UPSHOT OF REGULATORY BASED CREDIT RISK MANAGEMENT ON RETURN ON EQUITY OF COMMERCIAL BANKS IN KENYA

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ABSTRACT

Kenya has one of the most vibrant banking sectors in the entire East African region. Money lending practices have recently been a major target for almost every commercial bank, a phenomenon that has intensified competition and consequently increased loans default rates hence amplified exposure to credit risk. Central bank of Kenya (CBK) as banking sector regulatory authority adopts CAMEL rating system in its endeavor to improve the credit worthiness assessment process. Specific objectives of the study were to determine the effect of quantitative CAMEL components namely; capital adequacy, asset quality, earnings ability and liquidity adequacy, on Return on Equity (ROE) of commercial banks in Kenya. Descriptive research design was adopted. The population of study was forty-two licensed commercial banks in Kenya from 2011 to 2016 and purposive sampling of 39 banks was done. Multiple linear regression model was used in data analysis and t- statistic at 5% significance level was employed in test of hypotheses. The model intercept was 0.857 implying 85.7% of changes in ROE of commercial banks were attributable to the predictor variables. The study established that Capital Adequacy had a negative insignificant effect on ROE with a coefficient of -0.258 and a p-value of $0.118 > 0.05$. Asset Quality and Earnings Ability had negative significant effect on ROE with coefficients -0.959 and -0.596 respectively, and p-values $0.000 < 0.05$. Liquidity Adequacy had a regression coefficient 3.370 and a p-value of 0.000 hence a positive significant effect on ROE. The study concludes that regulatory based credit risk management has significant effect on ROE of commercial banks and recommends that CBK carry out a banking sector analysis on the most appropriate and optimal percentage levels for the respective CAMEL components to be maintained by commercial banks.
Keywords: Credit risk, Capital adequacy, Asset quality, Earnings ability, Liquidity adequacy

INTRODUCTION

Githaiga (2005) defined bank-based credit risk as the current or prospective risk to earnings and capital arising from an obligor's failure to meet the terms of a contract with the bank or if an obligor otherwise fails to perform as agreed. Simply put, credit risk refers to the probability that a borrower or counter parties will, either willingly or by face of circumstances, fail to honour a contractual obligation as and when it falls due. Giesecke (2004) terms credit risk as the most significant risk faced by banks hence the success of such businesses largely depends on accurate measurement and efficient management of credit risk to a greater extent than any other risk.

Coyle (2000) defined credit risk management as the process of identification, measurement, monitoring and control of risk arising from the possibility of default in loan repayments. Saunders and Cornett (2012) argue that management of credit risk arises out of the possibility that promised cash flows on future financial claims held by financial institutions, such as loans and bonds, will not be paid in full. They concluded that if the principle on all financial claims held by financial institutions were paid in full on maturity and interest payments were made on promised payment dates, financial institutions would not face any credit risk. However, this situation virtually affects all financial institutions and to a large extent those in long term credit transactions.

Central Bank of Kenya uses Capital adequacy, Asset quality, Management efficiency, Earnings and Liquidity (CAMEL) rating system in assessing commercial banks' credit risk levels. Capital adequacy refers to the level of capital required by commercial banks to enable them withstand risks such as operational, market and credit risks they are exposed to so as to absorb the potential inherent loses and protect the banks' debtors (Githaiga, 2015).

Asset quality measures the rate of non-performing loans hence reflects the bank's credit quality. In particular, it indicates how banks manage their credit risk exposures as it defines the proportion of loan losses relative to the total loans and advances (Hosna *et al.,* 2009). According to Uniform Financial Institutions Rating System (2014) management qualities are basically the capability of the board of directors and the entire management to identify, measure, and control the risks of an institution's activities and to ensure a safe, sound, and efficient operation in compliance with applicable laws and regulations.

For the purpose of this study however, management quality was not included as credit risk management proxy since it is qualitative and hence subjective in nature and the inherent possibility of its influence among independent variables that could in turn cause multicollinearity of studied variables.

Earnings in the perspective of credit facilities refer to an expression of commercial entity's net interest income relative to the total operating income. It can be measured by the ratio of net interest income to total operating income. Liquidity refers to the ability of an institution to obtain sufficient funds, either by increasing liabilities or by converting assets quickly to cash at a reasonable cost (Rundassa and Batra, 2016). It is simply a financial stability indicator that shows the financial muscle of a commercial bank to quickly and timely respond to short-term obligations as and when they fall due with little or no loss in value. Return on equity signals the effectiveness of a bank's management in utilizing the shareholders' funds hence a deduction that the higher the ROE of a firm the more effective its management is in utilizing shareholders' capital (Ongore and Kusa, 2013).

