THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

The Effect of Operational Risk Management on Financial Performance of Commercial Banks: A Case of Tier Two and Three Commercial Banks in Kenya

Rose Waithira Kamau
Operations Officer, Department of Branch Operations, SBM Bank Kenya Limited, Nairobi, Kenya
Dr. James Gatauwa
Lecturer, Department of Accounting and Finance, Kenya Methodist University, Kenya
Dr. Felix Mwambia
Lecturer, Department of Accounting and Finance, Kenya Methodist University, Kenya

Abstract:
Kenyan banking sector is exposed to risks that initiate from external and internal environments. Operational risk threatens the viability and long-term sustainability of banks. Despite growth in the Kenyan banking sector, operational risk possesses a major challenge. The main objective of this paper was to examine the impact of operational risk on the financial health of tier two and three commercial banks in Kenya. The findings indicate that operational risk has a significant negative effect on the financial performance of tier two and three banks. Bank size has a significant positive effect on the financial performance of tier two and three banks. The study also concluded that tier three banks are not able to mitigate operational risks as well as tier two banks through the dummy variable measure. Banks are therefore encouraged to develop effective risk management and measurements techniques to avoid huge operational losses that negatively affect the financial health of the institutions.

Keywords: *Operational risk, financial performance, Bank size, dummy variable*

1. Introduction

Commercial banks are established to maximize their shareholder value which is a function of risk and return. Being in the risk business, commercial banks provide financial services, and in the process, they assume various kinds of risks which defer in occurrences and nature in regards to the different business activities (Lyambiko, 2015). The major banking risks include operational risk, default, interest rate, liquidity, and market risk. Higher risk translates to a higher gain; however, higher risks may lead to greater losses. Operational risk, under Basel II framework, is defined as loss stemming from an operational failure linked to people, inadequate internal procedures and systems. This definition also covers legal risk but does not include reputational and strategic risk. The nature of operational risk is dynamic and complex. It is adjudged external if it originates from uncontrollable events like political risk, natural disasters, and security breaches and defined as internal if the financial organization can control it (Maina et al., 2014).

Financial performance of any enterprise can be described as the measure of the ability of an enterprise to achieve its financial goals guided by its financial benchmarks. The ability of a bank to generate sustainable profits normally indicates that the bank's performance and profitability have to be protected from unexpected losses. It has been established that the existence of a risk management policy and its integration in setting organizational objectives has a direct effect on the financial performance. Some risk management practices tend to have a significant effect on the financial health more than others. This means that developing solid risk management policies and integrating risk management in the processes of setting achievable organizational objectives can help banks improve their performance (Lyambiko, 2015).

The onset of bank crises has revealed the inefficiency in the banking system over the years despite numerous efforts being made. Financial institutions have faced large operational losses worldwide due to Lack of proper risk management. Well-known firms have suffered losses resulting in their failure, merger, or considerable equity price declines (Fontnouvelle et al., 2006).As reported by the Centre for Corporate Governance (2014), a number of banking institutions in Kenya collapsed in the eighties. Rural-Urban Credit Finance Company Limited was the first casualty being put under interim liquidation in 1984.During the period that followed, 32 banks had been put under receivership or liquidated in spite of the efforts by the government to streamline the banking industry through the introduction of statutory regulation procedures of containment. Bad governance and management practices and Weak internal controls were the reasons for the additional bank collapses. According to a survey conducted by PWC in the late 2010 and 2011 on 33 banks in Kenya, Tanzania, Zambia, Rwanda and Uganda, most banks in Kenya recorded cases of fraud in the months of

August to October 2010 having lost over 1.7 billion shillings to fraud. Growth in banking fraud leading to operational losses was attributed to the dwindling of the internal control systems effectiveness in most banks (Wanjohi, 2014). In 2016 the National Bank of Kenya annual report stated that the bank had incurred operational losses resulting to over 300 million shillings to fraud. During the same period, the Central Bank of Kenya placed two banks under receivership i.e. Imperial Bank Kenya limited and Chase Bank Kenya. Charterhouse Bank Limited was placed under statutory management while Dubai Bank was liquidated due to their inability to meet the capital requirement (Central Bank of Kenya, 2015).

The CBK categorizes Kenyan commercial banks into three peer groups. The classification is done using a weighted composite index that constitutes the number of loan and deposit accounts, customer deposits, net assets, capital and reserves. The paper will focus on tier two and three banks as they have in the past been faced with financial losses leading to closure. Tier one banks are able to buffer themselves from the shocks in the market and have in the past been able to thrive through the operational risk exposures and other risk exposures. CBK has introduced enforcement measures and reforms in the banking industry in this period of collapses, which has led to improvements in data reporting, review of business models of banks, cooperate governance and some transparency. Therefore, this paper aims to establish the effect of operational risk, bank size, operational risk practices, board and senior management insight on the financial health of tier Two and Three commercial banks in Kenya.

This paper is divided into the following sections; introduction, literature review, research methodology, data analysis and conclusions and recommendations.

2. Literature Review

2.1. Operational Risk Management and Financial Performance

Sparrow (2000), defines operational risk management as the systematic management and assessment of the tradeoffs between opportunity and risk to operate an efficient and effective company. Proper management of operational risk results to the reflection of the effectiveness of senior management and the board in administering processes, activities, systems and products (Bank for International Settlements, 2017).

