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The effect of Financial Risk on Profitability of Tier Three Commercial Banks in Kenya

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Abstract

The general objective of this study was to determine the effect of financial risk on profitability of tier three commercial banks in Kenya. This study is anchored to the existing literature review by theories and empirical studies that were reviewed. This study employed descriptive research design, collected data from elopements of audited financial statements of all the 22 tier three commercial banks in Kenya submitted to CBK for 5 years (2015-2-19) and analyzed them with descriptive and inferential statistics. Diagnostics tests were conducted on the data to ensure that regression assumptions underpinning multiple regression through ordinary least squares were met and misspecification did was checked in this study. Through, Hausman test, this study elected panel fixed effect regression model for its analysis. The findings of panel fixed effects regression model showed that credit risk (non-performing loans ratio) has statistically significant negative effect on profitability (return on capital employed) of commercial banks in Kenya (β= -0.084037, p-value= 0.0388) at significance level of 0.05. Liquidity risk (acid test ratio) was found with statistically insignificant negative effect on profitability (re-turn on capital employed) of tier three commercial banks in Kenya (β= -0.029777, p-value=0.2844) at significance level of 0.05. Operational risk (operating expenses ratio) was found with statistically significant negative effect on profitability of tier three commercial banks in Kenya (β= -0.041991, p-value = 0.0009) at significance level of 0.05. Therefore, this study recommended that management of tier three commercial banks and financial regulators led by CBK in Kenya should ensure that risk management measures in tier three commercial banks including proper credit appraisal, proper loan contracts management, good control of expenses are effective to minimize credit risk and operational risk in tier three commercial banks. This study also recommended that the effect of liquidity risk on profitability of commercial banks should be studied further since it was found to be statistically insignificant although it was negative.

Keywords: *Tier Three Banks, Financial Risk, Liquidity Risk, Operational Risk, Panel Data*

Introduction

Commercial banks are critical facilitators of economies for their engagement in taking deposits, making loans, underwriting securities, making payment arrangement and providing other commercial and investment services (Apostolik & Donohue, 2015). According to Allen (2013), commercial banks perform these services with primary objective to promote their profitability. Profitability of commercial banks is affected by non-financial risks including strategic risk, reputational risk and concentration risk, and financial risks, including, credit risk, market risk, liquidity, operational risk and systematic risk (Pesuth, 2018). Whereas non-financial risks stem to commercial banks from flawed management decisions and defective business strategies, financial risks that this study concentrated on are associated with inability to meet financial obligations (Apostolik & Donohue, 2015). According to Hull (2012) commercial banks are

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subjected to regulation in virtually all countries where they are required to keep minimum capital that can exceed risks when they occurred and to prevent the devastative impact that the collapse of commercial banks can bring to economies. Among issues ad-dressed in the regulation of commercial banks are minimum capital to keep, activities allowed to engage in, deposit insurance, and extent to which mergers and foreign ownership are al-lowed (Hull, 2012). According to study by association of certified fraud examiners (2020) on occupational frauds and abuses that included examination of 379 cases on commercial banking services, average loss due to frauds risk (operational risk) was US$1,546,000 in commercial banks.

According to CBK (2020), financial risk has caused the decline in profitability of commercial banks in Kenya during the last 5 years of this study (2015-19) with profitability indicators decline ding. ROA decreased to 4.94 percent during 2017 from 5.64 percent during 2016, while during 2015 and 2018, ROA was recorded at 5.4 and 5.0 percent respectively. ROE deceased to 30.9 percent during 2017 from 35.2 percent during 2016 and during 2015 and 2018, ROE stood at 31.3 percent and 32.1 percent. This decline in profitability of commercial banks in Kenya was caused by storm of interest rate capping, unfavorable weather conditions and prolonged electioneering period (which are variables of market risk and operational risk). Commercial banks in Kenya are classified into three tiers based on the weighted composite index whose elopement are net assets, customer deposits, capital and reserves, number of de-posit accounts and number of loan accounts (CBK, 2020). When analyzed based on tiers, profitability of tier three commercial banks separately was found to have declined during the last 5 years of this study (2015-2019). Return on capital employed (ROCE) was recorded at 10.8 during 2015, 13.0 during 2016, 13.9 during 2017, 8.9 percent during 2018 and 10.2 per-cent during 2019 respectively. Chase house bank that was placed under statutory management during June 2006 was found in tier three that also shows financial risk is affecting particularly this tier of commercial banks in Kenya (CBK ‘s bank annual supervision reports 2015, 2016, 2017 and 2018).

Research Problem

Previous empirical research studies have analyzed the effect of financial risk on profitability of commercial banks in different countries and have found mixed-up results. Shetty and Yadav (2019) found insignificant negative impact of financial risk on profitability of 43 commercial banks in India. Aluko, Kolapo, Adeyeye and Oladele (2019) found the impact of financial risk on profitability of systematically important banks in Nigeria insignificant and negative. Siregar, Nuruddin and Yusuf (2019) established that financial risk has

insignificant negative influence on profitability of Sharia banks in Indonesia. Mudanya and Muturi (2018) ascertained that financial risk has insignificant negative relationship with profitability of commercial banks listed in Nairobi securities exchange. Tafri, Hamid, Meera and Omar (2014) established that financial has insignificant negative impact on profitability of Malaysian com-mercial banks. Lake (2013) determined that financial risk shows insignificant negative effect on profitability of eight commercial banks in Ethiopia. However, El-Faham (2020) found that financial risk has significant negative influence on profitability performance of banks in Egypt. Wood and McConney (2018) showed significant negative impact of financial risk fac-tors on profitability of the commercial banking sector in Barbados. Muriithi (2016) established significant negative effect of financial risk on profitability of 43 commercial banks in Kenya. Al-Tamimi, Miniaoui and Elkelish (2015) confirmed significant negative relationship between financial risk and profitability of 11 Gulf cooperation council Islamic banks. Amin, Sanusi, Kusairi and Abdallah (2014) confirmed significant negative relationship of financial risk and profitability in commercial banks in Tanzania. Al-Rdaydeh1, Matar and Alghzwai (2017) established significant negative association amongst financial risk and profitability of Jordanian banking companies. Some of the above studies have been conducted in other countries and the studies conducted in Kenya have studied financial risk in the context of all commercial banks and the group of commercial banks listed at the Nairobi security exchange. Therefore, this study was conducted to find the effect of financial risk on profitability of tier three commercial banks in Kenya in order to add knowledge to existing empirical literature review.

