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**CORPORATE LOAN PORTFOLIO DIVERSIFICATION AND CREDIT  
RISK MANAGEMENT AMONG COMMERCIAL BANKS IN KENYA**

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## ABSTRACT

To minimize the total loan portfolio risk, it is important for commercial banks to consider diversifying their corporate loan portfolio. Yet, research indicates that the effect of such diversification has conflicting findings by various scholars. This study therefore sought to establish the association between corporate loan portfolio diversification and credit risk management among commercial banks in Kenya. The specific objectives of the study included: to determine the relationship between geographical diversification and credit risk management, to establish the relationship between industry diversification and credit risk management and to establish the relationship between the size of borrowing company and credit risk management among the commercial banks in Kenya. The study employed descriptive research design. The study targeted 86 respondents. Data was collected by use of a questionnaire. The obtained data was cleaned; coded and statistical outputs generated using SPSS. Descriptive and inferential statistics were used to analyze the data. The analyzed data was then presented in charts and tables. The study found out that there was no association between geographical diversification ( $p=0.113$ ,  $r=0.197$ ) and credit risk management, an association ( $p=0.001$ ,  $r=0.515$ ) between industry diversification and credit risk management and an association ( $p=0.004$ ,  $r=-0.351$ ) between size diversification and credit risk management at the banks. Consequently, the following recommendations were proposed; a framework is established that helps determine the size of the borrowing companies and their potential to grow over time, measures are put in place that helps identify borrowing companies based on specific parameters such as level of corporate tax and those that identifies borrowing companies based on competitive advantages in areas of existence other than mere geographical locality among other recommendations.

*Key Words: Corporate Loan, Credit Risk Management*

## INTRODUCTION

Buttiner (2001), Bikker and Metzmakers (2005), described risk management as the process that commercial banks put in place to control its financial exposures. They further stated; the process of risk management comprises the fundamental steps of risk identification, risk analysis and assessment, risk audit monitoring, and risk treatment or control. Jorion (2009) further rightly noted that a recognized risk is less risky than the unidentified risk. Various credit risk lapses arose from the risk management orientations in Kenya since the era when Kenya commercial banks were owned by foreigners or when they were branches of foreign owned commercial banks according to Kithinji (2010).

Kithinji (2010) further captures Kenya commercial banks risk management in four distinguishable phases as; the conservative risk management (before 1980's), lenient credit risk management (1980's), stringent credit risk management (1990's) and customized global credit risk management standards (year 2000's).

Commercial Banks in Kenya play a key role in mobilizing financial resources for investment by extending credit to various businesses and investors. Conford (2000) indicates that Lending represents the heart of the commercial banking industry and loans are dominant assets as they generate the largest share of operating income. There were a total of 43 commercial banks in Kenya as at November, 2010 (CBK Risk Management Survey Report, 2010). However for the purpose of this research, one commercial bank will be excluded given its being under statutory management currently. Commercial banks in Kenya are regulated by the Central bank of Kenya. The commercial banks in Kenya are required to maintain a certain level of core capital per the schedule issued by the central bank and must be met by year 2012. As firms, they exist to make profit and as such apply various methodologies among them, offering loans at an interest where this interest is there profit.

Kenya has experienced banking problems since 1986 culminating in major bank failures (37 failed banks 1998) following the crisis of; 1986 to 1989, 1993 to 1994, and 1998. This is according to Ngugi (2001), Kithinji and Waweru (2007) who further attribute such failures to poor credit risk Management. Poor credit risk Management, backed up by the Pollyanna effect and the Hawthorne effect lead to a high level of NPLs, Islam (2005). Theoretically, the existence of a high credit risk due to either of the above would automatically mean the rise in the level of NPLs. With this in mind therefore, a study on any method that will help curb either of this as a combination or stand alone is important.

## **STATEMENT OF THE PROBLEM**

From the foregoing background literature (Buttiner, 2001; Bessis, 2002; Acharya et al., 2002; Camp et al., 2005; Islam, 2005; Laker, 2007; Kithinji, 2010) and in the wake of high interest rates in the Kenyan commercial banking sector (year 2011 and 2012), existing loans and new ones have become expensive; some banks have varied upwards interest rates (as at December 2011) even for those with various properly agreed schemes. This trend is threatening credit risk management in Kenya even though the Central bank of Kenya has put in place a bench mark on the borrower evaluation criteria. Various studies conducted outside the Kenyan Market (Boyd et al., 1980; Kwast, 1989; Templeton and Severiens, 1992; Gallo et al., 1996; Demsetz and Strahan, 1997; Kwan, 1998; Stiroh, 2002, 2006; Acharya et al., 2006), Stiroh and Rumble, 2006; Hirtle and Stiroh, 2007), Laeven & Levine, 2007; Goddard et al., 2007) have also shown that it is in the best interest of all commercial banks to pursue some sort of risk management, which sometimes takes the form of simple asset-liability management, but can also consist of well thought out strategic implementations that aim to optimize the risk return trade-off.

Boyd et al., (1980) and Kwast (1989) while studying the effect of loan portfolio diversification on credit risk concluded that diversification led to increased agency costs which in turn were counterproductive on benefits, if any, for diversification. The same findings were echoed by Stiroh and Rumble (2006). Elsewhere, Laeven and Levine (2007) found out that diversification helped reduce credit risk and that chances of reducing the level of NPLs by diversification increased with diversification. In all the studies cited, it was evident that the findings were conflicting with studies from different regions providing different conclusions. This study therefore sought to investigate the association between corporate loan portfolio diversification and credit risk management among the commercial banks in Kenya.

