Risk Management and Profitability of Commercial Banks: Evidence from Kenyan Commercial Banks

By: Kinyua Tony Gitonga[1], Joseph Lumumba Barasa[2]

Abstract

Purpose: *The purpose of the study was to establish the relationship between risk management and profitability of commercial banks in Kenya.*

Methodology: *The study used secondary data which was obtained from banks' financial statements for the period between 2014 and 2018. The study carried out several test statistics and diagnostic test in order to achieve the most optimal solution. A regression model was employed to the hypothesis.*

Findings: *The study results found that credit risk and profitability were negatively and insignificantly related, interest risk and profitability revealed a positive and significant relationship, foreign exchange risk positively but non significantly influences the profitability of Kenyan commercial banks, liquidity risk and profitability were negatively and significantly related, there was positive and significant relationship between capital management risk and profitability of the banks, bank deposits and profitability revealed a negative and significant relationship, a positive and significant relationship between bank size and profitability was revealed and a positive but significant relationship between operational risk and profitability of Kenyan commercial banks was revealed.*

Implications: *The study findings narrowed down the research gap brought about by the conflicting empirical literature though there is room for further analysis on the effect of risk management on the profitability of other companies (non-banks) in Kenya.*

Keywords: *Risk Management, Profitability, Kenyan Commercial Banks*

1.1 Introduction

Management of risks is an important aspect in every organization, and this is mainly due to the risks which are emerging. These risks arise as a result of various reasons such as advancement in technology giving room for cybercrime, tough economic conditions leading to high default rates by debtors/borrowers and also increased competition in the market which can create risk loopholes as the organization pursues to catch up with emerging trends. The discipline of risk

management has also become very important and various regulators are demanding for risk management structures especially after the great recession of 2008 and international scandals that have happened in the recent past i.e. the Enron case, WorldCom case and the Lehman brothers' scandal. According to (Pavodani & Tugnoli, 2005), in addition to protecting organizations from vulnerabilities, risk management also helps them to see new opportunities.

The goal of any organization is to increase shareholder's wealth. This can only be achieved by using the available resources optimally and seeking risks whose benefit outweighs the risk. In the same manner, as much as banks exist to provide a platform where savers and seekers of finances meet, they have a goal of making profit and hence maximizing the shareholder's wealth. Every business operates in an environment of uncertainty about the future, it is how best a company can predict the eventualities in the future that determines the profitability of that business. According to Nikitta (2017), profits are only made by entrepreneurs who can make correct estimate about the future or whose prediction proves to be true. On the other hand, entrepreneurs who cannot make correct future estimates or whose prediction proves to be wrong, suffer losses in the long run.

Risks facing different organizations have increased in the current day than they were sometimes back. This can be attributed to emerging trends such as advancement in technology leading to threats such as phishing, cybercrime and identity theft. The increase of risk can also be attributed to other factors other than technology such as increased competition which makes organizations to sometimes jump into new operations and ventures without first carrying out due diligence. The financial services industry is more prone to these risks than other industries in the market, this is because of the greed for quick money and riches by the current day generation. The effects of mismanagement of risk in the financial industry especially banks have dire consequences on the economy as it can lead to bank rush, then to bank crisis, collapse of banks and general recession of the economy. Therefore, other than the efforts that the management puts in to maximize profits, it should put equal efforts in risk management as this can either make or break a bank's future. According to (Shahbaz, et.al., 2012), almost all banks have taken stringent measures to upgrade their structures of managing risk.

1.2 Research Problem

This study addresses research questions below; first, are profits in banks influenced by management of risk? Secondly, what types of risks significantly affect banks' profit?

1.3 Objective of the Study

The main purpose of this research study was to assess the effects of risk management on the profitability of commercial banks: Evidence from Kenyan commercial banks.

1.3.1 Specific Objectives

The specific objectives will be to assess the effect of the following variables on profitability of commercial banks in Kenya:

i. To determine credit risk effect on profitability
ii. To establish interest risk effect on profitability
iii. To assess foreign exchange risk effect on profitability
iv. To evaluate liquidity risk effect on profitability
v. To establish capital management risk effect on profitability
vi. To determine bank deposits effect on profitability
vii. To determine impact of bank size on profitability
viii. To assess operational risk impact on the profitability

2.1 Theoretical Framework

Modern Portfolio Theory (MPT) by Harry Markowitz in his paper (Markowitz, 1952), indicates how risk-averse investors can create a portfolio that can maximize return bearing risk at a certain level. According to the theory, for an investor to gain high return on any investment, they must be ready to face or incur some risks. It goes ahead to argue that an investor should not assess the risk and return on each investment individually but rather the investor should evaluate how each investment affects the portfolio's risk and return. MPT argues that an investor can maximize the returns of a portfolio composed of many assets by accepting a certain risk. Likewise, investors may choose the expected return of portfolio desired and minimize the risk involved. It is anchored on the belief that investors prefer less risk i.e., they want return on investment while incurring the lowest risk possible.

