation as a key asset that may enhance their financial performance and therefore budget for and engage on activities geared towards enhancement of their reputation including corporate social responsibility exercises and a wider geographical coverage in terms of branch network.

The study demonstrated that corporate social responsibility activities strategically manage Kenya's banking industry's reputational Risk. Acknowledging the critical role of CSR emphasizes the public expectations, stakeholder demands, and the needs of the public. Consequently, these activities demonstrate the bank's commitment to societal well-being and its initiative to mitigate reputational risks. Further, aligning the banking industry with social and environmental values is essential in fostering trust and goodwill from the public, which is a critical reputational defense for banks.

The study revealed a significant relationship between CSR and banking financial performance, like ROE and ROA. However, the study findings do not demonstrate the importance of CRS in managing banking reputational risks. Besides, the findings show that the costs and the activities related to CSR do not impact the commercial bank's performance in Kenya. Therefore, these findings require a robust exploration of CSR's role in the banking industry's economic returns. Consequently, future research should

emphasize CSR's role beyond reputation risk management and focus more on economic benefits.

The study demonstrated that reputational Risk is a complex concept influenced by numerous factors beyond CSR activities. The study recommends that commercial banks emphasize on the holistic approach to the elements that shape reputation in the banking industry was relevant. The reputation management complexity explains the complex relationship between the social responsibility of banks and societal expectations. Future studies can benefit from this study by using qualitative research methods to find perspectives from stakeholders like customers, regulators, and employees to gain a robust understanding of the critical factors contributing to reputational risks.

5.4.3. The relationship between technological Risk and the financial performance of commercial banks in Kenya

The exploration of the relationship between technological Risk and the financial performance of commercial banks in Kenya marked the third specific objective of the study and from the study findings, it demonstrated significant dependence of the banking operation on technological development. Arising from the conclusion that there was a positive and significant relationship between technological risk and financial performance of commercial banks in Kenya, it is recommended that commercial banks invest their resources on technological advancements including the hardware, software and personnel. The study's conclusion explains that technological risk is dynamic and influential factor in the running of the banking industry in Kenya. Consequently, the technological Risk needs

careful consideration in the strategic decision-making process among the different commercial banks operating in Kenya.

The study's significant findings acknowledge the emerging trends in technology and their essential role in improving efficiency in commercial bank operations. Effective technological innovation integration in the banking industry through ATMs and digital transaction platforms reflects the vital need to embrace technology in banks. Technology integration significantly improves the financial performance of banks. The study indicated that technology factors greatly influence the financial performance of banks due to their role in the efficiency of banking operations.

Future research should focus on the direct financial impact of technological advancement on banking institutions. This study provided an adequate foundation for further studies to identify the specific mechanism of the utilization of technology to enhance the financial performance of commercial banks. Robust knowledge of technological factors will help enhance efficiency in banking operations and improve customer satisfaction, which is a crucial element in enhancing the general financial performance of banks.

Further, this study emphasized the need for continuous technological transformation in banking. Technological innovations like blockchain, artificial intelligence, and digital banking shape traditional banking operations to become more efficient in serving a larger population of customers. Future studies must focus on the adoption rates and the possible challenges the technology can bring to the banking field.

Technology positively impacted the banking financial performance of all the branch's Return on Equity. Increased digital channels in the banking fields, apart from employees' physical presence, significantly help enhance banks' financial performance. Future studies explore specific operational benefits from the stable branch network that considers customer accessibility and improved market penetration.

The study's exploration of the technological risks in the banking industry and its relationship with financial performances emphasized the emerging trend in the banking sector's digitalization process. Digital channels have become essential banking services because they help customers make quick transactions remotely. Further, they help the bank management in analyzing financial metrics more easily. However, understanding the impact of technology risk on the banking industry's performance is essential in evaluating balancing innovation and mitigating the possible risks.

The banking industry has a potential risk of getting data breaches, cybersecurity threats, and system failures that pose a significant risk to the stability of a bank in Kenya. Consequently, future studies should focus on the adequate foundation of assessing the potential risks and the cybersecurity operation disruptions and their impact on the financial performance of the banking industry. Effective strategies should be made to protect the financial institution from potential risks associated with the technological landscape.

