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International Digital Organization for Scientific Research ISSN: 2550-794X
IDOSR JOURNAL OF SCIENTIFIC RESEARCH 6(1) 8-27, 2021.

Credit Risks Indicators and Performance of Deposit Money Banks in Nigeria and Botswana: A Comparative Analysis

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ABSTRACT

The study examined the responsiveness of credit risk parameters on the financial performance of deposit money banks in Nigeria and Botswana for a period of ten (10) years spanning 2010 to 2019 using longitudinal panel data and ex-post facto research design. The study used return on assetsto measure financial performance while non performing loans, capital adequacy risk, liquidity risk and loan loss provision were used as proxies for credit risk management. Secondary sources of data were obtained from twenty (20) quoted deposit money banks in Nigeria and Botswana and were analyzed using descriptive statistics, correlation, variance inflation factor and panel regression analyses. The results from regression analysis showed that credit risks had a negative and significant effect on return on assets of deposit money banks in Nigeria while a positive and significant effect was also documented for Botswana banks all at 5% level of significance. On the other hand, capital adequacy risk, liquidity risk and loan loss provision have insignificant effect on both banks.. Findings suggest that banks should strike a proper balance between credit risk managementstrategies and financial performance by engaging in appropriate credit and liquidity risk management practices that will ensure safety for their banks and yield positive profits. Therefore, in order to reduce non performing loans (NPL), deposit money banks in Nigeria and Botswana should evaluate the potential risk that may cause the borrower to default on its loan obligation.

Keywords: Credit risk parameters, capital adequacy risk, non- performing loans, return on assets

INTRODUCTION

A viable banks activity involves engaging in financial intermediation, provision of service, provision of loans to customers, and overall management of credit risks. It is worthy to note that credit risks can yield the possibility of both pleasant surprises as well as adverse business results with a general hypothesis that the amount of credit risk taken has a direct impact on the potential return [1, 2, 3, 4]. How well or poorly a bank performs has been linked to risks taken by management of the banks [5]. It is worthy to emphasis that the performance of the global economy has been affected by crises like the unforeseen Covid-19pandemic that hit the world in 2019 through 2020 and led to economic slowdown. The previous global economiccrisis was financial crisis of 2008–2009 that was attributed to excessive risk appetites by financialinstitutions [6]. The crisis led to erosion of the investor trust in the ability of deposit money banks (DMBs) to manage credit risks effectively [7]. Prior studies in this topic yielded inconsistent results with some prior studies documenting positive result, some negative and some no result or insignificant result.In one end of the spectrum are studies that assert a positive relationshipbetween credit risk management and financial performance [8, 9, 10, 11, 12, 13, 14, 15, 16]. A positive relationship signifies that effective credit risk management results in less credit risk, which leads to increased profits [17].

At theopposite end are those studies that stress that a negative relationship exits [18]. Other studies by [19, 20, 21, 22, 23] also, concluded a negative impact of credit risk on financial performance. The negative relationship could be due to less leverage and risk taking, as risk management practices get tightenedand this reduces bank profitability. Despite the perceived positive role of credit risk management on improving bank financial performance, studies in this area have offered inconsistent results.While the above research outcomes provide valuable insights on credit risk management, it is therefore evident that they have not induced and provided a clear cut relationship between credit risk and performance of deposit money banks [21, 22, 23, 24]. This outcome, therefore, led to a research question of how credit risk management practices have affected banks in developing economies such as Nigeria and Botswana, where financial sophistication is low and risk management is imperative in order to boost profits. This study is also expected to unravel the inconsistencies of results in developing nations and also add to a scanty literature therein.Based on these trends the researcher sought to investigate whether deposit money banks in Nigeria and Botswana were more prone to credit risks. The scopeof study covered the performance of these deposit money banks for ten years from 2010–2019. The researcher focusedon studying only listed deposit money banks across two countries (Nigeria and Botswana)because among the companies that issuedprofit warnings in the study period at least 25 per cent were from this banking sector [25, 26, 27]. Besides, most of the studies concentrated on one country analysis but this current study cut across two countries and extended the period to ten years against what some prior studies did. Against this backdrop, the following objectives were specified to guide this study:

i. To investigate the effect of credit risk on performance of deposit money banks in Nigeria and Botswana
ii. To ascertain the effect of capital adequacy on performance of deposit money banks in Nigeria and Botswana.
iii. To determine the effect of liquidity risk on performance of deposit money banks in Nigeria and Botswana.
iv. To determine the effect of loan loss provision on performance of deposit money banks in Nigeria and Botswana.

Credit Risk and Bank Performance

Credit risk occurs when a debtor defaults on a loan or other line of credit. The field of credit risk has gained considerable momentum due to the increased competition in the banking sector and the challenges of the present financial crisis. In 1996, the Bank of International Settlement (BIS) defined credit risk as the risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter. [28] studied some Nigerian banks between 2004 and 2008 and found that there exists a significant relationship between banks performance and credit risk management. [29] revealed that credit risk management has a strong bearing on bank profitability in Kenya. [7] posit that credit risk management plays a key role in bank's financial performance. [9] investigated the effects of credit risk and other risk components on the banks' financial performance. They found a strong relationship between risk components and the banks' financial performance. [11], examined the relationship between credit risk and banks' profitability. They found a linear relationship between credit risk and bank profitability. This study measured c*redit risk as non-performing loans /total loans*

