

**OPERATIONAL RISK AND FINANCIAL STABILITY OF COMMERCIAL
BANKS IN KENYA**

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D63/39468/2021

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE
(MSC) (FINANCE) IN THE FACULTY OF BUSINESS AND
MANAGEMENT SCIENCE, UNIVERSITY OF NAIROBI**

SEPTEMBER, 2022

DECLARATION

This research project is my original work and has not been presented for a degree in any other University.

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The research project has been submitted for examination with my approval as university supervisor

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ACKNOWLEDGEMENT

I sincerely appreciate my supervisor, Dr. Winnie Nyamute for the guidance and supervision that enabled me to clear this project.

DEDICATION

I dedicate this project to my Mother Hinda Abshir Gedi and Father Nur Ali for the support they gave me both moral and financial. I also dedicate this project my beloved brother Omar Nur (Omar Qatar) has never left my side and is very special.

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ABBREVIATIONS AND ACRONYMS

CBK Central Bank of Kenya

CBs Commercial Banks

FS Financial Stability

MPT Modern Portfolio Theory

OR Operational Risk

ABSTRACT

Presently, some of the commercial banks in Kenya have been facing stability challenges as demonstrated by a high uptake of mergers and acquisitions in the banking industry. Example of commercial banks that have undergone mergers and acquisitions demonstrating their financial stability concerns include Spire Bank, National Bank of Kenya, as well as Kingdom Bank and Access Bank. The other banks that are facing concerns with regard to the financial stability in Kenya include the Consolidated Bank and the Development Bank of Kenya among others. Thus, the nexus between operational risk and financial stability of Kenyan commercial banks was the main focus of the study. The study adopted correlational research design targeting 39 Kenyan commercial banks and census was embraced. Information was obtained from auxiliary sources over the five year period of 2017-2021. The analysis was done through Statistical Package for Social sciences guided by means and standard deviations, correlation and regression analysis and presented through tables. The study observed that operational risk ($r=-0.503$, $\beta=0.058$, $t>1.96$ & $p<0.05$) is a significant predictor of financial stability of commercial banks in Kenya when Bank size ($r=0.328$, $\beta=0.055$, $t>1.96$ & $p<0.05$) and liquidity ($r=-0.118$, $\beta=0.011$, $t>1.96$ & $p<0.05$) are controlled. The study conclude that operational risk is negatively but significantly linked with financial stability of commercial banks. It was recommended that finance managers working in commercial banks in Kenya should put in place adequate mechanisms to enhance the liquidity position while cutting down on operational costs and expenses. It is important to have in place revenue maximization efforts and mechanisms among commercial banks in Kenya so as to maximize the operating income.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Financial stability (FS) of lending institutions is a critical indicator of their ability to effectively realize their financial intermediation role which is an enabler of economic growth of a country (Wisdom & Isiaka, 2018). Although financial stability has long been linked with operational risks that an organization is prone, much of the literature focuses in developed countries and it is marred by contradictory results that only provide premature conclusion on the nature of the nexus between these two critical variables (Obeng & Mkhize, 2017). Conventional wisdom in the banking industry indicates that forecasting of the inherent operational risks helps the firm to device relevant response mechanisms that can contribute to financial stability. However, the nature of the empirical relationship between operational risk and financial stability is mixed and inconclusive from the existing literature. For instance, De-Jongh, De-Jongh, De-Jongh and Van-Vuuren (2013) observed that operational risk (OR) fueled the severity and duration of the global financial crisis witnessed in 2007/08. The other existing body of literature on operational risk links the same with other variables like financial performance (Lyambiko, 2015; Wisdom & Isiaka, 2018, & Obeng & Mkhize, 2017) and not financial stability.

The modern portfolio theory and the financial intermediation theory were used to explain the nexus between OR and FS. Developed by Markowitz (1952), the MPT argues that firms can maximize returns for a given risk through diversification of assets in a portfolio. Lending institutions are exposed to an array of risks one of them being OR. The MPT theory provides an argument and justification of how financial institutions can reduce exposure to OR by diversifying their operations and assets in place. Thus, based on the MPT, a positive relationship is predicted between OR and FS of the lending institution. This is to imply that MPT would allow lending institutions

to diversify their lending portfolios thus minimizing the operational risks and this can contribute towards financial stability of an institution. On the other hand, the financial intermediation theory developed and advanced by Gurley and Shaw (1961), argues that financial institutions like commercial banks are regarded as financial intermediaries that mobilize deposits to be utilized for the purpose of lending. Thus, a stable financial institution is expected to be in position to effectively realize its intermediation role in the economy.

One of the daunting regulatory role played by the CBK is promoting financial stability of the commercial banks in the economy. However, presently, some of the commercial banks in Kenya have been facing stability challenges as demonstrated by a high uptake of M&As in the banking industry. Example of commercial banks that have undergone M&As demonstrating their financial stability concerns include Spire Bank, National Bank of Kenya, as well as Kingdom Bank and Access Bank. The other banks that are facing concerns with regard to the financial stability in Kenya include the Consolidated Bank and the Development Bank of Kenya among others.

1.1.1 Operational Risk

Operational risk (OR) is defined as the possibility of loss that may be occasioned by failed or inadequate internal processes, systems or people or from outside event. OR can be categorized into expected as well as unexpected losses. Muriungi, Waithaka, Were and Muriuki (2017) observed that any inadequacies of the processes, systems or external events are collectively viewed and recognized as operational risk. Operational risk has increasingly been recognized in the financial industry as lending institutions put in place relevant internal control mechanisms and boards to manage financial losses that are connected with technical failures, human related errors as well as

fraudulent activities. The chief sources of OR could include weaknesses in appraisal and approval of credit in a lending institution (Gurunlu, 2019).

Most studies focusing on risks within the lending institutions have used cost income ratio as a measure of operational risk (Muriungi et al., 2017). Operating expenses represent the direct costs that are incurred in running the operations of the firm to generate revenues. Because of their close relationship with the daily operations of the organization, operating expenses are ideal measure of determining OR (Ebenezer, Islam, Yusoff & Shamsuddin, 2018). Thus, this study measured OR as a ratio between operating expenses and net income.

1.1.2 Financial Stability

Financial stability (FS) is the degree of the financial entity to facilitating and enhancing economic undertakings while managing risks and absorbing any inherent shocks (Healey, Mosser, Rosen & Tache, 2018). FS is also defined as a condition in which the mechanisms used to price, allocate and manage risks are being operated in a way that is efficient for positive contribution towards economic prosperity (Shams, Sobhan, Vrontis, Belyaeva & Vukovic, 2021). A financial institution is said to be stable when it has the ability to facilitate the efficiency of economic resources in combination with other financial activities for instance steering lending, savings and investments as well as creation of liquidity. Such an institution is able to carry out these activities even when there is an external shock or imbalance. According to Berger, Curti, Mihov and Sedunov (2020), financial instability of the lending institution can lead to ultimate collapse whose effects can be felt by the investors and the depositors.

