

**THE RELATIONSHIP BETWEEN LOAN PORTFOLIO SECTORAL
CONCENTRATION AND CREDIT RISK OF COMMERCIAL BANKS IN
KENYA**

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DECLARATION

This research project is my original work and has not been submitted for examination to any other university.

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ABBREVIATIONS AND ACRONYMS

ABC	: African Banking Corporation
CBK	: Central Bank of Kenya
CRBs	: Credit Reference Bureaus
CRK	: Concentration Ratio
GDP	: Gross Domestic Product
HHI	: Herfindahl-Hirschman Index
I&M	: Investments and Mortgage
Ksh.	: Kenya Shillings
MFB	: Microfinance Banks
MPT	: Modern Portfolio Theory
MRPs	: Money Remittance Providers
NIC	: National Industrial Credit
NPL	: Non Performing Loans
OECD	: Organisation for Economic Cooperation and Development
SBM	: Southern Bank of Mauritius
USA	: United States of America
ROA	: Return on Assets

ABSTRACT

The business activity in the banking industry is very sensitive as they handle depositors' money which on average constitutes 85% of their liability portfolio in their balance sheets. The questions that comes to the mind of commercial banks management while advancing credit facilities is whether they need to minimise their risk through diversification of the loan portfolios by advancing loans to various market sectors or they need to concentrate their loans to a few sectors that they have adequate knowledge. This study pursued to determine the impact of loan portfolio sectoral concentration on credit risk of commercial banks in Kenya. The study's population comprised of all 42 commercial banks operating in Kenya. Data was obtained from 40 out of the 42 banks giving a response rate of 95.24%. Loan portfolio sectoral concentration was the independent variable and was measured by the HH1 index on an annual basis. The control variables were liquidity as measured by the current ratio, bank size as measured by natural logarithm of total assets and management efficiency as measured by cost to income ratio per year. Credit risk was the dependent variable which the study sought to explain and it was measured by total non performing loans to total advanced loans on an annual basis. Secondary data was collected for a total period of 5 years (from January 2013 to December 2017) on an annual basis. The study employed a descriptive cross-sectional research design and a multiple linear regression model was used to analyze the association between the variables. Data analysis was undertaken using the Statistical package for social sciences version 21. The results of the study produced R-square value of 0.396 which means that about 39.6 percent of the variation in the Kenyan commercial banks' credit risk can be explained by the four selected independent variables while 60.4 percent in the variation of credit risk of commercial banks was associated with other factors not covered in this research. The study also found that the independent variables had a strong correlation with credit risk ($R=0.629$). ANOVA results show that the F statistic was significant at 5% level with a $p=0.000$. Therefore the model was fit to explain the relationship between the selected variables. The results further revealed that management efficiency produced negative and statistically significant values for this study while loan portfolio sectoral concentration, banks size and liquidity were established to be statistically insignificant determinants of credit risk among commercial banks. This study thus recommends that good measures should be put in place to enhance management efficiency among commercial banks as this will help reduce credit risk.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The core of traditional commercial banking is the extension of credit to borrowers at a premium above the return to the depositor. Extension of credit facility to borrowers brings with it risk to the lender in the sense that if unworthy borrower is advanced a loan facility and become unable to service it, then bank level of credit risk is affected. Therefore, it becomes imperative that a bank carefully selects and monitor potential borrowers with a view to effectively assessing their credit worthiness and therefore increasing their chance of repaying the loans (Ferreira, Santos, Marques, & Ferreira, 2014).

In the case of business firms, different sectors are affected differently by market forces such as economic, environmental, competitive and regulatory steps and this directly affects their performance and ability to service their loan commitments. Rachdi (2013) is of the view that credit risk level in a bank is a factor of loan portfolio, sectoral concentration, management quality in screening potential borrowers' requests and the effectiveness of the loan process quality. With regard to the loan sectoral concentration, Muhammad (2012) in his study found out that that the more a bank focuses on a particular sector in its lending policies, the more knowledge and industry-specific expertise it realises which translates to improved performance in terms of reduced credit risk of the loan portfolio.

In banks, risk is manifested in different areas and thus various entities are exposed to different financial risks. Credit risk being one of the financial risks results from defaults of inter-party commitments. Credit risk concentration in bank results from risk

concentration caused by lending to single borrower or a particular sector of an economy or risk concentration caused by possibility of contamination of various risks. Avinash and Mitchell-Ryan (2009) point that a bank whose loan portfolio is concentrated in a particular sector experiences increased credit risk due to high probability of default by borrowers in a particular economic sector.

Banks that are focused in a particular sector will generally accumulate necessary expertise and therefore will be in a position to detect increased credit risk from the lending and take appropriate action. On the other hand, a concentrated bank is more susceptible to economic depressions, due to exposure to limited number of economic sectors and therefore increased banking risk (Rachdi, 2013). Therefore the understanding of the effect of concentration of loan portfolio on credit risk will be important in understanding the effect of bank lending policies on loan performance.

1.1.1 Loan Portfolio Sectoral Concentration

Concentration is the total loans number in banks' credit portfolio while sectoral concentration is the number of economic sectors in a particular portfolio (Tabak, Fazio & Cajueiro, 2011). Acharya et al., (2006) combined the two and defined loan concentration as being concerned with advancement of credit facilities to only few sectors of the economy, leading to a high proportion of a bank loan being held by firms in a few sectors of the national economy. As a result of concentrating the bank loans in a few firms, the financial institution will have to make a choice between monitoring benefits and risk of concentration. Concentration risk is a banking term denoting the overall spread of a bank's outstanding accounts over the number or variety of debtors to whom the bank has lends money. It is calculated using a "concentration ratio" which

explains what percentage of the outstanding accounts each bank loan represents (Ciccarelli & Peydró, 2015).

This is because financial institutions with concentrated credit portfolio has enhanced abilities to monitor their portfolio resulting to low loan portfolio's credit risk but at the same time, they are might be faced with increase in credit risk due to specific sectoral concentrations risks (Hayden et al., 2007). Further, Böve and Pfingsten (2008) suggests that if loan's risk return profile is influenced by banks' external forces, the credit risk would increase to higher levels as compared with banks whose credit portfolio is less diversified.

Boyd and Prescott (1986) highlights that the traditional banking theory is of the view that banks should be as diversified as possible in regard to their loan portfolio. This is because concentrated banks would be more susceptible to economic slowdowns, due to exposure to few economic sectors. In addition, different intermediation theories argue that diversification enables lenders to have high monitoring and screening skills. Contrary to this, corporate finance theory postulates that it is essential for firms to concentrate their activity only on definite economic sectors to gain on expertise in running business in these sectors. Banks that are focused to limited sectors tend to have high skills and expertise in the sectors of specialization, and therefore will be in a position to detect earlier default signal among their borrower's and will be in a position to manage risk at early stage (Owino, 2013).

Hibbeln (2010) further expounded that credit risk concentrations is caused by uneven allocation of credit portfolio of banks and to estimate the extent of a bank concentration, concentration ratios are used. The two common measures of loan portfolio sectoral concentration are concentration ratio (CRk) and the Herfindhal-Hischman Index (HHI)

(Ávila et al., 2012). Concentration ratio CR_k , as a measure of loan concentration sums up the shares of largest commitments ' k ' in entire credit portfolio and then divides by the individual firm ratio. It assumes a fractional form with values constrained between 0 and 1 and values near to 1 shows high loan portfolio concentration. This method has its limitation as it chooses the number k arbitrarily meaning that limited large sectoral exposures are taken into consideration.

