



IMPACT OF INTERNAL CONTROL ON CREDIT RISK OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

By

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Abstract

The main objective of the study is to determine the impact of internal control on credit risk of listed deposit money banks (DMBs) in Nigeria for the period of five (5) years from 2018 to 2022. The population of the study consists of fourteen (14) listed DMBs in the Nigerian Exchange Group (NGX) and a census sampling technique was adopted in selecting the sample size of the study. The study used data from the audited annual report of the banks. The data was analyzed using the multiple regression model. The findings of the study that control environment, risk assessment, and control activities were found to be negatively significant on credit risk of the listed DMBs in Nigeria. The study recommended that DMBs in Nigeria should implement risk assessment mechanisms to allow for checks to ensure effective control of the banking activities. Similarly, credit policies and procedures should be followed to the later to ensure that loans are issued to credit worthy people and that there is a security for loan issued. This will reduce the number of non-performing loans of the bank.

Keywords: credit risk, internal control, listed deposit money banks, Nigeria

1. Introduction

After the global financial crisis in 2008 and the corporate scandals faced by the United States' firms of Enron in 2001, WorldCom in 2002, Tyco in 2016 necessitated the need to strengthen internal control of firms and this became increasingly significant. Consequently, the Sarbanes Oxley Act in 2002 was passed by the United State of America Congress to address corporate failures and fraud that led to significant financial losses to individuals and institutional investors. Also, the Dodd Frank Act in 2010 was passed by the United State of America Congress to address losses experienced during the global financial crisis in 2008 and to reduce risk in the banking system (Yilmaz et al., 2009)

A number of measures by the global banking regulatory institution-bank for international settlement provided Basel Accords (I-III) in order to strengthen the internal control process as well as reduce financial risks (Basel Committee on Banking Supervision, 2017). A crucial component of banking operations is internal control, which ensures that assets are protected, and monetary transactions are carried out in a precise and trustworthy way (Alisherovich & Ugli, 2023). Due to the development of complex business processes utilizing technology and the expansion of company units, internal control has also become essential in both the public and private sectors in today's world (Mongina, Ouma & Otsyulah, 2022). Internal control systems of a firm serve as a means of managing risk and lowering the possibility of fraud that can hinder smooth operations and accomplishment of objectives (Mogunde, 2016).

Internal control is a dynamic integral process that is adapting continuously to the changes facing financial service firms. Internal control entails basic organizational elements that help management to effectively deliver services to stakeholders; helps ensure reliability of financial statements and



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compliance with the laws and regulations (COSO, 1992). The Committee of Sponsoring Organizations (COSO) created the internal control integrated framework in 1992 in order to develop efficacious control systems. COSO assessed internal control in five mutually related components which include control environment, risk assessment, control activities, monitoring, and information and communication. However, in 2013, COSO's Board of Directors added 17 internal control principles to the five interrelated components because they were presumed very significant in assessing the five components.

Control environment is the foundation of internal control because it sets the organizational tone by influencing the control consciousness of the organizational workforce. It operates as the brain or the framework for the organizational structure and the fulcrum for planning, organizing, leading and controlling. Risk assessment involves the process of identifying, analyzing, and responding to risks from external and internal sources that threatened the achievement of organizational objectives. Control activities are policies and procedures that help to mitigate the risk that organizational objectives will not be met. These policies and procedures ensure the ways that management directives will be carried out (Whittington & Delaney, 2016). These three components are critical because they systematically encapsulate all components.

The internal controls and risk management aspects are critical to the financial sustainability of financial institutions. Utilising resources effectively and efficiently are vital for a sustainable financial system and are always crucial objectives (Dao & Le, 2012; Margono et al., 2020). Therefore, firms must ensure that risk management in relation to credit risk is closely supervised. One operational activities of banks is to create risk assets and as a result credit risk is created, Credit risk entails the probability that a counter party will fail to repayment obligations when they become due. Assessing the magnitude of the level of credit risk by a firm could be defined by the amount of loan loss provision or non-performing loans and this can be consequential on the returns as well as business expansions of these firms. According to Napitupulu et al. (2020), banks can expand business horizon by ensuring effective credit risk management and efficient internal control system.

The failure of control structures and activities, weak risk management, ineffective internal audit and monitoring activities, ineffective sharing and flow of internal information, and weak management oversight, accountability, and control culture are all contributing factors to the failure of internal control systems ((Kirkpatrick, 2009 and Lang 2010). Internal control systems are policies put in place by management to protect company property and ensure smooth operations. In essence, internal control systems are designed to act as the first line of defense to protecting resources and control fraud. In addition, a weak internal control of a firm can lead an uncontrollable credit risk level.