Research Objectives

General objective

To determine the effect of financial risk on profitability of tier three commercial banks in Kenya.

Specific objectives

i) To determine the effect of credit risk on profitability of tier three commercial banks in Kenya.
ii) To determine the effect of liquidity risk on profitability of tier three commercial banks in Kenya.
iii) To determine the effect of operational risk on profitability of tier three commercial banks in Kenya.

Hypothesis

H_{01}: Credit risk has no statistically significant effect on profitability of tier three commercial banks in Kenya

H_{02}: Liquidity risk has no statistically significant effect on profitability of tier three commercial banks in Kenya

H_{03}: Operational risk has no statistically significant effect on profitability of tier three commercial banks in Kenya

Significance of the Study

This study is significant or beneficial to different organizations and individuals who hold stakes or are affected by operations of tier three commercial banks in Kenya in different ways.

Scope of the Study

This study generally determined the effect of financial risk on profitability of tier three commercial banks in Kenya. Financial risk was measured in terms of liquidity risk, credit risk and operational risk while profitability of tier three commercial banks in Kenya was measured in terms of return on capital employed. This study collected its data from the audited financial statements of all the 22 tier three commercial banks in Kenya submitted to the CBK for 5 years (2015 -2019) and analyze them using the descriptive statistics and inferential statistics.

Literature Review

Introduction

This chapter presents literature review at which this study was anchored. This chapter presents empirical literature review, conceptual framework and operational definitions. The relationship between credit risk, liquidity risk and operational risk with profitability of commercial banks has been studied by previous researchers in Kenya and other countries. This section reviews credit risk, liquidity risk, and operational risk and profitability of commercial banks.

Credit risk and Profitability of Commercial Banks

Veizi, Mano and Cociu (2016) evaluated the effect of credit risk on the profitability of commercial banks: A case of Albania. This study generally determined an effect of credit risk on the profitability of commercial banks in Albania. NPLR measured credit risk while ROA and ROE measured profitability in this study. This study used descriptive and quantitative research methods. This study collected both primary and secondary data. Questionnaires collected primary data and secondary data was the data for 16 functioning

commercial banks in Albania published through official channels for 9 years (2008-2016). This study tested hypotheses and applied regression analysis to analyze the collected data. This study found NPLR with the negative impact on measures of profitability such as ROA and ROE. This study recommended that commercial banks in Albania must arrange credit risk management.

Sun and Chang (2018) investigated the effect of credit risk on the profitability of commercial banks in the United States. The general goal of this research study was to examine the relationship between credit risk and profitability of commercial banks in the United States. CAR and NPLR indicated credit risk while ROA and ROE indicated profitability in this study. This study studied the sample of 83 commercial banks in the United States for 8 years (2010-2017) through the OLS technique. This study showed that 1 percent increase in NPLR decreases ROA by 0.0881 percent and ROE by 0.141 percent. This study recommended important consequences for the bank regulators and policymakers in United States.

Alrop and Kokh (2020) analyzed the impact of credit risk on profitability performance of Russian commercial banks. This study examined the impact of credit risk on the profitability performance of 85 Russian commercial banks during the period (2008–2017). Return on assets and return on equity were used as indicators of bank profitability performance while the provisions loan losses to total credit ratio was used as an indicator to measure the quality of credit risk and the ratio of total loan to total assets as an indicator to measure the amount of credit risk. This study employed multiple regression to measure the effect of credit risk on the performance of Russian banks. The study found that the effect of credit risk on the performance of Russian banks is not a fixed effect but a changing one from one year to another, but in cases where credit leaves an impact on performance indicators this effect is often negative and significant. This study also found that the quality of credit has a significant and negative impact on performance indicators, but the volume of the credit has a limited impact. This study recommends increasing the interest of Russian banks in the quality of credit through the development of stricter credit policies.

Liquidity Risk and Profitability of Commercial Banks

Golubeva, Duljic and Keminen (2019) examined the impact of liquidity risk on profitability of commercial banks in Europe following introduction of Basel III principles. This research study generally investigated an impact of liquidity on bank profitability of European banks following the introduction of Basel III principles. This study used loan deposit ratio, financing gap ratio and coverage ratio to measure liquidity

risk while it used operating profit, depreciation, and amortization to measure profitability. This study used data from financial statements of 45 European banks with 180 observations for 4 years (2014-2017) and 38 observations for 2018. This study applied a quantities research design by ordinary least squares statistical technique. This study indicated that measures of liquidity risk had significant negative impact on some measures of profitability and insignificant effect on others. This study recommended further studies to investigate the relationship between liquidity risk measures and profitability measures that showed insignificant.

Obeidat, Khasawneh and Altal (2017) studied the impact of liquidity risk on profitability of Jordanian commercial banks. The main objective of this study was to determine the effect of liquidity risk on profitability of Jordanian commercial banks. Liquidity risk was measured in terms liquidity ratio and profitability of commercial banks was indicated by ROA and ROE. This study employed the descriptive research design to describe quantitative data extracted from the annual reports and final accounting statements of two Jordanian commercial banks during the period (2008 – 2014) and regression analysis model. This study showed significant negative impact of liquidly risk indicator and profitability measures of commercial banks. Therefore, this study recommended that Jordanian commercial banks should not over preserve liquidity and should look for tools to employ the excess liquidity keeping suitable and balanced combinations of assets and obligations in addition to clear and flexible plan to be able to deal with any urgent liquidity crisis, depending on diverse sources and employment of funds in terms of different sectors and terms and short-term employment. Commercial banks in Jordan should also put acceptable limits to liquidity risks according to their acceptable total risk volume.