### **GENERAL OBJECTIVES**

To investigate the association between corporate loan portfolio diversification and credit risk Management among commercial banks in Kenya.

### **SPECIFIC OBJECTIVES**

1. To determine the relationship between geographical diversification and credit risk management among the commercial banks in Kenya.
2. To establish the relationship between industry diversification and credit risk management among the commercial banks in Kenya.
3. To establish the Association between the size of borrowing company and credit risk management among the commercial banks in Kenya.

### **RESEARCH HYPOTHESES**

In this study, the following null hypotheses were tested to arrive at empirical grounds to make a conclusion on the association between corporate loan portfolio diversification and credit risk management among commercial banks in Kenya.

H01 - There exists no significant relationship between geographical diversification and credit risk management among commercial banks in Kenya.

H02 - There exists no significant relationship between industry diversification and credit risk management among commercial banks in Kenya.

H03 - There exists no significant relationship between size of the borrowing company and credit risk management among commercial banks in Kenya.

## **LITERATURE REVIEW**

### **Theoretical Review**

#### **Risk Diversification**

Markowitz (1952) measured risk for securities statistically and constructed desired portfolios based on ones overall risk preferences. This approach to plot the risk reward relation is done first by assigning expected values, standard deviations and correlations to a security's single period returns, that is, with no annuities. Hence with these measures it's easier to calculate the expected return and volatility of the portfolio to be used as measures for reward and risk respectively. With quadratic programming (optimization, minimization of the quadratic function subject to linear constraints) an investor is able to trace portfolios that will give an optimal risk reward combination of those that make up the portfolio. These portfolios make up the efficient frontier.

Here we assume that all market participants have the same expectations, investors are able to invest in riskless assets/securities yielding the risk free rate of interest and the costs of transactions, information and for management is zero on the market.

#### **Diversification by Industry**

As mentioned above, the repayment probabilities of outstanding loans should have low or negative correlations to diversify a loan portfolio. In the case of diversification across industries, one should be concerned with measurement of the movement, development of certain generally accepted variables for credit worthiness (figures taken from the balance sheets and cash flow statements) across whole industries. For instance, one is able to measure the cash turnover of a whole industry and its movements.

For instance; if a Kenyan firm has businesses in China, a recession in Kenya should not affect the profitability of the Kenyan firm in china. Another influencing factor for diversification of portfolios across sizes is that large firms often have well diversified portfolios than midsized ones, which in turn may lead to less vulnerability to the general economy. Hence the profitability of a company with these characteristics may be less volatile, which in turn indicates a lower correlation with firms that have more focused portfolios.

#### **Diversification by Customers**

Banks may also seek to diversify across individual customers. According to Legrand (1993), diversification across customers is justified, considering the MPT, if the customers' repayment abilities (which have earlier been defined as the general ability to make profits), have low correlation. It is possible that firms' profit making abilities have low correlations with others in the market. An example of this scenario is a firm offering the same product as the rest but in a different price say to a higher price. Hence, if the customers are price sensitive, the product may

have a high correlation with the general economy. This means that the sales of such a product would peak in a strong economy, while others' sales of the same product would stagnate or drop (stagnation out of the bank's perspective is not necessarily a bad thing, but may act as a warning sign if built into credit scoring systems). In other words, holding all other factors constant, one would assume that the firm can use this phenomenon to decide whether to diversify across firms.

### **The Basel Accord**

The ground work of the Basel accord was founded in 1988; this was in direct response to banks' poor lending practices in the early and mid-eighties. Representatives from the G-10 countries were the creators of the first accord's guidelines. The focus of the first accord was credit risk. According to the (Basel accord, 1988) an 8% lending capital requirement was the agreed upon hurdle rate. The original calculation was 'capital' divided by 'credit risk'. The banks were still responsible for their own credit scoring models in order to evaluate 'credit risk', but large risky exposures were greatly reduced.

### **Empirical Review on Diversification**

Many studies have been conducted in the past particularly in this area. Of interest however is how conflicting the results and findings have been. Acharya et al., (2006) reports that diversification of a bank assets is not guaranteed to produce superior performance or greater safety for banks for a sample of 105 Italian banks. Laeven and Levine (2007) examined the effects of diversification on market value of large banks from 42 countries and found that market value of diversified banks were lower than those of their specialized counterparts. Demsetz and Strahan (1997) show that better diversification does not translate into reduction in overall risk. Kwan (1998) concurs with these findings. Stiroh (2002, 2006), Hirtle and Stiroh (2007) find that increased diversification leads to lower equity & accounting returns for all banks. This result is consistent with evidence provided by several studies of De Young and Rice (2004a, b, and c).

## **RESEARCH METHODOLOGY**

### **Research Design**

The researcher employed a descriptive research design. A descriptive study is concerned with determining the frequency with which something occurs or the relationship between variables (Churchill, 1991). According to Cooper (1996), a descriptive study finds out who, what, where, and how of a phenomenon which was the aim of this study. Thus, this approach was appropriate for this study, since the researcher intended to collect detailed information through descriptions and was useful for identifying variables and hypothetical constructs.

### **Study Location**

This study was carried out on commercial banks located in Nairobi County in Kenya. Commercial Banks in Kenya were classified into three categories according to CBK Bank supervisory report, 2010.

### **Target Population**

The survey targeted all the 43 commercial banks in Kenya. However, despite trying to get information from the bank under statutory management (Charter-House Bank), it was not possible to get any feedback. The target respondents included branch managers and credit managers from each of the commercial banks. This resulted into a target population of 86 possible respondents.