Financial instability will have impairment on financial intermediation process and effect allocation of resources in the economy. Muriungi, Waitthaka, Were and Muriuki (2017) share that persistent

financial instability can occasion a financial crisis that could in turn lower the amount of credit that is circulating in the economy which would lower the available investments. The major focus of the financial institutions including international trade partners like the International Monetary Fund (IMF) has been on FS. There are several indicators in literature that have been utilized by scholars in measuring financial stability, these including non-performing loan ratio (International Monetary Fund, 2013), z-scores as well as the returns generated by the financial institution in assets (ROA) (Onuongo, 2014 & Obamuyi, 2013). In this study, FS was measured by NPLs ratio will be used to measure financial stability. The reason for adopting NPL ratio is because it represents the direct expense associated with lending activities in the firm and is used to gauge the overall health of the economy at larger.

1.1.3 Operational Risk and Financial Stability

From the MPT point of view, a negative nexus is predicted between OR and FS of a financial institution. Incidences of OR are likely to contribute to losses which can threaten the financial stability of the institution. This is particularly true when the financial institution has not fully diversified its loan portfolio. OR like system failure and breakdown may result into erroneous execution of financial transaction that can be costly on the side of the financial institution. From the financial intermediation point of view, the occurrence of OR is likely to complicate and adversely affect the ability of the financial institution to effectively allocate financial resources in the economy which would lead to instability (Gurley & Shaw, 1961).

Empirically, Adegbe and Olumuyiwa (2020) observed that existence of an inverse nexus between OR and FS of Nigerian banks. OR can contribute towards financial crisis in an economy (De-Jongh et al., 2013). OR positively impacts on FS through the returns generated on assets

(Lyambiko, 2015). Kamau (2018) noted that OR is negatively linked with FS through financial performance.

1.1.4 Commercial Banks in Kenya

Commercial banks are the broader components of financial intermediaries in an economy. By mobilizing deposits from customers and loaning out the same to those who require funds, commercial banks effectively realize their financial intermediation role in the economy that contribute towards capital creation. It is the responsibility of CBK to come up with regulations that are relevant in promoting financial stability of these institutions.

There are 39 fully functional commercial banks in Kenya after some like Chase Bank were put under receivership. Majority of these institutions have their head offices in Nairobi and their role towards economic prosperity of Kenya cannot be underscored. However, a large number of these institutions have been characterized by financial instability starting with institutions like Chase Bank, Imperial and Charterhouse that were forced to be placed under management and liquidation by CBK. A number of mergers and acquisitions (M&As) have also characterized and demonstrated the financial instability of the commercial banks in Kenya. Some of these M&As exercises that have been witnessed in Kenya include the acquisition of Jamii Bora Bank by Cooperative Bank leading to Kingdom Bank, National Bank was acquired by Kenya Commercial Bank as its subsidiary among other cases.

1.2 Research Problem

Financial stability became a hotly contested issue after the rise of the GFC in 2007/2008. This led to institution of mechanisms aimed at protecting commercial banks from shocks that arise from

the environment. One of the shocks that have been evident in the lending institutions in the world and in Kenya has been the issue of operational risk. As observed by Shams et al. (2021), operational risk has been one of the greatest contributors of corporate failure in the banking industry. Exposure to operational risks contributes to loss making among financial institution and if this occurs cumulatively can lead to financial instability.

In Kenya, commercial banks have been facing a number of challenges like increased competition and the changing regulatory environment that have threatened their financial stability. This can be explained by the placement of some of the banks like Chase, Imperial and Charter House under receivership (Atiti, Agung & Kimani, 2020). Concerns about financial stability has forced others banks to enter into mergers and acquisitions like the Kingdom Bank (that emerged after Cooperative Bank of Kenya acquired Jamii Bora Bank) as well as Access Bank (formerly the Transnational Bank of Kenya) (Musau, Muathe & Mwangi, 2018) Operational risk in terms of cybercrime has been widely reported in the context of commercial banks in Kenya leading to significant loss in the deposits that could otherwise been productively utilized for lending purpose. These financial stability challenges being evident among commercial banks as posed by operational risk need to be addressed urgently by the concerned parties including the CBK. Failing to undertake relevant immediate actions to revert this situation would lead to dire consequences in terms of significant loss of customer deposits in case the institutions collapse and this would negatively impact the economy of Kenya (Muriithi, 2016).

The existing studies include Mazankova and Nemeč (2008) which was an analysis of OR and FS within the context of Czech Republic where a negative nexus was registered. Adegbe and Olumuyiwa (2020) focused on Nigeria to link OR management and FS of deposit money banks. It emerged that that OR is a significant predictor of FS of the lending entities. The study conducted

in Tanzania by Lyambiko (2015) aimed at bringing out how the management of OR contributed towards ability of commercial banks to financially perform. The evidence were that varying degrees of the effect of operational efficiency, insolvency and credit risk on financial performance was registered.

Locally in Kenya, Ngaira and Miroga (2018) did an examination of the key issues that determine FS of commercial banks. It emerged that while interest rate and FS were directly linked with each other, operational costs and liquidity recorded an inverse nexus with FS. Toroitich (2018) did an analysis of OR exposure and the implication on financial performance with emphasis on Kenyan commercial banks and a significant and inverse link was noted. Kamau (2018) appraised how the management of OR impacted on financial performance of tiers II and III banks in Kenyan context and a negative link was noted. Muriithi and Muigai (2017) did an exploration of OR and profitability with a focus on Kenyan commercial banks where negative link was noted.

However, the reviewed studies create contextual gaps in that some were done in other countries like Nigeria (Adegbe & Olumuyiwa, 2020) aside from Kenyan. Other studies focused on financial performance as the dependent (Toroitich, 2018) which is differently operationalized from FS that will be the focus of the present study. Therefore, against these gaps, the present study sought for an answer to the following research question: what is the relationship between operational risk and financial stability of commercial banks in Kenya?

1.3 Research Objective

To determine the relationship between operational risk and financial stability of commercial banks in Kenya

1.4 Value of the Study

The study would assist risk managers and auditors working among commercial banks in Kenya to formulate relevant mechanisms to manage operational risks. The risk committee board members of the commercial banks would be able to develop and strengthen the existing risk management frameworks to effectively respond to OR events. The senior managers in the commercial banks would be able to implement relevant identified mechanisms of countering exposure to OR for stability of their institutions.

The policy makes at the CBK would be in position to strengthen the existing policies and framework of managing exposure to operational risks. The policy makers in the commercial banks in Kenya would come up with adequate and instrumental policies in regard to OR and financial stability. All this would lead to positive growth of the economy demonstrated by an increase in lending and investment activities.

The inquiry would add to the existing information on OR and FS. This would greatly lead to growth in the available literature on the same. As such, future scholars carrying out related inquiries would be best placed to review information of this inquiry. The inquiry would boost the available theories OR and FS.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The focus of this chapter is on reviewing theories linked with OR and FS and the key issues that determine FS in the context of lending entities. The chapter also focuses on past empirical inquiries as well as the gaps and the conceptual framework.