Operational risk and Profitability of Commercial banks

Simamora and Oswari (2019) studied the effect of operational risk on profitability of commercial banks listed in the Indonesian stock exchange. This study generally determined the effect of operational risk on profitability of commercial banks listed in the Indonesia stock exchange for 9 years (2009-2017). This study measured operational risk with cost-income- ratio and profitability in terms of ROA.The target population was all the banking companies listed in the Indonesian stock exchange during this study. This study selected the sample of five banking companies in the Indonesia by the purposive sampling technique. This study employed the quantitative research method through an associative method and regression analysis. This study showed a significant negative association between operational risk and profitability of commercial

banks. This study recommended that reduced operational risk might advance the capacity of banks to make the profits.

Lin and Chang (2016) conducted the analysis of the correlation between operational risk and profitability of commercial banks in Taiwan. This study generally aimed to establish the relationship between operational risk and profitability of banks listed in Taiwan. ROCE was employed to measure profitability of commercial banks whereas cost-to-income ratio was an indicator of operational risk in this study. The target population of this study was the 30 listed Taiwanese banks. This study employed the descriptive research design and inferential analysis. This study showed that operational risk affects indicators of profitability of commercial banks negatively. Thus, this study recommended that the government and banks in Taiwan would refer to the operational risk whenever effecting and applying the financial policies.

Hakimi and Boukaira (2019) studied the relationship between operational risk and profitability of Tunisian commercial banks. The main purpose of this paper was to investigate the relationship between operational risk and profitability of commercial banks in Tunisia. This study measured operational risk with capital charges and profitability of commercial banks with ROA and ROE. This study employed descriptive research design. Data were collected from financial statements of 10 commercial banks in Tunisia for 17 years (2000-2017) and analyzed using panel regression analysis. The findings of this study indicated that an increase in operational risk (capital charges) significantly increases profitability of commercial banks. Therefore, the findings of this could bring some important policy recommendations to policymakers toward the reinforcement of the operational risk and for improving the analysis and the management process of risks in the commercial banks.

Summary of Literature review and Research gap

The above literature reviews covered financial distress theory, stakeholder theory, risk management theory, operational risk theory and previous empirical studies conducted between financial risk measures and profitability of commercial banks in Kenya and other countries to anchor or relate this study to the existing theoretical and empirical frameworks. Some studies were conducted between financial risk and profitability of commercial banks in other countries that creates geographical research gap. There exists the methodological research gap in terms of measuring profitability of commercial banks since all the previous empirical studies have repeatedly measured the profitability of commercial banks with operation profit

margin, net profit margin, return on assets and return on equity, except three previous empirical studies(Lin & Chang, 2016; Kani, 2017; Dezfouli, Hasanzadeh & Shahchera, 2014) conducted between operational risk and liquidity risk and profitability of commercial banks in Tunisia, Iran and west African economic monetary union countries, respectively, that measured profitability of commercial banks using return on capital employed. However, all these previous empirical studies were conducted in other countries that does not only creates methodological research gap, but also geographical research gap. Again, some previous empirical studies between credit risk, liquidity risk and operational risk and profitability of commercial banks were conducted in other countries that also leaves geographical research gap. The previous empirical studies conducted between credit risk, liquidity risk and operational risk and profitability of commercial banks within Kenya have been conducted among listed commercial banks in the Nairobi stock exchange and all commercial banks in Kenya that creates the contextual research gap. Therefore, this study was conducted to determine the effect of financial risk on profitability of tier three commercial banks in Kenya and return on capital employed was employed to measure profitability to fill these research gaps and add knowledge to the existing empirical research in this research area.

Conceptual Framework

Kumar (2011) describes conceptual framework as the research tool intended to assist the researcher to develop awareness and understanding of the situation under scrutiny and to communicate it. Conceptual framework is the graphical representation of the connection between variables in the research study based on an idea developed as per the perception of the researcher (Saunders, Lewis & Thornhill, 2016). The conceptual framework to illustrate the relationship between the explained variable that is profitability of tier three commercial banks in Kenya and explanatory variables including credit risk, liquidity risk and operational risk for this study is shown in figure 2.1 below.

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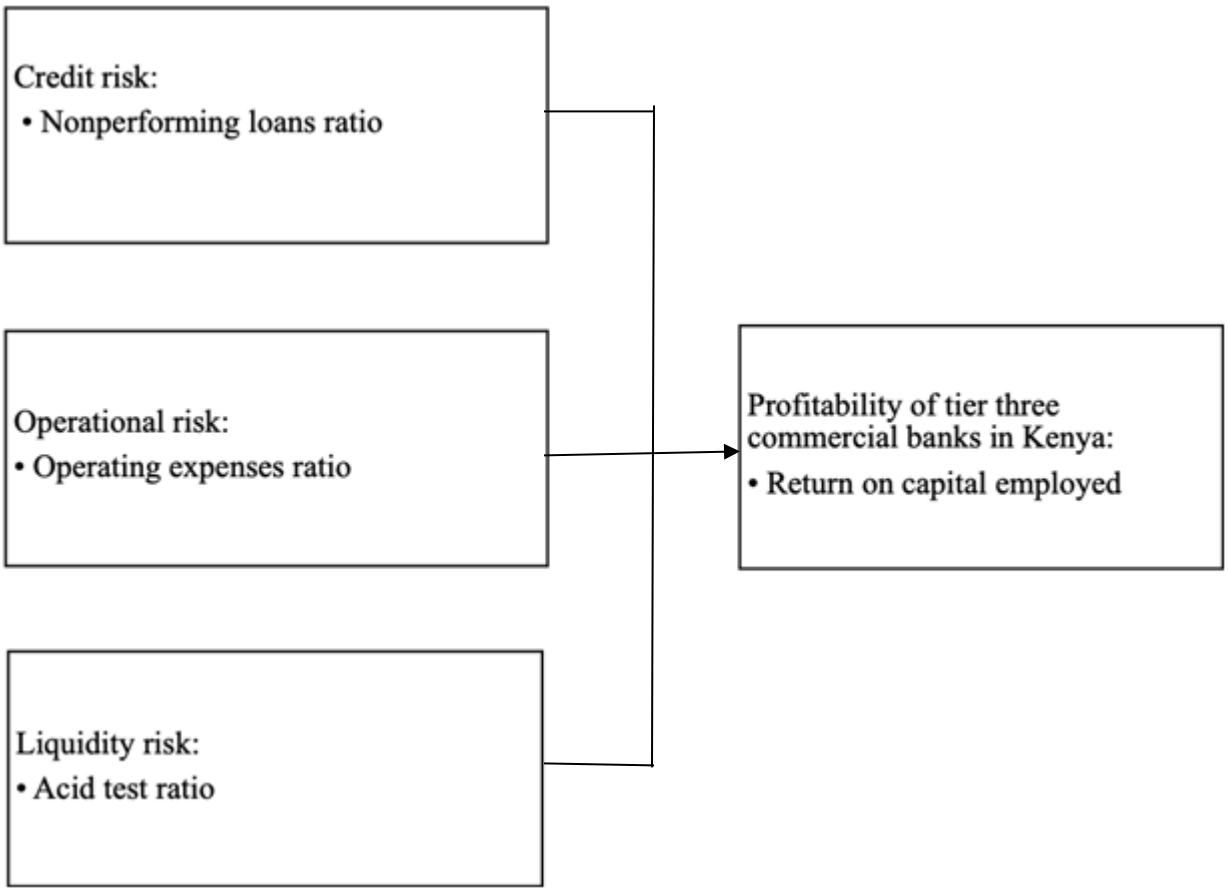

