Determinants of Bank Credit Risk: Evidence from Deposit Money Banks in Nigeria

Ogundele Stephen Omobolade[1], Akinadewo Israel Seriki[2] and Oloowokere Johnson Kola[3]

[1,2]Department of Management and Accounting, Obafemi Awolowo University, Nigeria

[3]Department of Accounting, Osun State University, Nigeria

ogundeleomobolade@gmail.com[1], omoeri@yahoo.co.uk[2], johnson.olowookere@uniosun.edu.ng[3]

Abstract

This study investigated the determinants of credit risk in Nigerian Deposit Money Banks (DMBs). The study employed secondary data, sought from the financial statements of the banks from 2009-2018 and adopted the specific variables and macro-economic variables thereof. The data were measured with panel data regression method. The findings revealed that Loan Loss Provision/Total Loan, Total Loan/Asset Ratio, Gross Domestic Product Growth, and Inflation had a positive and significant relationship. The results also showed that Bank Liquidity and Capital Adequacy Ratio had a negative and significant relationship. In line with the outcome of the study, it is thus recommended among others that banks' management should endeavour to develop rigorous and robust credit policies that will enable efficient and effective assessment of the creditworthiness of banks' customers.

Keywords: credit risk, deposit money banks, non-performing loan.

Introduction

Financial institutions play a vital role in the development of any economy. The health of the financial sector is crucial in any economy as its failure can disrupt economic development and growth of the nation. Deposit Money Banks (DMBs), nowadays offer large number of financial services and products in the market and amongst these services and products, lending is regarded as their major activity generating income (Grima & Thalassinos, 2020, Thalassinos & Stamatopoulos, 2015). Similarly, the rapid changes in the global financial sector pose various risks for the banking industry. Nonetheless, what stands as an argument is how efficient a bank can manage its exposures to risks - minimizing risk and at the same time ensuring profit maximization. Thus, the probability of borrowers being unable to meet their loan obligations to the DMBs has lately been on the increase and this has become a major concern for financial institutions in Nigeria, especially those involved in unsecured lending. Consequently, it has shown that the risks associated with borrower's default could have a huge impact on other related business (Sujeewa, 2015). Credit risk is considered as a vital concern which may cause financial instability, inefficiency and threatens the going concern of the business. This form of risk is inherent in the traditional function of DMBs, which is essentially based on granting credits. The share of Non-Performing Loans (NPLs) in total loans mirrors the credit risk of banks. Recently, NPLs has received more attention from policy makers, academic and practitioners, since the increasing rate of NPLs is cited among major causes of financial crisis and collapse in the financial institutions (Barr & Siems, 1994; Adebola, Yusoff & Dahalan, 2011) and also higher NPLs causes the banks to experience lower profit margins and if the problem increases, it could lead to corporate failure (Misman & Bhatti, 2020).

The challenge of Non-Performing Loans (NPLs) in the banking sector in many nations of the world cannot be overemphasized. In the present time, banks are very conscious of the distribution of their loan due to NPLs (Sontakke & Tiwari, 2013). The financial crises have revealed that an increase in the Non-Performing Loans (NPL) ratio of the banks indicated that there are some problems in the real economy (Claessens, Klingebiel, & Laeven, 2001). Many banks are investing huge amounts of cash and human resources in developing credit risk management systems. This is because the challenge of NPLs has led to the poor performance of some banks majorly as a result of several reasons. First, if the credit system is weak, NPLs are likely to increase which tends to increase the level of loan loss provisions. This is an expense that directly affects the income statement and consequently reduces the bank's profitability. Secondly, when the level of NPLs increases, this implies that the projected or expected cash inflows are either delayed or are not received at all. This negatively affects the banks' liquidity positions. Lastly, the increase of NPLs calls

for additional hands or people in managing the problem with respect to loans which also increases expenses and consequently increases the cost to income ratio (Kihuro & Iraya, 2018).

In Nigeria as an emerging economy; credit risk management plays a pivotal role to uphold the investors' confidence to invest. The size of NPLs is an important benchmark in evaluating a banking crisis (Misman & Bhatti, 2020). Therefore, the need to understand the determinants of credit risk is essential. A well-functioning banking sector with acceptable levels of credit risk translates into better bank performance and ultimately a stronger economy. Therefore, a forward-looking model that can predict the level of credit risk that leads to corporate failure can assist investors in making an informed judgment on their investment decisions and help the corporation to review its business strategy. It can also assist credit providers to mitigate and manage such threats. As a consequence, credit risk will be maintained at a secure level. The primary objective of this study is to explore the determinants of credit risk especially in an emerging economy like Nigeria.