In Nigeria, the failure of financial institutions such as Afribank Plc, Oceanic Bank Plc, Bank PHB, and Intercontinental bank as an aftermath of the global financial crisis in 2008 (Sanusi, 2011); the acquisition of Diamond bank by Access bank in April, 2019 (Okonji et al., 2023); and the revocation of Heritage bank operational licence in 2024 by the Central Bank of Nigeria (Cable, 2024) can be attributed to weak internal control structures and high level of credit risks through loan loss provisions. The empirical review of various studies on credit risk and internal control has created gaps that the current study intends to explore. Research studies such as Mongina, Ouma, and Otsyulah (2022), Nguyen (2021), Pham (2021), Koutoupis and Malisiovas (2021), Agung (2020), Mwichigi and Atheru (2019) Ogwiji and Lasisi (2022), Mongina, Ouma, and Otsyulah (2022), Akwaa-Sekyi (2020), and



Mwichigi and Atheru (2019) have provided varying results arising from different measurements and methodological approach to arrive at findings. Determining the effect of internal controls on credit risk of listed deposit money banks in Nigeria is, thus, the primary objective of this study. The specific objectives are to:

- (i) ascertain the influence of the control environment on the credit risk of Nigerian listed DMBs;
- (ii) Evaluate the effect of risk assessment on the credit risk of Nigerian listed DMBs;
- (iii) Examine the effect of control activities on the credit risk of Nigerian listed DMBs.

The study formulated hypotheses in null form in order to substantiate and link findings to previous studies. They include:

- H₁: control environment has no significant effect on the listed DMBs' credit risk in Nigeria;
H₂: risk assessment has no significant effect on credit risk of listed DMBs in Nigeria;
H₃: control activities have no significant effect on credit risk of listed DMBs in Nigeria.

This study further reviews the literatures pertinent to the study, the methodology in ensuring data were adequately sourced and analysed, the results emanating from the data analysed are discussed and a means to drawing conclusion and providing recommendations that will benefit stakeholders of listed deposit money banks.

2. Literature Reviews

This section reviewed the variables in the study, related empirical studies, and theories.

Conceptualization

Concept of Credit Risk

The concept of credit risk is defined by Rao and Suresh (2021) as the likelihood that a bank borrower may default on a debt by neglecting to make due payments in accordance with the agreed terms, potentially costing the lender interest or the principal of the loan. It is seen as loss that results from a borrower's inability to return a loan or fulfill contractual commitments to pay both the capital and interest borrowed at a predetermined time, which disrupts cash flows and raises collection costs (Gwamna, Miko, & Abdullahi, 2022).

Concept of Internal Control

Internal control is a system that makes sure enough checks and balances are put in place at banks to ensure that their operations are in line with rules, policies, and procedures with the goal of providing a reasonable assurance that their operations are conducted effectively, efficiently, and in compliance with applicable laws and regulations (Alisherovich, *et al.*, 2023). They further posited that internal control is necessary to manage risk, identify and stop fraud, and always maintain the quality and dependability of financial data. Mwichigi and Atheru (2019) see internal control as the set policies, strategies, processes, and structures that are under the direction of directors, management, and employed personnel in order to protect bank assets, reduce risks, and accomplish the objectives of the bank.

Concept of Control Environment

This is the central component of internal control system. In internal control, the control environment is the foundation upon which any effective internal control system (ICS) should be premised upon. The control environment is the set of standards, processes and structures that provide the basis for carrying out internal control across the organization. It guides in the attainment of the strategic objectives of the



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ICS and the support of adequate financial reporting to all stakeholders (Cohen & Sayag, 2010). It is made up of aspects such as ethical values, the integrity of personnel tasked with formulating, setting up and administering the controls, the directors, audit committees and the organization structure.

The control environment is highly dependent on the effectiveness of the management and the board of directors. Cases of major loss within financial firms like banks reflect management's inattention to and laxity in the control culture of the banking institution. In addition, further losses are attributable to laxity by the directors and senior management.

According to COSO (2013), one basic principle that is germane to the control environment of a firm involves the capacity of board of directors to demonstrates independence from management and exercises oversight responsibility of internal control. Under the principle of board of directors' demonstration of independence, the size of the board of directors has influence over deliberations and control over management (Aliyu, Jamil & Mohamed, 2014).

Eldenbug, Hermalin, Weisbach and Wosinska (2004) opined that small board size reduces the agency cost associated with large board size. Uwuigbe and Fakile (2012) chastised large board size for ineffectiveness and possible lack of coordination as compared to smaller board size. In contrast, Chen and Al-Najjar (2012) confirmed that large board size contributes positively to the general performance of firms. However, the significant point is the board's ability to contribute to deliberations, provide reliable information and avoid manipulations in board decisions

Concept of Risk Assessment

Risk assessment is the identification and analysis of risks related to the achievement of firm's objectives, determination of how such risk is manage, and implementation of the process to address such risks (BPP Learning Media, 2010). It refers to the assessment of factors that may have an inherent possibility of affecting the attainment of the organization objectives. Therefore, an internal control system should be able to address risks related to achieving a firm's goals and the risk assessment process should enable the firm to actively analyze all the relevant risk facing it (Karagiorgos et al., 2009).