Research Methodology

Introduction

This chapter presents research methodologies that were used to collect, analyze and present the data for this study. This chapter presents research design, target population, sampling de-sign and technique, research instrument, data collection procedure, data analysis, data presentation and diagnostics tests on the data.

Research Design

This study employed the descriptive research design that is appropriate to determine the effect of financial risk on probability of tier three commercial banks in Kenya or their relationship.

Target Population

Target population of this study consisted of all tier three commercial banks in Kenya during the 5 years of this study (2015-2019). During this period there were 22 tier three commercial banks in Kenya (CBK, 2020)

Sampling design and technique

This study employed the census research technique in choosing all the 22 tier three commercial banks in Kenya since their number is very small to allow the researcher to collect the data from all their members.

Research Instrument

This study made use of the secondary data collected using a data collection sheet.

Data Collection Procedure

This study collected secondary data from financial statements of tier three commercial banks in Kenya submitted to the CBK and availed at websites of individual tier three commercial banks. The data were collected from financial statements of tier three commercial banks in tier three for 5 years (2015-2019).

Data Analysis

Data analysis was done using e-view student version 11. The study performed the panel multiple regression model through statistical ordinary least squares statistical technique below:

$ROCEit = \beta 0 + \beta 1NPLRit + \beta 2ATRit + \beta 3OERit + \mu it.$

Where:

ROCEit=Return on capital employed measuring profitability of bank- i at year- t, β0=constant, β1, β2, β3=Coefficients, NPLRit=Nonperforming loans ratio measuring credit risk of the bank -i at year- t, ATRit=Acid test ratio measuring liquidity risk of the bank- i at year- t, OERit=Operating expenses ratio measuring operational risk of the bank -i at year- t and μit=error term where i is cross-sectional at t time period.

Operational Definition

Saunders, Lewis and Thornhill (2016) state that the operational definition is the specific ways in which variables are measured in the research study. Kumar (2011) refers to operational definition as the detailed statement of how conceptual variables are turned into measurable variables. The operational definition of the explained variable (profitability of tier three commercial banks in Kenya) and explanatory variables (credit risk, liquidity risk and operational risk) for this study is as shown in the table 2.1 below:

Table 2.1: Operational definition

Variable	Measure	Calculating formula	Data type	Statistics analysis	Variable type
Credit Risk	Non-performing loans ratio	Nonperforming loans divided by outstanding loans	Secondary	Descriptive, Inferential	Explanatory
Liquidity Risk	Acid test ratio	Liquid assets divided by short-term liabilities	Secondary	Descriptive, Inferential	Explanatory
Operational risk	Operating expense ratio	Operating expenses divided by operating profit	Secondary	Descriptive, Inferential	Explanatory
Profitability of tier three commercial banks in Kenya	Return on capital employed	Operating profit divided by capital employed	Secondary	Descriptive, Inferential	Explanatory

Data Presentation

This study employed tables and graphs to present its data after they are analyzed. According to Saunders, Lewis and Thornhill (2016) tables offer useful means of presenting large amounts of detailed information in the small space and they boon for readers, dramatically clarify text, provide visual relief, and serve as quick point of reference. Graphs can make analyzed data easier to understand and effectively communicate what they are supposed to show (Saunders, Lewis & Thornhill, 2016). Kumar (2011) defines data presentation is an application of data display techniques such as texts, tables, graphs and statistical measures to display analyzed data in the manner that makes study findings easy and clear to understand and pro-vide extensive or comprehensive information in a succinct and effective way.

Findings and Discussions

Introduction

This chapter presents data analysis and discussion of the findings for this study. This chapter presents response rate, descriptive analysis, and diagnostic tests on the data, regression analysis and hypothesis testing.

Response rate

This study collected the data electronically from elements of audited financial statements of tier three commercial banks in Kenya submitted to CBK for 5 years (2015-2019). Financial statements for eight commercial banks were not exiting electronically from the websites of commercial banks for all the 5 years (2015-2019) of this study therefore they were eliminated since they were inconsistent. One commercial bank that is Charter House bank was under statutory management therefore was eliminated since it did not produce financial statements for the 5 years (2015-2019) of this study. There were 22 tier three commercial banks in Kenya during this study. This study collected its data from the audited financial statements provided by thirteen tier three commercial banks in Kenya that constitutes 62 percent response rate. This response rate makes this study representative and comprehensive since it is above the 50 percent response rate that according to Singpurwalla (2013) should be considered excellent for the research studies.

Descriptive statistics

Descriptive analysis was conducted to describe basic features of all the study variables. The explained variable is profitability of tier three commercial banks in Kenya while the explanatory variables includes credit risk, liquidity risk and operational risk that measured financial risk. The descriptive analysis also served as data screening tool to spot out any observation that showed unusual or unique characteristics on the data.