Herfindahl-Hirschman Index (HHI) is a common measure of concentration and is basically the sum of squares of the shares of each economic sector exposures of the entire bank's credit portfolio. This measure is widely used as it takes into account all exposures which make it sensitive to both large and small economic entities. A lower HHI signifies low concentration and exposures are evenly distributed whereas the opposite indicates higher loan concentration levels. HHI is mostly used by regulators for screening purposes whereas bankers are using it as a tool for both planning and monitoring (Rhoades, 1993). HHI has been used by Acharya et al., (2006) in assessing the impact of credit portfolio concentration/diversification on risk and return of banks in Italy. The current study will use HHI in determining the effect of sectoral portfolio loan concentration on commercial banks' credit risk

1.1.2 Credit Risk

Credit risk is the probability that a counterparty or bank's borrower in lending arrangements may not be in a position to meet its obligations as per the contractual terms and conditions Lapteva (2012) and remains the most challenging and costly risk among all financial institutions in comparison with other risks as it impacts heavily on banks solvency (Chijoriga, 1997). It is notable that various financial institutions have experienced challenges over the years mainly due low debt repayment capacity among

the borrowers, lack of quality risk management of credit portfolio, or failure in mitigation on the impact on economic cyclicity amongst other conditions impacting on credit standing of a bank's borrowers (Basel, 1999).

Consequently, credit risk is a leading cause of uncertainties about bank's current and future financial standing and to cushion from the impact of eventual losses arising from credit risk, banks are supposed to allocate a high percentage of equity to finance its operations (Ávila et al., 2012). Were, Nzomoi, and Rutto (2012) suggest that concentration of credit risk in a bank arises due to uneven distribution of credit advanced to debtors, level of commitment, economic sectors or respective geographical area of operation. Based on the fact that concentrated loan portfolio may result in financial losses and bank's solvency due to concentration of loans in individual institutions or the risk arising from advancing credit facilities to few sectors in an economy.

Bhusal (2012) argued that for a bank to reduce the risk from advancement of loans to few debtors, a bank should granulise its investment portfolio into a high number of individuals or economic sectors. The cause of sectoral concentration is banks failure to advance credit to diverse sectors as segmented into geographical regions or industry. Credit risk arising from concentration leads to the worsening of some specific industries or geographic regions in a country, in relation to what the bank has adopted an unduly high exposure. Bonti et al., (2015) found out that sectoral credit concentration risk is one of the main factors in determining capital requirements level for credit risk.

The proportion of Non Performing Loans (NPL) to the entire bank's credit portfolio is the widely used measure of banks credit risk. NPL being the main variable is referred

to as the most appropriate measure of the real credit Loss arising from the lending activity of banks, which is normally ascertained from banks' audited annual reports.

1.1.3 Loan Portfolio Sectoral Concentration and Credit Risk

Acharya, Hasan, Saunders (2006) ascertained that sectoral loan concentration decreases bank return and on the other hand leads to increase of riskier credit facilities in the banking sector. This is because, banks with higher loan portfolio concentration can easily have an estimation of the risks and solvency of potential borrowers and this capacity is increased with increased monitoring capability. Similarly, Bhusal (2012) find that loan portfolio sectoral concentration result in less efficient risk return trade off among the banks with high risks while diversification based on geographical regions and industry leads to increase in the risk return trade off for low risk level commercial banks. The positive impact of monitoring could be an explanation for the home bias which has been recognized and studied by various empirical studies.

Waemustafa and Sukri (2015) identified several sources of a bank credit risk to include low institutional capability, inadequate policies in credit management and interest rates volatility. Consequently, banks reduce their credit risk by employing various screening and monitoring tools that enable them to identify each borrower's capability to service the loan advanced. In the same line, Ciccarelli and Peydró (2015) found that when banks lend to many borrowers, they face an information overload which hinders their ability to oversee their loans in an effective way.

Similarly the learning effect sets in because with high loan concentration, banks become familiar with their borrowers and able to recognize upcoming repayment challenges faster and be able to take remedial actions. Based on these various findings, there is

every reason for a bank to concentrate its loan portfolios to a few sectors that it is versed with its operations and this is likely to reduce its level of non-performing credit portfolio and therefore lower credit risk as opposed to sectoral loan diversification.

1.1.4 Commercial Banks in Kenya

In Kenya banks are regulated by Central Bank of Kenya (CBK) and the banking industry comprises of CBK, as the regulator, 43 banking institutions out of which 42 are commercial banks and one Mortgage Finance Company, 8 foreign banks offices representatives, 77 Seven foreign exchange (forex) bureaus (CBK, 13 Microfinance Banks (MFBs), 17 Money Remittance Providers (MRPs) and 2016) and 3 credit reference bureaus (CRBs) (CBK, 2016)

The banking sector capital and reserves increased by 9.58 per cent from Ksh. 540.60 billion by end of the year 2015 to Ksh. 592.42 billion by the end of the year 2016. This growth in core capital and reserves was mainly due to retained earnings and the additional capital injections for meeting the core capital and total capital regulatory requirements. Banks realised improved economic performance in 2016 with pre-tax profit growing by 10.0 per cent to Ksh. 147.4 billion as at the end of 2016 from Ksh. 134.0 billion for the year 2015. The upsurge in profitability was accredited to 5.7 per cent income increase compared to expenses increase by 3.8 per cent (CBK, 2016).

On the other hand, customer deposits increased by 5.3 per cent from Ksh. 2,485.9 billion for the year ending 2015 to Ksh. 2,618.4 billion for 2016. Net loan and advances increased by 4.4 per cent from Ksh. 2,091.4 billion as at December 2015 to Ksh. 2,182.6 billion for the year 2016. The increase in loan portfolio is as a result of increased demand for credit by all eleven economic sectors. A difficult business environment

experienced during the period negatively affected the loan portfolio quality caused by among other factors; failure by both private and public entities in making payments and poor weather conditions. As such, NPLs increased by 45.5 per cent to Ksh. 214.3 billion in 2016 up from Ksh. 147.3 billion in 2015 year end. Similarly, the ratio of Non performing Loans to total loans rose from 6.8 per cent for the year 2015 up to 9.2 per cent at the end of year 2016 (CBK, 2016).

1.2 Research Problem

The business activity in the banking industry is very sensitive as they handle depositors' money which on average constitutes 85% of their liability portfolio in their balance sheets (Saunders & Cornett, 2011). The questions that comes to the mind of commercial banks management while advancing credit facilities is whether they need to minimise their risk through diversification of the loan portfolios by advancing loans to various market sectors or they need to concentrate their loans to a few sectors that they have adequate knowledge (Demyanyk & Van Hemert 2009). Various studies undertaken in USA, for example, supports diversification due to its positive effect on bank performance but that credit growth to highly volatile activities offset, the gains. In other studies done in other advanced countries such as Germany, Italy and China, there has been evidence that concentration of loans improves financial performance and reduces the level credit risk. The dominant tool however, has been that diversification is an appropriate tool for mitigation of risk due to its significant relation to market-based risk measures (Chaibi & Ftiti 2015).

Commercial banks in Kenya face more credit risks due to the incapacity to manage risks effectively, lack of adequate resources to screen and monitor loan borrowers in

comparison to their counterparts in developed countries. In addition, local banks are affected more by economic shocks which extend to the loan borrowers and consequently affecting their ability to service their loan obligations. According to the CBK (2016), the largest proportion of the banking industry loan portfolio were concentrated on Real Estate, Trade, Personal/ Household and Manufacturing Sectors accounting for 70.89 per cent of total loans in December 2016. At the same time Personal/households, Trade and Agriculture sectors accounted for the 98.21 per cent being the highest number of loan accounts. Further, Trade, Personal/household, Real Estate and Manufacturing sectors accounted for 70.05 per cent being the highest value of non-performing loans. This was mainly caused by delayed remittances by employers, reduced and slow uptake of housing units and delay in payments from private and public sectors (CBK, 2016). It is therefore imperative that the influence of sectoral concentration of loan portfolio of commercial banks in Kenya is investigated

The question on whether lending concentration reduces or increases banks' risk and return is a matter of great concern within the realm of modern finance literature and policy. Leon (2017) sought to determine implications of loan portfolio concentration in Cambodia and found that the relationship between loan concentration and banks' performance to be economically relevant and statistically significant implying that diversification appears to be more advantageous than concentration. Chen, Shi, Wei and Zhang (2013) sought to determine the impact of loan portfolio sectoral diversification on risk and return among the listed Chinese commercial banks. The results were that loan portfolio sectoral diversification is related with both low bank's returns and low credit risk. Jahn, Memmel and Pfingsten (2013), studied on diversification verses concentration of credit portfolio among the Germany banks and

found that high credit portfolio concentration has reduced level of the estimated write offs and write downs in their loan portfolio and the unanticipated credit risk of the bank.