Capital Adequacy Risk and Bank Performance

Capital adequacy is the amount of capital a bank has to hold as required by its financial regulator. This helps to ensure that banks are not involving in or holding investments that amplify the risk of default. In addition, to guarantee that the

banks have enough capital to sustain operating losses while honouring withdrawals. [10], concluded that capital adequacy ratio influence banks' profitability (ROA). Implementation of financial risk management practices relates to the adequacy of the provision and reserves which are in accordance with Basel standards which require banks to have a capital adequacy ratio of 8%. Capital adequacy ratio is measured in terms of total capital as a percentage of total risk weighted assets which show the amount of capital an institution holds relative to the risk profile of its assets. Capital adequacy is evaluated using the minimum core capital which is the absolute amount of capital that institutions are required to maintain at all times for banks and mortgage finance companies as a requirement by the central bank.[11], studied the Risk Performance of the GCC Banking and showed that capital adequacy risk is the major factors that affect bank performance when profitability is measured by return on assets.

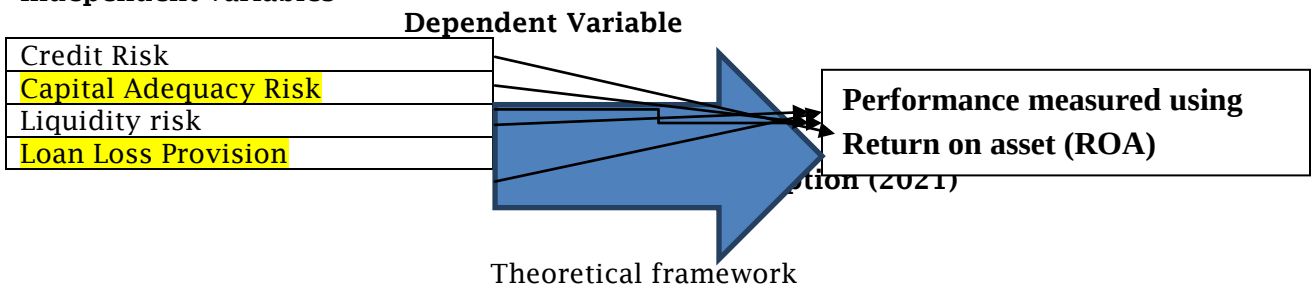
Liquidity Risk and Bank Performance

Liquidity risk is the situation whereby the financial institutions have to make payment but the available assets are long-term and can only be converted quickly with the capital loss. This situation can arise when depositors withdraw their funds unexpectedly and raising further deposits becomes impossible to do. To avoid such condition, a financial institution can hold highly liquid assets which can then be converted quickly into the required amount of fund to reduce their liquidity risk.Findings on the impact of liquidity risk as an important component of financial risk management practices on performance also disclosed mixed results. A statistically significant positive effect was found in the studies by [12, 14, 18, 20, 23, 24]. This positive impact of liquidity risk management on financial performance indicates that efficient liquidity risk management leads to increased profitability. Other studies by [3, 7, 9 10] provided evidence of statistically significant negative impact of liquidity risk management on financial performance**.** Studies by [11, 13, 16, 19]], underscored an insignificant effect on financial performance.However, the study conducted in China and Malaysia found that liquidity level of banks has no relationship with the performances of banks (Said &Tumin, 2011). This usually occurs due to the inability to convert a security or hard asset to cash without a loss of capital and/or income in the process.Ilhomovich (2009) used cash to deposit ratio to measure the liquidity level of banks in Malaysia but we *proxied liquidity risk astotal loans and advances divided by the total deposits*

Loan Loss Provision and Bank Performance

One of the ways banks make money is off the interest payments and expenses they receive from the loans they give out. If those loans are not repaid or the interest payments are not as high as expected, the banks' earnings can take a hit. To mitigate those losses, banks will always make provision such loan loss. It is a percentage (%) that reflects accumulated provision expenses (minus write-offs) of current total loans. It is a rough indicator of the overall quality of the loan portfolio, and it represents the —loan loss reserve amounts maintained by a commercial bank to offset the default risk in its total outstanding loan portfolio. [18], conceptualized loan loss provision as an income statement expense set aside as an allowance for uncollected loans and loan payments. This provision is used to cover different kinds of loan losses such as non-performing loans, customer bankruptcy, and renegotiated loans that incur lower-than-previously-estimated payments. A loan loss provision refers to funds set aside by a bank to cover bad loans – the ones that did not get fully repaid because the customer defaults or those that provide less interest income because the borrower negotiated a lower rate. Empirically, [14] discovered that loan loss provision has a positive and insignificant effect on performance of deposit money banks in Nigeria and Ghana.