A number of studies have been carried out around the globe in an attempt to establish and explain the effect of credit risk management on bank's financial performance with different and contradicting findings having been obtained. Hosna *et al.* (2009) carried out a study whose objective was to describe the impact of credit risk management on profitability of four commercial banks in Sweden over a 9-year period, 2000 to 2008 by use of multiple regression analysis. ROE was used as a profitability measure while non-performing loans (asset quality) and capital adequacy were the employed independent variables representing credit risk management. The findings of the study were that credit risk management had statistically significant effect on ROE in the four commercial banks but the direction of the relationship varied across the banks.

In Kenya, Fredrick (2012) conducted a study on the effect of credit risk management on financial performance of commercial banks over the period 2006 to 2010. CAMEL components were used as proxy of credit risk management while return on equity was the employed measure of financial performance. Secondary data was analyzed through multiple regression analysis where capital adequacy, asset quality, management efficiency and liquidity were found to exhibit a statistically insignificant effect on return on equity while the earnings component was found significantly impacting on bank's financial performance.

According to Central Bank of Kenya's Banks Supervision Annual Report (2015), the banking sector performance was on overall rated 'satisfactory' in 2015 compared to a 'strong' rating achieved in 2014. The number of institutions rated 'strong', 'satisfactory', 'fair' and 'marginal' in December 2015 were 11, 19, 8 and 2 respectively. This marked a decline from the previous ratings in 2014 of 22, 16 and 5 for strong, satisfactory and fair respectively where none of the banks had been rated

'marginal'. The drop in 2015 rating was due to the general drop in asset quality, earnings levels and liquidity positions of several banks in 2015 (CBK, 2015). The banking sector registered improved financial strength in 2015, with total net assets recording an increase of 9.2%. Despite the improved financial strength witnessed in the previous year, the banking sector registered declined profit before tax of 5.03% in 2015. The sector also registered a decline in asset quality with the non-performing loans (NPLs) ratio increasing from 5.6 per cent in December 2014 to 6.8% in December 2015.

The minimum regulatory capital adequacy ratios, as measured by the ratio of Core Capital and Total Capital to Total Risk Weighted Assets, are 10.5% and 14.5%, respectively (CBK Annual Report, 2015). Though the Core Capital to Total Risk Weighted Assets ratios remained unchanged at an average of 16 per cent in 2015 and 2014, the Total Capital to Total Risk Weighted Assets ratio decreased from 20 per cent in 2014 to 18.9% in 2015. The Central Bank of Kenya report also noted that the entire banking sector's average liquidity in the twelve months to December 2015 was above the statutory minimum requirement of 20% at 38.1 per cent compared to 37.7% registered in December 2014. The report divulges without giving a mention of specific banks that had registered a decline in their specific liquidity levels. These trends left a gap hence a need for further study on the upshot of regulatory based credit risk management on financial performance of commercial banks in Kenya.

Statement of the Problem
Banks rely on lending as a major segment of business hence credit risk management constitutes the backbone of every successful commercial bank in Kenya. Credit risk management ideally aims at maximizing a bank's risk adjusted rate of return by maintaining credit risk exposure within reasonable and acceptable parameters, a key approach to long term success of every banking institution.

The Central Bank of Kenya as a regulatory body to all commercial banks in Kenya has always developed credit risk regulatory frameworks but despite the efforts the exposure to credit risk has for long been a source of problem in the entire banking industry, a situation that has led to struggle and even collapse of some banks; recent cases being Charterhouse Bank under statutory management, and Imperial Bank and Chase Bank under receivership.

If this turbulence in commercial banks will not be contained depositors and investors will end up losing confidence in them, a situation that will negatively impact on the entire country's economy. A number of studies have been carried out around the globe in an attempt to identify and establish the effect of

credit risk management by use of CAMEL indicators on banks' financial performance where different and contradicting results have been obtained. The inconsistency in the findings by the previous researchers had resulted to a gap in literature in the area of credit risk management. The study therefore aimed at studying the upshot of regulatory based credit risk management on return on equity of commercial banks in Kenya, specific focus being on the quantitative components of CAMEL rating system components, so as to enhance objectivity of the research findings.