Moral Hazard Theory states that the party which is covered against a particular risk or peril may intentionally get involved in the risk knowing very well that another party will incur the cost associated with the risk. This theory was developed by Economist Paul Krugman (Krugman, 2009). This theory states that moral hazard only occurs when there is asymmetry of information on either or both parties. This theory applies in the day-to-day activities and it mostly affects institutions in the financial industry, i.e. insurance companies and banks. For example, a borrower may engage in activities that are against the covenant in the loan agreement without the knowledge of the lender. This exposes the lender to the risk because in the event of the borrower defaulting, the lender will not be able to recover its funds back hence a loss will be incurred. In the case of an insurance company, a driver may drive carelessly just because he or she is protected by the insurance cover and incase of any accident he or she will be compensated. This will eventually lead to a loss on the side of the insurance company.

Merton's default risk model developed by Robert C Merton (Merton, 1974) measures default risk. Actuaries and other credit evaluation personnel in banks use this model to assess a borrower's capability to repay a debt and the probability of default by a borrower. The Merton's default model was advanced to Black-Scholes model for options which became a Nobel-Prize winning model. This model is used to calculate the pricing of European derivative options without considering the dividends paid out during the life of the option. The Merton default theory is also used by investors to understand the credit ratings and spread of a company and comprehend the capital structure of an organization.

2.2 Empirical Review

This research adds to already existing significant empirical literature. One such study was done to analyze execution of risk management by banks in Malaysia, (Mohd and Salina, 2010). It was done for the period between 2006 and 2008 and it used five independent variables i.e. environment, policies and procedures, mitigation and monitoring as per the guidelines of Basel committee on supervision practices. These independent variables were then assessed on how they affected the profits measured by ROE. Results were that banks with better risk management practices reported higher ROE.

Another study was done by (Oluwafeni and Obawale, 2010) covering ten Nigerian banks for the period of 2006 - 2009. It was testing the effect of management of risks and performance of banks. The dependent variable was measured using the ratio of ROA and the independent variables included capital, liquidity and credit risks. Results were that there was a strong relationship in the variables.

Their findings were supported by a study done by (Hansen, 2009) on the Danish companies of the effect of foreign exchange risk management to the performance of the companies. Hansen concluded that foreign exchange risk management is both a financial and operational strategy and the two complement each other. He further found that the operating and financial hedges on the foreign exchange risk exposure had a positive impact to the financial performance of a company.

A research on the result of credit risk management and the success of industrial financial institutions in Nigeria was done by (Kargi, 2011). Kargi utilized the non-performing car loans as an action of credit rating threat in the financial institutions. He discovered that high degree of non-performing lending brought about monetary distress in the financial industry. The scientist utilized second information through in between 2004 as well as 2008 and used success ratios to determine the financial efficiency of financial institutions. He concluded that credit scores threat management had a substantial impact to the financial performance of commercial banks in Nigeria.

(Ahmed, Akhtar & Usman, 2011), did a study on the Islamic banks in Pakistan and how they manage their risks. The main aim of this study was to find out the factors that lead Islamic banks to manage their risks. The study found that some of the factors that influence banks to establish risk management mechanisms is the bank size. It found that a bank's size is positively and strongly correlated to financial risk, but it is negatively correlated to operational risk. On the other hand, the study found that asset management had a positive and strong correlation to liquidity and operational risks. Another finding from this study was that NPLs have a negative and significant relationship to the liquidity and operational risk.

At local level, a research was done by (Kithinji, 2010) to analyse the link between management of credit risk and the Kenyan bank's profitability. This study involved all the listed banks and it

used data between 2004 and 2008. The study used ROA and measures of credit risk as its independent and dependent variables respectively. The research got a weak bond. The research advocated that banks should not invest heavily in management of credit risk as it didn't have much benefit in terms of the company's profitability. Rather it suggested that banks should consider other factors affecting its profitability and not credit risk management.

Another study by (Wanjohi, 2013) to examine the relationship between financial risk management and financial performance of Kenyan commercial banks was done. Same population as that of Kithinji above but for the period 2008 to 2012 and risk management components as independent variables. A strong relationship was discovered.

A study was done by (Muteti, 2014) to establish the connection between economic risk administration and the financial performance of banks in Kenya. Information was gathered from 43 banks and assessed utilizing SPSS and using several regression versions. The independent variables were credit report risk, passion danger, liquidity threat, foreign exchange risk whereas the reliant variable was monetary efficiency gauged making use of ROA. The research wrapped up that the independent variables along with a bank's size had a positive and considerable influence on the financial performance of financial institutions in Kenya.