The study emphasizes the importance of considering the regulated aspects of technological advancement when dealing with financial institutions. This study and Jackson (2012) found that technological adoption is essential in improving the efficiency of financial institutions

given the risks associated with technology. However, understanding the technology regulatory framework and the clientele expectations is critical in addressing possible technology risks in the banking sector. Therefore, future studies should focus on the regulatory landscape in Kenya by exploring the impact of the regulatory framework in facilitating the adoption of technological innovation in the banking sector.

The relationship between technological Risk and commercial banks' performance in Kenya generally provides the framework for embracing digital innovation in banking. The study findings illustrate the role of technology integration in the strategic enhancement of the operation services in the banking sector. Technology directly impacts banks' financial performance, but a holistic approach to analyzing risk-associated measures is essential to develop a better mitigation strategy.

5.4.4. Moderating effect of firm size on the relationship between environmental Risk and the Financial Performance of commercial banks in Kenya

The study also emphasized the moderating effect of firm size on the relationship between environmental risk and the financial performance of commercial banks in Kenya as this formed the fourth and last specific objective of the study. The findings of the study demonstrated that firm size acts as a moderating element that regulates the strength of the relationship between environmental Risk and the general financial performance of banks.

The study emphasized providing significant knowledge on the size of firms as a key moderating factor in shaping environmental risk. The study's findings demonstrated that the relationship between environmental risks and financial performance depends on the

size of commercial banks. The smaller the banks, the higher the chances of adaptability from the experiences of different interplay between the economic players and their risk management approaches compared to the larger institutions.

In addition, this study demonstrated that smaller Banks become more resilient to environmental risks because they are prepared to respond to any negative impact on financial performance compared to larger Banks. The smaller bank's resilience depends on its ability to adapt quickly to changing circumstances. Future studies will focus on exploring the adaptive strategies that smaller banks depend on to enhance resilience against external challenges like environmental Risk.

The moderating effect of the bank sizes brought another relationship layer that gave the smaller banks a better resilience level. The findings provide significant information for future research by researchers focusing on the adaptive strategies, internal dynamics, and contextual factors in shaping the moderating factors of any given financial institution. Notably, the Kenyan banking sector continues to adapt to the ever-evolving financial world, requiring strategic guidelines, decision-making, policy formulation, and risk management practices. Understanding the environmental risks when running a banking industry is essential to help formulate better risk management strategies and other risk-mitigating strategies effectively.

With the conclusion that that firm size significantly moderated the relationship between environmental risks and financial performance of commercial banks in Kenya. The study recommends that commercial banks and the Cetral Bank of Kenya consider having specific

environmental risk startegies to mitigate economic risks, reputational risks and technological risks geared towards each bank tier in place as opposed to having a one size fits all policies and strategies to adequately manage environmental risks for the success of the banking industry in Kenya.

5.5 Suggestions for Further Studies

The study on the relationship between environmental risks, firm size and financial performance of commercial banks in Kenya forms a basis for further research on the key financial areas. The suggestions provide a robust understanding of complex dynamics within the banking field and contribute significantly to banking risk management and operational strategies. Besides, future studies will revolve around the effective use of technology in enhancing the performance of financial institutions.

Firstly, the future study should focus on the micro-level analysis of credit risk fluctuation in commercial banks. The research should focus on conducting a robust micro-level evaluation to provide the specific factors in the financial industry that contribute to the observed volatility in credit risk. Practical exploration of the individual role and the portfolios of borrower characteristics provides an economic indication of the relevant factors influencing credit risk dynamics. Therefore, an adequate examination of these factors will provide valuable insights into the framework of the credit risk variation in risk mitigation strategies.

In addition, future study needs to focus on the macroeconomic determinants of the banking sector performance. Practical analysis of the macroeconomic elements requires a robust

evaluation of these determinants of the commercial bank's economic performance. The study should emphasize the GDP growth, inflation rates, and the changes in the regulatory rates on the financial performance of the banking institutions. Therefore, a holistic approach to these examinations significantly contributes to a robust understanding of the macroeconomic variables shaping banking industry performance.

Furthermore, future studies should focus on the longitudinal study of the CSR activities on financial performance. The study needs to track the corporate social responsbility activities and their impact on the reputational risks and the company's general performance to the public. The study will analyze the CSR extent of the initiative on commercial banks in Kenya, the changes in their public perception, and the general economic outcomes. Therefore, future research provides valuable information on financial knowledge and the CSR long-term sustainability strategies.