The overall objective of the study was to determine the upshot of regulatory based credit risk management on return on equity of commercial banks in Kenya.

The specific objectives of this study was to determine the upshot of:
i.   Capital adequacy on return on equity of commercial banks in Kenya
ii. Asset quality on return on equity of commercial banks in Kenya
iii. Earnings ability on return on equity of commercial banks in Kenya
iv. Liquidity adequacy on return on equity of commercial banks in Kenya

The four hypotheses of the study were:
1: Capital adequacy has no statistically significant upshot on return on equity of commercial banks in Kenya
2: Asset quality has no statistically significant upshot on return on equity of commercial banks in Kenya
3: Earnings ability has no statistically significant upshot on return on equity of commercial banks in Kenya
4: Liquidity adequacy has no statistically significant upshot on return on equity of commercial banks in Kenya

The significance of the present study is hinged on the fact that the findings would enable commercial banks' credit managers to not only perform the regulatory requirements of credit risk management for banks but also improve competitive advantage in the banking industry.

Consequently, this would be of much help to individual depositors and banks' security investors by enhancing safety of their deposits and investments. It will also inform policy formulation by government, through the Central Bank of Kenya, with regard to credit risk management in the banking sector as well as providing further insight into the existing literature in the field of commercial banks' credit risk management.

Scope of the Study
The study sought to evaluate the upshot of regulatory based credit risk management on return on equity of commercial banks in Kenya. Kenya was chosen as a place of study because it has one of the most vibrant banking sectors within the East African region. This study focus was on commercial banks among the many financial institutions in Kenya based on public availability of their financial statements on their respective websites which in turn guaranteed data availability. The elements of credit risk management covered in the study are the quantitative aspects of CAMEL rating system.

There were various limitations of the study. The study relied on secondary historical data from Central Bank of Kenya and commercial banks' financial statements which might have been manipulated so as to favour the interest of management or any other stakeholder hence hindering their authenticity in reflecting the prevailing circumstances. However, this was overcome by adoption of only the audited financial statements. The prevailing macroeconomic conditions' presence or absence might have affected the relationship among variables under study. The researcher overcame this by holding those forces constant.

The study was based on the assumption that commercial banks were willing and were able to hire skilled and experienced credit risk managers competent enough to mitigate the credit risk exposure facing them. The study assumed that the periods under study experienced no abnormal occurrences that could have impacted credit risk management and return on equity of commercial banks.

LITERATURE REVIEW
Concept of CAMEL Rating System
CAMEL rating system refers to a bank's supervisory framework, whose origin is in United States (US). The rating system was developed in the year 1979 to classify the banks' overall performance conditions (Majumder & Rahman, 2016). It is today known and world widely recognized as a supervisory tool for commercial banks and is employed by various regulatory authorities.

The five aspects represented in the acronym CAMEL are: Capital Adequacy, Asset Quality, Management Efficiency, Earnings Ability and Liquidity. The bank supervisory authorities assign scores/ratings to each of the five factors.

The assigned ratings are: 'strong' (1), 'satisfactory' (2), 'fair' (3), 'marginal' (4) and 'unsatisfactory' (5). A bank rated '1' has the highest and the best rating, and poses the least supervisory concern while a '5'

rating is the lowest and the worst rating, indicating a critically deficient level of performance, and is reflective of inadequate risk management practices (CBK Prudential Guidelines, 2013).

CAMEL comprises of factors that are normally within the scope (internal factors) of commercial banks to manipulate hence the respective scores differ from one bank to another (Fredrick, 2013). Majumder and Rahman (2016) points out that the purpose of CAMEL model is to provide an accurate and consistent evaluation of a bank's financial condition and operations in the areas of capital adequacy, asset quality, management efficiency, earnings ability and liquidity.

Capital Adequacy
Capital is one of the bank's specific factors that widely influence its performance (Fredrick, 2013). Athanasoglou, Brissimis and Delis (2008) explains capital as the amount of own funds available for support of commercial banks' business and acts as a buffer in case of adverse situations. Under Basel III Accord of 2011 commercial banks' capital should be made up of tier 1 and tier 2 capitals (CBK, 2013). Tier 1 refers to a bank's core capital while tier 2 capital is the banks supplementary capital.