COSO (2013) identified five basic principles that firms should carry out when performing effective risk assessment: clearly specify objectives to facilitate the identification and assessment of risks related to organizational objectives; identify and analyze risks to the achievement of organizational objectives to determine how they might be managed; consider potential fraud related to the achievement of objectives; and identify and assess changes that could impact internal control. The prime reason of adopting risk assessment practices is to avoid the probable failure in future. But, in realistic terms, risk assessment is clearly not free of cost. In fact, it is expensive in both resources and in institutional disruption. But the cost of delaying avoiding proper risk management can lead to some adverse results, like failure of a bank and possibly failure of a banking system.

The numerous corporate scandals that took place have brought caution to board composition. Some scholars refer to it as board experience. For instance, board members especially for banks require some form of expertise in Banking and Finance related discipline. Burak, Malmendier and Tate (2008) reported that board members with finance background significantly affect capital budgeting and capital structure decisions and policies of non-bank institutions. Therefore, it is expected that the experience of board members with finance background should impact on taking good risk assessment decisions



which is a major pillar of internal control systems. Nevertheless, management experience aside board experience is significant to a firm control and decision-making process. The inherent nature of financial firms exposes them to risk of various forms. Firms in their quest increase profitability diversify their investments to have revenues from their primary source of risk asset-loan.

Control Activities

Control activities refer to policies, procedures, and mechanisms put in place to ensure directives of management are properly carried out (Aikins, 2011; Rezaee & Sharbatoghlie, 2001). Control activities are policies and procedures that ensure that management directives are carried out. In addition, control activities such as operating review and reporting, authorization, verifications, approvals and division of duties should be implemented in order to avoid risks crystallising. Therefore, these control activities ensure that all necessary actions should be taken with the aim to address risks so that organizational objectives are achieved.

COSO (2013) identified three basic principles of control activities to include selection and development of general control activities that mitigate the risk of achieving organizational objectives to an acceptable level; selection and development of general control activities over technology to support organizational objectives; and deployment of control activities through policies that establish what is expected and through procedures that put policies into action.

Rezaee and Sharbatoghlie (2001) opined that control activities are most effective when they are reviewed by management. As part of effort to fostering the appropriate control culture within a firm, top level management should ensure that adequate control activities are an integral part of the daily functions of all relevant personnel. Internal control ensures compliance with regulatory requirements. Mishkin (2006) stated that firms such as banks that are highly regulated because of the risky nature of credit assets and in order to ensure compliance, prudence and safety.

Empirical Review

Control Environment and Credit Risk

Ogwiji and Lasisi (2022) investigated how internal control systems affect financial services companies in Nigeria's efforts to avoid fraud. 284 responders from Nigeria's listed financial services companies make up the population. A cluster sampling technique was used after the structuring of questionnaire to obtain data. The study showed that control environments had a positive and significant impact on credit risk.

Pham (2021) examined how internal control affected Vietnam's joint stock commercial banks' credit risk from 2007 to 2018. The investigation employed the Random-walk Metropolis Hastings algorithm and Bayesian linear regression on a dataset of thirty Vietnamese joint stock commercial banks. The study's findings indicate that control environment significantly impact on bank credit risk. The findings of Shanmugan and Bourke (2016) on how Thai enterprises' credit risk management was affected by their control environment revealed a positive impact.

Risk Assessment and Credit Risk

Nguyen (2021) investigated the link between credit risk and internal control on Vietnamese commercial banks from 2009 to 2018. The multiple regression technique was used to evaluate the data



sourced secondarily. The result showed a strong correlation between internal control (risk assessment) and bank credit risk in Vietnam.

Agung (2020) examined how internal control affect credit risk of 11 listed banks on the Nairobi Securities Exchange. The study carried out a primary and secondary source of data and a census sample technique was employed to arrive at sample firms from the population. The result revealed that risk assessment significantly affects banks' credit risk.

Karim (2019) conducted a comparative case study of commercial banks in the United Arab Emirates and the United Kingdom by examining the impact of risk assessment methodologies on bank performance. The findings indicated that UK banks prioritized exposure limits and credit portfolio models in their management of credit risk, whereas Emirati institutions gave priority to credit score and financial statement analysis. Second, in comparison to UK banks that employ exposure restrictions, in terms of organizational profitability. The Emirati banks use creditworthiness research and internal ratings in addition to stress testing to assess potential credit risks and increase equity returns.