Besides, the future study should provide a comparative analysis of the Kenyan context and global banking practices. The study will explore the observed findings from the Kenyan context and relate the findings to the global risk factors. The comparison will provide effective risk factor strategies to enhance the financial performance of banks. Thus, country evaluation is essential in delivering relevant knowledge on the local and global economic dynamics in shaping the performance of the banking sector.

Besides, future studies should investigate the relationship between the geographical expansion of commercial banks by checking on the available factors to improve efficiency. Practical exploration of the stability factors of the different branches located in other

geographical areas will help enhance efficiency in the financial performance of banks. Therefore, the study should focus on the existing specific benefits and the key elements that can help the banks penetrate the other markets. Notably, practical analysis of the economies of scale and the customers' accessibility will be the key driving factors in enhancing the organization's running.

In addition, the study provides a foundation for future studies on technological innovation's impact on banking trends. Future studies will emphasize the emerging technologies' roles in shaping the future landscape of the banking industry in Kenya. Practical evaluation of innovations like artificial intelligence, blockchain, and digital operational efficacy will enhance an organization's risk management and general banking performance. Therefore, the forward-looking research should provide significant knowledge of the available opportunities in the technological landscape.

Future studies can also conduct an experimental or quasi-experimental design to establish causal relationships between risk factors and financial performance in order to develop a more robust understanding of the causes. Moreover, new research can explore the implications of the findings for regulatory policy and risk management practices in the banking industry (Gachigo *et al*., 2023). It is suitable to determine how policymakers and financial institutions can adapt to these findings to enhance financial stability. By addressing these suggestions, future research efforts can establish the limitations of the current study and contribute to understanding the complex relationship between risks and financial performance in the banking sector.

The suggested avenues for future research will significantly add to this study. The research will provide significant opportunities to explore the detailed dimensional approach to the emerging trends in commercial banks in Kenya. Pursuing these avenues ensures that the researchers significantly contribute to the comprehensive and nuanced understanding of the robust factors that influence the critical performance and resilience of the commercial banks in Kenya.

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APPENDIX I: LIST OF COMMERCIAL BANKS IN KENYA

1. African Banking Corporation Ltd.
2. Bank of Africa Kenya Ltd.
3. Bank of Baroda (K) Ltd.
4. Bank of India
5. Barclays Bank of Kenya Ltd
6. CFC Stanbic Bank Ltd.
7. Chase Bank (K) Ltd
8. Charter House Bank Ltd.
9. Citibank N.A Kenya
10. Commercial Bank of Africa Ltd
11. Consolidated and Development Bank of Kenya
12. Co-operative Bank of Kenya Ltd.
13. Credit Bank Ltd.
14. Development Bank of Kenya Ltd.
15. Diamond Trust Bank (K) Ltd.
16. Dubai Bank Kenya Ltd.
17. Ecobank of Kenya Ltd.
18. Equity Bank Ltd.
19. Family Bank Ltd.
20. Fidelity Bank Ltd.
21. First Community Bank Ltd.
22. Giro Commercial Bank Ltd.
23. Guaranty Trust Bank (K) Ltd.
24. Guardian Bank Ltd.
25. Gulf African Bank Limited.
26. Habib Bank A.G Zurich.
27. Habib Bank Ltd.
28. Imperial Bank Ltd
29. I&M Bank Ltd.
30. Jamii Bora Bank Ltd.
31. Kenya Commercial Bank (KCB) Ltd.
32. Middle East Bank (K) Ltd.
33. National Bank of Kenya Ltd.
34. NIC Bank Ltd.
35. M-Oriental Commercial Bank Ltd.
36. Paramount Bank Ltd.
37. Prime Bank Ltd
38. Sidian Bank Ltd.
39. Standard Chartered Bank (K) Ltd
40. Trans-National Bank Ltd.
41. UBA Bank Kenya Ltd
42. Victoria Commercial Bank Ltd Trans-National Bank Ltd.
43. UBA Bank Kenya Ltd
44. Victoria Commercial Bank Ltd

Source: CBK 2016

APPENDIX II: BANK CLASSIFICATION AS PER TIERS

Tier 1 banks in this tier control 49.9% of the market. They are as follows:

1. Co-operative Bank of Kenya
2. Kenya Commercial Bank (KCB)
3. Equity Bank
4. Barclays Bank
5. Commercial Bank of Africa (CBA)
6. Standard Chartered Bank
7. Charter House Bank Ltd.