Tier one capital refers to that which can be used in absorption of banks losses without necessarily having to terminate its operations; an example in this category being ordinary share capital. Tier 2 capital on the other hand refers to a secondary component of commercial bank's capital, in addition to tier one capital, which makes up a bank's required reserves. Capital adequacy ratio show the internal strength of a commercial bank to withstand loses and its resilience to crisis situations (Githaiga, 2015).

Asset Quality
As a measure of credit risk management, asset quality in a banking context refers to determination of the robustness of a financial institution against loss in value of its assets (Rundassa & Batra, 2016). Dang (2011) terms highest kind of risk facing commercial banks as the loss derived from delinquent loans. Non-performing loan refers to an obligation or loan whose borrower seems to have ceased making interest payments and neither repayment of the principal is being made.

Ordinarily, commercial banks would declare such loans whose repayment is ninety days or more overdue non-performing. Providing a reserve for non-performing loan does not translate to curative measure against credit risk but it's only a precautionary measure meant to mitigate its impact on the viability of the institution's financial reports. Therefore, commercial banks need to manage non-performing loans by fixing them to the lowest levels

possible hence improved asset quality. In the context of asset quality, a rating of 1 indicates a strong asset quality and minimal portfolio risks. On the other hand, a rating of 5 reflects a critically deficient asset quality that presents an imminent threat to the institution's viability (Uniform Financial Institutions Rating System, 2014).

Earnings Ability
Majumder (2016) points out that earnings ability generally reflects the quality of a bank's profitability and its ability to consistently earn. It determines the profitability of a bank while explaining sustainability and growth of its earnings in future. Earnings ability perceived in the context of credit facilities reflects not only the quantity and trend in earnings, but also the factors that may affect the sustainability of earnings (Dang, 2011). According to Baral (2007), earnings ability component in terms of credit facilities can be well represented by a ratio of net interest income to total operating income.

Liquidity Adequacy
An adequate liquidity means a situation where a financial institution can obtain sufficient funds either by increasing liabilities or by converting its assets quickly into cash (Majumder & Rahman, 2016).

According to Dang (2011) a financial institution should have adequate liquidity sources compared to future and present needs, and availability of assets readily convertible to cash without undue loss. CBK requires Kenyan commercial banks to observe a minimum liquidity ratio of 20 percent. Liquidity level indicates banks' ability to fund increases in assets and meet obligations as they fall due.

Return on Equity
ROE refers to a financial ratio that reflects how much profit a commercial bank earned relative to the amount of shareholders' equity (Ongore & Kusa, 2013). It reveals how much profit the financial institution has earned relative to shareholders' equity as reflected in the firm's financial position statement.

According to Pandey (2008), this ratio is of great interest to the present and also prospective shareholders as well as the management, which has the responsibility of maximizing the owners' welfare. ROE as a financial performance measure reveals how a bank management has been able to use resources of owners. It is a relative measure expressed as net profit after taxes divided by shareholders' equity, that is, net worth.

RESEARCH METHODOLOGY
This section describes research design, location of study, targeted population, sampling and sample size, instrument, and data collection procedure adopted.

Research Design

Research design refers to a conceptual structure within which a research is conducted (Kothari, 2004). This study adopted a descriptive research design aimed at determining the upshot of credit risk management on ROA of commercial banks in Kenya. The design is characterized by the fact that the researcher has no control over the variables under study and hence the researcher can only report what is happening or happened

Location of the Study

The study was conducted in Kenya. Central Bank of Kenya was the point of reference as it contained published financial statements and reports of all the licensed commercial banks in Kenya. This ensured availability of data sought for this study. Kenya was chosen as a location of the study as it has the most vibrant banking sector in East Africa region.

Target Population

Population refers to an entire group of objects, individuals or events, having a common characteristic or characteristics from which a sample is obtained (Mugenda & Mugenda, 2003).

The study's targeted population was the forty-two licensed commercial banks in Kenya over the period 2011 to 2016. The chosen study period was characterized by financial liberalization of commercial banks in Kenya and experienced no abnormal occurrences that could significantly affect the banking business.

Sampling Procedure and Sample Size

Sampling refers to selection of part of an aggregate or totality on the basis of which a judgement or inference about the aggregate or totality is made (Kothari, 2005). Sampling procedure involves choosing part of a population for use in test of hypotheses about the entire population. This study employed purposive sampling in selection of the research sample.