These are the rationale behind this study. Hence this conceptual framework diagram



Theoretical framework

The study was supported by three theories. These were the agency theory, information asymmetrytheory andshiftability theory. Agency theory was linked to firm performance while informationasymmetry and signaling theories were linked to the risks undertaken by the managers of these banksand the expected impact on banks' performances [15, 16, 17]. According to [18,19], shareholders task the banks' managers and the executive boardwith the role of managing risks. Risks affect the organizational performance. These risks if managedwell can help achieve the goal of maximizing investment returns and earnings of firms [20]. In practice,shareholders are not aware of all information available to the firm's managers that influence the riskyventures taken by them on behalf of the shareholders of the firm. As a result, the effects on ownership andgovernance, and the indirect costs to a firm's performance which include administrative, operationaland even reputation costs emerge much later when dismal performances are reported at the end of afinancial year [21]. Thus, information asymmetry came into play when investigatingthe risks taken by the managers and the overall effects on the firm performance. On the other hand, shiftability theory of liquidity.HaroldG, Moulton in 1915, developed shiftability theory [16].The theory states that banks should invest some of their funds available for investment in securities and credit instruments that have secondary market so that they can be converted to cash as and when a need arises to address declining liquidity. The theory contends that highly marketable securities held by banks is an excellent source of liquidity and that shiftability, marketability or transferability of a bank's assets is a basis for ensuring liquidity [18]. The theory further contends that highly marketable security held by a bank is an excellent source of liquidity.The theory is relevant to a study that focuses on the effect of credit risk on financial performance as it provides a clear explanation as to how credit risk affects financialperformance using liquidity coverage and net stable funding ratios as stated by new Basel III framework [20].

Empirical Review

[14] in their study opined that the performance of 14 companies listed under the commercial and services segment on the Nairobi Securities Exchange (NSE), experienced mixed fortunes. The study sought to assess the implications of financial risk on the performance of these companies. Their study applied explanatory research design using secondary panel data contained in published annualreports for the period five years spanning 2013-2017. Findings showed that credit riskhad an insignificant positive effect on return on equity (ROE) while liquidity risk had a significant negative effect on ROE and operational risk had a positive insignificant effect on ROE. The positive coefficients from the data analysis indicated that commercial and service companies at NSE were ableto take in more credit to boost performance of these companies however the negative coefficientsshow that within the period of study these companies experienced high liquidity problems in thatthe current

liabilities exceeded the current assets. Thus, concluding that these companies were unable to pay their entire obligation when they were due.

In a study done by [16], they investigated the relationship between credit risk management and profitability of Deposit Money Banks (DMBs) listed on Stock Exchange of two selected West African countries using a sample of twenty (20) Deposit Money Banks (DMBs). They covered 10 years period spanning from 2009 to 2018. Ex-Post Facto research design was employed while secondary data were collected and subjected to multiple regression and correlation analysis in order to achieve the study objectives. Three (3) specific objectives and hypotheses were tested and analyzed using descriptive statistics, Pearson correlation analysis and panel regression analysis. Their result revealed that credit risk has negative and significant effect on performance of banks in both Ghana and Nigeria using Return on Equity (ROE) as a proxy for measuring performance which was statistically significant at 1% level of significance. Based on their findings, it was recommended that banks in Nigeria and Ghana should enhance their capacity in credit analysis to reduce the risk of default in repayment.In a study done by Zhongming, Frimpong and Guoping (2019), they investigatedthe impact of some financial risk indicators on fifteen selected commercial banks' in Ghana. The indication from the augmented Dickey-Fuller unit root test results show that the data series after first difference at the first order achieved stationarity. The analysis of the data revealed the existence of significant long run relationship between bank financial performance and the variables of financial risk in the banking sector. The granger causality test results reveal that thereis unidirectional causality flowing from the variables of financial risk This suggest that the indicators of financial risk strongly and actively stimulate and improve the financial performance of banks in Ghana. The study recommends that bank managers should improve on the management of all the indicators of financial risk variables in order to improve on the achievement of the objective of the firm. A study by [20] reviewed management of credit risk and non-performing loans in the banks. In hisstudy, credit risk was measured by the characteristic of the borrower which was used to determine thecredit score. The study established that non-performing loans negatively affected a bank's lendingability. This created a negative signaling effect on credit risk. This study added value by shifting focusfrom banks and instead focusing on a non-financial sector operational risk did not significantly affect return on equity of commercial and services companies on NSE in Kenya. The results concluded that at five per cent level of significance, the null hypothesiswas not rejected. This further implied that an increase in operational risk had a positive effect on theperformance of the firms' as per ROE measure. However, the findings are inconsistent with [14] whose study found out that operational risk is inversely related with return on equity. [17], investigated how liquidity risk affected performance of insurancecompanies listed on the Nairobi Stock Exchange, Kenya. They looked at credit risk, operational risk and liquidity risk asthe explanatory variable of the study while ROE was used to gauge performance. They used descriptiveresearch design. For the methodology, multiple regression model was employed. The extreme valuetheory, credit risk theory and capital structure theory supported their research. They found that market risk andoperational risks had significant negative effects on ROE of the insurance companies listed NSE. Their research sought to add value by reviewing liquidity risk on a non-insurance sector of the NSE thusfilling the contextual gap.

METHODOLOGY

Ex post facto research design was used to describe the effects of credit risk on financial performance of 20 deposit money banks in Nigeria and Botswana by using existing secondary data on the selected proxies from the annual reports

of the quoted banks which cannot be manipulated or altered by the researcher. These two countries were selected because they have the largest and most active stock markets in Sub Sahara Africa (in terms of market capitalization, fast rising gross domestic product (GDP) and volume of trade). Deposit money banks were chosen because of their uniqueness in financial reporting disclosure requirements. The start of 2010 is chosen because this period is generally considered as the heat of the financial crisis in which the first severe sub-prime losses were realized. However still after 2010, many banks were still struggling for their existence after the capitalization exercise. The model adopted in this study assumed a linear relationship between credit risk variables measured using non-performing loans, capital adequacy risk, liquidity risk and loan loss provision and financial performance captured using return on assets (ROA). Panel least square was adopted for the purpose of hypothesis testing and was guided by the following linear explicit model as:

$$ROA_{i_t} = \beta_0 + \beta_1 CDRSK_{i_t} + \beta_2 CARSK_{i_t} + \beta_3 LQRSK_{i_t} + \beta_3 LLPV_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where,ROA stands for return on assets, CDRSK represents credit risk captured using non-performing loans, CARSK means capital adequacy risk measured using *Tier 1 capital + Tier 2 capital/Risk weighted assets*LQRSK stands for liquidity risk measured as the*ratio oftotal loans and advances divided by the total deposits*while LLPV means loan loss provision captured as*loan loss provision to classified loans.*