Gathaiya, (2017) passed the issues affecting collapsed banks in Kenya from the year 2015 to 2017.The study concluded the major issues that contribute to the collapse of the banking organizations in Kenya is related to: conflict of interest, insider lending, poor strategies in risk management, lack of internal controls, weak practices in corporate governance, regulatory and supervisory systems. The capability of a bank to identify, monitor and manage its risk is attributed to a bank's internal governance arrangements being effective which is very critical in the prosperity and success of banking institutions.

Muriithi, (2016) indicated that operational risk if not addressed systematically, can lead to earnings surprises and inconsistent performance for the stakeholders. The study demonstrated that operational losses generated are a cost to the bank as Operational risk exposures impact on the net worth and revenue of banks. On the contrary, Lyamiko (2015) study summary indicated operational risk management had a positive effect on the financial health of Tanzanian commercial banks. The study found that the three independent variables in the study (Credit risk, Insolvency risk and Operational efficiency) are positively correlated with the financial health of the Tanzanian commercial banks.

2.2. Operational Risk Exposures

Rajendran (2012) investigated operational risks involved in banking Industries and discusses in detail the operational risk exposures in line with the Basel II. Operational risk exposures can be categorized into four as people, processes, systems and external. The definition does not include reputational and strategic risk but includes legal risk and for this reason, the Basel committee recognizes operational risk as a term with many connotations, allowing banks to tailor their own definitions of operational risk provided they include the minimum aspects in the committee's definition (Bank for International Settlements, 2011).

The Basel committee also categorizes events losses as follows; internal fraud, external fraud, work place safety and employment practice, Business Practices, disclosure, fiduciary and suitability, damages to physical assets, other events and disasters, System failures and Business disruption, Process delivery and Execution management. Operational risk events have been covered full space by the event categories mentioned above and the banking sector and regulatory bodies have gained acceptance of the "Basel definition" (Bank for International Settlements, 2011)

Esterhuysen, (2003) carried out a study to evaluate the Management of Operational Risk by banks in South Africa. From the study, the researcher arrived at the conclusion that operational risk cannot be assigned a single definition as it takes on many forms and bank risk managers can use different ways to identify operation risk. The researcher also acknowledged the theory of asset and liability management as well as key performance indicators are useful in identifying, measuring and monitoring operational risk which possess a huge threat to financial health of an institution.

2.3. Board and Senior Management Oversight

A survey carried out by Tandon and Mehra, (2017) on the effect of ownership and size on operational risk management practices, focusing on Indian banks, shows that Basel II norms implementation has intensified the importance and focus given to Operation Risk Management by banks operating in India. From the questionnaire carried out on the 31 banks displayed a well enumerated policy approved by the Board of directors for Operation Risk Management. In most of the respondent banks in the study, a division of risk management department was managing Operational risk having appointed an exclusive chief risk officer indicating the sincerity of Indian banks have towards risk

management. The study also highlighted the need of involving officials at the branch level for effective management of operational risk as compromise on the impact of Operation Risk Management strategies mostly occurs at the grassroots level. Various banks in the survey reported of wide variations in the involvement of operational risk functionaries as it was observed that large sized banks and Multinational Company's size implemented involvement way down to the grassroots but for small banks the involvement was limited to the head office.

Gathaiya, (2017) in his study the issues affecting collapsed banks in Kenya from the year 2015 to 2017, pointed out cooperate governance among other duties organizations have apart from the goal of profit maximization. Cooperate governance in the banking industry is highlighted by the way in which banks manage their business particularly by the top management and the board of administration, which in turn impacts on how a bank works out its objectives and policies, taking into consideration that they make sufficient economic returns for the shareholders. Shareholders, the board of directors, management, the Central Bank of Kenya, external auditors are the stakeholders in the banking sector who play key roles regarding cooperate governance. The study also points out that despite the numerous efforts made to streamline the banking sector, issues have persisted as many banks have been put under receivership or even liquidated due to poor management and governance practices. An organization's Board of directorsis an essential mechanism to monitor manager's behavior and to advise them. Board of directors are the main and highest decision-making body and are primarily responsible for the fate of their organizations. To improve on the performance of a firm at the various levels, the board size should be limited to a certain level e.g. Dubai bank at the point of its collapse had three directors which was a compromise to its monitoring.

Anouar et al., 2017 in a study on the operational risk management in Tunisian banks points out that banks can avoid financial excesses and difficulties by implementing good governance. However, the effectiveness of operational risk management and the quality control of the internal control system may be affected by the functioning of the BOD and the organization. There is an emphasis in the study on the role of the Board of directors as a factor behind the development of a banking governance system.

2.4. Bank Size

Tandon and Mehra, (2017) in their survey of Indian banks and the relative operational risk remarked that size was observed to be a restraint to deep involvement of operational risk functionaries and the collection, usage of external loss data. Furthermore, when they are compared to peers, large-sized banks had a well-established model for ORM. Preparedness and performance of the new private sector public sector outperformed that registered by old private banks in numerous arenas. However, in Kenya, the observations were vice versa. The new private banks were the most affected during the collapses while the old public-sector banks seem to be financially stable.