Kamau (2010) assessed the level of danger administration by industrial banks in Kenya. Primary information was gathered in kind of studies on all the financial institutions in Kenya and information was assessed using SPSS. The study concluded that the major risks affecting banks in Kenya were credit, operational, reputation and compliance risks. It was also found that most banks did not face liquidity risk, and this can be attributed to the strict regulation by CBK that banks must maintain a certain level of float with it to cushion the banks from liquidity risks. It was also found that banks used both qualitative and quantitative measures to manage their risks.

Njeri (2010), also did a study to access the extent at which large commercial banks in Kenya apply strategic risk management measures. In addition to finding the strategic risk management measures applied by banks in Kenya, the study also aimed at assessing the challenges banks face in applying these strategies. A survey was done on 13 banks and after analysing using SPSS, it concluded that most banks have adopted risk management measures and the main steps in risk management by the banks include risk assessment, monitoring, controlling and reporting.

As per the literature review, the relationship between risk management and profitability of commercial banks may be positive, negative or otherwise. In consideration to the above, this study examined the effect of risk management on the profitability of Kenyan commercial banks and will purpose to test the following hypothesis:

H0: Risk management has no significant effect on the performance of commercial banks.

3.1 Methodology

The study adopted descriptive research design. Descriptive study uses surveys and fact-finding enquiries to describe a phenomenon currently, (Kothari, 2014).

The target population for this study was composed of all the Kenyan banks. To generalize the results of a research, a target population need to have observable characteristics (Mugenda and Mugenda, 2003). In this study, observable characteristics are that all these banks are regulated by the CBK and they perform the role of a commercial banks as defined by CBK. Data was collected from banks' financial statements for period between 2014 and 2018.

The study performed the following panel diagnostic tests on the collected data;

Normality Test

Evaluating the supposition of normality is necessary for a majority of the statistical dealings and parametric statistical evaluation is among the best methods for measuring this supposition; parametric statistical evaluations assume that data is usually normally distributed, however if this assumption of normality is not satisfied, interpretation may not be dependable, hence it is crucial that the researcher checks for this assumption before any analysis is undertaken; the most common test of normality tools is the Shapiro-Wilk (SW) test (Razali & Wah, 2011). The normality assumption ($ut \sim N(0, \sigma 2)$) is called for in order to conduct single or joint hypothesis examinations concerning the design criteria (Brooks, 2008). In this study, normality is examined making use of Shapiro-Wilk (SW) test.

Multi-collinearity Testing

Multicollinearity is concerned with the linear relationship among two or more variables; multicollinearity is a major data problem that might significantly lower the reliability of the estimates of the model criteria; a prominent multicollinearity analysis tool is difference variance

inflation factor (VIF) (Alin, 2010). VIF tests whether one predicator displays a strong linear relationship with another predicator (Mekonnen, 2015). A large value of VIF indicates some linear dependency between predicators and the norm is that if VIF is more than 10 then multicollinearity is considered high (Alin, 2010).

Autocorrelation

A presumption of straight regression designs is that the errors of the design are independent of each other (not connected), nevertheless, when this assumption is not fulfilled in the context of time- series research study, after that the errors are deemed non-independent or auto-correlated; auto-correlation is fundamental since it can; influence the soundness of inferences associated with conventional hypothesis tests and confidence levels, secondly, its existence can force a researcher to select a more suitable statistical analysis methodology and lastly, the accuracy of predictions stipulated from regression models can be made better by using information relating to auto correlation (Hultema & Laraway, 2006). Durbin-Watson test was utilized in this case.

Heteroscedasticity

A crucial assumption of linear regression modelling is homoscedasticity; under this assumption, the errors are assumed to be independently identically distributed; however, if the errors are not independently identically distributed and presumed to have distributions with diverse variances heteroscedasticity is present (Klein et al., 2016). Breusch-Pagan test was made use of in this case.

Tests for Fixed and Random Effects

Researchers in social science are often confronted with difficulties when dealing with grouped quantitative data, one of the most common difficulty arises when the reliant variable can be explained by other factors other than the independent variables only; to address this difficulty and enhance model-fit scholars often fancy the use of fixed or random- effects models (Clark & Linzer, 2015). However, to analyse the usefulness of either of the two models, Hausman test in regularly relied upon (Frondel & Vance, 2010). The Hausman test was employed to take a look at the presence of endogeneity in the independent variables; Hausman specification test functions by looking at the correlation between the error term and the panel's independent variables, as well as where it is observed that there is no connection in between the error term and also the panel's independent variables, after that the suitable version relevant is the Arbitrary results and

vice-versa (Sheytanova, 2014). STATA is utilized in the calculation of the Hausman statistic to gauge suitability of these models.

The empirical model for this research was as follows:

$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8X8 + \varepsilon$

Where:

α= constant or the interception point of the regression line and the y-axis

$\beta 1, \beta 2 \ldots \beta 8$ = the coefficients of the independent variables that will be determined

Y= Profitability measured by Return on Assets (ROA)

X1= is the credit risk for the bank, the study uses non-performing loans to total loans ratio.