ESTIMATION RESULTS AND DISCUSSION OF FINDINGS

The study investigated the relationship that exists between credit risks variables and banks performance measured using return on assets of quoted deposit money banks in Nigeria between 2010 and 2019. The study carried out some preliminary tests like descriptive statistics, correlations and variance inflation factor (VIF) analysis. The descriptive statistics was used to analyze the data in order to ascertain the normality and nature of the data. Correlation analysis was used to ascertain the association between the variables.Correlation coefficient measures the direction and degree of association between two or more variables. To further check for the case of perfect correlation among variables, Variance inflation factor (VIF) was conducted to test for the presence of multi-collinearity. Finally, the study used panel regression analysis and hausman specification tests in obtaining functional causal effect relationship between financial performance of banks and credit risks components like non performing loans, capital adequacy risks, liquidity risks and loan loss provisions.The table 1 below shows the descriptive statistics of the selected service firms that make up our sample

Table1: Descriptive Statistics Analysis

	ROA	CDRSK	CARSK	LQRSK	LLPV
Mean	2.354300	389065.7	15.64085	0.728050	-3484.920
Median	2.415000	337380.0	14.04500	0.500000	-3200.000
Maximum	9.540000	985389.0	70.88000	2.180000	59024.00
Minimum	-20.20000	100011.0	0.520000	0.000000	-9948.000
Std. Dev.	2.458043	240205.6	8.481410	0.631297	4998.468
Skewness	-4.020262	0.743911	4.246282	0.893471	9.736438
Kurtosis	38.38384	2.563647	27.75828	2.573920	123.6613
Jarque-Bera	10972.22	20.03347	5709.133	28.12255	124486.3
Probability	0.000000	0.000045	0.000000	0.000001	0.000000
Sum	470.8600	77813147	3128.170	145.6100	-696984.0
Sum Sq. Dev.	1202.353	1.15E+13	14314.93	79.30854	4.97E+09
Observations	200	200	200	200	200

Source: researcher's summary of descriptive result (2021) using E-view 10

The descriptive statistics result in Table 1 above shows the mean values for each of the variables, their maximum values, minimum values, standard deviation and Jarque-Bera values which show the normality and nature of the data. The result provides some insight into the nature of the selected listed deposit money banks from two Sub Sahara African countries (Nigeria and Botswana) that were used in the study. Firstly, it was observed that over the period under review, the sampled banks have average positive return on assets of 2.354% while its median value was 2.415. Within the period under review, the banks have maximum value of return on assets of 9.54 while its minimum value was -20.20. The large difference between the maximum and minimum values of return on assets indicates that the performance of the deposit money banks differs greatly among the banks selected and over the period under review, this shows that the banks are not heterogeneous in nature.This extreme large value of ROA implies that some banks in the sample performed poorly while some had very good ROA when compared to the average value.This therefore means that banks with mean value of ROA higher or equal to 2.354 are high profitable banks while banks with the value below the mean value of 2.354 are low profitable banks. Hence, it can be argued that Nigeria and Botswana banks had been efficient enough to generate a higher rate of return out of their assets. The mean log values of credit risk which proxy non-performing loans (CDRSK) of the selected banks was 389065.7 while its median value was 337380. The maximum value of credit risk was 985389 while the minimum value was 100011. This means that it was only banks that adopted an aggressive deposit mobilization to increase credit availability and develop a reliable credit risk management strategy with adequate punishment for loan payment defaults was chosen.The average non-performing loan (NPL) in the deposit money banks for the last 10 years was 389065 (39.5%) with standard deviations of 240205.6. The NPL of the deposit money banks are high when compared to the world average (2-3%). The result, in general, implies that the accumulation of non-performing loan which was claimed as the critical problem of the banking sector was on the high side.Capital adequacy risk has a minimum value of 52% and a maximum value of 70.88%; an average (mean) of 15.64% with a standard deviation of 8.48%. The average amount of CARSK is higher than the minimum capital requirement of the BASEL, Botswana Banks and Central Bank of Nigeria (15%) showing that the banks have the ability to bear loss results from a loan default. The mean value of the Liquidity risk (LQRSK) of the sampled banks was 0.73 approximately while its median value was 0.50. The maximum

value of liquidity risk was 2.180 while the minimum was 0. This means that only banks that actually take its liquidity position into consideration was used in this study since no banks had negativeliquidity risk value. The loan loss provision (LLPV) ratio shows the default risk that the bank expects to sustain from the lending business. For example, while some banks are making provision for non-performing loans and expected loss amount more, some are not making provision for it at all or making less provision. Also, while some of the banks are profitable and having large return on their asset, others are not. The value of skewness of 9.736 indicates that the data is positively skewed and therefore conform to the symmetrical distribution requirement. Moreover, the coefficient of Kurtosis 123.66 also indicates that loan loss provision variable meet the Gausian distribution criterion. Generally, the JB Probability values of 0.0000 shows that all the variables are normally distributed at 1% level of significance. It is an indication that all variables are approximately normally distributed. This means that there are no variables with outlier, even if there are, they are not likely to distort the conclusion and are therefore reliable for drawing generalization. This also justifies the use of panel least square estimation techniques. Hence, any recommendations made to a very large extent would represent the characteristics of the true population of study.