In the IMF staff discussion note on bank size and systematic risk by Laeven, Ratnovski & Tong, (2014) point out that large banks create more systematic risk and are riskier when they have less-stable funding and lower capital. Large banks are not individually riskier but create more systemic risk when they are more organizationally complex or engage more in market-based activities. Failures of banks that classified as either tier 1 or tier 2 register a disruptive effect on the financial system that the other smaller bank failures. Laeven, Ratnovski & Tong, (2014) additionally allude to the fact that the commonality of liquidity stress increases with the size of the bank. This is due to their reliance on the economies of scale, scope and system and it is increasingly difficult to replace such banks with other healthier smaller banks.

Dániel (2011) conducted a study on operational bank risk and size of the firm which sought to test the theory that there is a positive relation between operational risk losses incurred by Hungarian banking system and the size of the institutions. The empirical analysis conducted supported the correlation between the gross income-based institution sizes and the total operational risk losses incurred in a given period. The study presented forward looking results despite having a small sample of institutions which may have limited the ability to draw solid conclusions from the presented analysis. From the analysis the relationship between size of an institution and frequency parameter was regarded as strong and that with the loss size as less strong. Additionally, the institution size affects the size of individual loses by a small proportion and more by a business line or loss type. The most important result of the study was that larger institutions potentially incur a greater total loss from operational risk exposure as they incur more fixed costs related to risk management resulting from use of more advanced technologies and that an institution size affects the ORM method selection.

In contrast with the above studies, the empirical study results for bank groups carried out by Tripati Rao & Ghosh (2011) on operational risk measurement and quantification by applying Covariate-Var, showed that capital markets believe small sized banks in the private sector that are well-capitalized and well-diversified are exposed to risk less. The results also demonstrated that size is an important factor that impacts on equity risk considering large banks contribute more to the issue of systematic risk. Generally, large banks enjoy protection from governments under the notion of "too big to fail" and therefore considered less risky, and tend to have more opportunities in activity and geographical for diversification. On the contrary, it's difficult to monitor the complex large entities that can be exposed to higher risk, indicating that bank size is an important factor affecting risk.

A study conducted by Tarawneh (2006) demonstrated that high deposit holding banks, credits total assets or capital, does not indicate a healthier profitability performance. The study demonstrated that the size of a bank, operational efficiency and management of its assets, positively influenced the financial performance of these banks.

2.5. Conceptual Framework

The conceptual framework shown below represents the conceptualized interaction among operational risk exposures, operational risk management practices, board and senior management oversight, bank size and financial

performance. Therefore the conceptual framework generally depicts theinterrelationship between the variables under discussion.

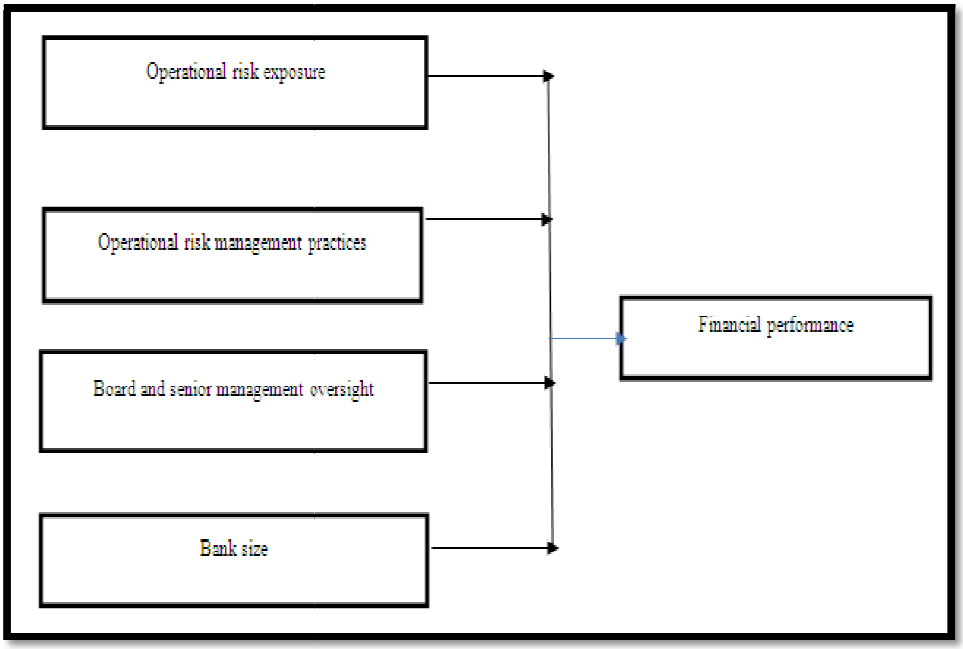

Figure 1: Conceptual Framework

3. Research Methodology

3.1. Research Design

In this paper causal research design was used where data was collected and analysis carried out to describe a causal relationship between the different variables.

3.2. Target Population

The population of the study comprised of Tier two and three licensed commercial banks in Kenya. The directory of licensed commercial banks mortgage finance institutions and Non-Operating Holding Companies, 2017 by Central Bank of Kenya, lists 36 banks in this category with Chase bank, Imperial bank being placed in receivership and Charterhouse Bank Limited being placed under statutory management.