The selected sample comprised of thirty-nine among the forty-two licensed commercial banks whose six years' data from 2011 to 2016 was employed in determining the upshot of regulatory based credit risk management on return on equity of commercial banks in Kenya. Charterhouse bank (under statutory management), and Imperial and Chase banks (under receivership) were excluded from the sample.

Research Instrument

The study employed data extraction checklists in collection of secondary data for the thirty-nine commercial banks. The purpose of the data extraction checklist was to provide guidance to the researcher so as to ensure completeness and relevance of the information obtained. The checklists were aimed at capturing data on the commercial banks' capital adequacy, Non-performing loans to total loans and advances ratio, Net interest income to total operating income, liquidity ratio, Return on assets, Return on equity and Net interest margin.

Data Collection Procedure

Data collection refers to the process of gathering specific information aimed at proving or refuting some facts (Kombo & Tromp, 2006). The researcher extracted data from the sampled commercial bank's published financial reports and statements for the six years, available at CBK website.

Data Analysis

The study employed descriptive statistics in analysis of Secondary data extracted from financial statements of the respective commercial. The data was coded, accumulated in Microsoft Excel and then exported to Statistical Package for Social Sciences (SPSS 24.0) and E-views for analysis.

Ordinary Least Squares (OLS) method was used to study the variables. Diagnostic tests on normality, autocorrelation, heteroskedasticity and multicollinearity were first performed to ensure that the linear regression assumptions hold Student t-statistic at 5% significance level was used to test the hypotheses. The null hypothesis was rejected if the p-value was below 0.05; at 5% significance level.

Model Specification

The study employed ordinary least squares multiple regression model where independent and dependent variables were assumed to be linearly related.

$$ROE = \alpha_0 + \alpha_1 CA + \alpha_2 AQ + \alpha_3 EA + \alpha_4 LA + \varepsilon$$

Where: ROE is Return on Equity, CA is Capital Adequacy Ratio, AQ is Asset Quality Ratio, EA is Earnings Ability Ratio, LA is Liquidity Adequacy Ratio, are constants, and is error/disturbance term.

RESULTS AND DISCUSSION

Descriptive Statistics

Descriptive statistics are key in describing the basic features of data. It provides a summary about the data and the measures obtained.

From Table 1, the average score of ROE was 10.1742% which represents the average commercial banks' financial performance as measured by Return on Equity. The maximum and minimum values obtained with respect to ROE were 30.7032% and -24.965 respectively. The range of all the variables in the sampled data was generally wide indicating a wide dispersion (spread) of the various measures of the variables under study.

Table 1: Descriptive statistics

	ROE%	CA%	AQ%	EA%	LA%
Mean	10.1742	23.461	8.0388	65.9518	41.87
Median	12.7262	20.766	65.472	67.6519	36.90
Range	55.6685	35.700	24.63	87.1196	61.033
Minimum	-24.965	11.133	1.4611	4.4569	20.367
Maximum	30.7032	46.833	26.09	91.576	81.400

Capital adequacy had a mean of 23.46% and a maximum value of 46.83% both values being far much more beyond the minimum regulatory level set by CBK, currently at 14.5%. The minimum level of capital adequacy the banks ever recorded was 11.13%. Asset quality as measured by the ratio of non-performing loans to total loans and advances posted a mean of 8.04%, with a maximum value of 26.09% and a minimum value of 1.46%. The mean of 8.04% implies that on average for every ksh. 1 lend out by a commercial bank 8 cents ended up being declared non-performing (at extreme risk of being forfeited/lost).

Earnings ability as measured by a ratio of net interest income to total operating income exhibited a mean of 65.95%, a maximum value of 91.58% and a minimum of 4.46%. The interpretation of this is that on average 65.95% of commercial banks' total earnings were interest related income; income as a result of credit risk exposure. Liquidity averaged at 41.87% with maximum and minimum values of 81.40% and 20.37% respectively, a measure that is still above the CBK set minimum of 20%. This implies that on average commercial banks complied with liquidity requirements as regulated by the CBK.

Normality Test

A normally distributed data aids a researcher in making accurate and reliable conclusions. Shapiro-Wilk test and coefficient of skewness were used to test normality of the sampled data. The results of the test were as presented in Table 2.