Tier 2 banks are medium-sized lenders. They control 41.7% of the market share. They are:

1. Family Bank
2. I&M Bank
3. NIC Bank Dubai Bank Kenya Ltd.
4. Diamond Trust Bank
5. Bank of Africa
6. Housing Finance
7. Ecobank
8. Prime Bank
9. Bank of Baroda
10. CFC Stanbic Bank
11. Citibank
12. Guaranty Trust Bank
13. National Bank
14. Bank of India

The final level is Tier 3. They control 8.4% of the market. They are:

1. Jamii Bora Bank
2. African Banking Corporation Ltd
3. Credit Bank
4. Paramount Universal
5. Consolidated and Development Bank
6. Fidelity Bank
7. Equatorial Commercial Bank
8. Chase Bank (K) Ltd
9. Giro Bank
10. Guardian Bank
11. Middle East Bank
12. Oriental Commercial Bank
13. Paramount Universal Bank
14. Trans-National Bank
15. Victoria Bank
16. First Community Bank
17. Habib A.G Zurich Bank
18. Habib Bank
19. Gulf Africa
20. Sidian Bank
21. UBA Bank

Source: CBK 2013

APPENDIX III: CLEARANCE LETTER FROM UNIVERSITY OF KABIANGA

UNIVERSITY OF KABIANGA
ISO 9001:2015 CERTIFIED
OFFICE OF THE DIRECTOR, BOARD OF GRADUATE STUDIES

REF: PHD/BSA/002/20 **DATE: 11TH AUGUST, 2023**

Teclah Tuwei,
Accounting & Finance Department,
University of Kabianga,
P.O Box 2030- 20200,
KERICHO.

Dear Ms. Tuwei,

RE: CLEARANCE TO COMMENCE FIELD WORK/DATA COLLECTION

I am pleased to inform you that the Board of Graduate Studies has considered and approved your PhD research proposal entitled **"Environmental Risk, Firm Size and Financial Performance of Commercial Banks in Kenya".**

Subsequently the Board has also approved the following supervisors for appointments.

1. Dr. Raymond Kemboi, PhD
2. Prof. Isaac Naibei, PhD
3. Dr. Johnmark Obura, PhD

You may now proceed to commence field work/data collection on condition that you obtain a research permit from NACOSTI and /or an ethical review permit from a relevant ethics review board.

You are also required to publish two (2) articles in a peer reviewed journal, with all your supervisors, before your oral defense of thesis and submit through your supervisors, and HoD, progress reports every three months, to the Director, Board of Graduate Studies.

Please note that it is the policy of the University that you complete your studies within three years from the date of registration. Do not hesitate to consult this office in case of any difficulties encountered in the course of your studies.

I wish you all the best in your research and hope that your study will yield original contribution for the betterment of humanity.

Yours Sincerely,

UNIVERSITY OF KABIANGA 11 AUG 2023 BOARD OF GRADUATE STUDIES

Dr. Ronald K. Rop
DIRECTOR, BOARD OF GRADUATE STUDIES.

cc 1. Dean, SBE ,
2. HOD, Accounting & Finance

APPENDIX IV: NACOSTI PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **549691**

Date of Issue: **23/August/2023**

RESEARCH LICENSE

This is to Certify that Ms.. Teclah Tuwei of University of Kabianga, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Baringo, Bomet, Bungoma, Busia, Elgeyo-Marakwet, Embu, Garissa, Homabay, Isiolo,
Kajiado, Kakamega, Kericho, Kiambu, Kilifi, Kirinyaga, Kisii, Kisumu, Kitui, Kwale,
Laikipia, Lamu, Machakos, Makueni, Mandera, Marsabit, Meru, Migori, Mombasa, Muranga,
Nairobi, Nakuru, Nandi, Narok, Nyamira, Nyandarua, Nyeri, Samburu, Siaya,
Taita-Taveta, Tanariver, Tharaka-Nithi, Transnzoia, Turkana, Uasin-Gishu, Vihiga,
Wajir, Westpokot on the topic: ENVIRONMENTAL RISK, FIRM SIZE AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA for the period ending : 23/August/2024.