3.3. Data Collection Procedure

The study used Secondary data from audited financial statements of Commercial banks in Kenya was collected. The study collected secondary data for a nine-year period starting year 2008 to 2017 from the audited financial statements of the commercial banks during the same period disclosed as per the Central Bank of Kenya prudential guidelines, on the effect of operational risk exposure, operational risk management practices, bank size, board and senior management oversight and financial performance of commercial banks in Kenya.

3.4. Data Analysis

This section discussed the techniques that were used to test the variables and analyze data. The data was organized in order to obtain the study variables, financial ratios were computed using MS-Excel program. Regression equations quantitatively analyzed the unbalanced panel data collected and the data was solved using statistical tool E-Views.

3.5. Model Specification

The data collected was analyzed in order to determine the relationship between operational risk management practices, Bank size and their effect on financial performance in tier two and three commercial banks in Kenya.The results were tested to see the extent of the relationship using the individual fixed effects dummy variable regression model. The model used dummy variable regression to estimate the individual fixed effect model which is a method for controlling for panel data omitted variables that are difficult to measure and controls for the differences between the banks. The fixed effects model removes the bias caused by these variables, minimizes correlation of errors and is a good fit for panel data hence a superior model.

$Yit= \beta 0+\beta CIRit+\beta SIZEit+\alpha 1Z1it+uit$ …… (I)

$Yit= \beta 0+\beta CIRit+\beta SIZEit+\alpha 1Z1it+uit$ …… (II)

Where;

Yit= Financial performance measured by Return on equity (ROE)

Yit II= Financial performance measured by Return on Assets (ROA)
CIR it = the operational risk measured by the cost to income ratio. It will be measured by the ratio of Operating expenses to net operating income
SIZE it= The Bank size which will be measured by the natural logarithm of total assets.
α = represents the fixed or individual effect representing time invariant variables that are difficult to measure and include all the characteristics of the individual that do not change over time.
Z1ít = Dummy variable which represents a bank's Tier classification and is assigned a value of 1 if the bank falls under tier two and a value of 0 if a bank falls under tier three.
β0 = Constant term
u it= Error term
β Coefficient =from the equation represent the strength and direction of the relationship between the variables.

4. Data Analysis

4.1. Descriptive Statistics

The study used data with 36 cross sections and a period of 9 years. Some of the observations on the three variables used for analysis of the secondary data were missing therefore instead of 324 observations (36*9) anticipated, 304 observations were used. Data obtained was transferred to E-views version 10 for analysis.

	Roe	**Dummy**	**Cir**	**Bank Size**	**Roa**	**Dummy**	**Cir**	**Bank Size**
Mean	14.12728	0.419753	93.06340	3.837742	2.018495	0.419753	93.36853	3.861803
Median	17.20000	0.000000	73.63922	4.139942	2.400000	0.000000	73.71000	4.143577
Maximum	47.35000	1.000000	1425.400	5.387610	10.40000	1.000000	1425.400	5.387610
Minimum	-90.8000	0.000000	0.000000	-0.744727	-17.47000	0.000000	0.000000	-0.744727
Std.Dev	18.42664	0.494882	103.8647	1.328485	3.229093	0.494282	103.8979	1.297212
Skewness	-1.876970	0.325203	8.125199	-1.982428	-2.386537	0.325203	8.137695	-2.035327
Kurtosis	8.823450	1.105757	93.53363	5.978100	12.92876	1.105757	93.62439	6.283096
Jarque-Bera	638.0617	54.15099	107870.3	328.8799	1613.109	54.15099	107737.0	363.5130
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000	0.000000
Sum	4506.602	136.0000	28477.40	1231.915	643.900	136.0000	28477.4	1231.915
Sum Sq.Dev	107974.1	78.91358	3290301	564.7588	3315.800	78.91358	3281612.	535.1176
Observations	319	324	306	321	319	324	305	319

Table 1: Descriptive Statistics Model I & II
Source: Authors Computations (2018)

The overall mean on ROE, CIR, Dummy and Bank size were 14.12728, 93.0634, 0.41.97 and 3.837742 respectively. This indicates that over the period of study the commercial banks were positively profitable. ROE mean of 14.12728 is a strong indication that the commercial banks were competing among themselves to make profits and the standard deviation of 18.4266 indicates a high variability in ROE across time. The minimum and maximum values for ROE were -90.8 and 47.35 respectively with a median value of 17.20. The mean value of Cir was 93.3685 with a median of 73.63. The standard deviation of the CIR was 103.86 which indicates a high variability in its values over time with a maximum and minimum value of 1425 and 0.00 respectively. The results further indicated that the Bank size had a mean of 3.837742 and a median of 4.139942. The standard deviation of bank size was 1.32848 which implies a low variability in its values over time with a maximum of 5.38761 and a minimum of -0.744727.

The overall mean on ROA, CIR, and Dummy and Bank size were 2.018495, 93.36853, 0.419753 and 3.861803 respectively. This indicates that over the period of study the commercial banks were positively profitable as in model I. The mean of ROA is 2.018495 indicating considerable competition between the commercial banks to make profits and the standard deviation of 3.229093 shows high variability in ROA across time with a minimum value of -17.47 and maximum value of 10.4. The median value was 2.40.

The mean value of Cir was 93.3685 with a median of 73.71. The standard deviation of the CIR was 103.89 which indicates a high variability in its values over time with a maximum and minimum value of 1425 and 0.00 respectively.
The results further indicated that the Bank size had a mean of 3.861803 and a median of 4.143577. The standard deviation of bank size was 1.297212 which implies a low variability in its values over time with a maximum of 5.38761 and a minimum of -0.744727.