2.2 Theoretical Review

2.2.1 Modern Portfolio Theory

This theory was developed by Markowitz (1952) and it allows the investors to ensure there is a mathematical tradeoff between the expectations of reward and the risk tolerance levels. There are two key concepts that form the foundation of this theory; the main goal of investors is to maximize returns per the level of risk and that diversification of portfolios mitigates against risk. The premise of the theory is that investors are characterized by risk aversion behavior and rationality. Investors who are rational have strong preference to assets that have little volatility (Elbadry, 2018).

MPT identifies two main components of risk that investors can face; systematic and unsystematic risk. Systematic risk cannot be reduced through diversification and they are market related. For unsystematic risks, an investor can minimize them through diversification. Thus, MPT applies more on these unsystematic risks. This theory has been criticized for premising on rationality behavior of investors and the assumption of existing of perfect market (Hakimi, 2020). OR are daily risks that organizations do face and these can be minimized through diversification as suggested by this theory. The relevance of this theory to the present inquiry is that it provides the

need for lending institutions to diversify their practices so as to minimize their exposure to operational risk.

2.2.2 Financial Intermediation Theory

The theory was proposed by Gurley and Shaw (1961) and developed by Akerlof (1970), Spence (1973) and Rothschild and Stiglitz (1976). It provides a description of how commercial banks mobilize savings from customers to be loaned out to borrowers hence credit creation in an economy. The theory view commercial banks as financial intermediaries and they help in reducing the cost of accessing funds from shylocks in an economy. By lending out the deposits obtained from customers, the borrowers can utilize the proceeds to invest and thus contributing to the growth of the economy.

The role of financial intermediaries is to increase the efficiency in the financial sector of the economy. Financial intermediation contributes towards reduction of transaction costs that borrowers incur when seeking to access loans. A stable financial institution will be able to effectively realize its financial intermediation role in an economy. This theory has been criticized on its premise that the forces driving the existence of financial intermediaries are the reduction of transaction costs and information asymmetry (Scholtens & Wensveen, 2000). This is not the case as issues of information asymmetry have been persistent in the lending institution in spite of their recognized role of reducing the same. Furthermore, the theory has been critiqued for failing to give recognition the role of lenders of managing exposure to risks in the banking relationship (Allen and Santomero, 1997; Scholtens and Wensveen, 2000). Despite these criticisms, this theory will anchor the dependent variable financial stability.

2.3 Determinants of Financial Stability of Commercial Banks

2.3.1 Operational Risk

When a financial institution face OR, the losses can be massive and this may have an effect on profitability. OR can be viewed as expenses that would reduce the net income that a financial institution has posted. In fact, OR can be regarded as an operating expense in the firm and it has an inverse nexus with profits generated. Thus, a negative relationship is anticipated between OR and financial stability of the financial institution (Gurunlu, 2019). OR in this study will be represented by operating expense against net operating income.

2.3.2 Bank Size

Large financial institutions enjoy some advantages due to their scale of operations. The negotiating power of large institution is far above that of smaller institutions and this ultimately lowers the costs of financing with high probability of improving overall stability. Larger financial institutions are in position of hedging and diversifying of risks as compared to the smaller firms (Ebenezer, Islam, Yusoff & Shamsuddin, 2018). The present study will measure bank size as natural logarithm of the total assets.

2.3.3 Liquidity Risk

Liquidity is the degree to which a firm is in position of meeting its obligations as they arise. In a lending entity like commercial banks, these obligations usually originate from the depositors. Liquidity risk is occasioned by the inability of financial institution to fail to meet its obligations immediately they arise (Saeed, 2015). This risk has adverse implication on earnings as well as the capital base of the financial institution and ultimately financial stability. As such, the challenging

role of financial managers is how best to there is availability of adequate funds for meeting future demands of borrowers (Mazankova & Nemeč, 2008). Liquidity risk in this study will be operationalized through current ratio that is determined as current assets against current liabilities.

2.3.4 Interest Rates

Commercial banks are highly involved in numerous foreign transactions. Any fluctuation in interest rate and inflation has direct implication on exchange rates and this ultimately impacts on revenues from foreign exchange transactions. There exists an apparent nexus between interest rates and financial stability of a lending entity. This is due to the fact that during periods of recession, interest rates would slow down the loan portfolio of commercial banks while also increasing the volume of non-performing loans hence more loan losses (Podder, 2012). The implication of this is that commercial banks especially those smaller in size may face challenges and difficulties in maintenance of their financial stability when market rates are consistently decreasing (Ventouri, 2012). There are two mechanisms through which interest rate impact on customers and commercial banks. First, a rise in interest rate would make it hard for customers to repay their loans and this will be a loss on the bank. If this situation keeps on persisting, commercial banks will be compelled to write off their debts which may be a hard decision (Makkar & Singh, 2013). Thus, an inverse relationship is predicted between interest rate and financial stability. The study will measure interest rate lending rate.

2.4 Empirical Literature Review

A study was conducted in Nigeria by Adegbe and Olumuyiwa (2020) whose focus was on OR management and FS of deposit money banks. The adopted design was ex-post facto research and 22 institutions were covered within a horizon 2009-2018. Selection of the firms was done

purposively. It emerged from the inquiry that OR has an inverse and significant nexus with FS. In particular, NPLs to total loans, cost against income ratio as well as loans against deposits all have significant interplay with FS. De-Jongh et al. (2013) did a review of OR within the banking context and its implication during periods of financial crisis. In particular, the inquiry plaid focus on the 2007/08 financial crisis that was evident around the globe. The outcome was that although credit crisis was the key cause of the global financial crisis, its severity and duration was due to OR.

A study focusing on commercial banks in Tanzania was done by Lyambiko (2015) and its essence was to bring out the implication that OR management practices had on financial performance. In total, 36 commercial banks were involved in the inquiry and census was the one that was embraced. The variables that were embraced in the inquiry include operation efficiency, insolvency as well as credit risk. The inquiry identified existence of a direct nexus between OR and financial performance. Elbadry (2018) did an appraisal of the link existing between financial stability and risk in the banking context with focus on Saudi Arabia. A number of ordinary least square (OLS) were adopted during the analysis. A total of 12 banks were covered within the time horizon 2011-2014. The outcome was that leverage and provisions had direct link with OR.

Ngaira and Miroga (2018) conducted an appraisal of key issues that determine financial stability of the listed banks in Kenyan context. The participants were 356 staff from the financial entities and information was sought from first hand sources. It emerged that interest rate had direct and significant nexus with financial stability. The size of the banking entities was established to have a direct and significant interplay with financial stability. Toroitich (2018) analyzed how OR exposure is linked with financial performance of Kenya's commercial banks. The variables of interest adopted in the inquiry were exposure to credit and liquidity risk as well as operational efficiency and operation expenses. A total 42 banks were covered and panel data was used. The

study obtained mixed results on OR and financial performance. Kamau (2018) strived to predict nexus between OR management and financial performance of Kenyan banks focusing on second and third tier entities. In total, 36 entities were covered and included in the inquiry. Panel data methodology was embraced in this inquiry. It emerged from analysis that OR has an inverse and significant link with financial performance. Equally, bank size was found to have significant implication on financial performance.