Literature Review

This section explains the concept of risk and credit risk in particular amidst so many risks that a bank is confronted with. It also shows evidence that identifies the major determinant of credit risks. Many researchers have conducted a lot of studies on determinants of credit risk, due to its significant impact on the failure of the banks. There are several variables that affect credit risk.

Concept of Risk and Credit Risk

Risk simply implies the possibility of an unexpected outcome. It is an unexpected and unclear future event that could affect the actualization of organizational objectives and goals (Kha & Ahmed, 2001). It creates the notion that future events may have some degree of uncertainty, thereby exposing an institution to adversity. Similarly, businesses are faced with uncertainties and depending on the nature of the operations, the banking sector experience specific types of risks. Risk management is springing up daily particularly in the banking sector as a growing volatile economic environment and becoming more complicated with the trend towards an integrated global financial system. Rejda (2011), opined that risk management is a process by which the identification, the assessment of loss exposures faced by an entity and the adoption of best possible techniques and strategies to deal with the risk exposure. Thus, strong risk management practices in the banking industry are paramount significance for both economic sustainability and financial stability.

Credit risk is regarded as a risk that a debtor or a counter party of a financial contract cannot fulfil its obligations in compliance with the agreed terms (Ahmet & Harun, 2019). Also, Credit risk refers to the risk of an economic loss from the failure of a counterparty to meet its contractual obligations (Jorion, 2009). Credit risk depends on the ability of borrowers to generate enough cash flows through operations, earnings, or asset sales in meeting their future interest and principal payment of the outstanding debt (Norlida & Rohani, 2015). Banks do their business by issuing various types of loans in a bid to earn profit by managing these loans and advances. The banks grant loans to various people like individuals, organizations as well as Government, for investment purpose they could earn profit from these loans. Banks set their deposits with high margins from the creation of credits as loans. If the assets do not generate any income, the bank profitability would be in question and in this case assets of banks become weak and these types of banks normally lose the confidence of its customers. Ultimately, unrecoverable amounts of loans are written off as Non-Performing Loans (NPLs).

Empirical Review

Ahmad and Ariff (2007) found out the factors that are associated with credit risk is the ratio on non-performance loan to total loan in different developed and developed countries like Australia, France, Japan, India, Korea, Malaysia, Mexico and Thailand. The banks' specific variables are used like liquidity, operating efficiency loan deposit ratio and spread to find out the credit risk. Different countries have different rating of credit risk, like Thailand; has more credit risk and Malaysia was in second number in credit. Louzis *et al.* (2012) examined the determinants of NPLs in the Greek Financial Sector used Dynamic

Panel Data Model and found as real GDP growth rate, Return on Assets and Return on Equity had negative, whereas unemployment, lending, and inflation rate had positive significant, while the Loan to Deposit Ratio and Capital Adequacy Ratio had an insignificant effect on NPLs. Norlida *et al.* (2015) investigated the determinants of credit risk and to examine the impact of earnings management on credit risk prediction. The results revealed that the Liquidity Ratio was significant in determining credit risk before and after earnings management was adjusted. Sohaib and Qazi, (2016) investigated the determinants of credit risk of Commercial Banks in Pakistan. The explanatory variables of this study are Macro and Bank-Specific variables. The Macro Variable includes GDP growth and growth in interest rate, while the Bank-Specific Variable consist Capital Adequacy Ratio, growth in advances, operation inefficiency, loan to depots ratio, loan loss provision and size of the bank. The dependent variable of the study was credit risk which is measured as the ratio of Non-Performing Loan to total loan in Twenty-six (26) Commercial Banks covering data period from 2007-2013. The findings revealed that operating inefficiency, loan deposit ratio, and size has an insignificant relation with credit risk in Commercial Banks of Pakistan. The relation between credit risk and growth in GDP is positive.

Majid and Ensieh (2016) examined the impact of Macro-economic features, such as GDP, inflation, rate of GDP growth, imports goods and final services, rate of nominal interest, amount of credit risk in the last period and the growth rate of the facility to be addressed in the credit risk of the Mellat Bank. Moreover, the effects of macroeconomic conditions on credit risk were investigated. In this regard, Credit risk of 52 active branches of Mellat Bank with variables such as GDP growth, GDP rates, inflation, credit growth and nominal interest rate. Based on the results of the research the effect of nominal interest rate, facility growth rate and the growth rate of GDP on the credit risk was significant and positive in contrast, the inflation rate has had a negative effect on credit risk.