### **Sampling Design and Sample Size**

A Sampling frame is a systematic list of subjects, elements, traits, firms or objects to be studied. From the Sampling frame the required number of subjects, respondents, elements and firms will be selected in order to make a sample. Purposive sampling technique was used to select the sample from each bank under study. The technique produced estimates of overall population parameters with greater precision. The purposive sampling ensured that only relevant respondents could be given a chance to provide responses and as such enhancing reliability and relevance of the study. The respondents were selected purposively for the purpose stated above. A sample size of eighty six was targeted..

### **Data Collection Procedure and Instruments**

The closed-ended questions provided more structured responses to facilitate tangible recommendations. The closed ended questions were used to test the rating of various attributes and this helped in reducing the number of related responses in order to obtain more varied responses. The open-ended questions provided additional information that may not have been captured in the close-ended questions. The questionnaire was carefully designed and tested with a few members of the population for further improvements. This was done in order to enhance its validity and accuracy of data collected for the study. The researcher administered the questionnaire individually to all respondents of the study.

### **Reliability test**

A reliability test was done using Cronbach's alpha test. The main objective of this test was to measure the internal consistency of the study components, which is, how closely related a set of components are as a group. The Cronbach's alpha value for this research was found to be 0.741 suggesting that the components have relatively high internal consistency.



## Data Analysis and Presentation

Before processing the responses, the completed questionnaires were edited for completeness and consistency. The data was then coded to enable the responses to be grouped into various categories. Descriptive and inferential statistics were used to analyze the data. Descriptive statistics included the frequencies, mean and standard deviation. Inferential statistics on the other hand included the Chi-square ( $\chi^2$ ) test. The chi-square ( $\chi^2$ ) test was used to determine whether there was a significant difference between the expected frequencies and the observed frequencies in one or more categories. Do the number of individuals or objects that fall in each category differ significantly from the number you would expect? Is this difference between the expected and observed due to sampling error, or is it a real difference?

The chi-square formula used on these data is

$$X^2 = \frac{(O - E)^2}{E}$$

Where:  $O$  is the Observed Frequency in each category

$E$  is the Expected Frequency in the corresponding category

$df$  is the "degree of freedom" (n-1)

$\chi^2$  is Chi Square

All quantitative data on corporate loan portfolio diversification was measured in real values by normalizing. The correlation matrix was also applied. Tables and other graphical presentations as appropriate were used to present the data collected for ease of understanding and analysis. The researcher used the data with an aim of presenting the research findings in respect to the association of corporate loan portfolio diversification and credit risk management among commercial banks in Kenya. Tables were used to summarize responses for further analysis and facilitate comparison. This generated quantitative reports through tabulations, percentages, and measure of central tendency.

## RESULTS AND FINDINGS

### Risk Management Manuals and Programs

#### Views on Corporate Loan Portfolio Diversification

The respondents were asked to indicate the extent of their agreement with given statements on corporate loan diversification and in order of preference and rated them as follows: that the company's profitability played a key role in credit scoring (mean: 4.64), that corporate loan portfolio diversification reduced credit risk (mean: 4.50) and that in credit appraisal and monitoring, the bank always considered the asset base and pre-tax profits of the borrower (mean: 4.45). In addition, that banks considered the size of a company before granting credit (mean:



4.30), that proximity of borrowing company was considered when granting credit (mean: 3.59) and that there was an increase in credit risk with diversification (mean: 2.73).

**Diversification, Lending and Regulation**

The respondents were asked to rate given comments on diversification, lending and regulation and gave the following; that industry diversification had increased the need for credit information sharing (mean: 4.41), that banks always regulated the amount given out to various sectors of the economy (mean: 3.58) and that industry diversification had reduced the need for credit information sharing (mean: 2.76) as well as that lending to various economic sectors had reduced the need for credit appraisal (mean: 2.36) and that lending to various economic sectors had no effect on credit appraisal (mean: 2.14). Table 1 has details.

**Table 1: Regional Presence and Level of Participation Cross tabulation**

		Level of participation of commercial banks					
			Rarely	Moderately	Mostly	Extremely	Total
Regional presence of the borrowing company	Never applied	Count	0	0	0	3	3
		% within Level of participation of	.0%	.0%	.0%	10.7%	4.5%
	Rarely applied	Count	0	3	0	0	3
		% within Level of participation of	.0%	25.0%	.0%	.0%	4.5%
	Moderately applied	Count	0	0	0	7	7
		% within Level of participation of	.0%	.0%	.0%	25.0%	10.6%
	Mostly applied	Count	0	3	12	3	18
		% within Level of participation of	.0%	25.0%	52.2%	10.7%	27.3%
	Extremely applied	Count	3	6	11	15	35
		% within Level of participation of	100.0%	50.0%	47.8%	53.6%	53.0%
	Total	Count	3	12	23	28	66
		% within Level of participation of	100.0%	100.0%	100.0%	100.0%	100.0%

**Table 2: Regional Presence and Level of Participation Chi-Square Test**

	Value	df	Asymp. Sig. (2-
Pearson Chi-Square	37.344(a)	12	.000
Likelihood Ratio	37.950	12	.000
Linear-by-Linear Association	1.321	1	.250
N of Valid Cases	66		

a 15 cells (75.0%) have expected count less than 5. The minimum expected count is .14.

Variety or category of industry had a significant association to the credit appraisal and monitoring ( $\chi^2 = 48.362$ ,  $P = 0.001$ ).