Control Activities and Credit Risk

Mongina, Ouma, and Otsyulah (2022) carried out a study by investigating the impact of control actions of deposit-taking (SACCOs) Savings and Credit Cooperatives on credit risk in Western Kenya. They were 212 respondents as population of the study. The sample size was established by simple random sampling. Data were sourced both primary and secondary data. The finding revealed that control activities had a strong inverse association with credit risk. A similar study by Katumba (2021) was examined on Ugandan savings and credit cooperative societies. The result showed that control activities had a substantial impact on credit risk management techniques.

Akwaa-Sekyi (2020) investigated the impact of the qualitative principles of the BCBS internal control framework on credit risk of banks for a subset of EU nations for a period between 2004 and 2016. The study's findings indicated a strong correlation between control activities and credit risk. Mwichigi and Atheru (2019) investigate credit risk and internal controls in commercial banks that are listed on Kenya's Nairobi Securities Exchange. A census of the 11 banks in Kenya's securities market was carried out by the research. The results showed that the banks' credit risk was greatly impacted by control activities. The effect of internal control on credit risk, profitability, and compliance with the US banking system was examined by Koutoupis and Malisiovas (2019). The research findings revealed that control activities had a significant impact on credit risk.

Theoretical Framework

Agency Theory

The Agency theory was first presented by Jensen and Meckling in 1976 as a means of elucidating the dynamic between the principal and the agent. The idea, which holds that people always have opportunity, self-interest, and individual preferences, was established based on earlier psychological research. The theory opined how to balance people's interests in order to maximize our collective gain. According to Jensen and Meckling (1976), when there is insufficient and unequal information shared between the primary and the agent, conflict will occur. They both have distinct, often competing interests, but this issue is reduced by limiting how much their interests diverge from one another and by establishing suitable management compensation systems and putting in place a strong monitoring



system to check unauthorized individuals' self-interest and deviant behaviour (i.e, company management).

Agency theory explained the need for internal control system to be implemented in order to provide informational benefits for investors and stockholders. Credit is a vital component of bank operations, serving as the foundation for all aspects of the bank's operations and primarily responsible for its earnings. Consequently, effective risk management in lending operations is a necessary and mandated necessity for all banks. Building an efficient internal control system is required to achieve that in order to help prevent and identify potential hazards in credit operations in order to help bank managers and staff meet the goals that shareholders have set forth.

Information Theory

Derban, Binner, and Mullineux (2005) emphasized that banks sought for borrowers' information before granting. Borrowers are screened through the use of credit assessments before funds are disbursed. There, information gathering is consequential to institutions' activities. Both qualitative and quantitative methods can be used to evaluate borrowers, albeit the application of qualitative models is arbitrary. However, figures and the total of the values compared to onset might be allocated to several borrowers' attributes that are examined using qualitative models (Derban et al., 2005).

Contingency Theory

The variety of internal controls (IC) is explained by contingency theory (Jokipii, 2010). The foundation of the IC framework of COSO and Basel is selected to be the essential principles of contingency theory. According to Chenhall (2003) and Luft and Shields (2003), each business must choose the best control system taking into account its contingency features. Furthermore, it is emphasized by Donaldson (2001) that there is a relationship between internal control structure and contingency characteristics, with the former influencing the latter. Furthermore, according to the author, each stage of the contingency facets fits within the internal control framework. The internal control framework places emphasis on the formation of distinct contingency characteristics as a result of variations in organizational aspects (Girinjas, 2009).

Company size, culture, governance philosophy, aims, and operational environment are among the factors that influence these variances (Girinjas, 2009; Lakis, and Girinjas, 2012). However, depending on the aims and objectives of each organization, these variables differ. The variety of internal controls is essentially explained by the contingency theory approach. The foundation of the IC framework of COSO and Basel is selected to be the essential principles of contingency theory. Since this theory offers an approach to IC and its efficacy in respect to credit risk, it was deemed relevant and appropriate to serve as the study's anchor. This is especially true for banking institutions, whose activities are always changing due to shifting business conditions and internal dynamics that call for new internal controls.

3. Methodology

For the purpose of this study, a correlational research design was used. This design revealed the relationship between two or more variables while forecasting for a specific result based on specific data (Salkind, 2012). The population and sample size of the study is fourteen (14) listed DMBs existing in the Nigerian Exchange Group (NGX) Plc as at December 31, 2022. The period of study is a five-year period from 2018 to 2022. The Ordinary Least Square model was used in analysing the panel nature of



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the data. In addition, the Breusch Langragian Multiplier test and the Hausman specification test were used in determining the fitness of the model. Nevertheless, further data analyses to determine heteroscedasticity and multicollinearity were conducted in order to align with conditions that validates the diagnosis of the data.