Ahmet and Harun (2019) carried out a study to determine the factors affecting Credit Risk Management of the banking sector. For this purpose, quarterly financial data for the period 2014 to 2017 Islamic banks operating in Turkey were explored. The study was conducted with panel data regression method. The results of the study showed that there was a positive significant relationship between Credit risk and Capital Adequacy Ratio, net profit share income and the natural logarithm of total assets. In addition, a negative and statistically significant relationship was found between the gross domestic product and credit risk.

Misman and Bhatti (2020) examined the issues related to Credit Risk in selected Islamic banks (IB) in nine countries (9) from Association of South East Asian Nations (ASEAN) and Gulf Cooperation Council (GCC) regions. The study used 12 years of unbalanced panel data from 40 different Islamic banks and employed the Generalized Least Squares Panel Data Regression, to estimate the ratio of Non-performance Financing to Total Financing as dependent variables and Bank Specific variables in determining the credit risk. The result showed that financing quality has a significant positive effect on credit risk. It was observed that the larger IBs owned more assets with lower credit risk compared to smaller banks. Also, the age of the bank is also a vital element in influencing the credit risk level. It was also observed that IBs were not affected by the global financial crisis due to less credit risk compared to the conventional banks.

Misman and Bhatti (2020) stated that most of the studies about the credit risk of Commercial Banks focus on developed countries, ignoring due research on banks from developing countries. Bonfim (2009), Louzis *et al*. (2012), Incekara and Çetinkaya (2019), Ahmet and Harun (2019) are among others who worked on developed country's data. In addition to variables explored in studies, this paper considered Capital Adequacy Ratio as it affects credit risk in addition to variables that have been explored in previous studies. Capital adequacy measures financial strength of a bank expressed by the ratio of its capital (net worth and subordinate debt) to its weighted credit exposures in terms of loans (Mendoza *et al.*, 2017). Capital absorption of risk is one of the vital parts DMBs need to consider. Basel Capital Accords introduced capital ratios to demonstrate the strength of risk management. As a result, the recognition of the crucial role of capital ratio, has led us to use indicators to measure the strength of credit risk management which makes will it essential in the model.

Methodology

Population and Sample

This study primarily focused on listed Deposit Money Banks (DMBs) in Nigeria. The population of this study comprised 22 DMBs listed on the Nigerian Stock Exchange as at 2019. The study adopted purposive sampling techniques to select DMBs whose stocks were actively traded on the stock market during the sample period with relevant data readily available totaling 12 Deposit Money Banks. The data for the study were sourced from secondary sources. Data covering years 2006 to 2018 was sourced from the Annual Reports and Accounts of the selected DMBs, Central Bank of Nigeria and Nigerian Stock Exchange factbook.

Research Model and Variables

The main objective of this study was to examine the determinants of credit risk in the Nigerian banking sector. Panel data technique is utilized in identifying the determinants of the credit risk of the Deposit Money Banks in Nigeria. The study investigated bank-specific variables such as Bank Size (*SIZ*), Bank Liquidity *(LIQ)*, Loan Loss Provision /Total Loan *(LLT)*, Return on Equity *(ROE)*, Capital Adequacy Ratio *(CAR)*, Loan to Asset Ratio *(LAR)*, and Operational Inefficiency *(OPI)*. Further, this study included Micro Economic Variables like GDP growth and Inflation *(INF)*, see Table 1. Dependent and Independent Variables that are thought to have an effect on the research model were select in the literature based on the studies used to determine credit risk in the Banking Sector (Vania & Sudarso, 2015; Sohaib & Oazi, 2016; Majid & Ensieh 2016; Buthiena, 2019; Ahmet & Harun, 2019). The specific model for this study is in the form of Panel Methodology and is stated in the equation 3.1.

$$CRR = SIZ_{it} + LIQ_{it} + LLT_{it} + ROE_{it} + CAR_{it} + LAR_{it} + OPI_{it} + GDP_{it} + INF_{it} + \varepsilon_{it} \quad \ldots 3.$$