In Kenya, Geitangi (2015) pursued to research on the connection between credit risk management practices and loan portfolio performance in Kenya. He established that there is negative and statistically significant relationship between use of credit risk control and non performing loans level. This implies that the continued use of credit risk control practices by commercial banks in Kenya leads to reduction in the overall non-performing loans levels. Mwangi and Moturi (2016) investigated the impact of management of credit on loan repayment performance of Kenya's commercial banks and found a positive significance association between the variables. Murira (2010) studied on the relationship between loan portfolio composition and financial performance of commercial banks in Kenya and concluded that every bank should establish an optimal loan mix as it was found that some types of loans (mortgage loans, business loans, and government loans) have great impact on financial performance of commercial banks.

Granted that different studies have been done in ascertaining the link between a bank loan portfolio concentrations or non-concentration on the bank performance, there has been mixed results even in studies carried out in developed countries. There has been no study in Kenya, at least that the researcher is aware of, that has sought to link loan portfolio sectoral concentration and bank credit risk. Consequently, these two gaps that relate to studies done previously and the lack of research that examines the impact of sectoral concentration of loan portfolio on bank credit risk locally forms main motivation for undertaking the present research. This therefore leads to the current

research question to be investigated: What is the relationship between loan portfolio sectoral concentrations on credit risk of commercial banks in Kenya?

1.3 Research Objectives

To establish the relationship between loan portfolios sectoral concentration and credit risk of commercial banks in Kenya

1.4 Value of the Study

The relationship between lending concentration and bank credit risk in Kenya will be beneficial to academics, to the bank's management and to the policy making by various regulatory stakeholders. For the regulators, this study will be of importance in controlling risk in promotion of financial standings and increased banks profitability. Therefore, it will help in determining credit limits for specific economic sectors with high systematic risk like real estate to mitigate the likely occurrence of "subprime tragedy" in Kenya.

For the commercial banks, they will be able to focus on the sectors that have lower credit risk and be able to establish whether diversification of loan portfolios or lending to limited sectors will be prudent to reduce cost and consequently achieve higher return. The management of commercial banks by use of this study will best placed to make an informed decision on the best lending practice and how to screen potential borrowers. Hence the research will be of great significance to the business as its recommendation will enable banks to improve on both optimal credit management practices in lending activity and quality of service.

In the academic field, this study is useful as it will help to widen the research agenda in the wider area of credit risk management practices and controls. This study will be useful for future academic researchers for reference purposes and also will enable them in suggestion of future research undertakings to be explored.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section will cover various research works on loan concentration and credit risk in banks. The main sections covered in this chapter include; theoretical framework, determinants of credit risk, review of empirical studies, conceptual framework and summary of literature review.

2.2 Theoretical Foundations

This section will explore theories that are of great significance in the area study on bank's loan portfolio sectoral concentration, credit risk and its relationship. This research is guided by three main theories, namely; Modern Portfolio Theory, Traditional Banking Theory and Trade-off Theory.

2.2.1 Modern Portfolio Theory

The theory was mainly expounded by Harry Markowitz (1927) through chain of publications and articles and further extended and refined by William Sharpe (1934). Modern portfolio theory is therefore a theory of finance which endeavours in maximization of portfolio anticipated return within certain level of risk in a portfolio, or help in reducing risk within certain level of anticipated yield to minimal level, by creating a suitable choice of various assets proportionally.

The argument advanced by Markowitz (1952) was that by investing in assets whose returns with different levels of returns, investors are able to offset certain common risks in individual stocks and hence recommends that investors are required to choose certain

financial assets in an investment portfolio determined by each individual asset portfolio contribution in the mean and variance of the entire portfolio (Lintner, 1975).

Indeed, according to Kaplan and Schoar (2005), portfolio theory is considered one of the influential economic theories and asserts that an "efficient frontier" asset portfolios at optimal levels if developed may offer possible optimal expected return for a specified risk level stated. This means therefore that in addition to reviewing the expected risk and return of an individual asset there is need to make informed analysis on the combined portfolio risk and return trade off the importance of portfolio diversification, specifically the minimization of the riskiness of the portfolio.

The main assumption of the theory is that all investors are risk averse and are not considering risky assets portfolio unless with minimal risks and higher expected rate of return. It helps in assessing risk and return in a mix of securities and its association. In banks, the assets are represented by loans and thus it is relevant in explaining the need for banks to have a mix of portfolio from different economic sectors and industries that yields high returns with possible minimal risks (Lintner, 1975). Despite the theory being widely accepted in the finance and economic field, it has some limitations in the banking industry as it does not explain how banks can determine and form a mix of loan portfolio that minimizes risks and maximizes returns and does not address various risks in managing bank's loan portfolio thus leaving study gap in the wider field of credit risk management especially in ascertaining optimal sectoral portfolio mix with high returns and minimal risks.

2.2.2 Traditional Banking Theory

Traditional banking theory through the work of Diamond in 1984 intimates that portfolio diversification is positively related to with portfolio returns reason being that when bank increases its credit portfolio to relatively new sectors in an economy, the credit portfolio quality increases hence the decline in credit risk (Mercieca et al., 2007). Diversified banks credit portfolio has low vulnerability to economic slowdowns in most sectors. The theory hints that given asymmetric information, credit diversification is a means of reducing risk in assets portfolio and further points out that diversification bring down the financial intermediation cost and also increases monitoring incentives (Diamond, 1984). Further, the theory proposed that firms needs to be less concentrated in order to decrease credit risk through the allocation of various credit lines to more sectors will lead to decrease in the level of risk.

Proponents of this theory argue that least concentrated banks can be affected by dilution of relative gain of administration by exceeding current expertise consequential from diversification drawing antagonism in the industry (Winton, 1999), and higher agency costs mainly from reduced personal risk by the activities of the management (Berger et al., 2010). Loan portfolio diversification also reduces idiosyncratic risk, decreased monitoring efforts leading to lower operational costs, which under normal circumstances causes higher efficiency levels: idiosyncratic risk proposition supports that loan portfolio concentration has inverse relationship with cost efficiency (Rossi, 2009).

The theory has been widely accepted however, corporate finance theory in contrast considers the diversification of the asset portfolio as inversely related to bank's returns. In their studies, Denis et al., (1997); and Meyer and Yeager (2001) outlined that

normally financial institutions concentrate their business activities on particular economic sectors in an industry in order to gain on the benefits of their expertise in lending to only few sectors.

2.2.3 Trade-off Theory

The earlier trade-off models in the field of finance influenced capital structure in finance. The tax benefit bankruptcy cost trade-off models forecast that companies maintains capital structure at optimal level by matching the gains and the corresponding costs of debt at level where marginal benefits equals marginal cost (Jensen & Meckling, 1976). The benefits comprise of tax shield while the costs comprise projected distress overheads. As per the agency theoretical model, Jensen (1986) posits that organizations use importance of reduction of likely challenges in free cash flow and other likely struggles between shareholders and managers, in compensation of the associated costs resulting from asset substitution problems and underinvestment.

According to Markowitz (1952) and Sharpe (1964), there is always a trade-off amid risk and return (as one is prepared to receive more returns than the corresponding costs. Nevertheless, trade-off is applicable only for the unsystematic risk, and not from avoidable risks by way of diversification. The theory, thus forecasts that diversified banks earns more expected returns than concentrated ones. The question is ascertaining the trade- off between likely risk of loan default and resultant loss, and the return arising from interest income and commission fees.

The above question is answered through analysis of the risk- return trade- off, is the crux of all investment decisions; the return on risky assets ought to incorporate estimated credit losses (Thygerson, 1995). In this case a high risk of default requires

commensurately high returns and the challenge in management is to make sure that the losses are lower than or equal to the expected level at the acquisition time and asset pricing by the firm. To achieve this position, management are required to do origination through strategic portfolio diversification and its management (Johnson, 2000).

This theory has explained the significance of trade-off between risk and return but only focused on perfect capital markets thus may not be very relevant to banks due to lack of clarity on the ideal loan portfolio level that maximizes banks' return and minimizes risk and how to determine the optimal level. Therefore the theory creates a study gap in credit risk and loan portfolio concentration in determining the sectoral loan portfolio mix where there is trade-off between returns and risk.