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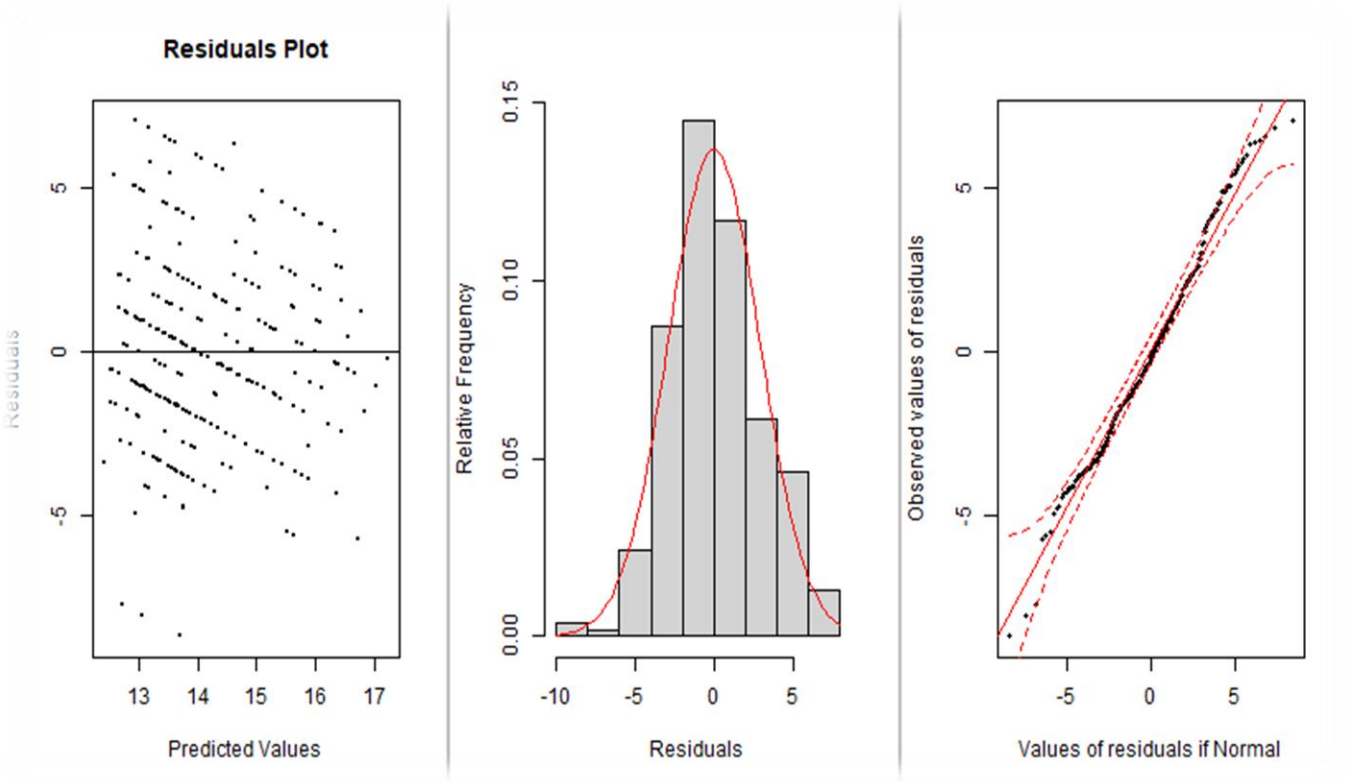
See overleaf for conditions