Hakimi (2020) did an appraisal of OR and performance of banks within the context of Tunisia. The variables of interest covered OR, credit and liquidity risk in relation to performance of the banks. The methodology adopted was panel data. Evidence were that OR and loan related activities are positively connected as far as performance is concerned. Muriithi and Muigai (2017) did a study whose focus was on OR and profitability of Kenyan commercial banks. The measure of OR was cost against income. The horizon of focus was 2005 all through to 2014 and all the 43 banking entities were covered. Information was obtained from the reports of the respective institutions. The findings were that OR have an inverse link with profitability of the entity both on a short and long term horizon.

2.5 Summary of Literature and Knowledge Gaps

The subsequent section has detailed in reviewing literature that presents gaps as summarized in Table 2.1.

Table 2.1: Summary of Literature and Knowledge Gaps

Author	Study	Key Findings	Knowledge gap	Focus of present study
Adegbe and Olumuyiwa (2020)	OR management and FS of deposit money banks in Nigeria	NPLs to total loans, cost against income ratio as well as loans against deposits all have significant interplay with FS	The study was conducted in Nigeria with focus on OR management	The present study was done in Kenya with focus on OR in general
Hakimi (2020)	An appraisal of OR and performance of banks within the context of Tunisia	OR and loan related activities are positively connected as far as performance is concerned	Bank performance was examined as the dependent variable	Financial stability was analyzed as the dependent variable in the present inquiry
Elbadry (2018)	An appraisal of the link existing between financial stability and risk in the banking context with focus on Saudi Arabia	leverage and provisions had direct link with OR	The study used financial stability as the independent variable	Financial stability was the dependent variable in the current study
Toroitich (2018)	How OR exposure is linked with financial performance of Kenya's commercial banks	The study obtained mixed results on OR and financial performance	The study covered financial performance as the dependent variable	Financial stability was the dependent variable in the current study
Muriithi and Muigai (2017)	OR and profitability of Kenyan commercial banks.	OR have an inverse link with profitability of the entity both on a short and long term horizon	The study covered profitability as the dependent variable	Financial stability was the dependent variable in the current study

2.6 Conceptual Framework

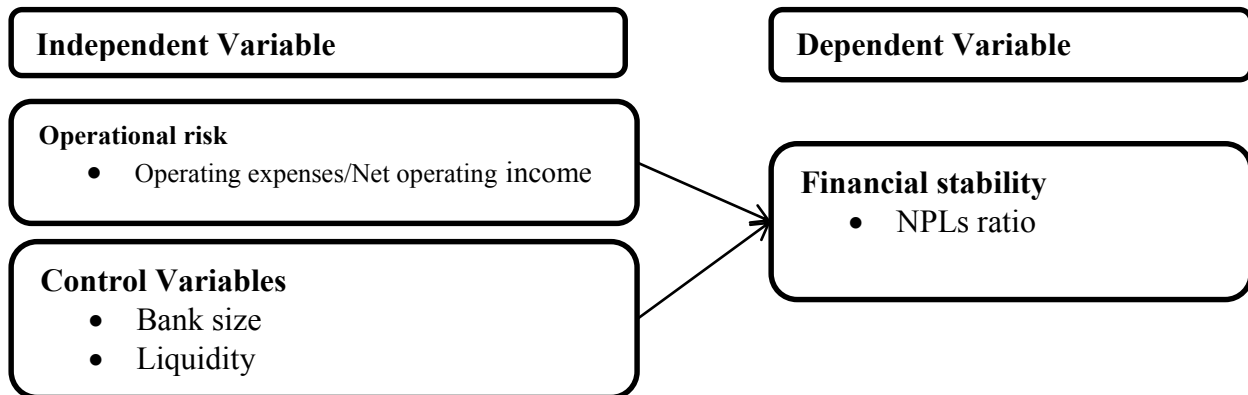


Figure 2.1: Conceptual Model

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter covers the methods that were adopted in achieving the formulated hypotheses. It details the research design, population, data gathering as well as analysis.

3.2 Research Design

The study adopted correlational research design to establish the cause effect nexus between OR and financial stability. Through this design, it was possible to explore the relationship between the variables of the inquiry so that relevant inferences can be drawn. This design supported the use of inferential statistics like correlation and regression analysis.

3.3 Population

Appendix I shows that as of December 2020, there were 39 fully operational commercial banks in Kenya after some like Imperial, Chase and Charterhouse had been placed under receivership and liquidation respectively. Thus, a total of 39 commercial banks (appendix I) were the target population in this study as at December, 2021 and census was adopted.

3.4 Data Collection

Second hand information was gathered in this study over a period 2017-2021. This period was selected upon because it was most current. The period was selected because of significant development that had been witnessed in the banking sector like mergers and acquisitions, increased adoption of technology like PesaLink. The study sought to relate if these developments contributed to operational risk and the resultant effect on financial stability. Information on NPLs, total NPLs and total assets as well as the net operating income was obtained on an annual basis from reports

and publications by the CBK. Information on operating expenses, current assets and liabilities was gathered from published reports of the respective commercial banks.

3.5 Data Analysis

Panel data methodology was adopted in this inquiry during the analysis that was conducted through SPSS version 24. The values of standard deviations and means were generated to provide a description of the variables of the study. Correlation and regression analysis were used to support drawing of relevant inferences.

3.5.1 Diagnostic Tests

Normality Test

The essence of conducting normality test is to ascertain if the data in the study has a normal distribution which is a desirable attribute (Pagan & Hall, 1983). This is a desirable condition that is needed for one to proceed with regression. Shapiro-Wilk was used to test for normality with $p > 0.05$ inferring presence of the condition (González-Estrada and Cosmes, 2019).

Multicollinearity Test

Multicollinearity is said to exist in a data when at least one of the independent variables as high relationship with another one. This shouldn't be the case and its presence is a strong violation of the regression assumption (Murray, Nguyen, Lee, Remmenga & Smith, 2012). Variance of inflation factors (VIF) helped in determining multicollinearity symptoms. Jensen and Ramirez (2013) observed that VIF values within the range 1-10 provide an indication of absence of multicollinearity in the data.

Autocorrelation test

Autocorrelation test seeks to determine the presence of serial correlation in the data. It is commonly used in time series data (White, 1992). It was tested through Durbin Watson Statistic (d). As observed by Savin and White (1977), the values of d closer to 2 indicate presence of serial correlation in the data.

Heteroskedasticity Test

This is a condition that occurs when the standard deviation of a predicted variable remain non-constant as after it has been monitored across various values of an explanatory variable (Rigobon, 2003) of Heteroskedasticity was gauged through Levin test and $p > 0.05$ will signify absence of this condition (Kaufman, 2013).