2.3 Determinants of Credit Risk

The banks credit risk and its causes have attracted a number of empirical studies. The main consensus is that credit risk determinants of banks can be categorised as macroeconomic and bank specific factors. In broad-spectrum, bank's credit risk refers to the risk a loan not being repaid fully or partially by the borrower to the lender (Athanasoglou et al., 2005). It is imperative to appreciate the determinants of credit risk since provides signal to the banking sector at the time when the industry are exposed to economic downturns.

2.3.1 Economic Environment

A country's' economic conditions might worsen during periods of stagnation and recession and during such a period; the financial intermediation risk increases (Llewellyn, 2002). Koch and McDonald (2003) established that throughout vibrant economic situation both lender and borrower's lender are assertive on investment

projects undertaken and subsequently their capability in repayment of their financial obligations. Under such a business cycle, banks will be keen to lessen their credit principles and standards and becomes more risk averse. Conversely, Jiménez and Saurina (2012) found out that the association between bank risk exposure and economic cycle is dialectical since during period of economic boom, the general growth in economic activities and cash collateral levels held by both households and businesses increases.

Consequently, under such business environment, borrowers are able to meet their financial obligation, leading to bank credit risk reduction. Zribi and Boujelbene (2011) affirmed this position when they found inverse relationship between credit risk and Gross domestic product. Similarly, in Slovenia, Aver (2008) established that loan portfolio credit risk is dependent on macro economic variables such as employment level, rate of interest and on the stock exchange index value. However, Fofack (2005) in prior study in Sub-Sahara countries did not find any linkage between bank's credit risk and country's GDP.

2.3.2 Inflation

Vogiazas and Nikolaidou (2011) identified inflation as key macroeconomic factor that has impact on the banking sector efficiency and credit risk. This is because high level of inflation depletes money value and thus reduces the rate of return in banking sector. In any economy, a high inflation rate generally has positive relationship with loan interest rate, increasing which ultimately leads to increase in cost of borrowing and if the borrowers cannot sustain the interest cost, it will result in a high credit risk. Indeed, Brissimis et al., (2008) found out that inflation negatively impacts on banks profitability

since in most cases the banks' operating expenses increases faster than inflation rate and this negatively impacts on the overall financial performance.

Castro (2013) note that if banks accurately forecast inflation, they will be able to control interest rates by way of adjusting so as to be in a position to increase their revenues at a faster rate than the resultant cost of mitigation of the negative effect of high inflation. In a study to seek and determine effect of inflation on credit risk, Thiagarajan, Auuapan et al., (2011) established strong relationship between the prevailing rate of inflation and credit risk.

2.3.3 Money Supply

The assessment of the effect of relationship between money supply and credit risk is supported by a research by Kalirai and Scheicher (2002) in a study conducted in Austrian banking system. Ahmad and Ariff (2007) assert that if the banks' regulator is determined to pursue an expansionary monetary policy, then its effect is to reduce the essential reserve rate which ultimately leads to discount rate reduction with money supply increasing.

Bofondi and Ropele (2011) in their study established a positive association between credit risk and money supply among Italian banks. Therefore, an increase in the supply of money results in reduced rate of interest which ultimately leads to availability of cheap funds to public in an economy. Availability of cheap funds leads to increased borrowing which ultimately leads to an increased default and credit risk as some of the borrowers have no capacity to repay the loans together with interest.

2.3.4 Market Interest Rate

The rate of interest in the market rate is a very important macroeconomic factor of the credit risk exposed to a bank through its lending process because it has a direct effect on the debt servicing burden incurred by a borrower. Nkusu (2011) notes that the interest rate has a positive effect on credit risk level because increase level of debt burden, to a borrower, occasioned by increase in interest rates results in increase non-performing loans levels. Though, an increase in interest rates, bank interest income from the newly lend loan increases, but if not closely monitored may expose bank to the challenges of increased credit risk.

Richard (1999) in his study found a significant and inverse association between banks' rate of interest measured by 3 year's treasury notes nominal rate of interest rate less the inflation rate. Fofack (2005) too supported this position in a study carried out among banks in Sub-Sahara Africa countries and found out a strong positive association between credit risk and rate of interest. Jiménez and Saurina (2012) used inter-bank rate of interest in measuring the effect of interest rate on problematic loans and found positive and significant association between interest rates and non-performing loans.

2.3.5 Foreign Exchange Rate

Zameer and Siddiqi (2010) posit that foreign exchange rate is also another macroeconomic determinant which increases the instability of a country economy among the developing countries. Exchange rate, being a measure of the local currency value against other currencies, affects firm's imports because continued increase in value of foreign currencies in relation to the local currency results in increase in prices of imported goods which ultimately affect the commodity prices traded locally (Sirpal

2009). As the local currency value against foreign exchange rate rises, its value is depreciated and therefore it becomes expensive to purchase foreign goods and services due to increase in cost and the purchaser require additional local currency units to purchase similar quantities of foreign goods and services more than the earlier period (Ngerebo, 2011).

The rise in commodity pricing due to exchange rate volatility will result in the rise in the demand for credit facilities in banks to finance the increased expenditure necessitated by depreciation of local currency (Ngerebo, 2011) and reduce the profitability of firms. Zribi and Boujelbene (2011) also researched in Tunisia through the use of the proportion of risk weighted assets of the total assets as banks credit risk proxy measure and found an inverse relationship between foreign exchange rate level and credit risk.

2.3.6 Bank Specific Factors

It is essential to note that apart from macroeconomic factors bank specific factors also affects bank's NPL. Bank size, ownership structure, profitability and efficiency, credit portfolio composition, management quality, interest rate policy, deposit liabilities size and bank's risk profile are vital factors of NPL. Salas and Saurina (2002) in the study of Spanish banks identified that capital ratio, credit growth, Real GDP and bank size as the major variables affecting credit risk levels) explained the association between bad loans and the ownership structure among the banks in Taiwan and determined that banks size was inversely linked to non-performing loans. It was also established that state owned banks had reduced levels of NPLs.

Moreover, Sufian (2014) points out that larger conventional bank are able to diversify their asset portfolio efficiently and in the process being able to reduce credit risks. Similarly, Cabiles (2012) is of the opinion that large banks employs strong risk management tools and take high risk without compromising credit risk in their portfolio and thus generates stable return and further take more risk by increasing securitization level to cushion against risk uncertainties.

2.4 Empirical Studies

Kozak (2015) researched on the effect of bank concentration of loan portfolio exposure on its risk and how to determine the same among the Polish banks. The study data covered the period 2008 – 2013 and used information from the various economic literature, Central banks reports, and annual audited financial reports of Poland banks listed on the Warsaw Stock Exchange (WSE). In his study, he found out that by estimating the surplus capital requirement portion in certain banks in Poland shows that banks ought to allocate 4 per cent and 2 per cent of their required core capital to cushion against credit portfolio concentrations risks on individual borrowers and economic sectors respectively. The study did not use data from individual banks but rather from the regulators which is different from the present study in which the data will be generated from the financial statements of individual banks.

Chen, Shi, Wei and Zhang (2013) researched on the impact of diversification of credit portfolio on banks' credit risk and returns among all the Listed Commercial Banks in China for period between 2007 and 2011. Through developing of a new measure diversification by considering systematic risk of various economic sectors by way of weighting them with their betas and comparing with the widely used measure

Hirschman-Herfindahl index (HHI). The dependent variable in their study was ROA and the measure of credit risk was the proportion of non performing loans to total loans. The control measures used were ratio of loan to deposit, asset ratio and equity ratio. By comparing average HHI of all banks in China with earlier studies, they found that banks in China were more diversified with HHI of 0.237 (Acharya *et al.* 2006) than its counterparts in Italy whose HHI was 0.291 (Hayden *et al.* 2007). In comparison with emerging markets they found out that Brazil had HHI 0.316 (Jahn *et al.* 2013) and Argentina had HHI of 0.55 (Bebczuk, Galindo 2008) hence were highly concentrated than Chinese banks.