X2= is the interest rate risk for the bank this study uses interest sensitivity to total assets ratio.

X3= is the foreign exchange risk for the banks, the study uses net forex exposure to total assets ratio.

X4= is the liquidity risk, liquidity of the bank is measured using the bank's liquidity ratio, which is total loans to deposits ratio

X5= is the capital management risk of the bank, the study uses equity to total assets ratio

X6= is the bank's deposits which uses deposits to total assets ratio

X7= is the bank's size which is measured using the natural log of total deposits.

X8= is operational risk of the bank which is measured by loans to assets ratio

The study is testing the joint significance and individual significance of independent variables using F-test and t-test respectively. The confidence interval and level of significance at 95% and 5% respectively.

4.1 Findings

Table 1 presents secondary descriptive statistics for the variables under study.

Table 1: Descriptive Statistics of Raw Data

Variable	Minimum	Maximum	Mean	Std. Deviation
ROA	-.2213849	.1292062	.0127833	.0336537
Credit Risk	0.00000	1.335914	.1544142	.1866837
Interest Risk	0.00000	.3349966	.0544092	.0288657

Foreign Exchange Risk	-.0028136	.02266	.0046469	.0042497
Liquidity Risk	.1469736	1.877648	.8087112	.2486538
Capital Management Risk	-.1116714	.4862942	.1752543	.0822006
Bank Deposits	.2525981	.9340418	.6958793	.1211403
Bank Size	8864537	298522451.5	94033174	76147894.23
Operational Risk	.1113359	.8794752	.554888	.1397832

The results show that the banking institutions in Kenya have a mean value of .0127833 for the dependent variable which is productivity measured using ROA capital with a maximum value of 0.1292062 and a minimum of -0.2213849. The variation in standard deviation is 0.0336537. The results also show that credit risk has a mean of 0.1544142 with a maximum value of 1.335914 and a minimum value of 0.00000. The variation in standard deviation for the variable credit risk was 0.1866837.

The results also indicate that the mean value of interest risk is 0.0544092 with a maximum value of 0.3349966 and a minimum value of 0.00000. The variation in standard deviation for foreign exchange risk is 0.0288657. In addition, the results show that the mean value for foreign exchange risk is .0046469 with a maximum value and minimum value of 0.02266 and -0.0028136 respectively. The variation in standard deviation of foreign exchange risk is 0. 0042497. The results further indicate that the mean value for liquidity risk is 0.8087112 with maximum and minimum values of 1.877648 and 0.1469736 respectively. The variation in standard deviation for liquidity risk is 0.2486538.

Further, the results show that the mean value for capital management risk is 0.1752543 with a maximum value of 0.4862942 and minimum value of -0.1116714. The variation in standard deviation for the variation in capital management risk is 0. 0822006. According to the descriptive statistics results, the mean value of Bank Deposits is 0.6958793 with maximum and minimum values of 0.9340418 and 0.2525981 respectively. The variation in standard deviation for Bank Deposits is 0.1211403.

Similarly, the results show that the mean value for Bank Size is 94033174 with maximum and minimum values of 298522451.5 and 8864537respectively. The variation in standard deviation for bank size is 76147894.23. Finally, the results show that the mean value for Operational Risk is 0.554888 with a maximum value of 0.8794752 and a minimum value of 0.1113359. The

variation in standard deviation for operational risk is found to be 0.1397832. The positive values for the mean of profitability measured in ROA imply that the banking institutions in Kenya are stable.

Prior to running a regression model pre-estimation and post estimation tests were conducted.

Table 2: Normality Test

Shapiro - Wilk Test for Normality					
Variable	**Obs**	**W**	**V**	**z**	**Prob>z**
ROA	190	0.75068	35.573	8.196	0.0670
Credit Risk	190	0.68614	44.781	8.725	0.1059
Interest Risk	190	0.69861	43.002	8.632	0.1274
Foreign Exchange Risk	190	0.86335	19.497	6.816	0.0881
Liquidity Risk	190	0.94814	7.399	4.593	0.1106
Capital Management Risk	190	0.84125	22.650	7.160	0.0971
Bank Deposits	190	0.89694	14.705	6.169	0.1840
Bank Size	190	0.96458	5.054	3.718	0.2799
Operational Risk	190	0.95691	6.148	4.168	0.0670

The results in Table 2 reveal that the P-values for all the variables are higher than the critical 0.05 and thus the conclusion is that the data is normally distributed.

Table 3: Multicollinearity Test Results

Variable	**VIF**
Credit Risk	1.40
Interest Risk	1.44
Foreign Exchange Risk	1.26
Liquidity Risk	3.32
Capital Management Risk	1.48
Bank Deposits	1.99
Bank Size	1.52
Operational Risk	2.95

The results in Table 3 indicate absence of multicollinearity since the VIF of all the variables were less than 10.