**Table 3: Category of Industry and Credit Appraisal and Monitoring**

		Credit appraisal and monitoring				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Variety or category of industry	Rarely applied	Count	3	0	3	0	6
		% within Credit appraisal and monitoring	100.0%	.0%	13.0%	.0%	9.1%
	Moderately applied	Count	0	3	0	0	3
		% within Credit appraisal and monitoring	.0%	25.0%	.0%	.0%	4.5%
	Mostly applied	Count	0	3	6	10	19
		% within Credit appraisal and monitoring	.0%	25.0%	26.1%	35.7%	28.8%
	Extremely applied	Count	0	6	14	18	38
		% within Credit appraisal and monitoring	.0%	50.0%	60.9%	64.3%	57.6%
Total	Count	3	12	23	28	66	
	% within Credit appraisal and monitoring	100.0%	100.0%	100.0%	100.0%	100.0%	

**Table 4: Category of Industry and Credit Information Sharing**

Variety or category of industry		Count	Credit information sharing				Total
			Rarely applied	Moderately applied	Mostly applied	Extremely applied	
Variety or category of industry	Rarely applied	% within Credit information sharing	3	0	3	0	6
			100.0%	.0%	13.0%	.0%	9.1%
	Moderately applied	% within Credit information sharing	0	3	0	0	3
			.0%	25.0%	.0%	.0%	4.5%
Variety or category of industry	Mostly applied	% within Credit information sharing	0	3	6	10	19
			.0%	25.0%	26.1%	35.7%	28.8%
Variety or category of industry	Extremely applied	% within Credit information sharing	0	6	14	18	38
			.0%	50.0%	60.9%	64.3%	57.6%
Total		% within Credit information sharing	3	12	23	28	66
			100.0%	100.0%	100.0%	100.0%	100.0%

**Table 5: Category of Industry and Credit Information Sharing Chi-Square**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	48.362(a)	9	.000
Likelihood Ratio	32.898	9	.000
Linear-by-Linear Association	12.494	1	.000
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Variety or category of industry had a significant association to the level of participation of commercial banks in credit risk management ( $\chi^2 = 48.362$ ,  $p = 0.001$ ).

**Table 6: Category of Industry and Level of Participation Cross Tabulation**

		Level of participation of commercial banks in credit risk management					
		Rarely applied	Moderately applied	Mostly applied	Extremely applied	Total	
Variety or category of industry	Rarely applied	Count	3	0	3	0	6
		% within Level of participation of commercial banks in credit risk management	100.0%	.0%	13.0%	.0%	9.1%
	Moderately applied	Count	0	3	0	0	3
		% within Level of participation of commercial banks in credit risk management	.0%	25.0%	.0%	.0%	4.5%
	Mostly applied	Count	0	3	6	10	19
		% within Level of participation of commercial banks in credit risk management	.0%	25.0%	26.1%	35.7%	28.8%
	Extremely applied	Count	0	6	14	18	38
		% within Level of participation of commercial banks in credit risk management	.0%	50.0%	60.9%	64.3%	57.6%
Total	Count	3	12	23	28	66	
	% within Level of participation of commercial banks in credit risk management	100.0%	100.0%	100.0%	100.0%	100.0%	

**Table 7: Category of Industry and Level of Participation Chi-Square Test**

	Value	df	Asymp. Sig. (2-
Pearson Chi-Square	48.362(a)	9	.000
Likelihood Ratio	32.898	9	.000
Linear-by-Linear Association	12.494	1	.000
N of Valid Cases	66		

a. 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Amount of loan borrowed had a significant association to the credit appraisal and monitoring ( $\chi^2 = 48.362$ ,  $P = 0.001$ ).

**Table 8: Amount of Loan Borrowed and Credit Appraisal and Monitoring Cross tabulation**

		Credit appraisal and monitoring				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Amount of loan borrowed	Rarely applied	Count	3	0	3	0	6
		% within Credit appraisal and monitoring	100.0%	.0%	13.0%	.0%	9.1%
	Moderately applied	Count	0	3	0	0	3
		% within Credit appraisal and monitoring	.0%	25.0%	.0%	.0%	4.5%
Mostly applied	Count	0	3	6	10	19	
	% within Credit appraisal and monitoring	.0%	25.0%	26.1%	35.7%	28.8%	
Extremely applied	Count	0	6	14	18	38	
	% within Credit appraisal and monitoring	.0%	50.0%	60.9%	64.3%	57.6%	
Total	Count	3	12	23	28	66	
	% within Credit appraisal and monitoring	100.0%	100.0%	100.0%	100.0%	100.0%	

**Table 9: Amount of Loan Borrowed and Credit Appraisal and Monitoring Chi-Square Test**

	Value	df	Asymp. Sig. (2-
Pearson Chi-Square	48.362(a)	9	.000
Likelihood Ratio	32.898	9	.000
Linear-by-Linear Association	12.494	1	.000
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Amount of loan borrowed had a significant association to the credit information sharing ( $\chi^2 = 48.362$ ,  $p = 0.001$ ).

**Table 10: Amount of Loan Borrowed and Credit Information Sharing Cross Tabulation**

		Credit information sharing				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Amount of loan borrowed	Rarely applied	Count 3	0	3	0	6	
		% within Credit information sharing	100.0%	.0%	13.0%	.0%	9.1%
	Moderately applied	Count 0	3	0	0	3	
		% within Credit information sharing	.0%	25.0%	.0%	.0%	4.5%
Mostly applied	Count 0	3	6	10	19		
	% within Credit information sharing	.0%	25.0%	26.1%	35.7%	28.8%	
Extremely applied	Count 0	6	14	18	38		
	% within Credit information sharing	.0%	50.0%	60.9%	64.3%	57.6%	
Total	Count 3	12	23	28	66		
	% within Credit information sharing	100.0%	100.0%	100.0%	100.0%	100.0%	

**Table 11: Amount of Loan Borrowed and Credit Information Sharing Chi-Square Test**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	48.362(a)	9	.000
Likelihood Ratio	32.898	9	.000
Linear-by-Linear Association	12.494	1	.000
N of Valid Cases	66		

a. 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Amount of loan borrowed had a significant association to the level of participation of commercial banks in credit risk management ( $\chi^2 = 48.362$ ,  $p = 0.001$ ).