Jahn, Memmel and Pfingsten (2013) examined the effect of concentration of credit portfolio versus diversification among German commercial banks. The investigation covered the period between 2008 and 2012 and used a unique dataset that used specific banks' sectoral exposure to the real economic sectors on Germany, comprising 27 industries/sectors categorized into three brackets based on maturity along with the matching write-offs and write-downs by commercial banks. They found out that the higher the concentrated the bank credit portfolio is, the lower the anticipated write-offs and write-downs in banks' loan portfolio. In addition, the study established that more concentrated banks had a lower unanticipated credit risk in the portfolio in that the unanticipated loss is measured loan loss rate standard deviation measure. As opposed to the present study, Jahn *et al.* (2013) did not employ a regression methodology and more so did not link with the credit risk of the banks unlike the present study which will consider the effect of bank loan concentration on credit risk.

Figini and Uberti S (2013) researched on the effect of measures of concentration in risk management practices among the Italian banks. The study covered the period 2008 –

2010 and the main objective was to ascertain useful novel index for measuring credit risk concentration through integration of single name and sectoral components. They arrived at a new index useful in measuring both sector and single name concentration for credit risk by use of one step approach. This study differs from the present because it used primary data while I intend to use secondary data only. At the same time, the Italian banks operate in a more advanced economy unlike the Kenyan ones whose level of regulation is still high and government intervention in the banking sector is common.

Ehikioya and Mohammed (2013) researched on commercial banks' credit accessibility and its impact on sectoral output performance in the Nigerian economy from the year 1986 and 2010. They employed the ordinary least square technique to augment a growth mode and determine the relationship amongst various credits by banks and its growth in sectoral output. In the study, the variables involved were verified using stationary and co-integration analysis using the Augmented Dickey-Fuller test. The study findings also shows that credit by commercial banks has direct and inconsequential effect on sectoral output performance but cumulative supply and demand for credit in the previous period has direct and substantial effect on the growth of manufacturing, services and agriculture sectors output.

Locally, Mwangi and Moturi (2016) investigated the impact of management of credit on loan repayment performance of Kenya's commercial banks. Through use of primary data, with a sample size of 55 respondents drawn using purposive sampling, the found that there exist a positive significance relationships between the variables all set at $p < .05$ and that organisational credit policies correlated at coefficient of 0.380, while risk identification processes correlated at coefficient of 0.692, debt collection processes at 0.417 and credit scoring correlated at 0.323. Further, they found that commercial

banks' effectiveness in implementing their organizational credit policies would result to an improvement in the loan repayment among its borrower. The study differs from the present study because a primary data collection approach was adopted while in this case secondary data will be used and thus facilitating establishment of relationship.

Geitangi (2015) sought to determine the association between credit risk management practices and loan portfolio performance of commercial banks in Kenya. The research used descriptive survey research design by carrying out a census of all the banks that operated from the year 2010 to 2014. Semi structured questionnaires was used to collect primary data while banks' audited financial reports and CBK supervisory reports being the source for secondary data. The study findings were that commercial banks used credit risk control practices in credit risk management to a very great extent to minimize credit loss. The study found out that there is strong negative relationship between use of credit risk control and level of non-performing loans by banks in Kenya.

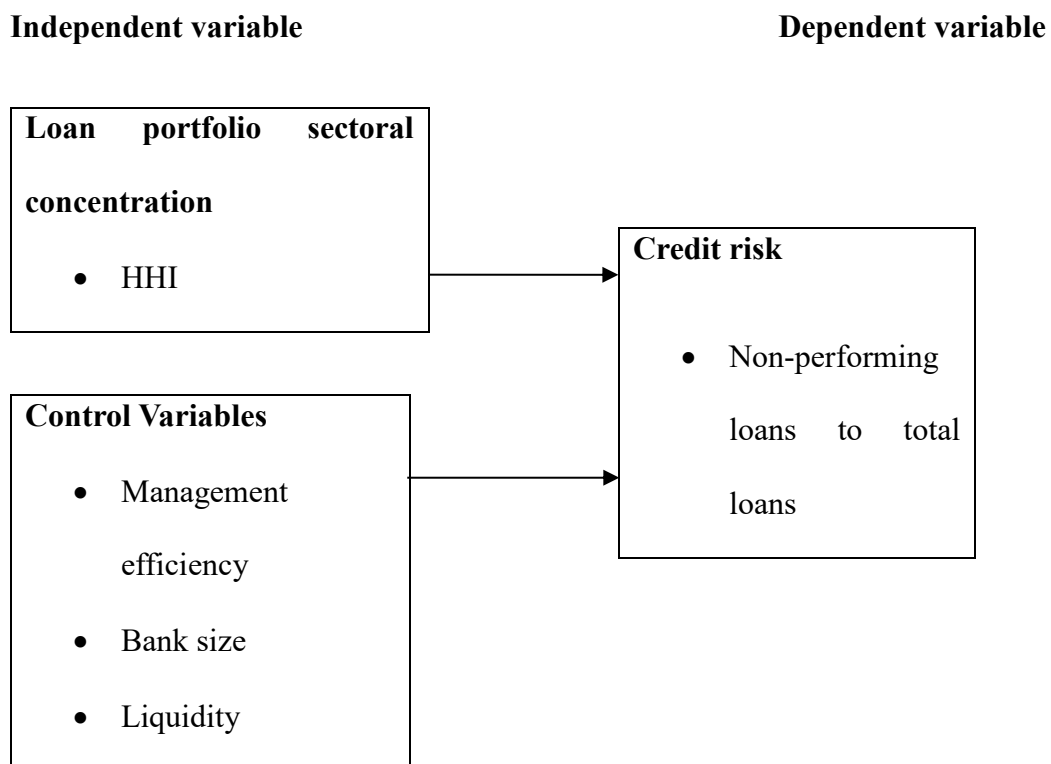
Murira (2010) studied on the association between loan portfolio composition and Kenya's commercial banks financial performance. The researcher used causal research design with the population consisting of 43 commercial banks in Kenya then. The researcher used simple random sampling design to come up with a sample size of thirty commercial banks. For purposes of analysis, the researcher used inferential statistics whereby correlation, collinearity and logistic regression models were used. The findings were that every bank should establish an optimal loan mix as it was found that some types of loans including mortgage loans, business loans, and government loans have great impact on commercial bank's financial performance in kenya. This study differs from the present research because it did not seek to investigate the effect of sectoral loan concentration on credit risk of the banks.

2.5 Conceptual Framework

A conceptual framework is an analytical research tool represented diagrammatically for researcher's use in developing and understanding of the condition being scrutinized, Ware and Sherbourne (1992). Therefore, conceptual framework in research is useful in outlining all the likely causes of action or used in presenting an appropriate choice of a new idea or thought.

The independent variables in the study will be loan portfolio sectoral concentration as measured by HHI. The control variables in this study will be banks management efficiency as measured by cost-income-ratio, bank size as measured by capital to asset ratio and liquidity as measured by loan to deposit ratio. Further, in the study the bank credit risk is measured by the proportion of non-performing loans to total loans.

Figure 2.1: Conceptual framework



Source: Researcher (2018)

2.6 Summary of Literature and Research Gap

The understanding of the factors that impact on the credit risk has received a lot of attention, both at the international, regional and local scene. In the developed countries (USA, Britain, Italy and Germany), the studies have tended to look at concentration measures and its influence on bank's credit risk level and returns on investment. In the Asian countries such as Cambodia and China, the studies have delved more on the loan concentration and its implication on the bank operating performance. In Kenya, most of the studies reviewed have looked at the effect of risk management practices on commercial banks performance. However, though risk management practices encompass the portfolio diversification, there is a need to establish only the aspect of loan concentration as opposed to diversification. In addition, the results on the studies undertaken have been varied and more studies need to be carried out.

It is notable that the effect of loan concentration on the credit risk of Kenyan banks has not been addressed on the previous research works. Few commercial banks in Kenya such as Imperial bank and Chase Bank have gone under receivership due to, among others, having most of their loan portfolios on a few sectors of the economy and consequently, whenever the sector is not performing, it has a ripple effect on the overall financial performance of the banks. In addition, the earlier studies findings have been conflicting and more studies are required to bridge the gap.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section entailed the discussion of the summary of the research methodology which was used in the study. It focused on research design, methods of data collection and was finalized with data analysis and methods of data presentation that was used in this study.