Table 4: Autocorrelation

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 8) = 3.983

Prob > F = 0.0771

The result provided is F-test with one and 9 degrees of freedom and a value of 3.983. The P-value of the F-test is 0.0771 revealing that the F-test is not statistically substantial at 5% level. It consequently abides by that; the null hypothesis of no autocorrelation is continual, in addition to the research concludes that residuals are not connected.

Table 5: Heteroscedasticity Test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ROA
chi2(1) = 49.05
Prob > chi2 = 0.0810

The results in the Table 5 reveal that the error terms are heteroskedastic, given that the p-value (0.0810) is greater than the 5% (0.000).

Table 6: Random and Fixed Effect Testing

	(b)	**(B)**	**(b-B)**
Variable	**fixed**	**Random**	**Difference**
Credit Risk	-.0655532	-.030411	-.0351422
Interest Risk	.3155599	.3079977	.0075623
Foreign Exchange Risk	.1547001	-.0474211	.2021212
Liquidity Risk	-.0732542	-.0548766	-.0183776
Capital Management Risk	.2147946	.1101309	.1046637
Bank Deposits	-.0943212	-.0765771	-.0177441
Bank Size	.207782	.2224411	-.0146591
Operational Risk	.030662	.0552717	-.0246097
chi2(8)	11.95		
Prob>chi2	0.1533		

The results in Table 6 show that p-value is 0.1533 which is greater than 0.05 therefore it is concluded that random effect model is preferred to fixed effects model.

Table 7: Descriptive Statistics of Cured Data

Variable	Minimum	Maximum	Mean	Std. Deviation
ROA	-.2213849	.1292062	.0127833	.0336537
Credit Risk	0.00000	1.335914	.1544142	.1866837
Interest Risk	0.00000	.3349966	.0544092	.0288657
Foreign Exchange Risk	-.0028136	.02266	.0046469	.0042497
Liquidity Risk	.1469736	1.877648	.8087112	.2486538
Capital Management Risk	-.1116714	.4862942	.1752543	.0822006
Bank Deposits	.2525981	.9340418	.6958793	.1211403
Log of Bank Size	11.97799	20.46144	17.16182	1.534302
Operational Risk	.1113359	.8794752	.554888	.1397832

The results on Table 7 shows the descriptive statistics of the study variables after the raw data is cured. From the results only bank size is cured, the rest of the variables remained the same. The variable bank size is cured by logging it. Logging of bank size is necessary because it was highly skewed and so it is logged with the intention of making it less skewed. Additionally, this is necessary to make patterns in the data more interpretable and for helping to meet the assumption of normality. Based on the results in Table 7, the results show that the mean value for Bank Size after curing is 17.16182 with maximum and minimum values of 20.46144 and 11.97799 respectively. The variation in standard deviation for bank size is 1.534302 after curing.

Table 8: Correlation Matrix

		ROA	CR	IR	FER	LR	CMR	BD	BS	OR
ROA	Pearson Correlation	1.0000								
Credit Risk	Pearson Correlation	-0.2926*	1.000							
Interest Risk	Pearson Correlation	0.2385*	-0.194*	1.0000						
Foreign Ex Risk	Pearson Correlation	0.1320	-0.157*	0.1048	1.0000					
Liquidity Risk	Pearson Correlation	-0.0452	-0.077	0.3278*	-0.1348	1.0000				
Capital Mgt Risk	Pearson Correlation	0.1640*	-0.379*	0.0179	0.0144	0.0200	1.0000			
Bank Deposits	Pearson Correlation	0.0327	-0.123	0.2751*	-0.0138	-0.2808*	-0.2065*	1.0000		
Log Bank Size	Pearson Correlation	0.2544*	-0.196*	0.2070*	0.3010*	-0.1126*	-0.2859*	0.3786*	1.0000	
Operational Risk	Pearson Correlation	0.0322	-0.116	0.3088*	-0.2289*	0.6783*	-0.1617*	0.2012*	0.1253 *	1.0000

* Correlation is significant at the 0.05 level (2-tailed). Key : CR - Credit Risk, IR - Interest Risk, FER - Foreign Exchange Risk, LR - Liquidity Risk, CMR - Capital Management Risk, BD - Bank Deposits, BS - Bank Size, OR - Operational Risk.

The Results in Table 8 show that Credit Risk and profitability in ROA are negatively and significantly associated (-0.2926), Interest Risk is positively and significantly related to profitability (0.2385), the results also show also that Foreign Exchange Risk and profitability are positively and insignificantly associated (0.1320), Liquidity Risk is found to be negatively and insignificantly associated with profitability of the Kenyan banks (-0.0452). In addition, the correlation results show that there is positive and significant association

between Capital Management Risk and profitability (0.1640), Bank Deposits is found to be positively and insignificantly associated with profitability (0.0327).