Table 1

Measurement of Variables

Variables	Measures	References
Credit Risk (CRR)	Non-Performing Loans / Total Loans	Vania *et al.*, 2015; Sohaib & Qazi 2016; Ahmet and Harun 2019
Firm Size (SIZ)	The logarithm of Total Assets	Tehulu & Olana, 2014; Buthiena, 2019; Ahmet and Harun, 2019
Bank liquidity (LIQ)	Total Loan / Total Deposit	Louzis *et al.*, 2012; Tehulu & Olana, 2014; Buthiena 2019
Return on Equity (ROE)	Profit after Tax/Total Equity	Tehulu & Olana, 2014; Vania *et al.*, 2015; Zheng *et al.*, 2018
Capital Adequacy Ratio (CAR)	As disclosed in the annual reports	Aemiro & Rafisa, 2014; Metin & Ali, 2015; Ahmet & Harun 2019
Loan to Asset Ratio (LAR)	Loan/Total Asset	Ahmet and Harun 2019
Loan loss provision (LLP)	Loan loss provision / Total loan	Sohaib and Qazi 2016
Operational Inefficiency (OPI)	Operating Expenses/Total Asset	Aemiro & Rafisa, 2014; Chaibi & Ftiti, 2015; Buthiena, 2019;
GDP Growth (GDP)	Rate of growth in GDP	Majid & Ensieh 2016; Ahmet and Harun 2019; Buthiena 2019
Inflation (INF)	Inflation rate	Majid & Ensieh 2016; Ahmet and Harun 2019; Buthiena 2019

Source: Authors' Field Work (2020)

Empirical Results and Discussions

Correlation Matrix

Table 2 tests the correlation among all the independent variables used in this study. Before starting the analysis, we checked the possible multi-collinearity between the independent variables of our model. Multi-collinearity can distort the precision of estimating regression coefficients and make the estimated values of the coefficients sensitive to small data fluctuations (Bourbonnais, 2009). To do this, we studied the correlation matrix above. The study of the correlation matrix (Table 2) reveals a weak correlation between the variables, except for the pair (SIZ, OPI) which are moderately correlated respectively to 55.5%. Since the correlation coefficient between these variables is less than the limit value (i.e. 0.8), then no serious problem of multi-collinearity (Kennedy, 2003). So, we confirm that we are not confronted with a problem of correlation of variables in our sample.

Table 2

Variable Correlation Matrix

Covariance Analysis									
Sample: 2009-2018									
Correlation									
Prob	SIZ	LIQ	LLT	ROE	CAR	LAR	OPI	GDP	INF
SIZ	1.000								

LIQ	-0.100	1.000							
	0.301	-----							
LLT	***-0.33018	-0.075	1.000						
	0.001	0.443	-----						
ROE	***0.277374	0.149	-0.258	1.000					
	0.004	0.124	*0.007	-----					
CAR	*0.1714	***-0.27289	-0.113	0.244	1.000				
	0.076	0.004	0.244	**0.0108	-----				
LAR	***-0.48	***0.438272	-0.064	0.027	-0.003	1.000			
	0.000	0.000	0.512	0.785	0.976	-----			
OPI	***-0.555	***-0.31985	***0.44424	***-0.35784	-0.127	0.072	1.000		
	0.000	0.001	0.000	0.000	0.189	0.459	-----		
GDP	**-0.214	**-0.256956	*0.164113	-0.077	*0.17758	-0.113	**0.21682	1.000	
	0.026	0.007	0.090	0.426	0.066	0.244	0.024	-----	

***, **, * indicate significant at 1%, 5%, 10% levels, respectively

Source: Authors' Field Work (2020)

Descriptive Statistics

In determining factors affecting credit risk of Deposit Money Banks; Table 3 shows the mean, median, maximum value, minimum value, standard deviation, skewness, kurtosis, Jarque-Bera and Probability values of the variables in the model.

Table 3

Descriptive Statistics

	CRR	SIZE	LIQ	LLT	ROE	CAR	LAR	OPI	GDP	INF
Mean	0.112	20.752	0.646	0.060	0.021	0.133	0.437	0.053	0.044	0.118
Median	0.055	20.825	0.615	0.035	0.088	0.173	0.434	0.051	0.046	0.121
Maximum	0.969	22.508	1.587	0.498	1.094	0.440	0.734	0.142	0.113	0.165
Minimum	0.006	18.678	0.262	0.001	-3.943	-1.986	0.155	0.000	-0.016	0.081
Std. Dev.	0.153	0.959	0.215	0.080	0.481	0.306	0.115	0.024	0.036	0.028
Skewness	3.136	-0.420	1.054	3.504	-5.775	-5.884	-0.180	0.825	0.227	0.256
Kurtosis	14.470	2.452	5.265	16.475	44.208	40.637	2.830	5.146	2.516	1.973
Jarque-Bera	797.4315	4.985846	47.0561	1134.155	9081.18	7451.056	0.740037	36.333	2.19867	6.532
Probability	0	0.082668	0	0	0	0	0.690722	0	0.33309	0.038