**Table 12: Amount of Loan Borrowed and Level of Participation**

		Level of participation of commercial banks in credit risk management				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Amount of loan borrowed	Rarely applied	Count	3	0	3	0	6
		% within Level of participation of commercial banks in credit risk management	100.0%	.0%	13.0%	.0%	9.1%
	Moderately applied	Count	0	3	0	0	3
		% within Level of participation of commercial banks in credit risk management	.0%	25.0%	.0%	.0%	4.5%
	Mostly applied	Count	0	3	6	10	19
		% within Level of participation of commercial banks in credit risk management	.0%	25.0%	26.1%	35.7%	28.8%
	Extremely applied	Count	0	6	14	18	38
		% within Level of participation of commercial banks in credit risk management	.0%	50.0%	60.9%	64.3%	57.6%



Total	Count	3	12	23	28	66
	% within Level of participation of commercial banks in credit risk management	100.0%	100.0%	100.0%	100.0%	100.0%

**Table 13: Asset Base and Credit Appraisal and Monitoring Chi-Square Test**

	Value	df	Asymp. Sig. (2-
Pearson Chi-Square	17.615(a)	9	.040
Likelihood Ratio	20.071	9	.017
Linear-by-Linear Association	8.025	1	.005
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Asset base of the borrowing company had a significant association to the credit information sharing ( $\chi^2 = 17.615$ ,  $p = 0.040$ ).

**Table 14: Asset Base and Credit Information Sharing Cross Tabulation**

		Credit information sharing				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Asset base of the borrowing company	Rarely applied	Count	0	0	2	3	5
		% within Credit information sharing	.0%	.0%	8.7%	10.7%	7.6%
	Moderately applied	Count	0	0	0	3	3
		% within Credit information sharing	.0%	.0%	.0%	10.7%	4.5%
	Mostly applied	Count	0	3	15	13	31
		% within Credit information sharing	.0%	25.0%	65.2%	46.4%	47.0%
	Extremely applied	Count	3	9	6	9	27
		% within Credit information sharing	100.0%	75.0%	26.1%	32.1%	40.9%
Total	Count	3	12	23	28	66	
	% within Credit information sharing	100.0%	100.0%	100.0%	100.0%	100.0%	

**Table 15: Asset Base and Credit Information Sharing Chi-Square Test**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.615(a)	9	.040
Likelihood Ratio	20.071	9	.017
Linear-by-Linear Association	8.025	1	.005
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Asset base of the borrowing company had a significant association to the level of participation of commercial banks in credit risk management ( $\chi^2 = 17.615, p = 0.040$ ).

**Table 16: Asset Base and Level of Participation Cross Tabulation**

		Level of participation of commercial banks in credit risk management					
		Rarely applied	Moderately applied	Mostly applied	Extremely applied	Total	
Asset base of the borrowing company	Rarely applied	Count	0	0	2	3	5
		% within Level of participation of commercial banks in credit risk management	.0%	.0%	8.7%	10.7%	7.6%
	Moderately applied	Count	0	0	0	3	3
		% within Level of participation of commercial banks in credit risk management	.0%	.0%	.0%	10.7%	4.5%
	Mostly applied	Count	0	3	15	13	31
		% within Level of participation of commercial banks in credit risk management	.0%	25.0%	65.2%	46.4%	47.0%
	Extremely applied	Count	3	9	6	9	27
		% within Level of participation of commercial banks in credit risk management	100.0%	75.0%	26.1%	32.1%	40.9%

Total	Count	3	12	23	28	66
	% within Level of participation of commercial banks in credit risk management	100.0%	100.0%	100.0%	100.0%	100.0%

**Table 17: Asset Base and Level of Participation Chi-Square Test**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.615(a)	9	.040
Likelihood Ratio	20.071	9	.017
Linear-by-Linear Association	8.025	1	.005
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Pretax profit of borrowing company had a significant association to the credit appraisal and monitoring ( $\chi^2 = 17.615$ ,  $P = 0.040$ ).

**Table 18: Pretax Profits and Credit Appraisal and Monitoring Cross Tabulation**

		Credit appraisal and monitoring				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Pretax profits of borrowing company	Rarely applied	Count	0	0	2	3	5
		% within Credit appraisal and monitoring	.0%	.0%	8.7%	10.7%	7.6%
	Moderately applied	Count	0	0	0	3	3
		% within Credit appraisal and monitoring	.0%	.0%	.0%	10.7%	4.5%
	Mostly applied	Count	0	3	15	13	31
		% within Credit appraisal and monitoring	.0%	25.0%	65.2%	46.4%	47.0%
	Extremely applied	Count	3	9	6	9	27
		% within Credit appraisal and monitoring	100.0%	75.0%	26.1%	32.1%	40.9%

Total	Count	3	12	23	28	66
	% within Credit appraisal and monitoring	100.0%	100.0%	100.0%	100.0%	100.0%

**Table 19: Pretax Profits and Credit Appraisal and Monitoring Chi-Square**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.615(a)	9	.040
Likelihood Ratio	20.071	9	.017
Linear-by-Linear Association	8.025	1	.005
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Pretax profit of borrowing company had a significant association to the credit information sharing ( $\chi^2 = 17.615$ ,  $P = 0.040$ ).