Table 4.1: Summary of descriptive statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
ROCE	65	0.087532	0.058568	0.026560	0.479306
NPLR	65	0.313371	0.927188	0.007536	7.551076
ATR	65	0.374335	0.135664	0.101000	0.827000
OER	65	1.107699	0.543821	0.616129	3.863918

As can be seen in table 4.1 above, the number of observations for each variable is 65. The mean of 0.087532 on data of profitability (ROCE) is below 0.20(that is the theoretical threshold when profitability is measured by ROCE) that means on average tier three commercial banks in Kenya during this study were less profitable. The standard deviation of 0.058568 shows the spread or variation in profitability while minimum

of 0.026560 and maximum of 0.479306 indicate low and high levels of profitability respectively. The mean of 0.313371 on data of credit risk (NPLR) is above 0.10(that is the theoretical threshold) that means credit risk affected tier three commercial banks in Kenya on average during this study. The standard deviation of 0.927188 show high spread of credit risk whereas minimum of 0.007536 and maximum of 7.551076 stand for low and high levels of credit risk. The mean of 0.374335 on data of liquidity risk (acid test ratio) is greater than 0.20(that is the liquidity minimum regulatory ratio by CBK) that implies liquidity risk was among tier three commercial banks during this study. The minimum of 0.101000 and maximum of 0.827000 describe low and high levels of liquidity risk while standard deviation of 0.135664 signals the variation of liquidity risk. The mean of 1.107699 on data of operational risk (OER) is above 0.80(that is the theoretical cutoff for operational risk measured by OER to exist) that indicates tier three commercial banks on average were affected by operational risk. The standard deviation of 0.543821 shows the spread of operational risk and minimum of 0.616129 and maximum of 3.863918 show low and high levels of operational risk respectively.

Diagnostics tests on the data

This study conducted diagnostics tests on the data before the panel regression model it employed was ran to ensure that the assumptions underpinning the least squares statistical method are not violated and model accuracy and stability are ensured.

Nonnormality test

Nonnormality or violation of normality distribution of error terms for all values of explanatory variables in the data invalidates the findings of all statistical tests. The Jargue-Bera test in figure 4.1 below found that skewness of 0.525055 and kurtosis of 3.3808774 are found between the theoretical limits of (-3 and +3) that means nonnormality is not exiting in this study. Also, the Jargue-Bera statistic of 3.879705 is statistically insignificant since its p-value of 0.143725 is above significance level of 0.05 that implies that the null hypothesis that error terms are normality distributed for all values of explanatory variable in this study is not rejected, thefore, the error terms in this study are normally distributed across values of explanatory variables.

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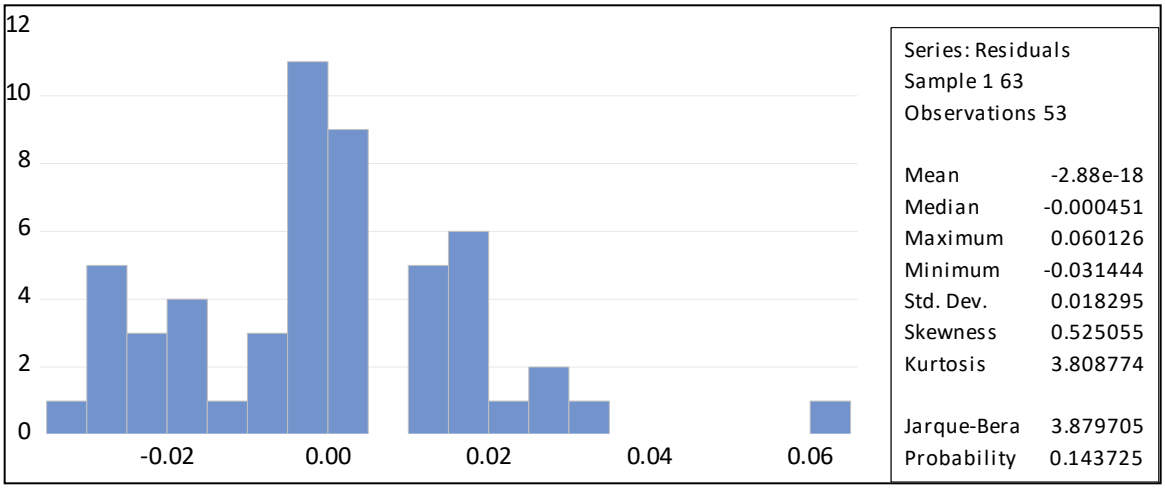

Figure 4.1: Jargue-Bera test for nonnormality

Heteroscedasticity test

In the regression analysis, heteroscedasticity is when the variance of error terms is unequal or varies across values of explanatory variables that affects standard errors and results of hypothesis testing by triggering imbalances in the levels of prediction by the explanatory variables. Glejser test findings in table 4.2 below show that the values of observed R-squared (Obs*R-squared) of 0.795567, scaled explained SS of 0.876122 and F-statistic of 0.248911 with p-values of 0.8505, 0.8312 and 0.8617 respectively are all insignificant statistically at signicance level of 0.05 that means the null hypothesis that the variance of error terms is constant or does not vary across values of explanatory variables in this study is not rejected, therefore heteroscedasticity is not the problem in this study.

Table 4.2: Glejser test for heteroscedasticity

F-statistic	0.248911	Prob. F(3,49)	0.8617
Obs*R-squared	0.795567	Prob. Chi-Square(3)	0.8505
Scaled explained SS	0.876122	Prob. Chi-Square(3)	0.8312

Autocorrelation test

Autocorrelation occurs in the regression analysis when error terms associated with the given time period carry over into future time periods that affects efficiency of ordinary least squares estimators by increasing or decreasing the sizes of standard errors. Table 4.7 (Fixed effects regression model findings) indicate that the Durban-Watson statistic of 2.664148 that tells there is no first-order autocorrelation among error terms

in this study. As per the findings of Breusch-Godfrey Lagrange multiplier test in table 4.3 below, the values of F-statistic of 1.530282 and observed R-squared (Obs*R-squared) of 3.240274 are all statistically insignificant since their p-values of 0.2271 and 0.1979 are above significant level of 0.05 respectively that implies the null hypothesis that there is no second- order autocorrelation among error terms in this study is not rejected and alternatively it is decided that there is no second-order autocorrelation among error terms in this study.