3.2 Research Design

The research design was descriptive research design that included the cross sectional data. A descriptive study is where data is collected from the information provided without changing or manipulating the outcome. The reason for using this design is that descriptive research determines and reports the way things are (Cooper & Schindler, 2007). This research design was considered appropriate for the current study as it enables the researcher to make conclusions about the variables under the study without experiencing any form of manipulation hence full control of the measurements.

3.3 Population of the Study

A study population comprises of group of individuals or companies being investigated by the researcher (Sekaran & Bougie, 2010). It is therefore defined in terms elements availability, specific time frame, topic of interest and geographical boundaries. In this study, the study population comprised of all the commercial banks operating in Kenya. As per Central bank of Kenya (CBK), as at the end of year 2017, there were 42 banks that operated in Kenya (Appendix II) which formed the study population.

3.4 Data Collection

In this study secondary data was obtained from annual CBK's supervisory reports, commercial banks annual reports and financial statements from 2013 – 2017 from the sampled commercial banks. From the financial statements, the researcher collected data on the banks, Non-performing loans level, Sectoral distribution of Loans, Cost to income ratio, Bank Size based on assets to capital ratio and Bank's Liquidity.

3.5 Diagnostic Tests

Linearity show that two variables X and Y are related by a mathematical equation $Y=c+bX$ where c is a constant number. The linearity test was obtained through the scatterplot testing or F-statistic in ANOVA. Stationarity test is a process where the statistical properties such as mean, variance and autocorrelation structure do not change with time. Stationarity was obtained from the run sequence plot. Normality is a test for the assumption that the residual of the response variable are normally distributed around the mean. This was determined by Shapiro-walk test or Kolmogorov-Smirnov test. Autocorrelation is the measurement of the similarity between a certain time series and a lagged value of the same time series over successive time intervals. It was tested using Durbin-Watson statistic (Khan, 2008).

Multicollinearity is said to occur when there is a nearly exact or exact linear relation among two or more of the independent variables. This was tested by the determinant of the correlation matrices, which varies from zero to one. Orthogonal independent variable is an indication that the determinant is one while it is zero if there is a complete linear dependence between them and as it approaches to zero then the multicollinearity

becomes more intense. Variance Inflation Factors (VIF) and tolerance levels were also carried out to show the degree of multicollinearity (Burns & Burns, 2008).

3.6 Data Analysis

The data collected from the different sources was organized in a manner that can help address the research objective. Statistical Package for Social Sciences version 22 was utilized for data analysis purposes. Both descriptive and inferential statistics were carried out. In descriptive statistics, the minimum, maximum, mean, standard deviation, skewness and kurtosis were computed for each variable. In inferential statistics, both regression and correlation analysis were carried out. Correlation analysis involved determining the extent of relationship between the study variables while regression analysis involved establishing the cause and effect between the dependent variable (credit risk) and independent variables: Loan portfolio sectoral concentration, bank's management efficiency, bank size and bank's liquidity.

The study applied the following regression model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

Y = Credit risk measured by expressing total non performing loans to total loans advanced on an annual basis.

B₀ = Constant (Y intercept)

β₁- β₄ = Regression coefficient for independent variables

X₁ = Loan portfolio sectoral concentration as measured by Hirschman-Herfindahl Index (HHI) on an annual basis.

- X_2 = Bank's management efficiency measured by cost-income-ratio on an annual basis
- X_3 = Bank size measured by natural logarithm of total assets on an annual basis
- X_4 = Bank's liquidity measured by loan deposit ratio on an annual basis
- ϵ = Error term

The HHI was calculated as

$$HHI = \sum_{l=1}^n S^2$$

Which is the sum of squares of relative economic sector exposure of bank's loan portfolio at a given time period and that S is relative exposure of a bank to economic sector measured by proportion of single economic sector to the entire loan portfolio. HHI ranges from 0 to 1 with the highest value of 1 denoting full sectoral Loan concentration whereas 0 denotes full diversification. This formula has been used before by scholars such as Rhoades (1993) and Acharya et al., (2006).

3.6.1 Tests of Significance

The researcher carried out parametric tests to establish the statistical significance of both the overall model and individual parameters. The F-test was used to determine the significance of the overall model and it was obtained from Analysis of Variance (ANOVA) while a t-test was used to establish statistical significance of individual variables.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND INTERPRETATION

4.1 Introduction

This chapter focused on the analysis of the collected data from the Central Bank of Kenya to ascertain the effect of loan portfolio sectoral concentration on credit risk of the Kenyan commercial banks. Using descriptive statistics, correlation analysis and regression analysis, the findings of the study were presented in table forms as shown in the following sections.

4.2 Response Rate

This study targeted the 42 commercial banks in Kenya as at 31st December 2017. Data was obtained from 40 banks representing a response rate of 95.24%. From the respondents, the researcher was able to obtain secondary data on loan portfolio sectoral concentration, bank size, liquidity, management efficiency and credit risk of banks.

4.3 Diagnostic Tests

The researcher carried out diagnostic tests on the collected data. A Multicollinearity test was undertaken and that Tolerance of the variable and the VIF value were used in situations where values more than 0.2 for Tolerance and for values below 10 for VIF implies that Multicollinearity doesn't exist. Multiple regressions is applicable if strong relationship among variables doesn't exist. From the outcome, all the variables had a tolerance values >0.2 and VIF values <10 as shown in table 4.1 showing that Multicollinearity amongst the independent variables doesn't exist.

Table 4.1: Multicollinearity Test for Tolerance and VIF

Variable	Collinearity Statistics	
	Tolerance	VIF
Loan portfolio sectoral concentration	0.392	1.463
Management efficiency	0.398	1.982
Bank liquidity	0.388	1.422
Bank size	0.376	1.398

Source: Research Findings (2018)

Shapiro-walk test and Kolmogorov-Smirnov test was used for normality test. The null hypothesis for the test was that the secondary data was not normal. If the p-value recorded was more than 0.05, the researcher would reject it. The results of the test are as shown in table 4.2.

Table 4.2: Normality Test

Credit risk	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Loan portfolio						
sectoral concentration	.176	200	.300	.892	200	.784
Management efficiency	.175	200	.300	.874	200	.812
Bank liquidity	.174	200	.300	.913	200	.789
Bank size	.176	200	.300	.892	200	.784

a. Lilliefors Significance Correction

Source: Research Findings (2018)

Both Kolmogorov-Smirnova and Shapiro-Wilk tests recorded o-values greater than 0.05 which implies that the research data was distributed normally and thus the null hypothesis was rejected. The data was therefore useful for use to conduct parametric tests such as regression analysis, Pearson’s correlation and analysis of variance.

Autocorrelation tests were run in order to check for error terms correlation across time periods and that Durbin Watson test was used to test Autocorrelation. A durbin-watson statistic of 1.763 indicated that the variable residuals were not serially correlated due to the fact that the value was within the acceptable range between 1.5 and 2.5.

Table 4.3: Autocorrelation Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.629 ^a	.396	.384	.1041	1.763

a. Predictors: (Constant), Bank liquidity, Management efficiency, Loan portfolio sectoral concentration , Bank size

b. Dependent Variable: Credit risk

Source: Research Findings (2018)

4.4 Descriptive Analysis

Descriptive statistics gives a presentation of the average, maximum and minimum values of variables applied together with their standard deviations in this study.

Table 4.4 shows the variables descriptive statistics applied in the study. An analysis of all the variables was obtained using SPSS software for the period of five years (2013 to

2017) for all the 40 banks that provided data for this study. The standard deviation, mean, minimum and maximum for all the selected variables for this study are as shown below.

Table 4.4: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Credit risk	200	.0	.9	.109	.1325
Loan portfolio sectoral concentration	200	.1	1.0	.245	.1299
Management efficiency	200	.0	1.7	.532	.2637
Bank size	200	15.1	20.3	17.607	1.2991
Bank liquidity	200	.2	8.2	.860	.5682
Valid N (listwise)	200				

Source: Research Findings (2018)

4.5 Correlation Analysis

The association between any two variables used in the study is established using correlation analysis. This relationship ranges between strong negative (-) correlation and perfect positive (+) correlation. Pearson correlation was employed to analyze the level of relationship between the commercial banks' credit risk and the independent variables for this study (loan portfolio sectoral concentration, bank liquidity, bank size and management efficiency).