The model of the study is expressed as follows:

$$CR_{it} = \beta_0 + \beta_1 CE_{it} + \beta_2 RA_{it} + \beta_3 CA_{it} + \beta_4 SZ_{it} + \epsilon_{it} \dots \dots \dots \text{equation 1.}$$

Where: CR is credit risk and it is defined as non-performing loans divided by total loans (Akwaa-Sekyi & Gené, 2016, 2017; Koutoupis & Malisiovas, 2019; and Tam, 2020); CE is control environment and it is defined as the board size (Akwaa-Sekyi & Gené, 2016, 2017; Zhang et al., 2007; Koutoupis & Malisiovas, 2019); RA is risk assessment and is represented as board expertise which is measured by proportion of board members with experience in banking or finance to the total number of board members (Koutoupis & Malisiovas, 2019); CA is control activities and it is measured as total loans to total assets (Koutoupis & Malisiovas, 2019; and Nguyen, 2017); SZ as a control variable is size of the bank and it is calculated as logarithm of bank total assets (Akwaa-Sekyi & Gené, 2016, 2017; and Koutoupis & Malisiovas, 2019); and β_0 is the constant term of the equation. The independent variable coefficients are β_1 – β_4 , and the error term is ϵ .

4. Results and Discussion

4.1. Descriptive Statistics

Table 1 presents the descriptive statistics that explain the mean, standard deviation, minimum, maximum, kurtosis, and skewness of the variables.

Table 1

Descriptive Statistics Results

Variables	Min	Max	Mean	Std. Dev.	Kurtosis	Skewness
CR	0.0002	0.6541	0.0343	0.0846	42.7578	5.9309
CE	6	19	12.9714	3.2391	2.3275	-0.1752
RA	0.4212	1	0.6812	0.1448	2.2106	-0.1607
CA	0.0623	16.9621	1.8449	3.2569	10.0792	2.5945
SZ	16.926	22.9913	20.3919	1.6951	2.0316	-0.3341

Source: Extracted from STATA Output, 2024.

Table 1 revealed that credit risk has a mean and standard deviation of 0.0343 and 0.0846, This suggests that the listed banks have an average non-performing loan of 3.43% and the variance of non-performing loans among the banks is 8.46%. Also, the maximum level of non-performing loans by the banks is 65.41% while the minimum is 0.02%. Control environment (CE) showed a mean value of approximately 13. This connotes that the average board size of the banks is approximately 13 members. The minimum value of 6 means that no bank has a board size of less than 6.

The average value of risk assessment is 0.6812 which denotes that some banks may not have board members that have expertise in banking or finance. However, the maximum value of 1 is a representation that some banks have at most a member with the knowledge of banking or finance. The result from control activities where the mean value is 1.8448 depicts that the percentage of loans to total assets of the banks is 184.49%. Nevertheless, the average value of firm size being represented by 20.3919 reflects the banks' assets value of over N20 trillion naira.



Correlation Matrix

The study's correlation matrix results show the degree of association between the independent variables and the dependent variable as well as the independent variables' association with one another.

Table 2

Correlation Matrix Result

	CR	CE	RA	CA	SZ
CR	1.0000				
CE	-0.1296 0.2851	1.0000			
RA	-0.0099 0.9351	-0.4808*	1.0000		
CA	-0.0881 0.4681	-0.4146*	0.0926 0.4456	1.0000	
SZ	-0.3337* 0.0048	0.2935* 0.0137	-0.3204* 0.0068	-0.3363* 0.0044	1.0000

Source: Extracted from STATA Output, 2023.

(0.0-0.3 = No Correlation, 0.3-0.5 = Weak Correlation, 0.5-0.7 = Fair Correlation, 0.7-1 = Strong Correlation, ± 0 = No Correlation)

Table 2 showed that credit risk of listed DMBs in Nigeria has an insignificant negative association with the control environment, risk assessment, and control activities

Diagnostic Test

The diagnostic test includes the Woodridge test for autocorrelation, the Shapiro-Wilk test for data normality, the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, and the multicollinearity test (which measures tolerance value and variance inflation factor VIF). Table 3 revealed the result.

Table 3

Diagnostic Test

Variables	VIF	Tolerance
CE	1.59	0.628816
RA	1.42	0.704848
CA	1.34	0.746220
SZ	1.25	0.801514
Mean VIF	1.40	-
Hetttest Chi2		103.84
Hetttest Sig		0.0000
Hausman		0.5683
Lagr. M. Test		0.0039

Source: Extracted from STATA 13 Output

The multicollinearity results as depicted by variance inflation factor (VIF) in table 3 revealed a value of 1.4 and which is less than 10. As a rule of thumb, a VIF of less than 10 connotes absence of multicollinearity (O'Brien, 2007). To determine if the variability of error terms is constant, the



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heteroskedasticity test was also conducted. The results, as shown in table 3 suggest the presence of heteroskedasticity since the null hypothesis (homoscedasticity) is rejected at a significant p-value of 5%. The Hausman test revealed with a p-value of 0.5683 which depicted the suitability of random effect model. The Langrangian Multiplier (LM) test. With a p-value of 0.0039 revealed the suitability of random effect model over the ordinary least square (OLS).