4.2. Normality Test

This was used to determine if a data set is well modeled by a normal distribution. The error term normality can be examined through the formal way using the Jarque-Bera test statistics or the informal way of using a graph to establish the pattern of the residual. From Figure 2below, the results after adjusting and using the white cross section covariance method to run model I, shows the skewness value to be at -0.126272 which is negative but close to 0, the kurtosis value also is at 2.636435 which is close to 3. The jarque-Bera statistic is at 2.491354 with a p-value is (0.287746) which is greater than 0.05 level of significance. This allows us to reject our null hypothesis and accept the alternate that our error term is now normally distributed. A good jarque-Bera statistic should be between 2 and 4.From Figure 3from running model II using the white cross section covariance method, the data is still negatively skewed however the value is close to 0 as it is at -0.104309 and the kurtosis value is close to 3 at 2.775478. The jarque-Bera statistic is at 1.189806 with a p-value of (0.5516) which is greater than the significance level of 0.05. However, model I gives us a better jarque-Bera statistic value as it is at 2.491354 which is between the recommended values of 2-4 degrees of freedom.

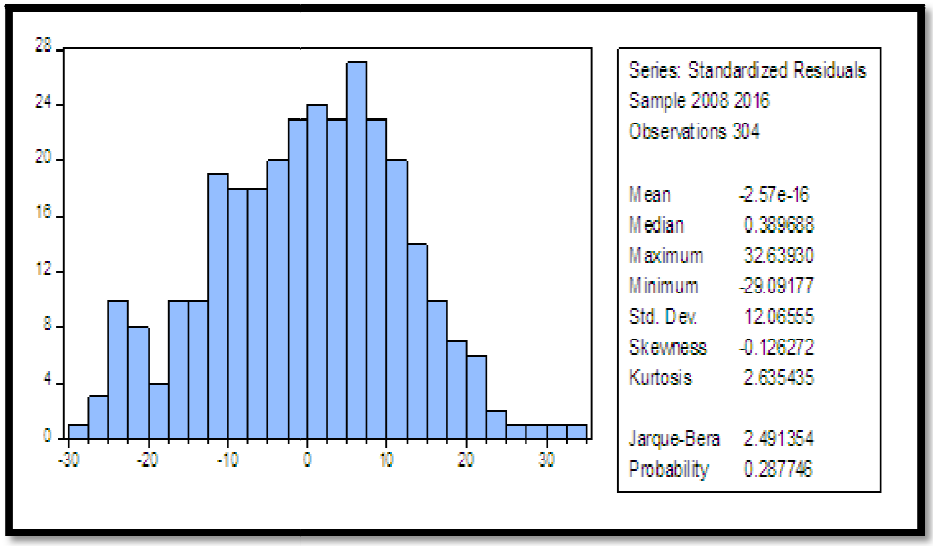

Figure 2: Normality Test Model I

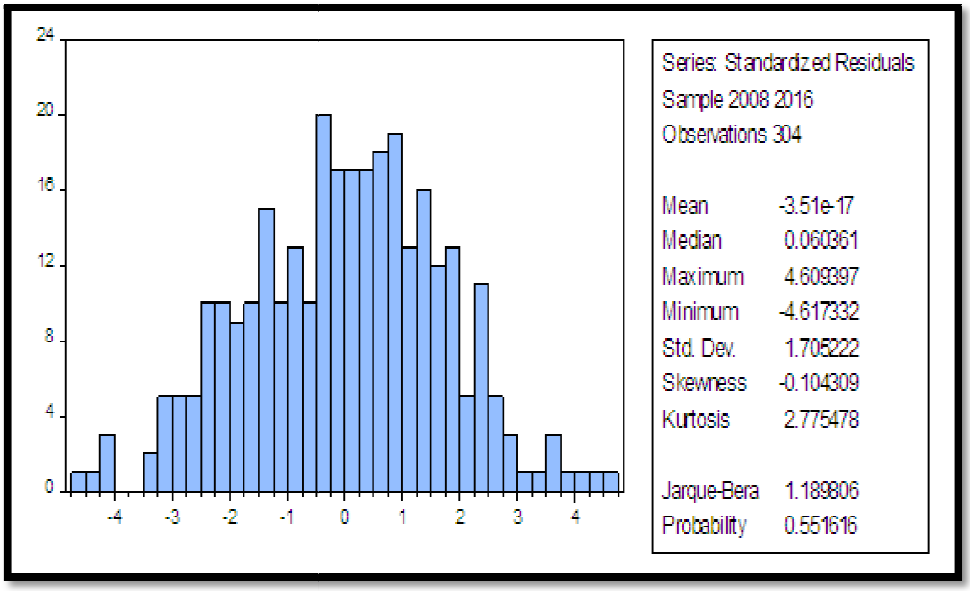

Figure 3: Normality Test Model II

4.3. Correlation Analysis

This test was conducted to establish possible connections between variables. By carrying out correlation analysis and getting the values, one can determine multi collinearity. Correlation coefficients range between negative one and positive one. According to Muriithi, (2016), pair-wise correlation coefficients of more than 0.8 indicates existence of high degree multicollinearity and permits a remedial action while correlation coefficients in less of 0.8 points out that the problem of multicollinearity is minimal and it is normally ignored.