The study found out that loan portfolio sectoral concentration and liquidity exhibited positive but insignificant association with credit risk as evidenced by ($r = .050, p = .478$; $r = .091, p = .199$). Management efficiency and bank size were found to have a positive and statistically significant correlation with the commercial banks' credit risk as shown by ($r = .613, p = .000$ and $r = .289, p = .000$) respectively.

Table 4.5: Correlation Analysis

		Credit risk	Loan portfolio sectoral concentration	Management efficiency	Bank size	Bank liquidity
Credit risk	Pearson Correlation	1				
	Sig. (2-tailed)					
Loan portfolio sectoral concentration	Pearson Correlation	.050	1			
	Sig. (2-tailed)	.478				
Management efficiency	Pearson Correlation	-.613**	-.050	1		
	Sig. (2-tailed)	.000	.481			
Bank size	Pearson Correlation	-.289**	-.026	-.303**	1	
	Sig. (2-tailed)	.000	.715	.000		
Bank liquidity	Pearson Correlation	.091	.091	.050	-.070	1
	Sig. (2-tailed)	.199	.202	.478	.327	

** . Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=200

4.6 Regression Analysis

Credit risk was regressed against four predictor variables; loan portfolio sectoral concentration, bank liquidity, bank size and bank management efficiency. The regression analysis was executed at a significance level of 5%. The critical value obtained from the F – table was measured against the one acquired from the regression analysis.

The study obtained the model summary statistics is shown below in table 4.6.

Table 4.6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.629 ^a	.396	.384	.1041	1.763

a. Predictors: (Constant), Bank liquidity, Management efficiency, Loan portfolio sectoral concentration , Bank size

b. Dependent Variable: Credit risk

Source: Research Findings (2018)

From the outcome in above table 4.6, the value of R square was 0.396, a discovery that 39.6 percent of the deviations in credit risk of commercial banks is caused by changes in loan portfolio sectoral concentration, bank liquidity, bank size and bank management efficiency. Other variables not in the model constitute for 60.4 percent of the variance in credit risk of the Kenyan commercial banks. Also, the results revealed that there exists a strong relationship among the selected independent variables and the credit risk as shown by the correlation coefficient (R) equal to 0.629. A durbin-watson statistic of

1.763 indicated that the variable residuals were not serially correlated since the value was more than 1.5.

Table 4.7: Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1.384	4	.346	31.965	.000 ^b
Residual	2.111	195	.011		
Total	3.496	199			

a. Dependent Variable: Credit risk

b. Predictors: (Constant), Bank liquidity, Management efficiency, Loan portfolio sectoral concentration , Bank size

Source: Research Findings (2018)

The significance value is 0.000 which is less than $p=0.05$ implying that the model was statistically important in the prediction of how bank’s loan portfolio sectoral concentration, bank’s liquidity, bank size loan and bank management efficiency affects the Kenyan commercial banks’ credit risk.

Coefficients of determination were used as indicators of the direction of the association between the independent variables and the commercial banks’ credit risk. The p-value under sig. column was used as an indicator of the significance of the association between the independent and the dependent variables. At 95% confidence level, a p-value of less than 0.05 was interpreted as a measure of statistical significance. As such, a p-value above 0.05 indicates that the dependent variables have a statistically insignificant association with the independent variables. The results are indicated in table 4.8

Table 4.8: Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.118	.114		1.035	.302
1 Loan portfolio sectoral concentration	.074	.057	.072	1.293	.197
Management efficiency	-.293	.029	-.582	-9.941	.000
Bank size	-.011	.006	-.107	-1.830	.069
Bank liquidity	.011	.013	.048	.854	.394

a. Dependent Variable: Credit risk

Source: Research Findings (2018)

From the results above, it is clear that apart from management efficiency, all the other three independent variables produced non-statistically significant values for this study (low t-values, $p > 0.05$). Management efficiency was established to be a significant statistically as a determinant of credit risk among commercial banks as shown by a p value below 0.05.

The following regression equation was estimated:

$$Y = 0.118 + 0.074X_1 - 0.293X_2 - 0.011X_3 + 0.011X_4$$

Where,

Y = Credit risk

X₁=Loan portfolio sectoral concentration

X₂= Management efficiency

X₃= Bank size

X₄= Bank liquidity

On the estimated regression model above, the constant = 0.118 shows that if selected dependent variables (loan portfolio sectoral concentration, bank liquidity, bank size and bank management efficiency) were rated zero, the commercial banks' credit risk would be 0.118. A unit increase in loan portfolio sectoral concentration or liquidity will result in an increase in credit risk by 0.074 and 0.011 respectively while a unit increase in management efficiency and bank size leads to a decrease in credit risk by 0.293 and 0.011 respectively.

4.7 Interpretation of Research Findings

The study sought to determine the association between loan portfolio sectoral concentration and credit risk of the Kenyan commercial. In this study Loan portfolio sectoral concentration was the independent variable and was measured by the HHI index on an annual basis. The control variables were liquidity as measured by the current ratio, bank size as measured by natural logarithm of total assets and management efficiency as measured by cost to income ratio per year. Credit risk was the dependent variable which the study sought to explain and it was measured by total non performing loans to total loans advanced on an annual basis.

The Pearson correlation coefficients between the variables revealed that loan portfolio sectoral concentration have a positive but statistically insignificant correlation with the commercial banks' credit risk. The study also found out that a significant and negative correlation exists between bank size and management efficiency with commercial banks credit risk in Kenya. Liquidity exhibited positive but insignificant association with credit risk of commercial banks in Kenya.

The model summary revealed that the independent variables: loan portfolio sectoral concentration, bank liquidity, bank size and bank management efficiency explains 39.6% of shifts in the dependent variable as revealed by R^2 value meaning this model doesn't include other factors that account for 60.4% of changes in the commercial banks' credit risk. The model is fit at 95% level of confidence since the F-value is 31.965. This shows that the overall multiple regression model is significant statistically and is an adequate model in prediction and explanation of the influence of the selected independent variables on the Kenyan commercial banks' credit risk.

The results concur with Jahn, Memmel and Pfingsten (2013) who examined the effect of concentration of credit portfolio versus diversification among German commercial banks. The investigation covered the period between 2008 and 2012 and used a unique dataset that used specific banks' sectoral exposure to the real economic sectors on Germany, comprising 27 industries/sectors categorized into three brackets based on maturity along with the matching write-offs and write-downs by commercial banks. They found out that the higher the concentrated the bank credit portfolio is, the lower the anticipated write offs and write downs in banks' loan portfolio. In addition, the study established that more concentrated banks had a lower unanticipated credit risk in the portfolio in that the unanticipated loss is measured loan loss rate standard deviation measure.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The summary of the results of the former chapter, conclusion and the limitations of the study are given in this chapter. The chapter also elucidates the policy recommendations that policy makers can implement to achieve the expected credit risk of the Kenyan commercial banks. Finally, suggestions for further research, which could be of great use to future researchers, are presented.

5.2 Summary of Findings

The study sought to examine the impact of loan portfolio sectoral concentration on the Kenyan financial bank's credit risk. The independent variables for the study were loan portfolio sectoral concentration, bank liquidity, bank size and bank management efficiency. A descriptive cross-sectional research design was employed in the study. Secondary data was obtained from the Central Bank of Kenya and was analyzed using SPSS software version 21. The study used annual data for 40 commercial banks covering a period of five years from January 2013 up to December 2017.

Based on correlation analysis results loan portfolio sectoral concentration was found to have a positive but statistically insignificant correlation with the commercial banks' credit risk. It was also determined that a positive and insignificant correlation exists between management liquidity and credit risk while management efficiency and bank size exhibited a strong and significant negative association with commercial banks' credit risk.