Table 4.3: Breusch-Godfrey LM test for second-order autocorrelation

F-statistic	1.530282	Prob. F(2,47)	0.2271
Obs*R-squared	3.240274	Prob. Chi-Square(2)	0.1979

Multicollinearity test

Multicollinearity increases the variance of regression coefficients, makes difficult to determine significance role of separate explanatory variables and reduces the overall predictive power of the regression model. Multicollinearity occurs in the regression analysis when there is high linear relationship among explanatory variables. The findings of variance inflation factor test in table 4.4 below indicate that the regression coefficients for all explanatory variables are less than cut off value of 10 that means there is no multicollinearity among explanatory variables found in this study.

Table 4.4: Variance inflation factor test for multicollinearity

Variable	Coefficient	Variance inflation factor
NPLR	0.001022	1.678219
ATR	0.000883	1.231299
OER	0.000221	1.968506
Constant	0.000369	NA

Model misspecification test

Model misspecification occurs when the regression analysis model does not account for everything it should or is in error that biases regression coefficients, error terms and regression estimators. Findings of RESET

Ramsey test in table 4.5 below show that values of F-statistic of 0.282565 and likelihood ratio of 0.311084 are statistically insignificant since their p-values of 0.5975 and 0.5770 respectively are above significant level of 0.05. Therefore, the null hypothesis that the panel regression model in this study is functionally specified is not rejected and conclusion made alternatively that the panel regression model in this study is specified functionally.

Table 4.5: RSET Ramsey test for model misspecification

	Value	**d.f.**	**Probability**
t-statistic	0.531568	48	0.5975
F-statistic	0.282565	(1, 48)	0.5975
Likelihood ratio	0.311084	1	0.5770

Hausman test

Hausman test was done to help the researcher choose between random effects regression model and fixed effects regression model in this study. From the findings of Hausman test in table 4.6 below, the chi-square statistic of 9.311461 is statistically significant since its p-value of 0.0254 is less than significance level of 0.05 that implies the null hypothesis that random effects regression model is relevant than fixed effects regression model for the analysis in this study is rejected, therefore the fixed effects regression model is relevant for the regression analysis in this model.

Table 4.6: Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.311461	3	0.0254

Model significance test and explanatory power accuracy

From the findings of fixed effects regression model in table 4.6 below, the coefficient of determination (r^2) that is found to be 0.838358 and not 0 signals that the panel regression model employed in this study is statistically significant. This means that the significant explanatory variables (operational risk and credit risk) jointly explain the explained variable (profitability of commercial banks in Kenya) on average by 83.8 percent and the rest of 16.2 percent is explained by other factors (error terms or residuals). The above

coefficient of determination(r^2) shows good predictive power for this study since it is above the 25 percent coefficient of determination(r2) suggested by Cohen (2013) to be large for social sciences researches.

Regression Analysis

The findings of panel fixed effects regression model in table 4.7 below shows that equation of panel regression model for this study is found to be:

ROCEit = 0.144137 - 0.084037 NPLRit - 0.029777 ATRit - 0.041991 OERit

Where:

ROCEit = Return on capital employed measuring profitability of bank-i at year-t, 0.144137 = constant, -0.084037, -0.029777 and -0.041991 = coefficients of NPLRit, ATRit and OERit respectively, NPLRit = Non-performing loans ratio measuring credit risk of bank-i at year-t, ATRit= Acid test ratio measuring liquidity risk of bank-i at year –t, OERit= Operating expenses ratio measuring operational risk of bank –i at year –t.

Credit risk (NPLR) is found to have statistically significant negative effect on profitability (ROCE) of tier three commercial banks in Kenya (β = -0.084037, p-value = 0.0388) at signicance level of 0.05 that also means as credit risk increases by 1 unit, profitability of tier three commercial banks in Kenya decreases by -0.084037 on its average value, assuming that other explanatory variables such as operational risk and liquidity risk are held constant. This research finding concurs with the findings from previous studies. Veizi, Mano and Cociu (2016) found credit risk with the negative impact on profitability of commercial banks in the study they conducted to evaluate the effect of credit risk on profitability of commercial banks: A case of Albania. Also, Abera (2018) studied the impact of credit risk on profitability of commercial banks in Ethiopia and showed that credit risk has important inverse impact on profitability of commercial banks. Again, Muriithi, Waweru & Muturi (2016) analyzed the effect of credit risk on profitability of commercial banks in Kenya and found that credit risk has significant negative effect on profitability of commercial banks.

Liquidity risk(ATR) is found to have statistically insignificant negative effect of profitability(ROCE) of tier three commercial banks in Kenya (β= -0.029777, p-value = 0.2844) at signicance level of 0.05 This research finding agrees with findings from previous studies. Trabelsi (2015) established insignicant negative effect of liquidity risk on profitability of commercial banks after analyzing the effect liquidity risk determinants on profitability: An empirical study on commercial banks in the Kingdom of Bahrain. Olawanle (2014)

examined liquidity risk and profitability of commercial banks in Nigeria and showed an insignificant negative association amongst liquidity risk and profitability of commercial banks.

Table 4.7: Panel fixed effects model regression findings

Dependent Variable: ROCE
Method: Panel Least Squares
Sample: 2015 2019
Periods included: 5
Cross-sections included: 13
Total panel (unbalanced) observations: 53

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.144137	0.014490	9.947032	0.0000
NPLR	-0.084037	0.039221	-2.142680	0.0388
ATR	-0.029777	0.027413	-1.086211	0.2844
OER	-0.041991	0.011642	-3.606891	0.0009
Effects Specification				
Cross-section fixed (dummy variables)				
Root MSE	0.008430	R-squared		0.838358
Mean dependent var	0.079696	Adjusted R-squared		0.772827
S.D. dependent var	0.021168	S.E. of regression		0.010089
Akaike info criterion	-6.110272	Sum squared resid		0.003766
Schwarz criterion	-5.515467	Log likelihood		177.9222
Hannan-Quinn criter.	-5.881539	F-statistic		12.79337
Durbin-Watson stat	2.664148	Prob(F-statistic)		0.000000

Operational risk (OER) is found to have statistically significant negative effect on profitability (ROCE) of tier three commercial banks in Kenya (β= -0.041991, p-value = 0.0009) at signicance level of 0.05 that also means as operational risk increases by 1 unit, profitability of tier three commercial banks in Kenya decreases by -0.041991 on its average value, assuming that other explanatory variables such as credit risk and liquidity risk are held constant. This research fining is similar to findings of previous studies. Simamora and Oswari (2019) found significant negative association between operational risk and profitability of commercial banks in their study that they conducted among commercial banks listed in the Indonesian stock exchange. Also, Hakimi and Boukaira (2019) studied the relationship between operational risk and profitability of Tunisian commercial banks and established that an increase in operational risk significantly increases profitability of commercial banks. Again, Muriithi and Muigai (2017) determined that operational risk

related negatively with profitability of commercial banks during their study that quantitatively studied operational risk and profitability of commercial banks in Kenya.