Concerning the bank size, the study results show that there is positive and significant association between the log of bank size and profitability (0.2544). Finally, the correlation results show that there is positive but insignificant association between Operational Risk and profitability of the banks (0.0322). The correlation results agree with the conclusion made by (Wadesango et al., 2018) that management of risk is directly related to an organization's profits and this is so because it increases customer satisfaction, loyalty and reduces fraud risk. However, these positive effects of risk management can be sometimes watered down by some barriers such as lack of proper employee training, lack of support from top management and non-existence of independent audit committee in the case of large organizations. In conclusion, the researcher is optimistic that the results of this research will motivate managements of various companies to put in place effective risk management system.

Testing the Relationship between Variables

Credit Risk and ROA

Y=.0212865-.0550677X1

Where:

Y= Profitability measured by Return on Assets (ROA)

X1= credit risk for the bank

The regression results show that the coefficient of determination R Square is 0.1474 indicating that credit risk explain 14.74% of the variation in profitability of the Kenyan commercial banks. The results further indicate that credit risk and profitability are negatively and significantly related (β =-.0550677, p=0.001). The model is found to be significant in explaining the relationship.

Interest Risk and ROA

Y=.0003279+ .2289201 X2

Where:

Y= Profitability measured by Return on Assets (ROA)

X2= Interest Risk for the bank

The regression results show that the coefficient of determination R Square is 0.1116 indicating that interest risk explain 11.16% of the variation in profitability of the Kenyan commercial banks. The results further indicate that interest risk and profitability are positively and significantly related (β = .2289201, p=0.006). The model is found to be significant in explaining the relationship.

Foreign Exchange Risk and ROA

Y=.0091811+ .7751793 X3

Where:

Y= Profitability measured by Return on Assets (ROA)

X3= Foreign Exchange Risk for the bank

The regression results show that the coefficient of determination R Square is 0.0458 indicating that foreign exchange risk explain 4.58% of the variation in profitability of the Kenyan commercial banks. The results further indicate that foreign exchange risk and profitability are positively and significantly related (β = .7751793, p=0.290).

Relationship between Liquidity Risk and ROA

Y=.0162924-.0043392X4

Where:

Y= Profitability measured by Return on Assets (ROA)

X4= Liquidity Risk for the bank

The regression results show that the coefficient of determination R Square is 0.0530 indicating that liquidity risk explain 5.30% of the variation in profitability of the Kenyan commercial banks. The results further indicate that liquidity risk and profitability are negatively and insignificantly related (β = -.0043392, p=0.691).

Capital Management Risk and ROA

Y=-.0046434 + .0994363 X5

Where:

Y= Profitability measured by Return on Assets (ROA)

X5= Capital Management Risk for the bank

Results show that the coefficient of determination R Square is 0.0610 indicating that capital management risk explain 6.10% of the variation in profitability of the Kenyan commercial banks. The results further indicate that capital management risk and profitability are positively and significantly related (β = .0994363, p=0.005).

Bank Deposits and ROA

Y=.0211755-.0120599 X6

Where:

Y= Profitability measured by Return on Assets (ROA)

X6= Bank Deposits for the bank

The regression results show that the coefficient of determination R Square is 0.0159 indicating that bank deposits explain 1.59% of the variation in profitability of the Kenyan commercial banks. The results further indicate that bank deposits and profitability are negatively and insignificantly related (β = -.0120599, p=0.628).

Log of Bank Size and ROA

Y=-.0318241+ .2136793 X7

Where:

Y= Profitability measured by Return on Assets (ROA)

X7= Log of Bank Size

The regression results show that the coefficient of determination R Square is 0.1665 indicating that the log of bank size explain 16.65% of the variation in profitability of the Kenyan

commercial banks. The results further indicate that the log of bank size and profitability are positively and significantly related (β = .2136793, p=0.026).

Operational Risk and ROA

Y= .00829+.0080975 X8

Where:

Y= Profitability measured by Return on Assets (ROA)

X8= Operational Risk

The regression results show that the coefficient of determination R Square is 0.0150 indicating that operational risk explain 1.50% of the variation in profitability of the Kenyan commercial banks. The results further indicate that operational risk and profitability are positively and insignificantly related (β = .0080975, p=0.697).

Table 9: Panel Regression Analysis

Dep Var: ROA	**Coef. Std.**	**Err.**	**z**	**P>|z|**
Credit Risk	-.0303785	.0170176	-1.79	0.074
Interest Risk	.3088041	.0927969	3.33	0.001
Foreign Exchange Risk	-.0310055	.7153978	-0.04	0.965
Liquidity Risk	-.0550165	.0173657	-3.17	0.002
Capital Management Risk	.1098593	.0362233	3.03	0.002
Bank Deposits	-.0766814	.0281812	-2.72	0.007
Log of Bank Size	.266074	.1067559	2.49	0.013
Operational Risk	.0554608	.029174	1.90	0.057
Constant	-.0069032	.0299517	-0.23	0.818
R Squared	0.2689			
F statistic	39.78			
P-value	0.0000			

Y=-0.0069032-0.0303785X1+0.3088041X2-0.0310055X3-0.0550165X4+0.1098593X5-0.0766814X6+ 0.266074X7 + 0.0554608X8

Where:

Y= Profitability measured by Return on Assets (ROA)

X1= credit risk for the bank

X2= interest rate risk for the bank

X3= foreign exchange risk for the banks

X4= liquidity risk

X5= capital management risk of the bank

X6= bank's deposits

X7= bank's size.