3.5.2 Analytical Model

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Y = is financial stability (NPLs/Total Loans)

X_1 is operating risk measured by operating expenses/net operating income

X_1 represents bank size measured by natural logarithm of asset

X_1 is liquidity represented by current assets/current liabilities

α is a constant

3.5.3 Significance Tests

The p-values from regression was interpreted taking into consideration the level of 0.05. In the event that the p-value is less than 0.05, it led to an inference that the relationship is significant. P-value above 0.05 will correspond with $t > 1.96$.

CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION

4.1 Introduction

The processing of the data that was obtained is done in this chapter. It is presented in descriptive and inferential terms with discussions.

4.2 Descriptive Statistics

Table 4.1: Descriptive Statistics

	n	Min	Max	Mean	Std. Dev
Operating risk	195	.28	15.76	4.6197	2.402
Bank size	195	3.35	5.47	4.6301	.281
Liquidity	195	.16	12.28	3.1259	2.702
Financial stability	195	.001	.76	.1958	.156

Source: Research Data (2022)

The findings in Table 4.1 indicate that operating risk (M= 4.6197, SD=2.402) and bank size, (M= 4.6301, SD=.281). The findings of descriptive statistics on liquidity (M= 3.1259, SD= 2.702) and financial stability had (M=.1958, SD= 0.156).

4.3 Diagnostic Tests

4.3.1 Autocorrelation Test

Autocorrelation test seeks to determine the presence of serial correlation in the data. It is commonly used in time series data (White, 1992). It was tested through Durbin Watson Statistic (d). The findings were determined and presented as shown in Table 4.2.

Table 4. 2: Autocorrelation Test

Model	Durbin-Watson
1	1.752

Source: Research Data (2022)

The value of d is 1.752 closer to 2 when rounded off. Savin and White (1977) noted that the values of d closer to 2 indicate presence of serial correlation in the data.

4.3.2 Multicollinearity Test

Multicollinearity is said to exist in a data when at least one of the independent variables as high relationship with another one. This shouldn't be the case and its presence is a strong violation of the regression assumption (Murray, Nguyen, Lee, Remmenga & Smith, 2012). Variance of inflation factors (VIF) helped in determining multicollinearity symptoms. Table 4.3 is a summary of the results.

Table 4. 3: Multicollinearity Test

	Collinearity Statistics	
	Tolerance	VIF
Operating risk	.997	1.003
Bank size	.990	1.010
Liquidity	.991	1.009
Mean VIF	.993	1.007

Source: Research Data (2022)

The mean VIF value is 1.007. This deduces that there was absence of multicollinearity in the data. This deduction is consistent with Jensen and Ramirez (2013) who observed that VIF values within the range 1-10 provide an indication of absence of multicollinearity in the data.

4.3.3 Normality Test

The essence of conducting normality test is to ascertain if the data in the study has a normal distribution which is a desirable attribute (Pagan & Hall, 1983). This is a desirable condition that is needed for one to proceed with regression. .

Table 4.4: Normality Test

	Shapiro-Wilk		
	Statistic	df	Sig.
Financial stability v	.928	3	.481
Operating risk	.910	3	.417
Bank size	.935	4	.621
Liquidity	.964	4	.801

Source: Research Data (2022)

From findings, the p-values are all above 0.05. Hence, there was normality assumption in the data that was used in this study. Pagan and Hall (1983) noted that $p > 0.05$ from Shapiro wilk test infer presence of the condition.

4.3.4 Heteroskedasticity Test

This is a condition that occurs when the standard deviation of a predicted variable remain non-constant as after it has been monitored across various values of an explanatory variable (Rigobon, 2003). Levin test adopted for this test and $p > 0.05$ will signify absence of this condition (Kaufman, 2013). The findings were determined and presented as shown in Table 4.5.

Table 4.5: Heteroskedasticity Test

Variable	Levene Statistic	df1	df2	Sig.
Financial stability	2.462	5	30	.755
Operating risk	4.306	6	31	.403
Bank size	10.389	4	31	.334
Liquidity	5.664	4	31	.102

Source: Research Data (2022)

The finding of the study in Table 4.5 indicates the p-values being above 0.05. This is a clear indication of absence of Heteroskedasticity. This is consistent with Kaufman (2013) who shared that $p > 0.05$ signify absence of this condition.

4.4 Correlation Analysis

Table 4.6 is a breakdown of the findings

Table 4.6: Correlation Analysis

		Financial stability	Operating risk	Bank size	Liquidity
Financial stability	Pearson Correlation	1			
Operating risk	Pearson Correlation	-.503	1		
Bank size	Pearson Correlation	.328	.301**	1	
Liquidity	Pearson Correlation	.118	.123	-.038	1

Source: Research Data (2022)

While operating risk had a strong and negative relationship with financial stability of the commercial banks ($r=-0.503$), bank size had a moderate and positive relationship ($r=0.328$) while liquidity had a weak and positive relationship ($r=0.118$). This means that when bank size and liquidity of Kenyan commercial banks are controlled, operational risk would exert unfavorable outcomes on financial stability.

4.5 Regression Results

The findings of the study were determined and presented as shown in the subsequent sections.

4.5.1 Model Summary

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.905	.819	.816	.06706

Source: Research Data (2022)

Table 4.7 indicates that operational risk exerts strong effect on financial stability of commercial banks ($R=0.905$). At the same time, the value of R-square is given as 0.819, which means that the overall regression was fit for predicting operational risk on financial stability. The adjusted R-squared value of given as 0.816, this implies that 81.6% change in financial stability among commercial banks in Kenya is explained by operational risk.

4.5.2 Analysis of Variance

Table 4.8 is a breakdown of the ANOVA findings of the study.

Table 4.8: Analysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.894	3	1.298	288.680	.000 ^b
Residual	.859	191	.004		
Total	4.753	194			

Source: Research Data (2022)

Table 4.8 indicate that on overall, the regression model of the study was significant (F=288.680, p<0.05).

4.5.3 Regression Beta Coefficients and Significance

Table 4.9: Regression Beta Coefficients and Significance

	Unstandardized Coefficients		Standardized	t	Sig.
	β	Std. Error	Beta		
(Constant)	.234	.082		2.864	.005
Operation risk	-.058	.002	-.883	-27.100	.000
Bank size	.055	.018	.063	3.056	.013
Liquidity	.011	.002	.012	5.500	.010

Source: Research Data (2022)

From Table 4.9,

$$Y = .234 - .058X_1 + .055X_2 + .011X_3$$

Y= is financial stability (NPLs/Total Loans)

X₁ is operational risk measured by operating expenses/net operating income

X₂ represents bank size measured by natural logarithm of asset

X₃ is liquidity represented by current assets/current liabilities

The study observed that at 5%, the analysis demonstrated that operational risk (p<0.05), bank size (p<0.05) as well as liquidity (p<0.05) are all significant predictors of financial stability of commercial banks in Kenya.