Regression Analysis

The regression result is shown in table 4.

Table 4

Regression Result

Variables	Coefficients	T-Value	P-Value	Hypotheses
Constant	0.6837	4.34	0.000	
CE	-0.0065	-1.85	0.064	Failed to Reject
RA	-0.1416	-1.92	0.055	Failed to Reject
CA	-0.0083	-2.59	0.009	Rejected
SZ	-0.0223	-3.76	0.000	Rejected
R²			0.2114	
Adj. R²			0.1629	
Wald Chi²			18.77	
Prob. Chi²			0.0009	

Source: Extracted from STATA 13 Output

According to Table 4, the p-value of 0.0009 and a Wald-Chi² value of 18.77 showed the fitness of the model is fitted and statistically significant. Additionally, the R-square (R²) is 0.2114 revealed the strength of the relationship between the variables. As a rule of thumb, an R-square value of greater or equal 0.1 is adequate (Falk & Miller, 1992).

Discussion of Findings and Hypotheses Testing

From table 4, the control environment as represented by board size revealed an insignificant negative impact on credit risk with a coefficient and p-values of -0.0065 and 0.064, respectively. This indicates that an increase in board size would lead to a decrease in credit risk and vice versa. This result suggests that banks with a large board size would result to quality decision making in the reduction of credit risk. This outcome is consistent with studies by Koutoupis & Malisiovas (2021), Pham (2021), and Mongina *et al.* (2022). Therefore, the study failed to reject the null hypothesis that control environment does not have a significant effect on credit risk.

Risk assessment which is characterized by board members' expertise in banking or finance, revealed a negative impact on credit risk with coefficient and p-values of -0.1415 and 0.055, respectively. This suggests that an increase in board expertise on banking or finance will lead to a reduction in credit risk. In other words, the presence of expertise in banking or finance of banks board would reduce credit risk, though insignificantly. The results are consistent with the findings of Nguyen (2021), Pham (2021), and Mongina *et al.* (2022). Based on the findings of the risk assessment and credit risk, it can be said that the study is unable to disprove the null hypothesis, which states that the credit risk of Nigeria's listed deposit money institutions is not significantly impacted by risk assessment.



Furthermore, a p-value of 0.009 and a coefficient value of -0.0083 were found for control activities, which are defined as total loans divided by total assets. This indicates that during the period, control activities had a negative but notable impact on the banks' credit risks. This means that credit risk will drop by 0.0083 for every unit increase in control actions. This implies, however, that banks do not guarantee credit limitations the more credit they give. The results corroborated those of research conducted by Pham (2021), Koutoupis & Malisiovas (2021), and Mongina et al. (2022). Therefore, the study failed to reject the null hypothesis that risk assessment does not have a significant effect on credit risk.

The result of control activities which revealed a coefficient value of -0.0223 and a p-value of 0.000 respectively denotes a significant negative impact on credit risk. This implies that an increase in control activities will lead to a decrease in credit risk significantly. The outcome was consistent with the study of Pham's (2021) and Nguyen's (2021). Therefore, the study rejected the null hypothesis that control activities does not have a significant effect on credit risk. The impact of firm size on credit risk revealed a significant negative result as evidenced by a p-value of 0.000 and a coefficient of -0.0223. This result is an evidenced that banks with large asset base can equally impact on the reduction of credit risk.

5. Conclusion and Recommendations

The findings of the study revealed that control environment and risk assessment were negatively insignificant on credit risk. However, control activity was significantly negative on credit risk. The results underscore the role played by these variables on credit risk. Therefore, the study concluded that effective and efficient control environment, availability of experts to take critical decision on risk assessment of creating risk assets, and increase in control activities through increase in total loans would lead to reduction in credit risk.

Based on the findings, the study recommends that increase in board size, board expertise, and increase in total loans by banks would create a platform for a think-tank of critical and strategic decision making on how to minimize credit risk. Future researchers should consider other components of internal control in order to provide further findings on the relationship between internal control and credit risk.

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. describe

Contains data

obs: 70
vars: 8
size: 2,310

	storage	display	value	
variable name	type	format	label	variable label
cr	float	%8.0g	CR	
ce	byte	%8.0g	CE	
ra	float	%8.0g	RA	
ca	float	%8.0g	CA	
sz	float	%8.0g	SZ	

Sorted by:

Note: dataset has changed since last saved

. su, detail

CR

Percentiles		Smallest		
1%	.0002406	.0002406		
5%	.0006332	.0003292		
10%	.0011505	.00042	Obs	70
25%	.0038878	.0006332	Sum of Wgt.	70
50%		.0110452	Mean	.0342558
		Largest	Std. Dev.	.084588
75%	.0235335	.107		
90%	.0871185	.1716263	Variance	.0071551
95%	.107	.2040472	Skewness	5.930853
99%	.6540629	.6540629	Kurtosis	42.75776