X8= operational risk

The panel regression results in Table 17 show that the coefficient of determination R Square is 0.2689 indicating that credit risk, interest risk, foreign exchange risk, liquidity risk, capital management risk, bank deposits, bank size and operational risk jointly explain 26.89% of the variation in profitability of the Kenyan banks. This implies that, 26.89% of the variation in profitability is influenced by credit risk, interest risk, foreign exchange risk, liquidity risk, capital management risk, bank deposits, bank size and operational risk.

The results further indicate that credit risk and profitability are negatively and insignificantly related (β =-.0303785, p=0.074), regarding the influence of interest risk, positive and significant relationship is established between interest risk and profitability (β =.3088041, p=0.0001). A negative and insignificant relationship is found to exist between foreign exchange risk and profitability (β =-.0310055, p=0.0965). The results further reveal negative and significant relationship between liquidity risk and profitability (β =-.0550165, p=0.002); however, there is positive and significant relationship between capital management risk and profitability of the banks (β =.1098593, p=0.002). The findings are in agreement with the findings of a study by (Zimmerman, 1996) on the influencers of profits in banks which indicated that the main factors affecting profitability in banks is the loan portfolio structure, and the willingness and ability of senior management to control the risks facing the bank.

The study in addition to this test the relationship between bank deposits and profitability and the results reveal that Bank Deposits and profitability are negatively and significantly related (β =-.0766814, p=0.007). The relationship between bank size and profitability indicate that there is positive and significant relationship between Bank Size and profitability (β =.266074, p=0.013).

Finally, the relationship between operational risk and profitability is tested and the results revealed a positive but insignificant relationship between the two variables (β =.0554608, p=0.057). The results contradict with the conclusion by (Lasisi et. Al., 2018) that the bond between liquidity risk and the bank's profitability is positive but immaterial, that between credit risk and profitability is significant but on the opposite direction.

The model fit is statistically significant as indicated by F= 39.7800 (p=0.000<0.05) implying the model has goodness of fit. The results in Table 4.9 therefore indicate that the overall model is statistically significant. The study by (Nikitta Dutta, 2017) indicate that profits are only made by entrepreneurs who can make correct estimate about the future or whose prediction proves to be true. On the other hand, entrepreneurs who cannot make correct future estimates or whose prediction proves to be wrong, suffer losses in the long run.

5.1 Discussion

This study seeks to determine the relationship between the risk management and profitability of Kenyan banks. Based on panel regression analysis results, the study reveals that credit risk and profitability are negatively and insignificantly related. The correlation analysis results reveal that credit risk and profitability which is measured using ROA are negatively and significantly associated. The trend line show that there is a general increase in the level of credit risk throughout the five years indicating that the number of defaulters was increasing in the banks at an increasing rate. Regarding the relationship between interest risk and profitability, the results show that there is positive and significant relationship between interest risk and profitability. This implies that an improvement in rate of interest risk results in a substantial improvement in earnings of the banks in Kenya.

In addition, the results reveal that there is positive and insignificant relationship between foreign exchange risk and profitability indicating that any positive change in foreign exchange risk will result into a positive change in profitability, but the effect is not significant. The results further indicate that liquidity risk and profitability are negatively and significantly related. The findings on panel regression analysis also show that there is positive and significant relationship between capital management risk and profitability of the banks.

Additionally, the results reveal that bank deposits and profitability are negatively and significantly related. The study finds out that there is positive and significant relationship between Bank Size and profitability of the Kenyan banks. Finally, the results reveal that there is positive but insignificant relationship between Operational Risk and profitability.

5.2 Conclusion

The research likewise concludes that, the profitability of the financial institutions in Kenya depends on several variables consisting of the capacity of a financial institution to transform its deposit responsibilities right into income earning properties. On top of that, based upon the findings it is enough to conclude that, a rise in financial institution size results in boosted success by enabling banks to realize economies of scale. This implies that enhancing dimension allows financial institutions to spread out fixed prices over a greater asset base, thus decreasing their typical expenses. Furthermore, as the range of procedure rises, banks can much better utilize specialized inputs such as automation and competence in a certain business line, causing far better efficiency.