4.6 Discussion

The findings from correlation analysis indicate that operational risk had a strong and negative relationship with financial stability of the commercial banks (r=-0.503). The study observed that reducing operational risk by a unit would lead 0.058 unit improvement in financial stability of

commercial banks in Kenya. Operational risk ($p < 0.05$) is significant predictors of financial stability of commercial banks in Kenya. This finding is in line with Adegbe and Olumuyiwa (2020) who noted that OR has an inverse and significant nexus with FS. De-Jongh et al. (2013) did a review of OR within the banking context and its implication during periods of financial crisis and the outcome was that although credit crisis was the key cause of the global financial crisis, its severity and duration was due to OR. A study focusing on commercial banks in Tanzania was done by Lyambiko (2015) and its essence was to bring out the implication that OR management practices had on financial performance. The inquiry identified existence of a direct nexus between OR and financial performance.

Thus, OR is negatively but significantly interlinked with financial stability of commercial banks. This finding is consistent with Mazankova and Nemeč (2008) which was an analysis of OR and FS within the context of Czech Republic where a negative nexus was registered. Adegbe and Olumuyiwa (2020) focused on Nigeria to link OR management and FS of deposit money banks. It emerged that that OR is a significant predictor of FS of the lending entities. The study conducted in Tanzania by Lyambiko (2015) aimed at bringing out how the management of OR contributed towards ability of commercial banks to financially perform. The evidence were that varying degrees of the effect of operational efficiency, insolvency and credit risk on financial performance was registered. Ngaira and Miroga (2018) did an examination of the key issues that determine FS of commercial banks. It emerged that while interest rate and FS were directly linked with each other, operational costs and liquidity recorded an inverse nexus with FS. Toroitich (2018) did an analysis of OR exposure and the implication on financial performance with emphasis on Kenyan commercial banks and a significant and inverse link was noted. Kamau (2018) appraised how the management of OR impacted on financial performance of tiers II and III banks in Kenyan context

and a negative link was noted. Muriithi and Muigai (2017) did an exploration of OR and profitability with a focus on Kenyan commercial banks where negative link was noted

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

A recap of the main analysis issues is provided in this chapter with concluding and recommending remarks. The areas requiring further inquiries are also highlighted.

5.2 Summary

The nexus between operational risk and financial stability was key in this present study. The main independent variable was operational risk with bank size and liquidity as control variables. On the other hand, financial stability was the dependent variable. The study observed from correlation analysis that operational risk had a strong and negative nexus with financial stability. Bank size had a moderate and positive relationship with financial stability. Liquidity had a weak and positive relationship with financial stability.

From regression analysis, the study established that operational risk had the highest beta coefficient followed by bank size and liquidity. However, the beta coefficient of operational risk was negative; implying that exposure to this risk may reduce financial stability. The study further observed that operational risk, bank size and liquidity were all significant predictors of financial stability.

5.3 Conclusion

The study concludes exposure to operational risk may threaten financial stability of a commercial bank. Therefore, failing to effectively manage operational risk may lead to financial instability in a commercial bank. The modern portfolio provides diversification as one the strategies commercial banks can leverage to minimize their exposure to some of the operational risk.

The study further argues that operational risk can only exert negative effect on financial stability of the commercial bank after controlling for their size and liquidity position. Thus, in large and highly liquid commercial banks like for the case of tier I institutions in Kenya, incidences of operational risks like for the case of system disruptions may not necessarily contribute towards financial instability. Thus, with or without exposure to operational risks, large and relatively liquid commercial banks would continue to play their financial intermediation role in an economy. This reasoning is well grounded in the financial intermediation theory.

5.4 Recommendations of the Study

The operations managers working among commercial banks in Kenya should monitor and rectify any operational issues quickly and promptly whenever they arise. The finance managers working in commercial banks in Kenya should put in place adequate mechanisms to enhance the liquidity position while cutting down on operational costs and expenses. It is important to have in place revenue maximization efforts and mechanisms among commercial banks in Kenya so as to maximize the operating income.

Sound liquidity regulations and other guidelines need to be formulated to govern the operations of the commercial banks. There should be regular monitoring by CBK of the regulations to ensure there is compliance by commercial banks. The policy makers working in Kenyan commercial banks should have in place sound policies revolving around operational risk and liquidity to enhance financial stability.

5.5 Limitations of the Study

In total, 39 Kenyan banking entities were the focus of the present inquiry. The study was limited to information obtained in secondary sources. The period that the study was limited to was five years, from 2017-2021. The study was limited to operational risk as the independent variable, liquidity and bank size as control variables and financial stability as the dependent variable.

5.6 Suggestions for Further Research

In the present study, the value of adjusted R square was 0.861, this means that aside from operational risk and after controlling for liquidity and bank size, there are still other factors with an effect on financial stability of commercial banks in Kenya. Thus, the focus of future studies should be on bringing out other factors aside from the aforementioned variables that also have an effect on financial stability.

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APPENDICES

Appendix I: List of Commercial Banks in Kenya as at December, 2021

1. KCB Bank Kenya Ltd
2. Co-operative Bank of Kenya Ltd
3. Equity Bank Kenya Ltd
4. I & M Bank Ltd
5. Absa Bank Kenya Plc
6. Standard Chartered Bank Kenya Ltd
7. NCBA Bank Kenya PLC
8. Stanbic Bank Kenya Ltd
9. Bank of Baroda (Kenya) Limited
10. Citibank N.A. Kenya
11. Diamond Trust Bank Kenya Limited
12. Bank of India
13. Prime Bank Ltd
14. Family Bank Ltd.
15. SBM Bank Kenya Ltd
16. Gulf African Bank Ltd
17. Guaranty Trust Bank Ltd
18. Victoria Commercial Bank Limited
19. Habib Bank AG Zurich
20. National Bank of Kenya Ltd
21. First Community Bank Ltd
22. African Banking Corporation Ltd
23. Middle East Bank (K) Ltd
24. Sidian Bank Ltd
25. Paramount Bank Ltd
26. Guardian Bank Limited
27. UBA Kenya Bank Ltd
28. M-Oriental Commercial Bank Ltd
29. Development Bank of Kenya Ltd
30. Credit Bank Ltd
31. Ecobank Kenya Ltd
32. Kingdom Bank Ltd
33. Consolidated Bank of Kenya Limited
34. Mayfair CIB Bank Ltd
35. Bank of Africa (K) Ltd
36. DIB Bank Kenya Ltd
37. HFC Ltd

38. Spire Bank Limited
39. Access Bank Plc
40. Imperial Bank Ltd*
41. Chase Bank (K) Ltd**
42. Charterhouse Bank Ltd**

*Bank in Receivership

**Banks in Liquidation

Source: CBK (2021)

Appendix II: Data Collection Sheet

	2017	2018	2017	2020	2021
Operating expenses					
Net operating income					
Total assets					
Current assets					
Current liabilities					
NPLs					
Total Loans					