Pearson Correlation Matrix

Pearson's correlation matrix was applied to check the degree of association between credit risk and financial performance of quoted deposit money banks in Nigeriaand Botswana so as to determine the nature or degree of association.Therefore, in examining the association among the variables, we employed the Pearson correlation coefficient (correlation matrix) and the results are presented in the table 2. below

Table 2: Correlation Analysis Result

	ROA	CDRSK	CARSK	LQRSK	LLPV
ROA	1.000000				
CDRSK	-0.030505	1.000000			
CARSK	-0.036974	0.195074	1.000000		
LQRSK	-0.023247	-0.058620	-0.068346	1.000000	
LLPV	0.004322	-0.062664	-0.016082	-0.027242	1.000000

Source: researcher's summary of correlation result (2021) using E-view 10

The above results show that there exist a positive butvery weak association between return on assets and loan loss provision (ROA/LLPV= 0.0043) while negative and weak correlation is documented against ROA, credit risk, capital adequacy risk and liquidity risk (ROA/CDRSK/ and LQRSK = -0.030/-0.036 and -0.023) respectively. In the case of other explanatory variable, there exists a positive and strong association between credit risk and capital adequacy risk (CRSK/ CARSK= 0.20) approximately while there exist a negative andvery weak association between credit risk, liquidity risk and loan loss provision (CRSK/LQRSK and LLPV= -0.058 and -0.062) respectively. It was discovered that a negative and very weak association existed between capital adequacy risk, liquidity risk and loan loss provision (CRSK/LQRSK and LLPV = -0.06 and -0.01) respectively. Finally, we documented that liquidity risk was negatively correlated with loan loss provision, therefore in checking for multicollinearity, the study noticed from the correlation table above that no two explanatory variables were perfectly or highly correlated and thereby ruled out the case of having an outlier. This indicates the absence of multi-collinearity problem in the model used for the analysis. This also justifies the use of the panel least square and variation inflation factor (VIF). Therefore, to further check for multicollinearity problem, VIF analysis was conducted below in table 3.

Variance Inflation Factor (VIF)

To further check for multi-collinearity problem or to know whether the independent variables used are perfectly correlated, we conducted Variance Inflation Factor (VIF) to check for the multi-collinearity problem. The result of the Variance Inflation Factor (VIF) is provided below in table 3 below:

Table 3 Variance Inflation Factor Result

Variance Inflation Factors
Date: 01/16/21 Time: 23:37
Sample: 2010 2019
Included observations: 200

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.313678	2.797887	NA
CDRSK	5.43E-13	1.805200	1.072265
CARSK	0.000420	1.982079	1.066113
LQRSK	0.091580	1.437092	1.004111
LLPV	1.05E-09	1.119808	1.005539

Source: researcher's summary of VIF result (2021)

It can also be seen from the table that all the variables had a variance inflation factor (VIF) of less than 10: Credit risk (1.072), capital adequacy risk (1.066), liquidity risk (1.004) and finally, loan loss provision (1.006) approximately. This implies that there was no multicollinearity problem with the variables, thus all the variables were maintained in the regression model. Even if there are outliers, they are not likely to distort the conclusion and are therefore reliable for drawing generalization.Hence, any recommendations made to a very large extent would represent the characteristics of the true population of study and thus can be used to draw conclusion.

Test of Hypotheses (Nigeria and Botswana)

In order to examine the relationship between the dependent variable (ROA) and the independent variables such as credit risk (CDRSK), capital adequacy risk (CARSK), liquidity risk (LQRSK) and loan loss provision (LLPV)and to test the formulated hypotheses, we employed panel regression analysis since the data had both time series (2010-2019) and longitudinal properties (20 quoted deposit money banks from Nigeria and Botswana). The summary result of both countries regression analysis is presented below. However, the study takes into cognizance the non homogeneity nature of the banks, hence the need for testing its effect on the data. This necessitated the use of Hausman effect specification test to ascertain which effect to explain. That is whether fixed effect or random effect is to be used in interpreting the regression result or to ascertain that which is best to be adopted in the study since our data is a panel data with complete information. Below is the summary of the Hausman test result

Table 4: Hausman Effect Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.613901	4	0.9615

Source: Researcher's summary of Hausman effect test result (2021)

The Nigeria and Botswana Hausman test result above shows a chi-square statistics value of 0.613901and probability value0.9615 which is greater than 5% (0.05); this means that there is heterogeneity in the collection of the banks' data. Since the Chi-square (Prob) value is greater than 5%, hence we accept the random effect and interpret its regression while the fixed effect is rejected. Hausman test shows that the random-effects estimation (REM) method is more appropriate and more preferable than the fixed effects model (FEM) for all deposit money banks in Nigeria and Botswana; hence the results from REM is presented and interpreted in table 5 below.