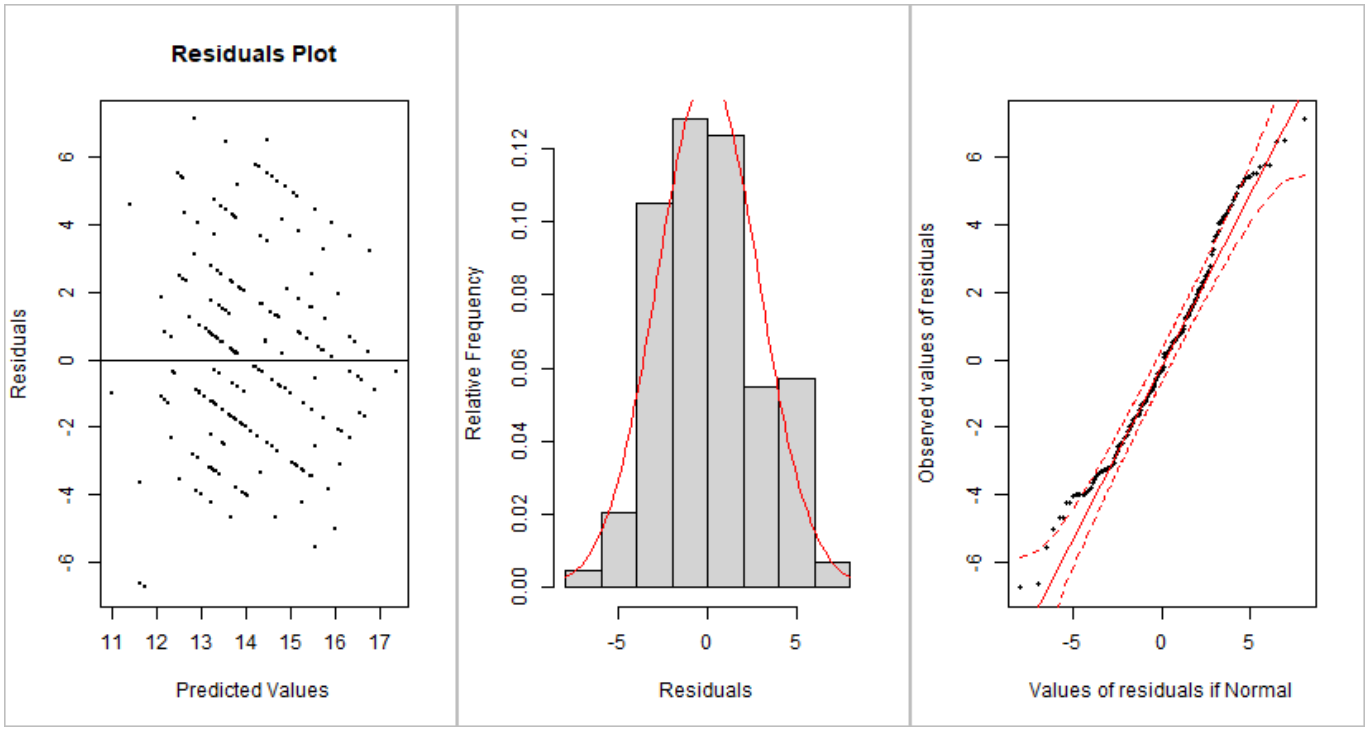
APPENDIX V: DATA EXTRACTION FORM

Bank	Year																					
		Admin cost	Total operating cost	Value of assets	Total loans	NPLS	Total investment on technology	Total investment on CSR	Total deposits	Non-interest income	Total operation income	Firm size natural log of the total assets	Liquidity risk Total assets/liquid assets	Credit risk Npl /total loans	Interest rate risk Interest expense/interest income	Total loans	Total deposits	Total assets	ROA net income/ Total assets	ROE Net income / average total equity	Number of ATMs	Number of agents