The co-efficient of determination R-square value was 0.396 which means that about 39.6 percent of the variation in credit risk of the Kenyan commercial banks is associated

by the four selected independent variables while 60.4 percent in the variation of credit risk was associated with other factors not covered in this research. The study also found a strong correlation between the independent variables and the commercial banks' credit risk ($R=0.629$). ANOVA results indicate that the F statistic was at 5% significance level with a $p=0.000$ and therefore the model was fit in explaining the association between the variables selected.

The regression results indicated that when all the selected independent variables for the study are at zero level the commercial banks' credit risk will be 0.118. A unit increase in loan portfolio sectoral concentration or liquidity will result in an increase in credit risk by 0.074 and 0.011 respectively while an increase in one unit in management efficiency and bank size will result into a reduction in credit risk by 0.293 and 0.011 respectively.

5.3 Conclusion

It can be concluded from the findings that the Kenyan commercial banks' credit risk is significantly affected by management efficiency. Thus a conclusion is made that that a unit increase in management efficiency leads to a significant reduction in credit risk of commercial banks. The study established that loan portfolio sectoral concentration is a statistically insignificant determinant of credit risk and therefore this study concludes that this variable does not influence to a large extent the Kenyan commercial bank's credit risk

This study concludes that independent variables selected for this study loan portfolio sectoral concentration, bank liquidity, bank size and bank management efficiency influence to a large extent credit risk of commercial banks in Kenya. Thus, it's adequate

to make a conclusion that these variables greatly affect credit risk of commercial banks as shown by the p value in anova summary. The fact that the four of the independent variables accounts for 39.6% of changes in credit risk indicate that the variables not incorporated in the model explains 60.4% of the variations in credit risk the commercial banks

This finding concurs with Jahn, Memmel and Pfingsten (2013) who examined the effect of concentration of credit portfolio versus diversification among German commercial banks. The investigation covered the period between 2008 and 2012 and used a unique dataset that used specific banks' sectoral exposure to the real economic sectors on Germany, comprising 27 industries/sectors categorized into three brackets based on maturity along with the matching write-offs and write-downs by commercial banks. They found out that the higher the concentrated the bank credit portfolio is, the lower the anticipated write offs and write downs in banks' loan portfolio. In addition, the study established that more concentrated banks had a lower unanticipated credit risk in the portfolio in that the unanticipated loss is measured loan loss rate standard deviation measure.

5.4 Recommendations

The study established that loan portfolio sectoral concentration has a positive but insignificant impact on credit risk of commercial banks in Kenya. Therefore the study wishes to make the following recommendations for policy change: Commercial banks in Kenya should make informed decisions before concentrating loan portfolios in certain sectors as this can lead to increased credit risk that can negatively influence financial performance and indeed the wealth of the bank owner's which is the main goal of a bank and any firm in general.

The study established a significant and negative relationship exists between credit risk and management efficiency. This study thus recommends that shareholders and directors of commercial banks in Kenya should come up with measures of improving efficiency of managers by ways of either reward or punishment as an increase in management efficiency has been found to have a significant influence on reducing the credit risk among commercial banks.

The study found out that a negative relationship exists between credit risk and size of a bank and this implies that larger banks are likely to have less credit risk. This study recommends that banks' management and directors should aim at increasing their asset base by coming up with measures and policies aimed at enlarging the banks' assets as this will eventually have a direct effect on credit risk. From the findings of this study, big banks in terms of asset base are expected to have lower credit risk compared to small banks and therefore banks should strive to grow their asset base.

5.5 Limitations of the Study

The research scope was for a period of five years from 2013 to 2017. It has therefore not been determined whether the results would hold for a longer period of study. Furthermore there is uncertainty on whether same findings would hold beyond 2017. As such a longer period of study is necessary as it will take into considerations major economic conditions such as booms and recessions.

Data quality is one of the study limitations. From this research, it is hard to conclude whether the results present the true facts about the situation. The data that has been used is only assumed to be accurate. There is also a great inconsistency in the measures used depending on the prevailing conditions. Secondary data was employed in the study

which was already in existent as opposed to primary data which was raw information for use in research . Furthr, the study also considered selected determinants of and did not consider all the factors affecting credit risk of commercial banks mainly due to limitation of data availability.

For data analysis purposes, the researcher applied a multiple linear regression model. Due to the shortcomings involved when using regression models such as erroneous and misleading results when the variable values change, the researcher cannot be able to generalize the findings with certainty. If more and more data is added to the functional regression model, the hypothesized relationship between two or more variables may not hold.

5.6 Suggestions for Further Research

This study mainly focused on loan portfolio sectoral concentration and credit risk of commercial banks in Kenya and depended on secondary data. A research study where data collection depends on primary data i.e. in depth questionnaires and interviews covering all the 42 commercial banks registered with the Central Bank of Kenya is recommended so as to compliment this research.

The study was not exhaustive of the independent variables affecting credit risk of commercial banks in Kenya and it's recommended that further studies be carried out to incorporate other variables like capital adequacy, growth opportunities, industry practices, age of the firm, political stability and other macro-economic variables. Establishing the effect of each variable on credit risk will enable policy makers know what tool to use when controlling the credit risk.

The study concentrated on the last five years since it was the most recent data available. Future studies may use a range of many years e.g. from 2000 to date and this can help confirm or disapprove this study's findings. The study limited itself by focusing on financial institutions. The recommendations of this study are that further studies be conducted on other non-financial institutions operating in Kenya. Finally, due to the inadequacies of the regression models, other models such as the Vector Error Correction Model (VECM) can be used in explaining the different associations between the variables.

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APPENDICES

Appendix I: Data Collection Form I (Loan Portfolio Concentration)

Name of the Bank.....

No.	Year	2013	2014	2015	2016	2017
1.	Trade					
2.	Personal/Household					
3.	Real Estate					
4.	Manufacturing					
5	Building and construction					
6.	Transport and Communication					
7.	Agriculture					
8.	Energy and Water					
9.	Tourism, restaurant and Hotels					
10.	Financial services					
11	Mining and Quarrying					
	Total Gross Loans					
	HHI will be calculated as					
	$HHI = \sum_{l=1}^n S^2$					

Appendix II: Data Collection Form II

Name of the Bank.....

Variable	Description of the Variable	Measurement of the Variable	2013	2014	2015	2016	2017
Y	Credit Risk	NPLs/Total Loans					
X₁	Loan portfolio Sectoral Concentration	Hirschman-Herfindahl Index (HHI) (From Appendix 1)					
X₂	Bank's Efficiency	Cost-Income Ratio					
X₃	Bank Size	Total Assets					
X₄	Liquidity	Loan to Deposit Ratio					

Appendix III: Licensed Commercial Banks in Kenya

1. ABC Bank (Kenya)
2. Bank of Africa Ltd
3. Bank of Baroda (K) Limited
4. Bank of India
5. Barclays Bank of Kenya Limited
6. Citibank N.A Kenya
7. Commercial Bank of Africa
8. Consolidated Bank of Kenya
9. Cooperative Bank of Kenya Limited
10. Credit Bank Limited
11. Development Bank of Kenya Limited
12. Damond Trust Bank Limited
13. Dubai Islamic Bank (Kenya) Limited
14. Ecobank Kenya Limited
15. Equity Bank Limited
16. Family Bank Limited
17. First Community Bank Limited
18. Guaranty Trust Bank (K) Ltd
19. Guardian Bank Limited
20. Gulf African Bank Limited
21. Habib Bank A.G Zurich
22. Housing Finance Company of Kenya
23. I&M Bank Limited

24. Imperial Bank Kenya (In Receivership)
25. Jamii Bora Bank
26. Kenya Commercial Bank (Kcb)
27. Mayfair Bank Limited
28. Middle East Bank (K) Limited
29. National Bank of Kenya
30. NIC Bank Limited
31. M-Oriental Commercial Bank
32. Paramount Universal Bank Limited
33. Prime Bank Limited
34. SBM Bank Kenya Limited
35. Sidian Bank Limited
36. Spire Bank Limited
37. Stanbic Bank Kenya Limited
38. Standard Chartered Bank Kenya Limited
39. Trans National Bank Limited
40. UBA Kenya Bank Limited
41. Victoria Commercial Bank Limited

Source: Central Bank of Kenya (CBK) report 2017