Hypothesis testing

This section presents how the hypotheses that were based on specific objectives of this study were tested. These hypotheses were tested using the findings of panel fixed effects regression model and the testing criterion was that the null hypotheses are rejected when p-value is less than or equals significance level of 0.05, alternatively, they are not rejected when p-value is above significance level of 0.05.

Hypothesis test on credit risk

From the findings of panel fixed effects regression model in table 4.6 above, credit risk (nonperforming loans ratio) is found with the p-value of 0.0388, which is less than significance level of 0.05, which implies the null hypothesis that credit risk has no statistically significance effect on profitability of tier three commercial banks in Kenya is rejected. Therefore, the coefficient of -0.084037 of credit risk means that credit risk has statistically negative effect on profitability of tier three commercial banks in Kenya. It also means that as credit tisk increases by 1 unit, profitability of tier three commercial banks in Kenya dresses by -0.084037 on its average value, assuming that other explanatory variables that are operational risk and liquidity risk are held constant. This research finding concurs with the findings from previous studies. Veizi, Mano & Cociu (2016) found credit risk with the negative impact on profitability of commercial banks in the study they conducted to evaluate the effect of credit risk on profitability of commercial banks: A case of Albania. Also, Abera (2018) studied the impact of credit risk on profitability of commercial banks in Ethiopia and showed that credit risk has important inverse impact on profitability of commercial banks. Again, Muriithi, Waweru & Muturi (2016) analyzed the effect of credit risk on profitability of commercial banks in Kenya and found that credit risk has significant negative effect on profitability of commercial banks.

Hypothesis testing on liquidity risk

Based on the findings of panel fixed effects regression model in table 4.6 above, liquidity risk (acid test ratio) is found with p-value of 0.2844, that is above significance level of 0.05, which implies the null hypothesis that liquidity risk has no statistically significant effect on profitability of tier three commercial banks in Kenya is not rejected. Therefore, the coefficient of -0.029777 of liquidity risk means that liquidity

risk has statistically insignificant negative effect on profitability of tier three commercial banks in Kenya. This research finding agrees with findings from previous studies. Trabelsi (2015) established insignificant negative effect of liquidity risk on profitability of commercial banks after analyzing the effect liquidity risk determinants on profitability: An empirical study on commercial banks in the Kingdom of Bahrain. Olawanle (2014) examined liquidity risk and profitability of commercial banks in Nigeria and showed an insignificant negative association amongst liquidity risk and profitability of commercial banks.

Hypothesis testing on operational risk

Referring to the findings of panel fixed effects regression model in table 4.6 above, operational risk (operating expenses ratio) is found with p-value of 0.0009, that is below significance level of 0.05, that means at significance level of 0.05, the null hypothesis that operational risk has no statistically significant effect on profitability of tier three commercial banks in Kenya is rejected. Therefore, the coefficient of operational risk of -0.041991 means that operational risk has statistically significant negative effect on profitability of tier three commercial banks in Kenya. This also means that as operational risk increases by 1 unit, profitability of tier three commercial banks in Kenya decreases by -0.041991 on its average value, assuming that other explanaorory variables that are credit risk and liquidity risk are kept constant. This research fining is similar to findings of previous studies. Simamora & Oswari (2019) found significant negative association between operational risk and profitability of commercial banks in their study that they conducted among commercial banks listed in the Indonesian stock exchange. Also, Hakimi & Boukaira (2019) studied the relationship between operational risk and profitability of Tunisian commercial banks and established that an increase in operational risk significantly increases profitability of commercial banks. Again, Muriithi & Muigai (2017) determined that operational risk related negatively with profitability of commercial banks during their study that quantitatively studied operational risk and profitability of commercial banks in Kenya.

Conclusions and Recommendations

Introduction

This chapter presents the conclusion and recommendations for this study. This chapter presents summary of the findings, conclusion, recommendation for policies, limitations of the study and recommendations for further studies.

Summary of the findings

The general objective of this study was to determine the effect of financial risk on profitability of tier three commercial banks in Kenya. To achieve this object, secondary data were collected from financial statements of all the 22 tier three commercial banks in Kenya submitted to CBK and for 5 years (2015-2019) and availed at their websites. Collected data were analyzed using descriptive statistics such mean, standard deviation, minimum, maximum and inferential statistics that was panel fixed effects regression model. The findings of these descriptive statistics and panel fixed effects model were presented as per specific objectives.