Based upon the findings as well as the conclusions of this research study, several recommendations can be made; the managements of financial institutions in Kenya financial institutions need to invest in threat administration to improve their success. Banks in Kenya should manage the levels of their interest risks to be able to improve on their profitability. Based on the findings, excessive liquidity risk can lead to a decrease of the ROA and in consequence poor financial profitability. The study therefore recommends proper management of liquidly risk by the banks. Banks in Kenya should make maximum use their readily available resources for instance possessions to improve their profitability and properly execute their core functions as an example supplying retail banking services.

References

Ahmed, N., Akhtar, M. F., & Usman, M. (2011). Risk management practices and Islamic banks: An empirical investigation from Pakistan. *Interdisciplinary Journal of Research in Business, 1*(6): 50-57.

Alin, A. (2010). Multicollinearity. Wiley Online Library.

https://doi.org/10.1002/wics.84

Brooks, R. D. & Iqbal, J. (2007). A test of CAPM on Karachi stock exchange. International journal of Business, *12*(4): 429-444. https://research.monash.edu/en/publications/a-test-of-capm-on-the-karachi-stock-exchange

Clark Jr, P. C. (2013). *The effects of multicollinearity in multilevel models*. [PhD thesis, Indiana University of Pennsylvania]. Indiana University Research Repository. https://corescholar.libraries.wright.edu/etd_all/740

Hansen, M.A (2009). *An empirical study of strategic approaches to foreign exchange risk management used by Danish medium-sized non-financial companies.* Unpublished Master of Science thesis. Aarhus School of Business, University of Aarhus

Kamau, P.M. (2010). *Adoption of risk management by commercial banks in Kenya*. Unpublished MBA project, School of Business, University of Nairobi.

Kargi, H. S. (2011). *Credit Risk and the Management of Nigerian Banks*. An unpublished MBA Project, Ahmadu Bello University, Zaria – Nigeria

Kithinji, K.M. (2010). *Research on credit risk management and profitability of commercial banks in Kenya.* Unpublished MBA project, School of Business, University of Nairobi.

Kothari, C. R. (2004), Research methodology: Methods and techniques. *2nd Edition, New Age International Publishers, New Delhi.* https://www.scirp.org/(S(lz5mqp453edsnp55rrgjct55))/reference/ReferencesPapers.aspx?ReferenceID=1285422

Krugman, P (2009). *The Return of depression economics and the crisis of 2008*, W.W. Norton, New York. http://static.stevereads.com/papers_to_read/krugman--the_return_of_depression_economics.pdf

Lasisi O, Lateef O & Marvis I (2018*).* Financial risk management and the profitability: An empirical evidence from commercial banks in Nigeria. *Journal of Management Sciences 16*(2), 2018, University of Maiduguri.

Markowitz, H. (1952). Modern Portfolio theory: The efficient frontier. *The Journal of Finance, 7*(1), 1952

Merton, R. C. 1974. On the pricing of corporate debt: The risk structure of interest rates. *Journal of Finance* 29:449–70.

Mohd, R. & Salina, K (2010). A comparative analysis of the performance of conventional and Islamic unit trust companies in Malaysia. *Asian Academy of management journal of accounting and finance*

Mugenda, O. M. & Mugenda, *A. G.* (2003*).* Research methods: Quantitative and qualitative approaches. *African Centre for technology studies. Nairobi, Kenya*

Muteti, S.R. (2014). *Research on relationship between financial risk management and financial Risk management in Kenya*. Unpublished MBA project, School of Business, University of Nairobi

Nikitta, D. (2017). Top 5 theories of profit. Economic discussions http://www.economicsdiscussion.net/profit/top-5-theories-of-profit-explained/6101

Njeri, V. W. (2010), *A survey on strategic risk management practices by large commercial banks in Kenya.* Unpublished MBA project, school of business, University of Nairobi.

Oluwafeni, A.S. & Simeon, O.S. (2010). Risk management and financial performance of Banks in Nigeria. *International Journal of Economics and Financial Issues 14*(6).

Pavodani and Tugnoli (2015). *Enterprise risk management and firm value.* [Paper presentation]. Academia education. https://www.academia.edu/40168985/ENTERPRISE_RISK_MANAGEMENT_AND_FIRM_VALUE

Razari, N.M, Wah, Y.B., (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics, 2*(1): 21-33.

Shahbaz H, Tabassum R, Muhammad R, Mansoor A, Hafiz M & Yasir K (2012). Impact of risk management on non-performing loans and profitability sector in Pakistan *International journal of business and social science.*

Wadesango N. Mhaka C. & Shava F (2018), Effectiveness of Risk Management systems on financial performance in a public setting. *Academy of strategic management journal, research article:17*(4), 2018.

Wanjohi, C.M. (2013). *Research on relationship between financial risk management and financial performance of banks in Kenya*. Unpublished MBA project, School of Business, University of Nairobi.

Zimmerman, G. (1996). Factors influencing community bank performance in California. *Federal Reserve Bank of San Francisco* vol 1: 26-41.