Table 2: Normality test values

	ROE	CA	AQ	EA	LA
Shapiro-Wilk value	0.968	0.943	0.970	0.930	0.951
Sig. value	0.328	0.228	0.388	0.108	0.092
Skewness	0.981	1.289	1.074	1.785	1.289

From Table 4, all the p-values of Shapiro-Wilk test were greater than 0.05 (insignificant) hence the sampled data was normally distributed. The skewness values were also between -3 and +3, an indication that the sampled data for all the variables was normal and unbiased.

Autocorrelation Test

Autocorrelation exists when the variances of the error terms are sequentially interdependent, a phenomenon that leads to biasness and inconsistency of parameter estimates. Durbin Watson (DW) score was employed where a DW score between 2 and 2.5 implies non-existence of autocorrelation. The results of the test were as presented in Table 3.

Table 3: Durbin Watson statistic values

	DW value	Status
Value	2.382	No autocorrelation

Table 3 shows that the Durbin Watson values for the model was 2.382 implying absence of autocorrelation in the model since the obtained value is between 2 and 2.5.

Heteroskedasticity Test

Heteroskedasticity occurs in a situation where the variance of the error term is not constant in each period and for all values of the predictor variables or when some important variables are omitted from a model. In this study, heteroskedasticity was tested by performing ARCH test to determine if the residuals had constant variance. Heteroskedasticity would be present if the computed p-value is less than 0.05 at 5% significance level. The results obtained were as presented in Table 4.

Table 4: ARCH test for heteroskedasticity

	F-statistic	p-value	Obs*R^2	P-value
Value	0.263996	0.61002	0.2746	0.60027

The results on table 4 indicate that the p-value of F-statistic for the Model was 0.610019>0.05 hence absence of heteroskedasticity since the computed p-value was greater than the critical value at 5% significance level.

Multicollinearity Test

The purpose of multicollinearity test was to find out whether it was possible to isolate the effect of each independent variable adopted in the study. Incidence and degree of multicollinearity if any was tested using Variance Inflation Factor (VIF).

Table 5: Variance inflation factor estimates

	CA	AQ	EA	LA
Value	1.494	1.074	4.366	4.123

Based on results in Table 5 the VIF values ranged between 4.366 and 1.074 which are less than 10 hence absence of multicollinearity.

Correlation

The study applied Pearson Product Moment correlation coefficient (R) in determining the presence and the strength of the relationship between individual variables at 5% significance level. The results of the correlation analysis were as presented in Table 6.

Table 6: Pearson correlation value for model

	ROE	CA	AQ	EA	LA
Pearson Correlation	1	-0.195	-0.388	-0.322	0.629
Sig.(2-tailed)		0.223	0.015	0.049	0.000
N	39	39	39	39	39

Capital adequacy had a Pearson correlation value of -0.195 and a p value of 0.223>0.05 hence capital adequacy had statistically negative insignificant relationship with ROE of commercial banks. This implies an increase in Capital adequacy would lead to statistically insignificant decrease in ROE. The correlation value between Return on Equity and Asset quality was -0.388 with a p-value of 0.015<0.05 indicating a negative statistically significant relationship between Return of Equity and asset quality. This implies that an increase in asset quality would result to a statistically significant decrease in ROA of commercial banks holding other factors constant. On the relationship between Earnings Ability and ROE a correlation value of -0.322 and a $P = 0.049<0.05$ were obtained indicating a significant negative relationship between Return on Equity and Earnings Ability of commercial banks. This implies that an increase in Earnings Ability would lead to statistically significant decrease in the ROE of commercial banks in Kenya. Liquidity adequacy had a Pearson correlation value of 0.629 and a $P = 0.000$ was <0.05 hence liquidity adequacy had a positive and statistically significant relationship with ROE. This suggests that an increase in liquidity of a commercial bank would result to a statistically significant increase in the return on equity of commercial banks in Kenya.

Tests for Overall Significance of the Model

The test for the overall model's significance was carried out by use of F- statistic. The test results were as presented in Table 7.

Table 7: Overall significance of the models

	F Statistic value	p- value
Value	49.522	0.000

The F-statistic values for model was 49.522 and a P-value of 0.000<0.05. This implies the model was statistically significant in predicting the dependent variable at 5% significance level.

Regression Model

The results of the analysis of the effect independent variables capital adequacy, asset quality, earnings ability and liquidity adequacy on the dependent variable ROE were as presented in Table 8.