Credit risk and profitability of tier three commercial banks in Kenya

The mean of 0.087532 on the data of profitability (ROCE) is below 0.20 theoretical threshold when profitability is measured by return on capital employed that implies tier three commercial banks in Kenya on average were less profitable during this study (2015-2019). This mean has standard deviation, minimum and maximum of 0.058568, 0.026560 and 0.479306 respectively. Data on credit risk (NPLR) showed the mean of 0.313371 that is above 0.10 theoretical cutoff that means on average credit risk affected tier three commercial banks during this study (2015-2019). This mean of credit risk has standard deviation of 0.927188, minimum of 0.007536 and maximum of 7.551076 respectively. Panel fixed effects regression model showed credit risk with statistically significant negative effect on profitability of tier three commercial banks in Kenya (β= -0.084037, p-value =0.0388) at significance level of 0.05. This implies that the null hypothesis that credit risk has not statistically effect on profitability of tier three commercial banks in Kenya rejected. Therefore, the coefficient of credit risk of -0.084037 means that as credit risk increases by 1 unit, profitability of tier three commercial banks decades by -0.084037, assuming that other explanatory variables such as operational risk and liquidity risk are held constant

Liquidity risk and profitability of tier three commercial banks in Kenya

Descriptive analysis found that data on liquidity risk (ATR) have mean of 0.374335, that is above 0.20 minimum regulatory ratio that tells on average liquidity risk affected tier three commercial banks in Kenya during this study (2015-2019). This mean of liquidity risk was found with minimum of 0.101000, maximum of 0.827000 and standard deviation of 0.135664. Corresponding to this, profitability (ROCE) of tier three commercial banks in Ken-ya was found with mean, minimum, maximum and standard deviation of 0.087532, 0.026560, 0.479306 and 0.058568. Inferential analysis, through panel fixed effect regression

model, found that liquidity risk has statistically insignificant negative effect on profitability of tier three commercial banks in Kenya (β= -0.029777, p-value = 0.2844) at significance level of 0.05 that implies the null hypothesis that liquidity risk has no statistically significant effect on profitability of tier three commercial banks in Kenya is not rejected.

Operational risk and profitability of tier three commercial banks in Kenya

Descriptive analysis found that data on operational risk (OER) have mean of 1.107699, which is above 0.80 theoretical threshold that implies operational risk greatly affected tier three commercial banks in Kenya during this study (2015-2019). The standard deviation showing variability of operational risk was found to be 0.543821 whereas, minimum and maximum indicating low and high levels of operational risk were found to be 0.616129 and 3.863918 respectively. This relates to mean, minimum, maximum and standard deviation that were found to be 0.087532, 0.026560, 0.479306 and 0.058568 on data of profitability (ROCE) of tier three commercial banks in Kenya. Inferential analysis though panel fixed effect model found that operational risk has statistically significant negative effect on profitability of tier three commercial banks in Kenya (β= -0.041991, p-value = 0.0009) at significance level of 0.05, that tells the null hypothesis that operational risk has no statistically significant effect on profitability of tier three commercial banks in Kenya is rejected. This also means that as operational risk increases by 1 unit, profitability of tier three commercial banks in Kenya, decreases by -0.041991 on its average value assuming that other explanatory variables such as credit risk and liquidity risk are held constant.

Conclusions

Based on the summary of findings of both the descriptive statistics and inferential statistics above, this study concludes that data on profitability (ROCE) of tier three commercial banks in Kenya have mean that is below theoretical value that implies profitability (return on capital employed) of tier three commercial banks in Kenya was less daring this study. Credit risk (NPLR) and operational risk (OER) have statistically significant negative effects on profitability (ROCE) of tier three commercial banks in Kenya, therefore, the null hypotheses that credit risk and operational risk have no statistically significant effects on profitability of tier three commercial banks in Kenya were rejected. This also means that as credit risk (NPLR) and operational risk (OER) increase, profitability to tier three commercial banks in Kenya de-creases on its average value. Liquidity risk (ATR) has statistically insignificant negative effect on profitability of tier three commercial banks in Kenya, therefore, the null hypothesis that liquidity risk has no statistically

significant effect on profitability of tier three commercial banks in Kenya was not rejected. This also means that as liquidity risk (ATR) increases, profitability (ROCE) of tier three commercial banks in Kenya does not decrease on its average value.

Recommendations for Policies

From the summary of findings and concussion above, this study recommends that management of tier three commercial banks in Kenya and financial regulators led by CBK in the Kenya should ensure that existing internal controls in tier three commercial banks in Kenya and regulatory risk management policies are effective. Operational risk can be reduced by improving overall efficiency levels, for example, by adherence to internal controls and policies including cost budgets, expenses approval limits, effective reconciliation of transactions including suspenseses, incomes, expenses to avoid losses through write-offs, monitoring staff productivity through daily productivity reports to avoid work backlogs that bring overtime costs. Credit risk can be managed by loans rescheduling, thorough appraisal of new credit applications and good management of exiting loans contracts.

Limitations of the Study

This study like its counterparts conducted previously faced some research limitations. Only secondary data were collected electronically from elements of audited financial statements of tier three commercial banks in Kenya submitted to CBK for only 5 years (2015-2019) that may not have revealed many financial periods in which financial has severely affected this group of commercial banks in Kenya. Market risk that is another category of financial risk as recognized by Basel committee on banking supervision in1996 was not included as the measure of financial risk in addition to credit risk, liquidity risk, and operational risk. Although accounting measurement approach of variable was adopted, profitability was only measured with return on capital employed and other important accounting profitability ratios were not employed to measure profitability. These include gross profit margin, operating profit margin, net profit margin, return on assets and return on equity. Again, credit risk was only indicated with nonperforming loans ratio while other important measures to give much better reflection of credit risk were not used including loan loss provisions gross loans ratio, debt equity ratio, loan loss provisions pre-provision income ratio, equity asset ratio, debt asset ratio and allowance for loan losses gross loans ratio. Liquidity risk is another measure of financial risk that was not measured comprehensively. Only acit test ratio was employed to measure liquidity and very popular accounting ratios that are also usually employed to assets liquidity risk were not

involved. These are defensive internal ratio, current ratio, cash ratio, time-interest earned ratio and operating cash flow ratio. Liquidity risk was found with statistically insignificant effect on profitability of tier three commercial banks in Kenya than an expectation that it should have statistically significant negative effect on profitability of commercial banks.

Recommendations for further Studies

Based on the above research limitations, this study recommends that effect of liquidity risk on profitability of commercial banks should be studied again since it was found to be statistically insignificant although negative. Further studies that can cover extended years than 5 years (2015-2019) are recommended. There is the need for further studies that can measure profitability of commercial banks with all profitability ratios or use any other popular profitability ratio that is not return on capital employed. Also it would be better if further studies to measure credit risk and liquidity risk with other leverage ratios, asset quality ratios and liquid-ity ratios that were not employed in this study. Again, if another studies to use both secondary data and even primary data alone are conducted it can give good data application.

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