CE

Percentiles		Smallest		
1%	6	6		
5%	7	6		
10%	9	7	Obs	70
25%	10	7	Sum of Wgt.	70
50%		14	Mean	12.97143
		Largest	Std. Dev.	3.239124
75%	15	19		



**IMPACT OF INTERNAL CONTROL ON CREDIT RISK OF LISTED DEPOSIT
MONEY BANKS IN NIGERIA**

90%	.0871185	.1716263	Variance	.0071551
95%	.107	.2040472	Skewness	5.930853
99%	.6540629	.6540629	Kurtosis	42.75776

CE

Percentiles		Smallest		
1%	6	6		
5%	7	6		
10%	9	7	Obs	70
25%	10	7	Sum of Wgt.	70
50%	14		Mean	12.97143
		Largest	Std. Dev.	3.239124
75%	15	19		
90%	17	19	Variance	10.49193
95%	19	19	Skewness	-.1752247
99%	19	19	Kurtosis	2.327464

RA

Percentiles		Smallest		
1%	.4210526	.4210526		
5%	.4375	.4210526		
10%	.4641026	.4375	Obs	70
25%	.5714286	.4375	Sum of Wgt.	70
50%	.7142857		Mean	.6812377
		Largest	Std. Dev.	.144823
75%	.7894737	.875		
90%	.8285714	.8888889	Variance	.0209737
95%	.875	1	Skewness	-.1607169
99%	1	1	Kurtosis	2.210587

CA

Percentiles		Smallest		
1%	.0623172	.0623172		
5%	.0683807	.0635249		
10%	.3271275	.0683007	Obs	70
25%	.361287	.0683807	Sum of Wgt.	70
50%	.4183369		Mean	1.844927
		Largest	Std. Dev.	3.25688
75%	.5600586	8.940905		
90%	6.063612	9.373608	Variance	10.60727
95%	8.940905	13.05606	Skewness	2.594499



99% 22.99134 22.99134 Kurtosis 2.031574
 . tabstat cr ce ra ca sz, statistics(min max mean sd kurtosis skewness) column(statistics)

variable	min	max	mean	sd	kurtosis	skewness
-----+-----						
cr	.0002406	.6540629	.0342558	.084588	42.75776	5.930853
ce	6	19	12.97143	3.239124	2.327464	-.1752247
ra	.4210526	1	.6812377	.144823	2.210587	-.1607169
ca	.0623172	16.96206	1.844927	3.25688	10.07922	2.594499
sz	16.92598	22.99134	20.3919	1.695094	2.031574	-.3341827

. swilk cr ce ra ca sz

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
-----+-----					
cr	70	0.37323	38.579	7.943	0.00000
ce	70	0.98770	0.757	-0.606	0.72760
ra	70	0.95931	2.504	1.996	0.02294
ca	70	0.55276	27.528	7.209	0.00000
sz	70	0.93851	3.785	2.894	0.00190

. pwcorr cr ce ra ca sz, sig star(0.05)

	cr	ce	ra	ca	sz
-----+-----					
cr	1.0000				
ce	-0.1296	1.0000			
		0.2851			
ra	-0.0099	-0.4808*	1.0000		
		0.9351	0.0000		
ca	-0.0881	-0.4161*	0.0926	1.0000	
		0.4681	0.0003	0.4456	
sz	-0.3337*	0.2935*	-0.3204*	-0.3363*	1.0000
		0.0048	0.0137	0.0068	0.004

. regress cr ce ra ca sz

Source	SS	df	MS	Number of obs =	70
-----+-----				F(4, 65) =	4.36
Model	.104376168	4	.026094042	Prob > F	= 0.0035
Residual	.389327855	65	.005989659	R-squared	= 0.2114
-----+-----				Adj R-squared =	0.1629



*IMPACT OF INTERNAL CONTROL ON CREDIT RISK OF LISTED DEPOSIT
MONEY BANKS IN NIGERIA*

Total | .493704023 69 .007155131 Root MSE = .07739

cr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----						
ce	-.0064745	.0036273	-1.78	0.079	-.0137188	.0007698
ra	-.1416214	.0766287	-1.85	0.069	-.2946594	.0114167
ca	-.0082798	.0033116	-2.50	0.015	-.0148936	-.001666
sz	-.0222493	.0061394	-3.62	0.001	-.0345106	-.009988
_cons	.6836982	.1635752	4.18	0.000	.3570159	1.01038

. vif

Variable	VIF	1/VIF
-----+-----		
ce	1.59	0.628816
ra	1.42	0.704848
ca	1.34	0.746220
sz	1.25	0.801514