Source: Authors' Field Work (2020)

The result in Table 3 indicate that the average credit risk variable is 11.2 percent. This result indicates the share of Non-Performing Loan of DMBs to Total Loans; which means that the bank has a problem of receiving 11.2 naira for every 100 naira given out. The minimum and maximum values are 0.006 and 0.969 respectively. Also, the mean value of loan loss provision in relation to the total loan is 0.06. Likewise, the average value of capital adequacy ratio is 13.3% which is similar to the result achieved by Kajola *et al.* (2018). This is less than the 15% minimum CAR required by the CBN for DMBs with international authorization and more than 10% CBN's minimum figure for DMBs with national authorization, this result reveals a high CAR value of 8% Basel requirements. The average value of loan in relation to Total Asset is 0.437. It shows that an average of 43.7 percent of the Total Asset is given out in the form of a loan. The bank liquidity shows an average value of 64.6 percent; this shows that an average of about 64.6 percent is given as loan in relation to the deposits made by customers. The average value of the gross domestic product (GNP) growth rate during the sample period is 4.4%. This results in the period under review shows the average yearly growth rate in Nigeria. The average value of the inflation rate is at the level of 1.18%. The credit risk (CR) variable has a positive average value, the positive of the average for this variable shows that the banks in the sample have a high credit risk. As reported in Table 3, SIZ, LAR, OPI, GDP and INF mirrors a normal distribution. Also, the standard deviation of the Credit Risk Variable of DMBs is smaller than the average, indicating that the differences between banks are insignificant.

Regression

In line with similar studies conducted in other climes, this study adopts regression analytical approach. In the analysis, the random effects model and the fixed effects model were estimated separately with the help of Eviews. Before the panel data regression, the Hausman test was used as the last step to select the most accurate estimator. Hausman test results are given in Table 5. The presentation of the result of regression based on Fixed Effects and Random Effects techniques is shown in Table 5. It demonstrates an agreement in the results of the two approaches. The coefficients of the Bank Liquidity and Capital Adequacy Ratio had a negative and significant relationship to credit risk; while Firm Size, Loan Loss Provision/Total Loan, Growth in GDP, Loan/Asset Ratio and Inflation Rate had a positive and significant relationship in the two techniques.

Table 4

Regression Result

	Fixed Effect			Random Effect		
Variable	Coefficient	t-Statistic	Prob.	Coefficient	t-Statistic	Prob.
SIZ	0.060158	2.040664	0.0443	0.047105	1.819301	0.0719
LIQ	-0.125308	-2.505098	0.0141	-0.122555	-2.482438	0.0147
LLT	1.270203	10.90308	0	1.266968	10.94474	0
ROE	-0.023065	-1.447286	0.1514	-0.022309	-1.401949	0.1641
CAR	-0.093767	-2.354884	0.0208	-0.092166	-2.341492	0.0212
LAR	0.039133	2.401394	0.0185	0.033601	2.195237	0.0305
OPI	0.446571	0.849286	0.3981	0.374663	0.721064	0.4726
GDP	1.355671	4.810745	0	1.273064	4.747622	0
INF	0.743658	2.582777	0.0115	0.725698	2.540432	0.0126
C	-1.319283	-2.064854	0.0419	-1.035651	-1.837104	0.0692
R square	0.7944			0.6969		
Adjusted R square	0.7421			0.6691		
Durbin Watson	1.5797			1.4795		
F stat	16.808			25.04109		
Prob (F stat)	0			0		

Source: Authors' Field Work (2020)

Hausman's Specification

To determine which of the results of the two regressions (Fixed effects and Random effects models) is appropriate for valid inference, Hausman's (1978) specification test was conducted. Table 5 presents the result of Hausman's specification test.

Table 5

Hausman Test

Correlated Random Effects - Hausman Test				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		2.677672	9	0.9757

Source: Authors' Field Work (2020)

According to Gujarati and Porter (2009), when the p-value is significant at 5% level, the Fixed Effects Model is more appropriate for valid inferences to be made. However, if the p-value is not significant at 5%, then the Random Effects Model is suitable to be used for inference. The results of the p-values for the two models as shown in Table 5 are greater than 5%, hence the discussion of regression results was made using the outcome of the Random Effects Model.