Appendix III: Raw Collected Data

Bank	Operating risk	Bank size	Liquidity	Financial stability
KCB Bank Kenya Ltd	4.771	5.019	7.136	0.083
Co-operative Bank of Kenya Ltd	4.277	5.092	9.436	0.071
Equity Bank Kenya Ltd	5.295	5.017	3.151	0.067
I & M Bank Ltd	3.787	4.637	2.792	0.139
Absa Bank Kenya Plc	4.716	4.917	9.768	0.071
Standard Chartered Bank Kenya Ltd	4.352	5.056	4.290	0.126
NCBA Bank Kenya PLC	5.868	5.159	3.628	0.073
Stanbic Bank Kenya Ltd	4.064	4.467	2.145	0.076
Bank of Baroda (Kenya) Limited	4.561	4.700	0.836	0.061
Citibank N.A. Kenya	3.320	5.066	1.540	0.045
Diamond Trust Bank Kenya Limited	4.678	5.151	6.071	0.076
Bank of India	3.340	4.991	0.775	0.021
Prime Bank Ltd	4.538	5.133	1.783	0.057
Family Bank Ltd.	3.287	5.236	0.999	0.202
SBM Bank Kenya Ltd	1.355	4.714	0.273	0.586
Gulf African Bank Ltd	4.848	4.442	1.023	0.097
Guaranty Trust Bank Ltd	2.038	4.789	1.140	0.103
Victoria Commercial Bank Limited	3.102	4.497	4.556	0.001
Habib Bank AG Zurich	4.789	4.997	0.390	0.104
National Bank of Kenya Ltd	8.899	4.533	2.891	0.406
First Community Bank Ltd	8.131	4.292	0.933	0.400
African Banking Corporation Ltd	5.365	4.668	4.974	0.216
Middle East Bank (K) Ltd	3.267	4.514	5.318	0.444
Sidian Bank Ltd	3.537	4.404	4.158	0.211
Paramount Bank Ltd	4.689	4.458	8.813	0.123
Guardian Bank Limited	5.559	4.485	0.410	0.109
UBA Kenya Bank Ltd	0.808	4.668	3.171	0.046
M-Oriental Commercial Bank Ltd	2.367	4.036	8.851	0.105
Development Bank of Kenya Ltd	2.286	4.314	1.896	0.216
Credit Bank Ltd	3.647	4.337	3.668	0.086
Ecobank Kenya Ltd	4.412	4.493	1.187	0.386
Kingdom Bank Ltd	2.207	4.066	1.282	0.212
Consolidated Bank of Kenya Limited	6.796	4.752	0.282	0.251
Mayfair CIB Bank Ltd	3.966	4.549	2.818	0.047

Bank of Africa (K) Ltd	4.695	4.637	6.050	0.315
DIB Bank Kenya Ltd	3.822	4.461	2.229	0.306
HFC Ltd	0.792	4.718	1.404	0.156
Spire Bank Limited	4.186	4.654	1.624	0.342
Access Bank Plc	4.825	4.834	4.329	0.217
KCB Bank Kenya Ltd	3.792	4.788	2.556	0.069
Co-operative Bank of Kenya Ltd	4.276	4.984	1.243	0.112
Equity Bank Kenya Ltd	4.785	5.063	1.462	0.074
I & M Bank Ltd	5.650	4.274	3.228	0.146
Absa Bank Kenya Plc	4.629	4.462	1.703	0.074
Standard Chartered Bank Kenya Ltd	4.078	4.620	1.272	0.163
NCBA Bank Kenya PLC	3.190	5.052	9.467	0.078
Stanbic Bank Kenya Ltd	4.429	5.111	1.629	0.107
Bank of Baroda (Kenya) Limited	2.691	5.046	3.268	0.090
Citibank N.A. Kenya	4.014	5.201	2.310	0.030
Diamond Trust Bank Kenya Limited	4.086	4.735	11.390	0.072
Bank of India	4.001	4.786	0.234	0.070
Prime Bank Ltd	5.900	4.768	0.999	0.074
Family Bank Ltd.	1.759	4.759	1.213	0.173
SBM Bank Kenya Ltd	3.328	4.617	2.086	0.691
Gulf African Bank Ltd	4.387	4.743	11.696	0.109
Guaranty Trust Bank Ltd	13.414	4.530	2.516	0.189
Victoria Commercial Bank Limited	8.645	4.297	2.276	0.031
Habib Bank AG Zurich	6.234	4.712	6.151	0.090
National Bank of Kenya Ltd	3.363	4.427	7.064	0.476
First Community Bank Ltd	3.702	4.478	0.782	0.462
African Banking Corporation Ltd	4.391	4.365	4.325	0.401
Middle East Bank (K) Ltd	5.524	4.516	5.889	0.400
Sidian Bank Ltd	1.384	4.732	2.254	0.209
Paramount Bank Ltd	2.465	4.027	4.647	0.173
Guardian Bank Limited	2.133	4.342	8.147	0.099
UBA Kenya Bank Ltd	4.105	4.330	3.083	0.128
M-Oriental Commercial Bank Ltd	6.785	4.557	0.806	0.096
Development Bank of Kenya Ltd	1.558	4.131	0.929	0.287
Credit Bank Ltd	8.096	4.813	8.165	0.083
Ecobank Kenya Ltd	3.704	4.590	3.589	0.217
Kingdom Bank Ltd	5.737	4.603	3.513	0.696

Consolidated Bank of Kenya Limited	6.628	4.447	3.545	0.253
Mayfair CIB Bank Ltd	4.861	4.710	2.046	0.306
Bank of Africa (K) Ltd	4.442	4.866	2.644	0.362
DIB Bank Kenya Ltd	5.627	4.769	1.902	0.466
HFC Ltd	4.569	4.666	1.542	0.271
Spire Bank Limited	4.773	4.903	1.269	0.440
Access Bank Plc	4.927	4.655	2.402	0.242
KCB Bank Kenya Ltd	5.396	4.748	3.476	0.074
Co-operative Bank of Kenya Ltd	5.682	4.782	1.739	0.111
Equity Bank Kenya Ltd	4.925	4.650	2.680	0.090
I & M Bank Ltd	2.789	4.276	2.213	0.123
Absa Bank Kenya Plc	4.293	3.352	2.099	0.066
Standard Chartered Bank Kenya Ltd	3.023	4.478	3.709	0.139
NCBA Bank Kenya PLC	3.051	4.773	1.658	0.125
Stanbic Bank Kenya Ltd	4.195	4.680	1.415	0.118
Bank of Baroda (Kenya) Limited	7.164	4.639	1.880	0.084
Citibank N.A. Kenya	5.845	4.512	0.911	0.041
Diamond Trust Bank Kenya Limited	1.859	4.721	1.314	0.083
Bank of India	3.892	4.498	2.112	0.089
Prime Bank Ltd	4.962	4.673	1.585	0.117
Family Bank Ltd.	14.164	4.503	1.766	0.152
SBM Bank Kenya Ltd	11.155	4.313	3.643	0.550
Gulf African Bank Ltd	5.913	4.752	0.941	0.147
Guaranty Trust Bank Ltd	3.443	4.318	1.681	0.185
Victoria Commercial Bank Limited	4.105	4.568	9.477	0.049
Habib Bank AG Zurich	4.644	4.283	4.952	0.112
National Bank of Kenya Ltd	5.049	4.527	1.546	0.415
First Community Bank Ltd	2.668	4.827	9.048	0.397
African Banking Corporation Ltd	2.327	4.047	12.063	0.177
Middle East Bank (K) Ltd	1.949	4.339	8.859	0.141
Sidian Bank Ltd	4.410	4.328	1.857	0.206
Paramount Bank Ltd	6.859	4.570	0.922	0.176
Guardian Bank Limited	2.265	4.503	0.465	0.095
UBA Kenya Bank Ltd	8.976	4.840	1.171	0.230
M-Oriental Commercial Bank Ltd	3.741	4.651	0.496	0.189
Development Bank of Kenya Ltd	-6.286	4.721	2.206	0.341