Table 8: Model coefficient estimates of variables, $R^2 = 0.857$

Model	Coefficients	Std. Error	t-statistic	p-value
(Constant)	3.444	4.171	0.826	0.415
Capital Adequacy	-0.258	0.160	-1.605	0.118
Asset Quality	-0.959	0.136	-7.034	0.000
Earnings Ability	-0.596	0.088	-6.800	0.000
Liquidity Adequacy	3.370	0.312	10.786	0.000

Dependent Variable: ROE

Capital adequacy's effect on ROE was negative and statistically insignificant at 5% significance level based on its p-value of 0.118>0.05 and a regression coefficient of -0.258. Asset quality and earnings ability's regression coefficients were -0.959 and -0.596 respectively (both p-values being 0.000<0.05) implying negative and statistically significant effect of asset quality and earnings ability on ROE at 5% significance level. Regarding the effect of liquidity adequacy on Return on Equity a coefficient of 3.370 and a p-value of 0.000 were obtained. This implies liquidity adequacy positively and significantly affects the ROE of commercial banks. The constant of the model was 3.444 implying the proportion of Return on Equity that is independent of the predictor variables included in the model. The stochastic multiple linear regression equation relating the variables was as follows:

$$ROE = 3.444 - 0.258CA - 0.959AQ - 0.596EA + 3.370LA$$

The R^2 of model 2 was 0.857 meaning 85.7% of changes in Return on Equity were attributable to capital adequacy, asset quality, earnings ability and liquidity adequacy while 14.3% of the changes in ROE were occasioned by the error term.

DISCUSSION

The study sought to determine the upshot of regulatory based credit risk management on Return on Equity of commercial banks in Kenya where capital adequacy, asset quality, earnings ability and liquidity adequacy were the predictor variables while ROE was the dependent variable. As shown in Table 8, Capital adequacy was found to have regression coefficient of -0.258 and a p-value of 0.118>0.05 at 5% significance level meaning that capital adequacy had statistically insignificant and negative upshot on ROE of commercial banks. The regression coefficient of -0.258 implies that a unit increase in capital adequacy ratio would result to 0.258 units decrease in ROE.

Therefore, the study failed to reject the null hypothesis that capital adequacy had no statistically significant upshot on ROE of commercial banks in Kenya. The interpretation of these findings is that a commercial bank that creates risky assets (increased levels of risk-weighted assets) generates more returns in form of interests from the investment in risky assets hence increased ROE, assuming the capital (equity) levels remain constant. These findings are similar to those of Poundel (2012) but contradict Abdelrahim (2013) who had found a positive but statistically insignificant effect of capital adequacy on ROE of commercial banks in Saudi Arabia.

Asset quality and Return on Equity had a regression coefficient of -0.959 and a p-value of 0.000<0.05 at 5% significance level. This implies that a unit change in asset quality ratio of a commercial bank would result to 0.959 units change in its return on equity towards the opposite direction. The null hypothesis that asset quality has no statistically significant upshot on ROE of commercial banks in Kenya was therefore rejected at 5% significance level. These findings suggest that as much as commercial banks may aim at increasing their interest earnings through increased loans and advances to their customers, they should mount strategies aimed at reducing the level of non-performing loans and advances an approach that would translate to improved bank earnings hence increase in their ROE. These findings support those of Ongore and Kusa (2013) in their study on effect of credit risk management on financial performance of commercial banks in Kenya.

On the upshot of earnings ability of commercial banks in Kenya on ROE a regression coefficient of -0.596 and a p-value of 0.000<0.05 at 5% significance level were obtained suggesting a negative and statistically significant upshot of banks' earnings ability on ROE. Based on the result analysis, a unit increase in earnings ability ratio would result to 0.596 units decrease in returns on equity. Therefore, null hypothesis that earnings ability had no statistically significant upshot on ROE of commercial banks in Kenya was rejected at 5% significance level. These findings can be attributed to reduced levels of net interest income earned by commercial banks occasioned by increased loans defaults hence reduced ROE. These findings differ from those of Abdelrahim (2013) who had found a positive but statistically insignificant relationship between earnings ability component of CAMEL rating system and ROE of Saudi commercial banks.