Table 5 Combined Random Effect Regression Result

Cross-section random effects test equation:				
Dependent Variable: ROA				
Method: Panel Least Squares				
Date: 01/16/21 Time: 23:35				
Sample: 2010 2019				
Periods included: 10				
Cross-sections included: 20				
Total panel (balanced) observations: 200				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	2.400231	0.485795	4.940835	0.0000
CDRSK	-8.64E-09	7.62E-07	-3.011344	0.0110
CARSK	-0.006587	0.021082	-0.312444	0.7551
LQRSK	0.058227	4.325682	2.178786	0.0543
LLPV	-5.18E-06	3.28E-05	-0.157860	0.8747
		Effects Specification		
Cross-section fixed (dummy variables)				
R-squared	0.491973	Mean dependent var		2.354300
Adjusted R-squared	0.399447	S.D. dependent var		2.458043
S.E. of regression	2.199300	Akaike info criterion		4.526322
Sum squared resid	851.2984	Schwarz criterion		4.922120
Log likelihood	-428.6322	Hannan-Quinn criter.		4.686496
F-statistic	3.155567	Durbin-Watson stat		2.179739
Prob(F-statistic)	0.000009			

Source: Researchers Summary of Regression Result (2021)

Table 5 above shows the panel regression result of 20 quoted deposit money banks in both Nigeria and Botswana. It can be seen from the table above, that the F-statistics value of 3.1555 and their P-value of 0.0000 showed that the overall regression model was generally significant at 1% level of significance thus showing that the model was well specified in explaining banks performance. From

the result above, the study observed that the R. squared value was 0.4919 (49.2%) approximately and R-squared adjusted value was 0.3994 (40%) approximately. The adjusted R-squared which stood at 40% indicates that all the independent variables jointly explain about 40% of the system variation in performance of deposit money banks of our sampled countries (Nigeria and Botswana) over the 10years period while about 60% of the total variations were unaccounted for, hence captured by the stochastic error term.Moreover, the Durbin Watson statistic of 2.1797 showed that the model is well spread since the value is approximately 2 and that there have not been self or auto correlation problem and that error are independent of each other.

Discussion of Findings

In testing our hypotheses for both Nigeria and Botswana, we provide the below specific analysis for each of the independent variables as follows:

Ho_1:*Credit risk has no significant effect on return on assets of deposit money banks in both Nigeria and Botswana.* The analysis result of the effect of credit risk (measured using non performing loans) on return on assets of quoted deposit money Banks in Nigeria and Botswanashowed a coefficient value of -8.64, t-value of -3.01 and a P-value of 0.0110. The coefficient value of -8.64revealed that credit risk has negative effect on return on asset of deposit money banks in both Nigeria and Botswana. This result suggests that Non-Performing Loans (NPL) which measures the extent of credit default risk sustained by deposit money banks have a negative effect on ROA. This suggests the need for strong credit risk management to keep the level of NPL as low as possible which will help to maintain the high profitability level of the deposit money banks. Therefore, in order to reduce NPL, deposit money banks in Nigeria and Botswana should evaluate the potential risk that may cause the borrower to default on its loan obligation. Therefore, based on t-statistics values of credit risk management and its coefficient,credit risk appears to be statistically significant and negatively associated with the probability for banks to make huge profit in financial year. By implication, this means that a decrease in the bank's non-performing loans levelwill result to about 8.64% increase in banks profitability. The t-value of -3.01 reveals that banks credit risk has a strong effect on return on assets of selected banks. The probability value of 0.0110 reveals that the effect of credit risk on banks profitability is statistically significant at 1% level of significance. The p-value result re-affirms the t-test statistics result. This finding is in line with the findings of prior studies such as [18, 19, 20, 21, 23] who documented negative and significant result between credit risk and firm performance but negates the findings of [13, 16, 19] that found positive and significant results. Our finding also disagreed with findings of [20] that found insignificant relationship between credit risk and performance of firms. This result therefore rejects our first null hypothesis (H_0) but accepts our alternate hypothesis and therefore concludes that credit risk has significant effect on return on assets of banks which was statistically significant at 1% level of significance.

H_{02}:*Capital adequacy risk has no significant effect on return on assets of deposit money banks in Nigeria and Botswana.*

It can be observed from the regression table 5 above that capital adequacy risk has a negative coefficient value of -0.0065. This reveals a very weak and negative effect on return on assets of banks. As indicated in table 5 above, there is a negative relationship between CARSK and ROA. By implication, this means that a 1% decrease in capital adequacy base leads to a corresponding increase in return on assets of banks. As banks with strong capital base has every tendency of making profit in the long run. It maintains stability and protection against depositors and confidence on the deposit money banks. The t-value of -0.312 reveals that banks capital adequacy risk has a strong effect on return on assets of

selected banks but its effect is not statistically strong enough to drive its performance. The probability value of 0.7551 reveals that the effect of capital adequacy risk on banks profitability in Nigeria and Botswana is statistically insignificant. This result is in agreement with the findings of [14, 17, 18, 20] that recorded negative and insignificant effect between capital adequacy risk and performance of banks but disagrees with the findings of [11, 13, 15, 18] that documented a positive and strong effect between capital adequacy risk and performance of banks. As a result of this insignificant result found, this study therefore accepts the second null hypothesis (H_{02}), which states that capital adequacy risk has no significant effect on profitability of deposit money banks in Nigeria and Botswana.