Credit Bank Ltd	4.013	4.428	0.870	0.101
Ecobank Kenya Ltd	5.797	4.827	2.085	0.198
Kingdom Bank Ltd	4.282	4.851	1.887	0.565
Consolidated Bank of Kenya Limited	5.451	4.916	1.481	0.295
Mayfair CIB Bank Ltd	4.165	4.714	6.491	0.015
Bank of Africa (K) Ltd	5.499	4.757	1.199	0.399
DIB Bank Kenya Ltd	5.007	4.703	1.110	0.010
HFC Ltd	5.190	4.593	3.943	0.269
Spire Bank Limited	5.278	4.702	7.979	0.515
Access Bank Plc	5.202	4.753	2.267	0.176
KCB Bank Kenya Ltd	3.430	4.698	11.376	0.123
Co-operative Bank of Kenya Ltd	4.251	4.550	11.435	0.168
Equity Bank Kenya Ltd	3.010	4.722	2.982	0.120
I & M Bank Ltd	3.326	4.591	3.655	0.126
Absa Bank Kenya Plc	4.701	5.474	3.538	0.074
Standard Chartered Bank Kenya Ltd	6.420	4.674	3.097	0.146
NCBA Bank Kenya PLC	6.002	5.302	1.122	0.139
Stanbic Bank Kenya Ltd	2.150	4.781	3.585	0.142
Bank of Baroda (Kenya) Limited	4.303	4.398	4.985	0.124
Citibank N.A. Kenya	6.672	4.671	1.699	0.028
Diamond Trust Bank Kenya Limited	8.393	4.504	5.303	0.119
Bank of India	11.138	4.336	7.151	0.047
Prime Bank Ltd	6.229	4.775	1.037	0.109
Family Bank Ltd.	6.176	4.251	4.194	0.149
SBM Bank Kenya Ltd	4.483	4.651	7.542	0.441
Gulf African Bank Ltd	4.768	4.154	3.133	0.176
Guaranty Trust Bank Ltd	4.772	4.532	3.077	0.208
Victoria Commercial Bank Limited	6.066	4.875	4.405	0.066
Habib Bank AG Zurich	3.019	4.245	3.159	0.122
National Bank of Kenya Ltd	1.526	4.411	4.057	0.354
First Community Bank Ltd	5.781	4.287	3.147	0.361
African Banking Corporation Ltd	10.098	4.591	7.451	0.156
Middle East Bank (K) Ltd	15.756	4.524	0.947	0.103
Sidian Bank Ltd	4.398	4.863	0.541	0.115
Paramount Bank Ltd	4.147	4.713	0.602	0.171
Guardian Bank Limited	8.248	4.740	0.372	0.128

UBA Kenya Bank Ltd	3.906	4.392	0.766	0.407
M-Oriental Commercial Bank Ltd	5.290	4.730	3.776	0.234
Development Bank of Kenya Ltd	4.316	4.764	2.847	0.337
Credit Bank Ltd	0.744	4.884	2.325	0.115
Ecobank Kenya Ltd	4.169	4.652	5.677	0.163
Kingdom Bank Ltd	5.640	4.759	1.883	0.762
Consolidated Bank of Kenya Limited	5.108	4.770	2.486	0.240
Mayfair CIB Bank Ltd	5.407	5.275	0.212	0.026
Bank of Africa (K) Ltd	5.180	4.690	2.736	0.398
DIB Bank Kenya Ltd	5.061	4.404	7.099	0.014
HFC Ltd	3.578	4.970	1.234	0.258
Spire Bank Limited	3.849	5.054	1.742	0.708
Access Bank Plc	2.738	4.477	0.361	0.046
KCB Bank Kenya Ltd	3.556	4.527	4.053	0.219
Co-operative Bank of Kenya Ltd	5.328	4.738	2.590	0.130
Equity Bank Kenya Ltd	6.316	4.596	4.298	0.084
I & M Bank Ltd	5.960	4.534	1.678	0.108
Absa Bank Kenya Plc	2.320	4.813	0.921	0.077
Standard Chartered Bank Kenya Ltd	4.194	4.746	1.805	0.157
NCBA Bank Kenya PLC	6.788	5.193	2.899	0.160
Stanbic Bank Kenya Ltd	8.313	4.554	0.164	0.112
Bank of Baroda (Kenya) Limited	9.176	4.374	0.841	0.105
Citibank N.A. Kenya	7.154	4.831	2.102	0.019
Diamond Trust Bank Kenya Limited	7.475	4.804	0.501	0.158
Bank of India	5.580	4.682	0.804	0.028
Prime Bank Ltd	4.848	4.026	0.256	0.109
Family Bank Ltd.	4.671	4.544	0.352	0.150
SBM Bank Kenya Ltd	3.444	4.896	1.039	0.344
Gulf African Bank Ltd	3.175	4.360	0.284	0.161
Guaranty Trust Bank Ltd	1.622	4.431	0.757	0.138
Victoria Commercial Bank Limited	5.481	4.324	3.894	0.139
Habib Bank AG Zurich	11.348	4.659	7.643	0.116
National Bank of Kenya Ltd	3.908	4.590	1.551	0.335
First Community Bank Ltd	5.021	4.893	4.243	0.288
African Banking Corporation Ltd	4.851	4.752	2.769	0.197
Middle East Bank (K) Ltd	-2.634	4.843	3.386	0.079

Sidian Bank Ltd	5.539	4.428	4.672	0.118
Paramount Bank Ltd	0.643	4.752	2.793	0.191
Guardian Bank Limited	0.770	4.789	1.973	0.164
UBA Kenya Bank Ltd	0.284	4.668	0.592	0.478
M-Oriental Commercial Bank Ltd	2.791	4.415	0.853	0.268
Development Bank of Kenya Ltd	0.329	4.497	1.725	0.293
Credit Bank Ltd	5.448	4.493	1.200	0.282
Ecobank Kenya Ltd	1.139	4.668	1.918	0.161
Kingdom Bank Ltd	0.586	4.036	2.589	0.745
Consolidated Bank of Kenya Limited	0.872	4.637	2.193	0.275
Mayfair CIB Bank Ltd	2.335	4.292	1.584	0.038
Bank of Africa (K) Ltd	9.600	4.485	2.661	0.317
DIB Bank Kenya Ltd	0.915	4.066	12.283	0.150
HFC Ltd	1.464	4.314	1.264	0.220
Spire Bank Limited	1.089	4.533	1.567	0.760
Access Bank Plc	1.408	4.404	3.664	0.065