**Table 20: Pretax Profits and Credit Information Sharing Cross Tabulation**

			Credit information sharing				Total
			Rarely applied	Moderately applied	Mostly applied	Extremely applied	
Pretax profits of borrowing company	Rarely applied	Count	0	0	2	3	5
		% within Credit information sharing	.0%	.0%	8.7%	10.7%	7.6%
	Moderately applied	Count	0	0	0	3	3
		% within Credit information sharing	.0%	.0%	.0%	10.7%	4.5%
	Mostly applied	Count	0	3	15	13	31
		% within Credit information sharing	.0%	25.0%	65.2%	46.4%	47.0%
	Extremely applied	Count	3	9	6	9	27
		% within Credit information sharing	100.0%	75.0%	26.1%	32.1%	40.9%
Total		Count	3	12	23	28	66
		% within Credit information sharing	100.0%	100.0%	100.0%	100.0%	100.0%

**Table 21: Pretax Profits and Credit Information Sharing Chi-Square Test**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.615(a)	9	.040
Likelihood Ratio	20.071	9	.017
Linear-by-Linear Association	8.025	1	.005
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

Pretax profit of borrowing company had a significant association to the level of participation of commercial banks in credit risk management ( $\chi^2 = 17.615$ ,  $p = 0.040$ ).

**Table 22: Pretax Profits and Level of Participation Cross Tabulation**

		Level of participation of commercial banks in credit risk management				Total	
		Rarely applied	Moderately applied	Mostly applied	Extremely applied		
Pretax profits of borrowing company	Rarely applied	Count	0	0	2	3	5
		% within Level of participation of commercial banks in credit risk management	.0%	.0%	8.7%	10.7%	7.6%
	Moderately applied	Count	0	0	0	3	3
		% within Level of participation of commercial banks in credit risk management	.0%	.0%	.0%	10.7%	4.5%
	Mostly applied	Count	0	3	15	13	31
		% within Level of participation of commercial banks in credit risk management	.0%	25.0%	65.2%	46.4%	47.0%
	Extremely applied	Count	3	9	6	9	27
		% within Level of participation of commercial banks in credit risk management	100.0%	75.0%	26.1%	32.1%	40.9%

Total	Count	3	12	23	28	66
	% within Level of participation of commercial banks in credit risk management	100.0%	100.0%	100.0%	100.0%	100.0%

**Table 23: Pretax Profits and Level of Participation Chi-Square Test**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.615(a)	9	.040
Likelihood Ratio	20.071	9	.017
Linear-by-Linear Association	8.025	1	.005
N of Valid Cases	66		

a 11 cells (68.8%) have expected count less than 5. The minimum expected count is .14.

### Analysis of Variance

**Table 24: ANOVA**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.118	3	4.706	8.023	.000 <sup>b</sup>
	Residual	36.367	62	.587		
	Total	50.485	65			

a. Dependent Variable: Credit risk management

The ANOVA findings of this study explained that the  $0.001 \leq p \leq 0.05$  at 95% confidence interval implying that there were significant differences in the means of the groups from which the study data was sourced and thus, the groups were independent i.e. the study confirmed that there are variations among the groups which make them different and hence independent.

### Pearson Product Moment Correlation Analysis

There was no significant relationship in the regional presence of the borrowing company to the credit appraisal and monitoring ( $r = 0.143$ ,  $p = 0.254$ ).

**Table 25: Regional Presence and Credit Appraisal and Monitoring Correlations**

		Regional presence of the borrowing company	Credit appraisal and monitoring
Regional presence of the borrowing company	Pearson Correlation	1	-.143
	Sig. (2-tailed)	.	.254
	N	66	66

Credit appraisal and monitoring	Pearson Correlation	-.143	1
	Sig. (2-tailed)	.254	.
	N	66	66

There was no significant relationship in the regional presence of the borrowing company to the credit information sharing ( $r = 0.143$ ,  $p = 0.254$ ).

**Table 26: Regional Presence and Credit Information Sharing Correlations**

		Regional presence of the borrowing company	Credit information sharing
Regional presence of the borrowing company	Pearson Correlation	1	-.143
	Sig. (2-tailed)	.	.254
	N	66	66
Credit information sharing	Pearson Correlation	-.143	1
	Sig. (2-tailed)	.254	.
	N	66	66

There was no significant relationship in the regional presence of the borrowing company to the level of participation of commercial banks in credit risk management ( $r = 0.143$ ,  $P = 0.254$ ).

**Table 27: Regional Presence and Level of Participation Correlations**

		Regional presence of the borrowing company	Level of participation of commercial banks in credit risk management
Regional presence of the borrowing company	Pearson Correlation	1	-.143
	Sig. (2-tailed)	.	.254
	N	66	66
Level of participation of commercial banks in credit risk management	Pearson Correlation	-.143	1
	Sig. (2-tailed)	.254	.
	N	66	66

There was a significant relationship in the variety or category of industry to the credit appraisal and monitoring ( $r = 0.138$ ,  $P = 0.270$ ).



**Table 28: Category of Industry and Credit Appraisal and Monitoring Correlations**

		Credit appraisal	Variety or category of industry
Credit appraisal	Pearson Correlation	1	.138
	Sig. (2-tailed)	.	.270
	N	66	66
Variety or category of industry	Pearson Correlation	.138	1
	Sig. (2-tailed)	.270	.
	N	66	66

There was a significant relationship in the variety or category of industry to the credit information sharing ( $r = 0.244$ ,  $P = 0.048$ ).