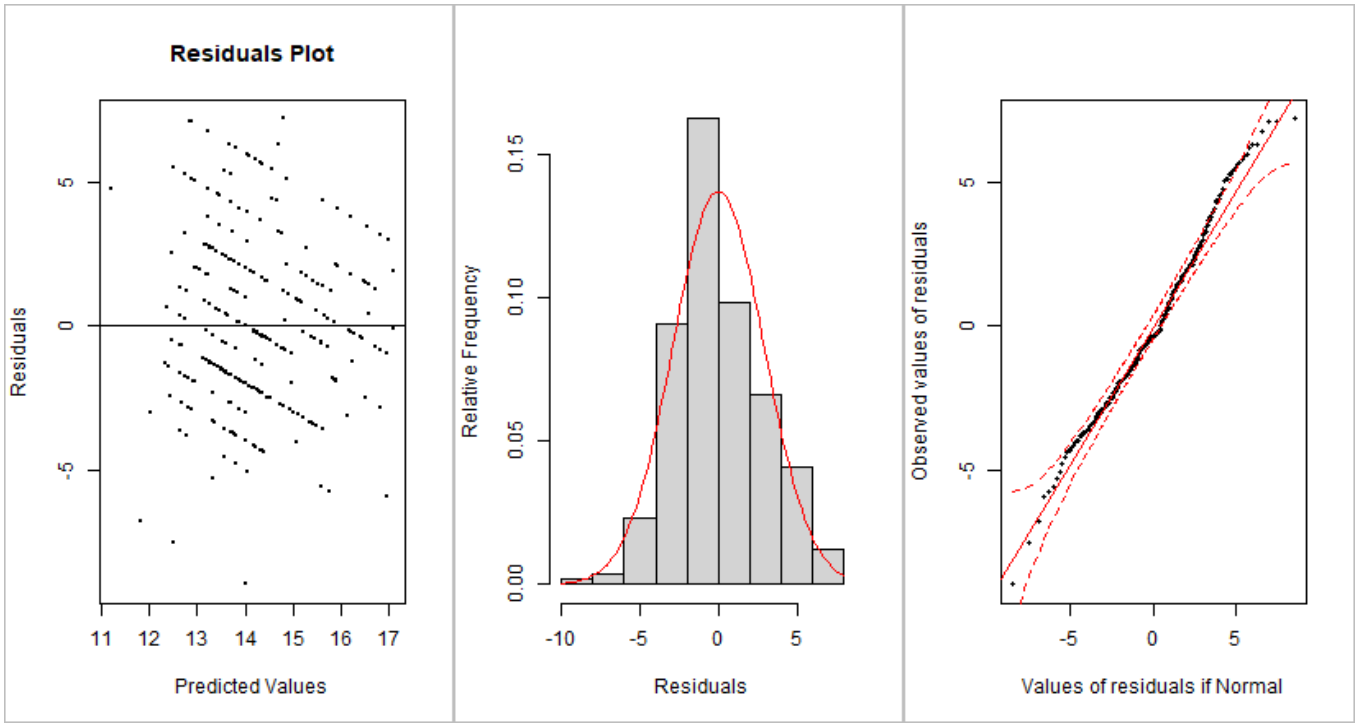
APPENDIX VI: MODEL DIAGNOSTICS



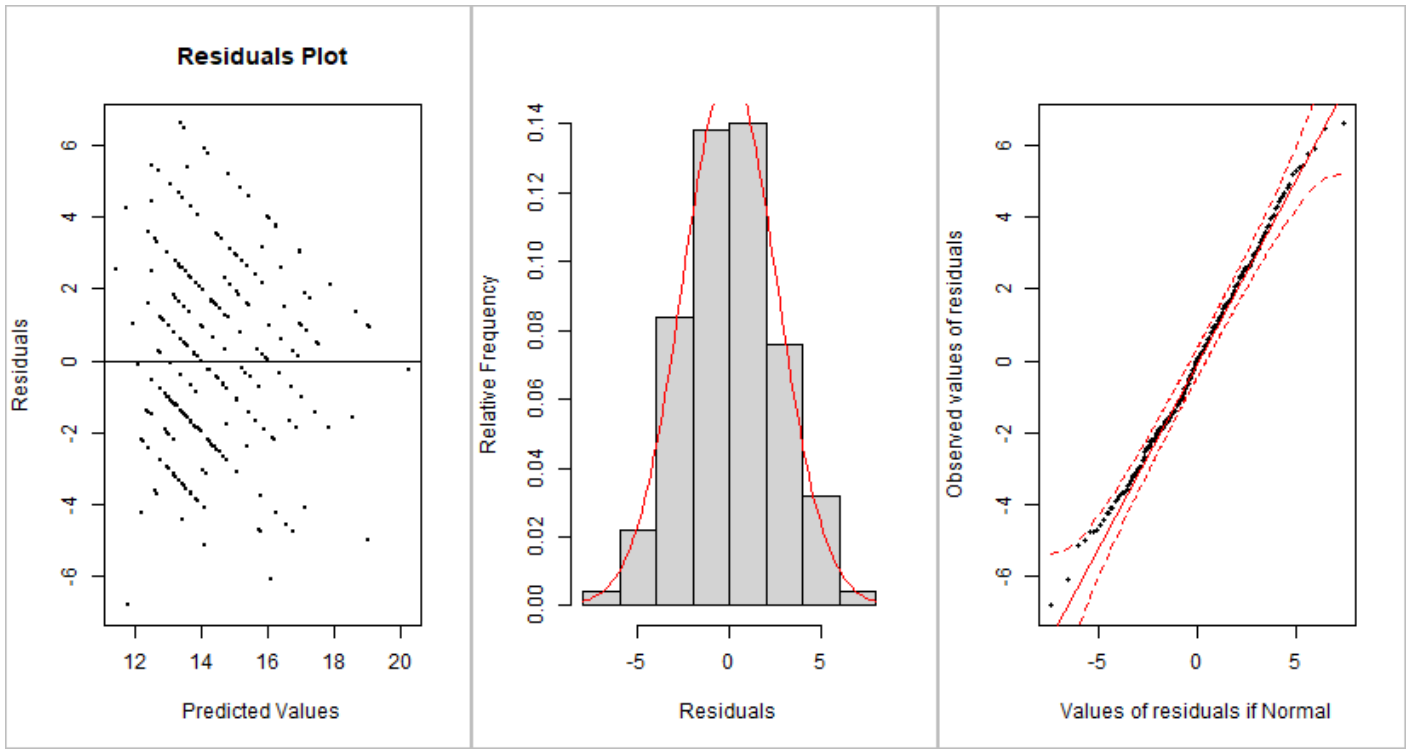
A. Diagnostics for regression model fitted to determine the relationship between economic risk and financial performance