Discussion of Regression Result

The result of the regression in Table 5 provides that the coefficient of determination (R-square) of 0.697 (69.7%) and Adjusted R-square of 0.669 (66.9%) indicating that 69.7% variation in the dependent variable (CRR) is explained by the explanatory (bank-specific and macro-economic) variables (SIZ, LIQ, LLT, ROE, CAR, LAR, OPI, GDP and INF). The F-statistic is 25.041 and this is significant at 1% level (p = 0.000). This affirms that the model as a whole is jointly fit. Hence, the explanatory values are significantly linked with the dependent variable.

The findings suggest that Banks Size (SIZ) had a positive impact on credit risk and it is not statistically significant having a p-value of 0.0791 and a coefficient of 0.0471. These results mean that each unit increase in the size of DMBs will increase the credit risk by 4.7%. It could be explained that larger banks have a tendency to engage in more risk in a bid to have more returns and in a bid to enhance their financial performance. This result is similar to the studies in the literature (Abdullah, Khan & Nazir, 2012; Tehulu & Olana, 2014; Sohaib & Qazi, 2016). With respect to Bank Liquidity (LIQ), the result revealed that there is a negative and significant relationship between bank liquidity and credit risk as for the p-value and t- stat are 0.0147 and -2.4824 respectively while the coefficient value is -0.1225. The result is similar to the findings in the works of Buthiena (2019). The liquidity ratio likewise determines the banks' credit risk. As liquidity increases; it connotes a lower amount of credit is granted and as a result, the likelihood of credit risk decrease (Tehulu & Olana, 2014).

Table 4 showed that there exists a positive and significant relationship between Loan Loss Provision/Total Loans (LLT) and credit risk at 1% level of significance as for the p-value is 0.000, tstat is 10.9947 and coefficient is 1.26696. These results mean that each unit increase in the LLP of DMBs, the credit risk will increase by 1.267%. The outcome of this study is consistent with the works of Sohaib & Qazi 2016. Many banks are investing huge amounts of human resources and cash in enhancing the credit risk management systems. The result depicts that credit risk increases positively and this has the tendency to weaken the credit system which invariably affects the performance of banks. The relationship between Return on Equity (ROE) and credit risk is negative and insignificant at 5% level (coefficient = -0.0223; t-stat = -1.401 and p-value = 0.1641), the result is the same with the works of; also the works of Massai & Jouini (2013), Tehulu & Olana (2014) and Roman & Bilan (2015).

The findings also revealed that Capital Adequacy Ratio (CAR) negatively and significantly affects credit risk, having a p-value of 0.0212 and co-efficient of -0.0922. This result connotes that each unit increase in CAR of Deposit Money Banks, the credit risk will increase by 0.21%. The negative relationship in the result is similar to Aemiro & Rafisa (2014). The LAR has a significant relationship with credit risk as the p-value, coefficient and t values are 0.0305, 2.195 and 2.195 respectively. This result is similar to the studies in the literature (Ahmet and Harun 2019). Also, the relationship between Operating Expenses (OPI) and credit risk is positive and insignificant at 5% level (coefficient = 0.3746; t-stat = 0.7210 and p-value = 0.4720), Prior studies reported similar positive findings between operating inefficiency and credit risk for example Park & Zhang, (2012); Aemiro & Rafisa (2014); Abid *et al.* (2014) and Chaibi & Ftiti (2015).

The GDP growth was included in our analysis to see the effect of the real economy on credit risk. It, therefore, appears that there is a positive relationship between the GDP growth rate and credit risk. The result shows that there is a positive and significant relationship. The outcome of the similar to the work of Alexandri and Santoso (2015). From Table 4, the relationship between Inflation (INF) and credit risk is positive and significant at 5% level with t value giving 2.5404. It indicates that the higher the inflation, the higher the credit risk of Nigerian DMBs. The outcome of this study is consistent with the works; Louzis 2012**,** Sohaib and Qazi 2016. Higher inflation can make debt servicing easier by reducing the real value of outstanding loans. However, it can also weaken borrowers' ability to service debt by reducing their real income. Therefore, the relationship between inflation and credit risk can be positive or negative.