**Table 29: Variety or Category and Credit Information Sharing Correlations**

		Variety or category of industry	Credit information sharing
Variety or category of industry	Pearson Correlation	1	.244(*)
	Sig. (2-tailed)	.	.048
	N	66	66
Credit information sharing	Pearson Correlation	.244(*)	1
	Sig. (2-tailed)	.048	.
	N	66	66

\* Correlation is significant at the 0.05 level (2-tailed).

There was a significant relationship in the variety or category of industry to the level of participation of commercial banks in credit risk management ( $r = 0.438$ ,  $P = 0.001$ ).

**Table 30: Category of Industry and Level of Participation Correlations**

		Variety or category of industry	Level of participation of commercial banks in credit risk management
Variety or category of industry	Pearson Correlation	1	.438(**)
	Sig. (2-tailed)	.	.000
	N	66	66
Level of participation of commercial banks in credit risk management	Pearson Correlation	.438(**)	1
	Sig. (2-tailed)	.000	.
	N	66	66

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

There was a significant relationship in the amount of loan borrowed to the credit appraisal and monitoring ( $r = 0.438$ ,  $P = 0.001$ ).

**Table 31: Amount of Loan Borrowed and Credit Appraisal and Monitoring Correlations**

		Credit appraisal and monitoring	Amount of loan borrowed
Credit appraisal and monitoring	Pearson Correlation	1	.438(**)
	Sig. (2-tailed)	.	.000
	N	66	66
Amount of loan borrowed	Pearson Correlation	.438(**)	1
	Sig. (2-tailed)	.000	.
	N	66	66

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

There was a significant relationship in the amount of loan borrowed to the credit information sharing ( $r = 0.438$ ,  $P = 0.001$ ).

**Table 32: Amount of Loan and Credit Information Sharing Correlations**

		Amount of loan borrowed	Credit information sharing
Amount of loan borrowed	Pearson Correlation	1	.438(**)
	Sig. (2-tailed)	.	.000
	N	66	66
Credit information sharing	Pearson Correlation	.438(**)	1
	Sig. (2-tailed)	.000	.
	N	66	66

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

There was a significant relationship in the amount of loan borrowed to the level of participation of commercial banks in credit risk management ( $r = 0.438$ ,  $P = 0.001$ ).

**Table 33: Amount of Loan and Level of Participation Correlations**

		Amount of loan borrowed	Level of participation of commercial banks in credit risk management
Amount of loan borrowed	Pearson Correlation	1	.438(**)
	Sig. (2-tailed)	.	.000
	N	66	66

Level of participation of commercial banks in credit risk management	Pearson Correlation	.438(**)	1
	Sig. (2-tailed)	.000	.
	N	66	66

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

There was a significant relationship in the asset base of the borrowing company to the credit appraisal and monitoring ( $r = 0.351$ ,  $P = 0.004$ ).

**Table 34: Asset Base and Credit Appraisal and Monitoring Correlations**

		Asset base of the borrowing company	Credit appraisal and monitoring
Asset base of the borrowing company	Pearson Correlation	1	-.351(**)
	Sig. (2-tailed)	.	.004
	N	66	66
Credit appraisal and monitoring	Pearson Correlation	-.351(**)	1
	Sig. (2-tailed)	.004	.
	N	66	66

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

There was a significant relationship in the asset base of the borrowing company to the credit information sharing ( $r = 0.351$ ,  $P = 0.004$ ).

**Table 35: Asset Base and Credit Information Sharing Correlations**

		Asset base of the borrowing company	Credit information sharing
Asset base of the borrowing company	Pearson Correlation	1	-.351(**)
	Sig. (2-tailed)	.	.004
	N	66	66
Credit information sharing	Pearson Correlation	-.351(**)	1
	Sig. (2-tailed)	.004	.
	N	66	66

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

There was a significant relationship in the asset base of the borrowing company to the level of participation of commercial banks in credit risk management ( $r = 0.351$ ,  $P = 0.004$ ).

**Table 36: Asset Base and Level of Participation Correlations**

		Asset base of the borrowing company	Level of participation of commercial banks in credit risk management
Asset base of the borrowing company	Pearson Correlation	1	-.351(**)
	Sig. (2-tailed)	.	.004
	N	66	66
Level of participation of commercial banks in credit risk management	Pearson Correlation	-.351(**)	1
	Sig. (2-tailed)	.004	.
	N	66	66

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

There was a significant relationship in the pretax profits of borrowing company to the credit appraisal and monitoring ( $r = 0.351$ ,  $P = 0.004$ ).

**Table 37: Pretax Profits and Credit Appraisal and Monitoring Correlations**

		Pretax profits of borrowing company	Credit appraisal and monitoring
Pretax profits of borrowing company	Pearson Correlation	1	-.351(**)
	Sig. (2-tailed)	.	.004
	N	66	66
Credit appraisal and monitoring	Pearson Correlation	-.351(**)	1
	Sig. (2-tailed)	.004	.
	N	66	66

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

There was a significant relationship in the pretax profits of borrowing company to the credit information sharing ( $r = 0.351$ ,  $P = 0.004$ ). This implies that pretax profits of the borrowing company are strongly negatively correlated with credit information sharing. Enhancement pretax profits will reduce credit information sharing and reduction of pretax profits will enhance credit information sharing.