B. Diagnostics for regression model fitted to determine the relationship between reputational risk and financial performance



C. Diagnostics for regression model fitted to determine the relationship between economic risk and financial performance



D: Diagnostics for regression model to determine the moderating effect of firm size on the relationship between environmental risk and the financial performance

APPENDIX VII: PUBLICATIONS FROM THE THESIS

American International Journal of Business Management (AIJBM)
ISSN- 2379-106X, www.aijbm.com Volume 07, Issue 06 (June-2024), PP 52-58

Relationship between Reputational Risk and Financial Performance of Commercial Banks in Kenya

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Accounting and Finance, University of Kabianga, Kenya

Accounting and Finance, Bomet University College, Kenya.

ABSTRACT:- Financial institutions play a key role in spurring the growth of the economy. The purpose of this study was to determine the relationship between reputational risk and the financial performance of commercial banks in Kenya. The study was anchored on agency theory, stakeholder theory and prospect theory. The population of the study was forty - two (42) commercial banks in Kenya. 32 purposively sampled commercial banks which had audited financial accounts for the years 2016 to 2021 were included in the study. ROA and ROE were used to measure performance while CSR activities and total loans were used to indicate reputational risk. Mixed effects regression model showed that for ROE, the presence of CSR yields an estimate of 0.85 (p=0.754), suggesting a slight insignificant positive effect and for ROA, an estimate of 0.65 (p=0.306), implying a modest insignificant positive effect. Total loans, for ROE, the estimate is -0.15, suggesting a negative relationship, though not statistically significant (p-value of 0.671). For ROA, estimate 0.09, indicating a positive relationship between total loans and ROA. However, this positive effect is also not statistically significant, as the p-value stands at 0.300. This research concluded that there is a link between reputational risk and financial performance of Kenyan commercial banks and recommended that banks engage in CSR activities to boost their reputation among stakeholders and attract business thus better performance.

Key words: Commercial Banks, Corporate Social Responsibility, Financial Performance, Reputational Risk

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TECHNOLOGICAL RISK AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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Abstract

Commercial banks are a key player in the financial industry and impacts greatly on any nation's economy. Banks operate in a very risky environment and their performance is of great interest to all stakeholders not just the shareholders. Technology is now referred as a necessary evil and a great business enabler. The aim of this research was to establish the relationship between technological risk and financial performance of commercial banks in Kenya. The study used number of branches, ATMs and Agents as key indicators for independent variable while ROE and ROA were used for dependent variable. The study was anchored on diffusion of innovation theory. The study population was the forty two (42) commercial banks in Kenya. Purposive sampling was used to pick 32 commercial banks. Data was analyzed using R statistical software version 4.3.2. Linear mixed effects multiple regression allowing random effects to vary by banks was used. The study results showed that for ROE, (beta: 0.11,95% CI; p-value: 0.003) an increase in the total number of branches is associated with a positive effect. The number of ATMs and agents ranged from 0 to over 500. From the mixed effects regression model, a larger branch network contributes significantly to higher ROE (beta: 0.15; 95% CI: (0.06 – 0.24); p-value: 0.001). The study concluded that there is a statistically significant relationship between technological risk and the financial performance of commercial banks in Kenya. The study recommends that banks adopt and utilize technological innovations to become more efficient in serving a larger population of customers. The study findings may be beneficial to government and its agencies, commercial banks managers, technological experts and scholars alike in policy formulation and development of required technological software and hardware and advancement of knowledge and more research towards addressing technological risk and maximizing financial performance.

Keywords: Technological Risk, Risk Management, Financial Performance, Commercial Banks, Technology