With regard to upshot of liquidity adequacy on ROE of commercial banks in Kenya, regression coefficient of 3.370 and a p-value of 0.000<0.05 at 5% significance level were obtained, implying that a unit increase in liquidity would translate to 3.370 units increase in ROE. The null hypothesis that liquidity adequacy had no statistically significant upshot on financial performance of commercial banks in Kenya was thus rejected at 5% significance level. This could be as a result of increased long term deposits by bank customers (depositors) that were subsequently offered to other bank customers as interest-earning loans, and the commercial banks' ability to collect large proportion of the loans advanced to customers hence increased ROE. Abdelrahim (2013) had similar findings contrary to Ongore and Kusa (2013) who obtained a statistically insignificant effect of liquidity adequacy on ROE though the direction of the relationship was similarly positive.

A general conclusion that regulatory based credit risk management had a significant upshot on return on equity of commercial banks in Kenya was therefore drawn. This conclusion was also supported by the R^2 value of 0.857 implying that 85.7% of the changes in commercial banks' Return on Equity could be attributed to regulatory based credit risk management with just 14.3% of the changes being attributed to other forces.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

i.   Central bank of Kenya to carry out a banking sector analysis on the most appropriate and optimal percentage levels of capital adequacy to be maintained by commercial banks.

ii.   Commercial banks to device appropriate policies aimed at reducing non-performing loans and advances so as to improve their asset quality ratios hence improved return on equity.

iii. Commercial banks to device strategies aimed at improving their net interest income that will subsequently improve their earnings ability hence improved financial performances.

iv. Commercial banks to highly focus on liquidity adequacy maintenance so as to fulfill their obligations as and when they fall due an approach that will translate to improved return on equity.

REFERENCES

Abdelrahim, K.E. 2013. Effectiveness of Credit Risk Management of Saudi Banks in the Light of Global Financial Crisis: A Qualitative Study. Asian Transactions on Basic and Applied Sciences, Volume, 3.

Athanasoglou, P.P., Brissimis, S.N. and Delis, M. D. 2008. Bank-Specific, industry-specific and macroeconomic determinants of bank profitability. Journal of International Financial Markets, Institutions and Money, 18(2):121-136.

Central Bank of Kenya. 2013. Bank Supervision Annual Report, 34-40.

Central Bank of Kenya. 2013. Prudential Guideline for Institutions Licensed under Banking Act, CBK/PG/03, 82-124.

Central Bank of Kenya. 2015. Bank Supervision Annual Report, 22-38

Coyle, B. 2000. Corporate Credit Analysis. 1st edition. Chicago: Glenlake.

Dang, U. 2011. The CAMEL Rating System in Banking Supervision. A Case Study. Arcada University of Applied Sciences International Business.

Fredrick, O. 2013. The impact of credit risk management on financial performance of commercial banks in Kenya. DBA Africa Management Review, 3(1).

Giesecke, K. 2004. Credit Risk Modeling and Valuation: An Introduction. Cornell University.

Githaiga, J.W. 2015. Effects of Credit Risk Management on the Financial Performance of Commercial Banks in Kenya (Doctoral Dissertation, University of Nairobi).

Hosna, A., Manzura, B., and Juanjuan, S. 2009. Credit Risk Management and Profitability in Commercial Banks in Sweden. Rapport nr.: Master Degree Project 2009: 36.

Kombo, D.K. and Tromp, D.L. 2006. Proposal and Thesis Writing: An Introduction. Nairobi: Paulines Publications Africa, 10-45.

Kothari, C.R. 2004. *Research Methodology: Methods and Techniques*. New Age International.

Majumder, M.T.H., and Rahman, M.M. 2016. A CAMEL Model Analysis of Selected Banks in Bangladesh. International Journal of Business and Technopreneurship, 6(2):233-266.

Ongore, V.O. and Kusa, G.B. 2013. Determinants of financial performance of commercial banks in Kenya. International Journal of Economics and Financial Issues, 3(1):237

Pandey, I.M. 2008. Financial Management. Vikas Publishing House (PVT) Ltd, New Delhi.

Poudel, R.P.S. 2012. The impact of credit risk management on financial performance of commercial banks in Nepal. International Journal of Arts and Commerce, 1(5):9-15.

Rundassa, S. G., and Batra, G.S. 2016. The impact of credit risk management on the financial performance of ethiopian commercial banks. Journal of Economics and Finance, 7(6):111-112.

Saunders, A. and Cornett, M.M. 2012. *Financial Markets and Institutions*. McGraw-Hill/Irwin. Springer Berlin Heidelberg.

Uniform Financial Institutions Rating System. 2014. Statements of Policy. The United States: Federal Deposit Insurance Corporation (FDIC).