**Table 38: Pretax Profits and Credit Information Sharing Correlations**

		Pretax profits of borrowing company	Credit information sharing
Pretax profits of borrowing company	Pearson Correlation	1	-.351(**)
	Sig. (2-tailed)	.	.004
	N	66	66

Credit information sharing	Pearson Correlation	-.351(**)	1
	Sig. (2-tailed)	.004	.
	N	66	66

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

There was a significant relationship in the pretax profits of borrowing company to the level of participation of commercial banks in credit risks ( $r = 0.351$ ,  $P = 0.004$ ). This implies that pretax profits of the borrowing company are strongly negatively correlated with the level of participation of commercial banks. Hence enhancement of pretax profits will reduce the level of participation of commercial banks and reduction of pretax profits will enhance level of participation.

**Table 39: Pretax Profits and Level of Participation Correlations**

		Pretax profits of borrowing company	Level of participation of commercial banks in credit risk management
Pretax profits of borrowing company	Pearson Correlation	1	-.351(**)
	Sig. (2-tailed)	.	.004
	N	66	66
Level of participation of commercial banks in credit risk management	Pearson Correlation	-.351(**)	1
	Sig. (2-tailed)	.004	.
	N	66	66

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

### Hypotheses Test of Study Variables

**Table 40: Hypotheses Test of Study Variables**

Null hypothesis	Presumed significance level of data	Computed p-values for variables	Conclusion
Ho <sub>1</sub> : credit risk management among the commercial banks in Kenya is independent of geographical diversification	$\alpha = 0.05$	$p=0.113$ $r=0.197$	Null hypothesis accepted
Ho <sub>2</sub> : credit risk management among the commercial banks in Kenya is independent of industry diversification.	$\alpha = 0.05$	$p=0.001$ $r=0.515$	Null hypothesis rejected
Ho <sub>3</sub> : credit risk management among the commercial banks in Kenya is independent of the size of the borrowing company.	$\alpha = 0.05$	$p=0.004$ $r=-0.351$	Null hypothesis rejected

The researcher presumed that sampling was done at 95% confidence interval and hence at a significance level of  $\alpha = 0.05$ , since the p-values for geography diversification ( $p = 0.113$ ), industry diversification ( $p = 0.001$ ) and size diversification ( $p = 0.004$ ), then two of these variables namely: industry diversification and size diversification have critical values that lie within the rejection region on a normal distribution curve and thus their null hypotheses which state that Ho2: credit risk management among the commercial banks in Kenya is independent of industry diversification and Ho3: credit risk management among the commercial banks in Kenya is independent of the size of the borrowing company were rejected. However, the null hypothesis for geographical diversification had no critical value and thus did not lie within the rejection region and therefore its null hypothesis which stated that Ho1: credit risk management among the commercial banks in Kenya is independent of geographical diversification was accepted.

Hence, the study concluded that at the  $\alpha = 0.05$  level of significance, since the p-value for industry diversification was found to be less than 0.05 ( $p= 0.001$ ) and size diversification found to be less than 0.05( $p= 0.004$ ), then there existed enough evidence to conclude that the slope of the multiple regression line was not Zero and hence the variables namely industry diversification and size diversification were significant and good predictors of credit risk management among commercial banks in Kenya.

## **CONCLUSIONS AND RECOMMENDATIONS**

Based on the objects of the study, it was concluded that corporate loan portfolio diversification had a strong association with credit risk management among commercial banks in Kenya. More specifically, it was concluded that Geographical diversification had no significant relationship with credit risk management among commercial banks in Kenya. Secondly, it was concluded that there existed a significant relationship between industry diversification and credit risk management among commercial banks in Kenya and that there existed a significant relationship between size of the borrowing company and credit risk management among commercial banks in Kenya. The study concluded that asset base and pretax profits of the borrowing companies affected to a small extent credit risk management among commercial banks under study. In addition, the study concluded that the variety or category of the industry and amount of loan borrowed affected moderately the credit risk management among commercial banks.

The study concluded that even though lack of diversification was not a major cause of ineffective credit risk management, internal controls were necessary to cushion the banks from any negative unforeseen intrusions emanating from such credit loan portfolio diversifications. Particularly, the study concluded that proper credit appraisals, credit information sharing and hedging were necessary antecedents in effective credit risk management among commercial banks in Kenya.

### Policy Recommendations

The following policy recommendations were proposed to improve the overall management of credit risk among commercial banks in Kenya. Firstly, on size diversification, a framework is established that helps determine the size of the borrowing companies and their potential to grow over time. This is to be achieved through identification of proper measurable metrics such as growth in profitability, decrease in operational cost and general improvement of effectiveness and efficiency in management as growth indicators.

Secondly, on industry diversification, measures are put in place that helps identify borrowing companies based on specific parameters. This is to be achieved through identifying proper parameters such as level of corporate tax, compliance levels on various corporate requirements upon which companies in various industries of the economy may be targeted.

Thirdly, on geographical diversification, measures are put in place that identifies borrowing companies based on competitive advantages in areas of existence other than the mere geographical locality. This is to be achieved through identification of proper competitive measures that support the existence of such companies in their areas over time.

### Contribution to Knowledge

1. This study found out that geographical diversification has no significant relationship with Credit risk management among commercial banks in Kenya. This means, commercial banks should not look at the geographical location of the borrowing company in an endeavor to enhance credit risk management.
2. The significant relationship established between industry diversification and credit risk management among commercial banks in Kenya will help banks to always ensure that they consider the industry of operation of the borrowing company before extending credit. This is because some industries are prone to various economic shocks.
3. The significant relationship established between size of the borrowing company and credit risk management among commercial banks in Kenya would help banks know that they should always consider size of the borrowing companies before extending credit based on level of their pre-tax profits or their asset base.

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