Correlation t-statistic Probability	ROE	Bank Size	CIR	Dummy
ROE_	1.000000 ------ ------			
BANK SIZE	0.098034 1.711890 0.0879	1.000000 ------ ------		
CIR	-0.433276 -8.354437 0.0000	-0.100714 -1.759163 0.0796	1.000000 ------ ------	
DUMMY	0.319276 5.854853 0.0000	0.225295 4.018521 0.0001	-0.213615 -3.799936 0.0002	1.000000 ------ ------

Table 2: Correlation Matrix Model I
Source: Authors Computations (2018)

Correlation t-statistic Probability	ROA	Bank Size	CIR	Dummy
ROA_	1.000000 ------ ------			
BANK SIZE	0.113167 1.979339 0.0487	1.000000 ------ ------		
CIR	-0.617165 -13.63082 0.0000	-0.115375 -2.018489 0.0444	1.000000 ------ ------	
DUMMY	0.289964 5.265243 0.0000	0.225295 4.018521 0.0001	-0.207421 -3.684727 0.0003	1.000000 ------ ------

Table 3: Correlation Matrix Model II
Source: Authors Computations (2018)

From both Table 2and 3 above it was found that the correlation for each pair of variables is not high enough as the values were all lower than 0.8, therefore it was concluded that no serious multicollinearity problem existed.

4.4. Unit Root Test

Unit root test is a statistical test that determines if time series data is non-stationary and poses a unit root. The test was presented as: null hypothesis -data series is non-stationary the alternate hypothesis data series is stationary. Decision Rule: Reject null hypothesis if the p-value of unit root test less than Significance level. Otherwise, do not reject.

Variables	ADF-Fisher Prob**	ADF-Choi z-stat Prob**
CIR	0.0005	0.0002
Bank size	0.0000	0.0000
ROE	0.0013	0.0003
ROA	0.0003	0.0002

Table 4: Unit Test
Source: Authors Computations (2018)

From table 4 above, the p-value of all three statistics is somewhat consistent with values less than the significance level of 0.05. Therefore, the null hypothesis was rejected and concluded that that all the variables are stationary at significance level of 0.05. The result proves the entire parameter and Estimation model are not false.

4.5. Serial Correlation

This is described as the similarity between observations as a function of the time lag between them.Serial correlation can be tested using the Durbin-Watson statistic and from a regression model it measures the linear association between adjacent residuals. A DW statistic of around 2 shows there is no serious serial correlation, below 2 shows there is a positive serial correlation and if it lies between 2 and 4 there is negative correlation. A DW statistic below 1.5 indicates strongly existence positive first order serial correlation.

	DW statistic
Model I	1.809925
Model II	1.474020

Table 5: Serial Correlation
Source: Authors Computations (2018)

From table 4.5, the Durbin-Watson statistic test gave a value of 1.809925 for model I and 1.474020 for model II. Durbin-Watson statistic of 1.809925 (around to 2) for model I suggests that there is no (first-order) autocorrelation however, the value of model II of 1.474020 indicates positive first order serial correlation again proving that model I is better than model II for our panel data regression analysis.

4.6. Heteroskedasticity

Heteroskedasticity refers to the variances of the error terms' probability distributions and occurs when the error term variance is not constant across the number of observations. To obtain an interpretable and precise result the researcher has to ensure the model is free from Heteroskedasticity. Breusch-pagan LM is used to carry out a hypothesis test and obtaining the p values to detect the Heteroskedasticity problem. The null hypothesis for this test states absence of heteroskedasticity problem while the alternate states presence of heteroskedasticity problem. Decision Rule: Reject null hypothesis if p-value is less than significance level of 0.05. Otherwise, do not reject.

	Probability
Model I	0.0000
Model II	0.0000

Table 6: Heteroskedasticity Test
Source: Authors Computations (2018)

4.7. Regression Analysis

4.7.1. Hausman Test

Hausman test was used to discriminate between the fixed effects and random effects specification of the model. The null hypothesis states that Random effect model is appropriate and the alternative hypothesis states that fixed effect model is appropriate. The decision rule on the test should be reject null hypothesis if p-value is less than significance level of 0.05(5%). Otherwise, do not reject. The test has been used by choon, hooi, murthi, yi & shven, (2013) and Murithi (2015) on their studies to decide on the regression model best fit for the data sets used. Both researchers' results indicated fixed effect was a better fit for the data compared to random effects which is consistent with our results.

	Chi-sq. Probability
Model I	0.0512
Model II	0.0267

Table 7: Hausman Test
Source: Authors Computations (2018)

From the results on table 7above, the p values on both models are below 0.05 and therefore, the null hypothesis is rejected at 0.05 level of significance concluding FEM specification is preferred over REM specification for both model I and II.

4.7.2. Model summary

Variable	Coefficient	Std. Error	Prob.
Bank size	0.583546	0.215403	0.0072
CIR	-0.027351	0.009971	0.0065
Dummy	-5.364621	9.208690	0.5607
C	16.99493	3.832243	0.0000
R-squared	0.753508		
Adjusted R-square	0.720273		
Prob(F-statistic)	0.000000		
DW statistic	1.802218		

Table 8: Regression Analysis Model I
**Dependent Variable -ROE **
Source: Authors Computations (2018)

According to table 8, the R-square of the study output is 0.753508 which is equivalent to 75.3508%. This means that 75.3508% variation of ROE can be explained by operational risk and the bank size. The F-statistic value is at 22.67 and its p-value is 0.000 which is less than the significance level of 0.05 meaning that our model is a good fit and the variables are significant in explaining the variations in ROE. The DW statistic of 1.802218 indicates that the residuals in the model are not serially correlated as the statistic is approximately 2.