Conclusion and Recommendations

The main objective of the study was to examine the determinants of the credit risk of Deposit Money Banks (DMBs) in Nigeria. The study based on panel data analysis on the period from 2009 to 2018. The data were analysed by using the fixed effect model and random effect model in conducting detailed panel data analysis. The robustness of the results was statistically checked through the Hausman specification test. This study revealed that LLT, LAR, GDP and INF had a positive and significant relationship at 5% level of significance while LIQ and CAR had negative and significant relationship at 5% level of significance. In this study, both macroeconomic and bank-specific variables which have impact on the credit risk of DMBs were explored. The study differs from other studies and is unique with the use of 2 macroeconomic variables and the inclusion of 7 bank-specific variables. In lieu of this, it is considered that banking industry should take these factors into consideration for good credit risk management.

Studies have shown that the banking credit risk is significantly affected by both the bank specific and macroeconomic variables (Louzis 2012; Tehulu & Olana, 2014; Sohaib & Qazi, 2016; Ahmet & Harun 2019), if banks could develop such robust systems, the likelihood of the growth in credit risk will significantly reduce, also minimize the levels of provisions held and ultimately enhance bank performance. So, DMBs could improve credit risk management by formulating policies around these factors. The Deposit Money Banks as well as the regulatory authorities should come up with identification, assessment, measurement and evaluation of credit risk in order to avoid unpleasant financial distress in the banking industry. In line with the outcome of the study, it is recommended that banks 'management should endeavour to develop rigorous and robust credit policies that will enable them to efficiently and effectively assess the creditworthiness of their customers. In a bid to reduce credit risk, bank managers should focus on quality of loan instated of quantity of loan. The credit history of the customer should be put into consideration before giving out loans to customers and likewise, each customer should be assigned a credit limit subject to the firm policy and their respective credit history.

Based on the findings summarized above, the researchers recommend that, banks maintain minimum level of non-performing loans vis-a-vis provision for loans and advances. There is also a need for DMBs to diversify their source of income base. This is because over-reliance on interest income from loans and advances may not yield adequate returns necessary to compensate providers of capital in the industry.

References

Abdullah, A., Khan, A.Q. & Nazir, N. (2012). A Comparative Study of Credit Risk Management: A Case Study of Domestic and Foreign Banks in Pakistan.

Abid, L., Ouertani, M. N. & Zouari-Ghorbel, S. (2014) Macroeconomic and Bank Specific Determinants of Household's Non Performing Loans in Tunisia: A Dynamic Panel Data. *Procedia Economics and Finance*, 13.58-68.

Adebola, S.S., Yusoff, W. & Dahalan, J. (2011). An ARDL Approach to the Determinants of Nonperforming Loans in Islamic Banking System in Malaysia. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *33*(830), 1 11

Ahmad, N. H. & Ariff, M. (2007). Multi-Country Study of Bank Credit Risk Determinants. *International Journal of Banking and Finance*, *5*(1).

Ahmet, I. & Harun, C. (2019) Credit Risk Management: A Panel Data Analysis on the Islamic Banks in Turkey. 3rd World Conference on Technology, Innovation and Entrepreneurship 947–954.

Aemiro, T. T. & Rafisa, O. D. (2014) Bank- Specific Determinants of Credit Risk: Empirical Evidence from Ethiopian Banks", in Research Journal of Finance and Accounting 5(7)80– 85.

Alexandri, A., Santoso, S. 2015. Non-Performing Loan: Impact of Internal and External Factor (Evidence in Indonesia). International Journal of Humanities and Social Science Invention, 4(1), 2319-7722.

Bank for International Settlements. (2000). Principles for the Management of Credit Risk. 10 23, 2018 tarihinde https://www.bis.org/publ/bcbs75.pdf adresinden alındı.

Barr, R.S., & Siems, T.F. (1994). Predicting Bank Failure Using DEA to Quantify Management Quality. Financial Industry Studies Working Paper 94-1, Federal Reserve Bank of Dallas

Bonfim, D (2009) Credit Risk Drivers: Evaluating the Contribution of Firm Level Information and of Macroeconomic Dynamics.*Journal of Banking & Finance*. 33: 281 - 99

Buthiena, k. (2019) Determinants of Bank Credit Risk: Empirical Evidence from Jordanian Commercial Banks. *Academy of Accounting and Financial Studies Journal* 23(3).

Chaibi, H. & Ftiti, Z. (2015) Credit Risk Determinants: Evidence from a Cross-Country Study. Research in International Business and Finance, 33, 1-16.

Claessens, S., Klingebiel, D. & Laeven, L. (2001). Financial restructuring in banking and corporate-sector crises. *The National Bureau of Economic Research*.