Ho_3: *Liquidity Risk has no significant effect on return on assets of deposit money banks in Nigeria and Botswana.*

The coefficient values of 0.0582 shows that liquidity risk has positive influence on return on assets of selected banks in Nigeria and Botswana. This indicates that an increase in the management of liquidity ratios of banks leads to an increase in the profitability of selected banks to the tune of 0.058%. By implication, this means that an efficient management of banks liquidity ratio will result to an increase in banks performance to the tune of 0.058%. The study is strongly of the opinions that if the deposit money banks concentrate on the management of loan deposit ratio, it will result to high profit profile of deposit money banks in Nigeria and Botswana. The t-value of 2.178 reveals that banks liquidity risk has a strong effect on return on assets of selected banks while the probability value of 0.0543 reveals that the effect of liquidity risk on banks profitability in Nigeria is statistically significant at 5% level of significance. Our finding is in line with the findings of [16, 17, 18, 19] who documented positive and significant result but in disagreement with the findings of [21, 22, 23, 24] who found negative effect and the results of and Said and Tumin (2011) that recorded insignificant result As a result of this significant result obtained, we therefore reject our third null hypothesis (Ho_3), and conclude that liquidity risk has significant effect on profitability of deposit money banks in Nigeria and Botswana which was statistically significant at 5% level of significance.

H_{04}: *Loan loss provision has no significant effect on performance of deposit money banks in Nigeria.*

The regression result in table 5 above revealed that loan loss provision has negative and insignificant effect on return on assets of quoted deposit money banks in Nigeria and Botswanahaving recorded a strong but negative coefficient value of -5.18% and t-statistics value of -0.157 and a probability value of 0.8747 which is statistically insignificant. This implies that a 1% decrease in the fraction of loan loss provision is associated with a percentage increase in the ratio of return on assets by a very large magnitude of -5.18. That is to say that, it may not be the level of nonperforming loans that is significantly related to the level of return in asset; rather, it is the amount of provision made that is negatively associated with theprofit.The management of deposit money banks in Nigeria and Botswana should clearly recognize the risk arising from lending business and strengthens their credit risk management capability, in addition to allowing high loan loss provisions to loan and advances. The more provision banks keep aside against loan loss, the more their ability to manage their profit and performance base. This study disagreed with the study of [21, 22, 14] who documented negative and significant effect of loan loss provision on banks performance and also differs from the findings of [14, 16, 18] that recorded positive but insignificant result. As a result of this insignificant result documented, this leads to the rejection of our last alternate hypothesis and conclude that loan loss provision has no significant effect on performance of deposit money banks in Nigeria and Botswana.

COMPARATIVE ANALYSIS OF COUNTRIES SPECIFIC RESULTS

The result provides an insight into the responsiveness nexus between credit risks variables and performance (return on assets) of deposit money banks quoted across these 2 countries (Nigeria and Botswana). We examined it variable by variable.

Table 6: Summary of country specific regression results

Variables	Nigeria		Botswana	
	Coeff. Value	P-value	Coeff. Value	P-value
CDRSK	-1.99	0.0428	3.02	0.0182
CARSK	0.0025	0.9190	-0.017	0.5852
LQRSK	-0.3689	0.1920	0.0008	0.9985
LLPV	-8.15	0.9765	-6.87	0.5913
R-square	41.8%		35.6%	

Source: Researchers' Summary of country specific analysis (2021)

The country specific analysis was carried out to examine the effect of credit risk on performance of each country selected for the study. This will enable us examine the impact each country credit risk components and bank system plays on performance of each banks quoted in their respective stock exchange. From the result above, the study observed that credit risk variables jointly affect about 41.8% of banks performance in Nigeria while jointly affect about 35.6% of what happened in Botswana banks using ROA as a measure of performance. The joint effect was more pronounced in Nigeria banks using while this was also followed by Botswana banks. This indicates that credit risks management in Nigeria has about 41.8% chances of improving profitability of banks while in Botswana, credit risk can only improve performance by about 35.6% respectively. In other words, Nigerian and Botswana credit risk strategy have the tendency of improving profitability when adequate measures are put in place to control it.

In the same vein,**non-performing loan**was seen to have a significant effect on both Nigeria and Botswana banks with a negative effect on Nigeria banks while a positive effect was documented against Botswana banks.The positive role of credit risk management on bank performance could be seen in terms of better management of funds, and reducing unnecessary costs such as doubtful advances. Similarly, loan loss provision was found to have anegative and insignificant effect on both Nigeria and Botswana banks. Capital adequacy risk documented a positive and insignificant effect on return on assets of Nigeria banks while a negative and an insignificant effect was recorded for Botswana banks. In the same vein, liquidity risk has positive but insignificant effect on Botswana banks while a negative and insignificant effect was reported against Nigeria deposit money banks.

CONCLUSION AND RECOMMENDATIONS

The study concluded that, for deposit money banks to generate more profits, they needed to manage theircredit risks strategies effectively.The studynoticed that liquidity ratio and loan loss provision negatively influenced performance of deposit money banks in Botswana while credit risk and loan loss provision negatively affect performance of banks in Nigeria. The negative coefficients of both credit risk, liquidity risk and loan loss provision showed that thesebanks experienced high liquidity problems in that their current liabilities exceeded the currentassets. Thus, concluding that these banks were unable to pay their entire obligation when they weredue. This would adversely affect the bank's performance.Based on the research results, credit risk, liquidity and capital adequacy risks are critical, and companiesneed to pay attention to them. Banks engaging in risk projects can either lose or gain. Informeddecisions need to be adhered to in such scenarios. Consequently, managers of banks need to

comeup with strategies capable of managing these by taking into consideration return on shareholder's assts when dealing with banks' performance of the company. The study also recommends that policymakers and regulators review the external effects of systematic risk on banks' performance.