Variable	Coefficient	Std. Error	Prob.
Bank size	0.134250	0.018838	0.0000
CIR	-0.013582	0.002221	0.0000
Dummy	-0.939675	1.279135	0.4632
C	3.290681	0.463008	0.0000
R-squared	0.751849		
Adjusted R-square	0.718390		
Prob(F-statistic)	0.000000		
DW statistic	1.522498		

Table 9: Regression Analysis Model II
**Dependent Variable –ROA*
Source: Authors Computations (2018)

From table 9 the results are slightly different as the R-square of the study output is 0.751849 which is equivalent to 75.1849%. This means that 75.1849% variation of ROA can be explained by operational risk and the bank size. The F-statistic value is at 22.47 and its p-value is 0.000 which is less than the significance level of 0.05 meaning that our model is a good fit and the variables are significant in explaining the variations in ROE. The DW statistic however is at 1.522 which indicates that the residuals of the model might be serially correlated.

4.7.3. Bank Specific Factors Coefficients

The following fixed effect regression equation was obtained from both models.

Model I

ROE=0.58354642471*Banksize-0.027350788756*CIR-5.36462124053*Dummy+16.9949292539+ (CX=F)

Model II

ROA=0.1342503951*Banksize-0.0135823493831*CIR-0.939675270853*Dummy+3.29068094811+ (CX=F)

4.7.3.1. Bank Size

The results indicate that bank size is significant in both models at 5% interval with p-value 0.0072 from model I and 0.000 in model II.It is detected that bank size has a coefficient value of 0.583546 from running the data in model I This means that when bank size increases by 1 percentage point, the ROE of tier two and three Kenya commercial banks increases by 0.583546 units holding CIR and dummy variable constant. A high ROE indicates high efficiency and this is consistent with the researcher's expectations confirming that larger banks (tier two) are more profitable and more efficient than smaller banks (tier 3)

For model II the bank size has a coefficient value of 0.134250 which means that when the bank size increases by 1 percentage point, the ROA increases by 0.134250 units holding CIR and dummy variable constant. A higher ROA number indicates that an institution is earning more money on less investment indicating that larger banks are able to earn more money on less investment compared to smaller banks.

4.7.3.2. CIR

It is found that CIR which is a measure of operational risk is significant in both models at 5% interval with a p-value 0.0065 in model I and 0.0000 in model II. The CIR has a coefficient value of -0.027351 in model I which means holding other variables being held constant, when CIR increases by 1 percentage point the ROE decreases by 0.027351 units. A lower ROE indicates low efficiency confirming that lack of proper management of operational risk has a negative effect on a bank's profitability and efficiency as per the researcher's expectation.

In model II, the CIR coefficient of -0.013582 which indicates that an increase in CIR by 1 percentage unit decreases the ROA by 0.013582 units. A lower ROA indicates an institution is not able to generate enough money from its assets.

4.7.3.3. Dummy Variable

The dummy variable is a categorical variable coded as 1 if bank falls under Tier two or 0 if a bank falls under tier three. A one-unit difference represents switching from one category to the other holding other variables constant. The dummy variable coefficient is the average difference in Y between the category for which $X_3 = 0$ (the reference group) and the category for which $X_3 = 1$(the comparison group). The dummy variable has a coefficient of -5.364621 in model 1 and therefore the researcher expects that banks in tier three are 5.364621 units poorer in handling risk management practices, board and senior management oversight than tier two banks. For model II the dummy variable has a coefficient of -0.939675 units indicating that tier three banks are 0.939675 units poorer in handling risk management practices, board and senior management oversight than tier two banks.

5. Conclusion and Recommendation

The study concludes that operational risk has the most impact on financial performance of tier two and three banks. The study indicated existence of operational risk which is mostly related to costs linked to employee misconduct, failures in systems or risks due to operating expenses. This brings a great concern in the financial industry which is crucial in a country's economy and therefore it is important for measures to be taken to minimize occurrence of operational risks in Kenyan banks.

The study also investigated the impact bank size has on financial performance of tier two and three commercial banks in Kenya. From the study Bank size was found to have a significant positive effect on financial performance of tier two and three commercial banks in Kenya during the period of the study. Asset quality and Cost to income ratio are enhanced by the bank size in affecting financial performance indicating that banks with high total assets are expected to manage their risks through other means like asset quality and finance leverage management techniques.

The dummy variable indicated that tier two banks are better at handling operational risk management practices, board and senior management practices compared to tier three banks. Bank size has the greatest impact on the banks indicating tier two banks have a better financial performance compared to tier 3 banks.

The study recommends that Kenyan banks must permanently improve and tailor their risk management process as well as create awareness on risk issues to employees. This is in line with the new Basel Capital Accord where banks are required to give a capital provision for operational risk. Banks are being urged to put in place control and operational risk management processes which encapsulate the design, implementation and review of operational risk management. The board and senior management are expected to conduct regular reviews on operational risk management in line with the guidelines and procedures laid out by the CBK on operational risk management.