Gujarati, D. N. & Porter, D. C. (2009). *Basic econometrics.* New York: McGraw-Hill/Irwin.

Gray, B., Cassidy, C., & R. B. A. (1997). *Credit risk in banking. Proceedings of a Conference at H.C. Coombs Centre for Financial Studies 1-2 May 1997*.

Grima, S., Thalassinos, I. E. (2020). *Financial derivatives: A blessing or a curse?* Emerald Publishing Co., London UK, ISBN: 9781789732467

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1215 1271.

Incekara, Ahmet, & Harun Çetinkaya. (2019). Credit risk management: A panel data analysis on the Islamic banks in Turkey. *Procedia Computer Science* 158: 947–54.

Jorion, P. (2009*). Financial risk manager handbook*. New Jersey: John Wiley & Sons, Inc.

Khan, T. & Ahmed, H. (2001). Risk management: An analysis of issues in Islamic financial industry (Occasional Papers) (No. 91). *The Islamic Research and Teaching Institute* (IRTI).

Kihuro, J. M. & Iraya, C. M. (2018) Credit risk management and bank performance: A Critical literature Review. IOSR *Journal of Economics and Finance 9*(6), 9-13.

Louzis, D., Vouldis, A. & Metaxas, V. (2012). Macroeconomic and bank-specific determinants of nonperforming loans in Greece: A Comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking and Finance*, 36 (4), 1012 -1027.

Majid, L. G. & Ensieh, A. (2016). Analyse and survey variables of macroeconomic effects on credit risk of bank Mellat. *European Journal of Economics and Business Studies*. 2(2). 143-152

Mendoza, R. & Rivera, J. P. (2017). The effect of credit risk and capital adequacy on the profitability of rural banks in the Philippines. *Scientific Annals of Economics and Business 64*(1), 2017, 83 – 96.

Metin, V. & Ali, H. (2015) Determining impacts on non-performing loan ratio in Turkey. *In Journal of Applied Finance & Banking*, 5(1) 1-11.

Messai, A. & Jouini, F. (2013). Micro and macro determinants of non-performing loans. *International Journal of Economics and Financial Issues*, 3(4), 852-860.

Misman & Bhatti (2020). The determinants of credit risk: An evidence from ASEAN and GCC Islamic banks. *Journal of Risk and Financial Management*, *13*(89) 1-22.

Norlida, A. M., Ng Y. T. & Rohani, M. (2015). The determinants of credit risk in Malaysia. *Procedia - Social and Behavioural Sciences* 172, 301 – 308.

Rejda, G. E. (2011). Principles of risk management and insurance. *Pearson Education India*.

Roman, A., Bilan, I. (2015). An empirical analysis of the macroeconomic determinants of non-performing loans in EU28 banking sector. *Revista Economică,* 67(2), 108-127.

Sohaib, I. K. & Qazi M. N. (2016). the determinants of credit risk in commercial banks of Pakistan. *Journal of Poverty, Investment and Development*. 25, 65-72.

Sontakke, R. N. and Tiwari C. (2013): Trend analysis of nonperforming asset in scheduled commercial banks in India; *International Journal of Application or Innovation in Engineering & Management*.

Sözer, İ. A. (2010). *Bankalarda Takipteki Krediler: Takibine Yönelik Bir Model Önerisi.* İstanbul: Marmara Üniversitesi Bankacılık ve Sigortacılık Enstitüsü, Yüksek Lisans Tezi.

Sujeewa, K. (2015). Impact of credit risk management on the performance of commercial banks in Sri Lanka. *Proceedings of the 1st International Conference in Accounting Researchers and Educators*.

Tehulu, A. & Olana, D. R. (2004). Bank-specific determinants of credit risk: empirical evidence from Ethopian Bank. *Research Journal of Finance and Accounting*, 5(7), 80-85.

Thalassinos, I. E., & Stamatopoulos, V.T. (2015). The trilemma and the Eurozone: A Pre announced tragedy of the Hellenic debt crisis. *International Journal of Economics and Business Administration*, 3(3), 27-40. DOI: 10.35808/ijeba/77.

Vania, A. & Sudarso, K. W. (2015). Bank-specific determinants of credit risk: empirical evidence from Indonesian banking industry. *International Journal of Technical Research and Applications. 1-4.*

Zheng, C., Sarker, N., & Nahar, S. (2018). Factors affecting bank credit risk: An empirical insight. *Journal of Applied Financeand Banking*, 8(2), 45-67.