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Appendix

DESCRIPTIVE RESULT

	ROA	CDRSK	CARSK	LQRSK	LLPV
Mean	2.354300	389065.7	15.64085	0.728050	-3484.920
Median	2.415000	337380.0	14.04500	0.500000	-3200.000
Maximum	9.540000	985389.0	70.88000	2.180000	59024.00
Minimum	-20.20000	100011.0	0.520000	0.000000	-9948.000
Std. Dev.	2.458043	240205.6	8.481410	0.631297	4998.468
Skewness	-4.020262	0.743911	4.246282	0.893471	9.736438
Kurtosis	38.38384	2.563647	27.75828	2.573920	123.6613
Jarque-Bera	10972.22	20.03347	5709.133	28.12255	124486.3
Probability	0.000000	0.000045	0.000000	0.000001	0.000000
Sum	470.8600	77813147	3128.170	145.6100	-696984.0
Sum Sq. Dev.	1202.353	1.15E+13	14314.93	79.30854	4.97E+09
Observations	200	200	200	200	200

CORRELATION RESULT

	ROA	CDRSK	CARSK	LQRSK	LLPV
ROA	1.000000	-0.030505	-0.036974	-0.023247	0.004322
CDRSK	-0.030505	1.000000	0.195074	-0.058620	-0.062664
CARSK	-0.036974	0.195074	1.000000	-0.068346	-0.016082
LQRSK	-0.023247	-0.058620	-0.068346	1.000000	-0.027242
LLPV	0.004322	-0.062664	-0.016082	-0.027242	1.000000

VIF RESULT

Variance Inflation Factors
Date: 01/16/21 Time: 23:37
Sample: 2010 2019
Included observations: 200

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.313678	2.797887	NA
CDRSK	5.43E-13	1.805200	1.072265
CARSK	0.000420	1.982079	1.066113
LQRSK	0.091580	1.437092	1.004111
LLPV	1.05E-09	1.119808	1.005539

NIGERIA REGRESSION RESULT

Dependent Variable: ROA
Method: Panel Least Squares
Date: 02/01/21 Time: 18:05
Sample: 2010 2019
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.303535	0.546633	6.043420	0.0000
CDRSK	-1.99E-07	7.57E-07	-2.263380	0.0428
CARSK	0.002535	0.024877	0.101908	0.9190
LQRSK	-0.368915	0.280746	-1.314055	0.1920
LLPV	-8.15E-07	2.76E-05	-0.029521	0.9765

R-squared	0.418691	Mean dependent var	2.982800
Adjusted R-squared	0.322627	S.D. dependent var	1.802183
S.E. of regression	1.822458	Akaike info criterion	4.086956
Sum squared resid	315.5284	Schwarz criterion	4.217214
Log likelihood	-199.3478	Hannan-Quinn criter.	4.139673
F-statistic	3.452378	Durbin-Watson stat	1.852715
Prob(F-statistic)	0.007426		

BOTSWANA REGRESSION RESULT

Dependent Variable: ROA
Method: Panel Least Squares
Date: 02/01/21 Time: 18:13
Sample: 2010 2019
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.638855	0.973134	1.684099	0.0955
CDRSK	3.02E-07	2.31E-06	2.230451	0.0182
CARSK	-0.017981	0.032829	-0.547722	0.5852
LQRSK	0.000893	0.488410	0.001829	0.9985
LLPV	-6.87E-05	0.000128	-0.538861	0.5913

R-squared	0.356567	Mean dependent var	1.738990
Adjusted R-squared	0.335706	S.D. dependent var	2.857303
S.E. of regression	2.907867	Akaike info criterion	5.021902

Sum squared resid	794.8349	Schwarz criterion	5.152968
Log likelihood	-243.5841	Hannan-Quinn criter.	5.074932
F-statistic	4.155356	Durbin-Watson stat	2.404825
Prob(F-statistic)	0.060139		

COMBINED REGRESSION RESULT

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.613901	4	0.9615

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CDRSK	-0.000000	-0.000000	0.000000	0.0369
CARSK	-0.006587	-0.007145	0.000025	0.9106
LQRSK	0.058227	0.006918	0.014489	0.0699
LLPV	-0.000005	-0.000004	0.000000	0.7903

Cross-section random effects test equation:
Dependent Variable: ROA
Method: Panel Least Squares
Date: 01/16/21 Time: 23:35
Sample: 2010 2019
Periods included: 10
Cross-sections included: 20
Total panel (balanced) observations: 200

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.400231	0.485795	4.940835	0.0000
CDRSK	-8.64E-09	7.62E-07	-3.011344	0.0110
CARSK	-0.006587	0.021082	-0.312444	0.7551
LQRSK	0.058227	4.325682	2.178786	0.0543
LLPV	-5.18E-06	3.28E-05	-0.157860	0.8747

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.491973	Mean dependent var	2.354300
Adjusted R-squared	0.399447	S.D. dependent var	2.458043
S.E. of regression	2.199300	Akaike info criterion	4.526322
Sum squared resid	851.2984	Schwarz criterion	4.922120
Log likelihood	-428.6322	Hannan-Quinn criter.	4.686496

F-statistic	3.155567	Durbin-Watson stat	2.179739
Prob(F-statistic)	0.000009		