6. References

i. Anouar, R., Fakhri, I., & Salem, B. (2017). Operational Risk Management in Tunisian Banks. The IUP Journal of Operations Management, XVI (3), 1-23.
ii. Antony Rajendran, M. (2012). Operational Risks involved in Banking Industries. Amity International Business School, pp.1-9.
iii. Bank for International Settlements. (2011). Principles for the Sound Management of Operational Risk. Switzerland: Bank for International Settlements.
iv. Central Bank of Kenya. (2015). Bank Supervision Annual Report 2015 (pp. 4-112). Nairobi: Central Bank of Kenya.
v. Centre for Corporate Governance. (2014). A study of corporate governance practices in the commercial banking sector in Kenya (pp. 1-63). Nairobi: Centre for Corporate Governance
vi. Choon, l., hooi, l., murthi, l., yi, t., & shven, t. (2013). The determinants influencing liquidity of malaysia commercial banks, and its implication for relevant bodies: evidence from 15 malaysia commercial banks [ebook] (pp. 50-66). malaysia.
vii. Dániel, H. (2011). Operational risk of banks and firm size. [ebook] Budapest: Homolya Dániel, pp.100-142.
viii. Esterhuysen, J. (2003). The Management of Operational Risk in South African Banks.Evidence on Implications of Large Operational Losses. Journal of Money, Credit, and Banking,[online]38(7),pp.1-29.
ix. Fontnouvelle, P., Dejesus -Rueff, V., Jordan, J. and Rosengren, E. (2006). Capital and Risk: New OpRisk Advisory and Towers Perrin (2010). A New Approach for Managing Operational Risk. 2nd ed. [ebook] Canada: Society of Actuaries, pp.1-91.
x. Gathaiya, R. (2017). Analysis of Issues Affecting Collapsed Banks in Kenya From Year 2015 to 2016. International Journal of Management & Business Studies, 7(3), 1-7.
xi. Laeven, L., Ratnovski, L. and Tong, H. (2014). Bank Size and Systemic Risk. Bonn: Max Planck Institute in Bonn.
xii. Lyambiko, M. (2015). The effect of operational risk management practices on the financial performance in commercial banks in Tanzania (1st ed., pp. 1-57). Nairobi: Mary Raphael Lyambiko.
xiii. Maina, G., Alala, D., Wabwile, E., & Douglas, D. (2014). Effects of Operational Risks in the Lending Process of Commercial Banks Profitability in Kakamega Town. International Journal of Business and Management Invention, 3(5), 1-7.
xiv. Muriithi, J. (2016). Effect of Financial Risk on Performance of Commercial Banks in Kenya. (pp. 1-197). Nairobi: Jomo Kenyatta University of Agriculture and Technology. Retrieved from http://ir.jkuat.ac.ke
xv. Sparrow, A. (2000). A theoretical framework for operational risk management and opportunity realisation (pp. 1-32). New Zealand: New Zealand Treasury.
xvi. Tandon, D. and Mehra, Y. (2017). Impact of Ownership and Size on Operational Risk Management Practices: A Study of Banks in India. Global Business Review, 18(3),
xvii. Tarawneh, M. (2006), a comparison of financial performance in the Banking sector: Some evidence from omani commercial Banks. International Research Journal of Finance and Economics, 3, 101-112.pp.795-810.
xviii. Tripati Rao, D., & Ghosh, P. (2011). Measurement and Quantification of Operational Risk an Application of Covariate-Var. Metamorphosis: A Journal Of Management Research, 10(2), 70-81. doi: 10.1177/0972622520110206
xix. Wanjohi, M. (2014). Fraud in the banking industry in Kenya a case of commercial bank of Africa, Kenya (pp. 15-100). Nairobi: Maryanne Wamuyu Wanjohi.

Appendix

List of Tier Two and Three Commercial Banks in Kenya

- African banking corporation Ltd
- Bank of Africa Ltd
- Bank of Baroda (K) Ltd
- Bank of India
- Citi bank Kenya
- Consolidated Bank of Kenya Ltd
- Credit bank Ltd
- CFC Stanbic Bank Kenya Ltd
- Diamond trust bank Kenya Ltd
- Development Bank of Kenya Ltd
- Dubai bank Kenya Ltd
- Eco bank Ltd
- Equatorial Bank Ltd
- Family Bank Ltd
- Fidelity Commercial Bank Ltd
- First Community Bank Ltd
- Giro commercial Bank Ltd
- Guardian bank Ltd
- Gulf African bank Ltd
- Guaranty Trust Bank
- Habib bank Ltd
- Habib bank Ag Zurich
- Housing Finance Cooperation Ltd
- I & M bank Ltd
- K-rep bank Ltd
- Middle East bank Kenya Ltd
- M-oriental bank Ltd
- National Bank of Kenya
- NIC Bank
- Paramount Bank Ltd
- Prime Bank Ltd
- Transnational bank Ltd
- UBA Kenya bank Ltd
- Victoria Commercial Bank Ltd
- Chase Bank in Receivership
- Imperial Bank in Receivership

Source: Directory-of-Licenced-Commercial-Banks-Mortgage-Finance-Institutions-and-Nohcs (2017)