Mean VIF | 1.40

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of cr

chi2(1) = 103.84

Prob > chi2 = 0.0000

. xtset id year, yearly

panel variable: id (strongly balanced)

time variable: year, 2018 to 2022

delta: 1 year

. xtreg cr ce ra ca sz, fe

Fixed-effects (within) regression

Number of obs = 70

Group variable: id

Number of groups = 14

R-sq: within = 0.1334

Obs per group: min = 5

between = 0.4169

avg = 5.0

overall = 0.1666

max = 5

F(4,52) = 2.00

corr(u_i, Xb) = -0.9048

Prob > F = 0.1079

cr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
-----+-----						
ce	-.0080445	.0069065	-1.16	0.249	-.0219034	.0058144
ra	-.2038922	.1262384	-1.62	0.112	-.4572081	.0494237
ca	-.0094462	.010253	-0.92	0.361	-.0300203	.0111279



```

      sz | -.0745276   .0320872  -2.32   0.024   -.1389152  -.0101399
    _cons |   1.81469   .6800254   2.67   0.010   .4501195   3.179261
-----+-----
sigma_u | .09612624
sigma_e | .07627485
rho | .61363987 (fraction of variance due to u_i)
-----+-----
F test that all u_i=0:   F(13, 52) =    1.15           Prob > F = 0.3433
. estimate store fe
. xtreg cr ce ra ca sz, re
Random-effects GLS regression           Number of obs   =    70
Group variable: id                     Number of groups  =    14
R-sq:  within = 0.1060                  Obs per group: min =     5
      between = 0.5171                      avg =     5.0
      overall = 0.2114                      max =     5
                                Wald chi2(4)   =   15.09
corr(u_i, X) = 0 (assumed)              Prob > chi2    =   0.0045
-----+-----
      cr |      Coef.   Std. Err.      z    P>|z|    [95% Conf. Interval]
-----+-----
      ce |   -.006602   .0039076   -1.69   0.091   -.0142608   .0010568
      ra |  -.1480345   .0810848   -1.83   0.068   -.3069578   .0108888
      ca |  -.0084206   .0036442   -2.31   0.021   -.0155631  -.0012781
      sz |  -.0229123   .0068372   -3.35   0.001   -.0363129  -.0095117
    _cons |   .7035014   .1790927    3.93   0.000    .3524863   1.054517
-----+-----
sigma_u | .01939151
sigma_e | .07627485
rho | .06071003 (fraction of variance due to u_i)
-----+-----

```

```

. estimate store re
. hausman fe re

```

```

      ---- Coefficients ----
      |      (b)      (B)      (b-B)      sqrt(diag(V_b-V_B))
      |      fe      re      Difference      S.E.
-----+-----
      ce |   -.0080445   -.006602   -.0014425   .0056947
      ra |  -.2038922  -.1480345   -.0558577   .0967543
      ca |  -.0094462  -.0084206   -.0010256   .0095835
      sz |  -.0745276  -.0229123   -.0516152   .0313503
-----+-----

```

b = consistent under Ho and Ha; obtained from xtreg



IMPACT OF INTERNAL CONTROL ON CREDIT RISK OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

B = inconsistent under Ha, efficient under Ho; obtained from xtreg
 Test: Ho: difference in coefficients not systematic

$$\chi^2(4) = (b-B)'[(V_b - V_B)^{-1}](b-B)$$

$$= 2.94$$
 Prob>chi2 = 0.5683
 . xttest0
 Breusch and Pagan Lagrangian multiplier test for random effects

$$cr[id,t] = Xb + u[id] + e[id,t]$$
 Estimated results:

	Var	sd = sqrt(Var)
cr	.0071551	.084588
e	.0058179	.0762748
u	.000376	.0193915

 Test: Var(u) = 0

$$\chi^2(01) = 0.08$$
 Prob > $\chi^2 = 0.0039$
 . xtglsl cr ce ra ca sz

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: homoskedastic

Correlation: no autocorrelation

Estimated covariances = 1 Number of obs = 70

Estimated autocorrelations = 0 Number of groups = 14

Estimated coefficients = 5 Time periods = 5

Wald $\chi^2(4) = 18.77$

Log likelihood = 82.38831 Prob > $\chi^2 = 0.0009$

	cr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
ce		-.0064745	.0034954	-1.85	0.064	-.0133253	.0003763
ra		-.1416214	.0738412	-1.92	0.055	-.2863475	.0031048
ca		-.0082798	.0031912	-2.59	0.009	-.0145344	-.0020253
sz		-.0222493	.0059161	-3.76	0.000	-.0338446	-.010654
_cons		.6836982	.157625	4.34	0.000	.3747588	.9926376

Appendix B

Table 1: List of Population and Sample Size of the Study

SN	Bank Name	Year of Listing	Year Incorporated	Sample Size
1	Access Bank	1998	1989	Selected
2	Eco Bank	2006	1986	Selected
3	Fidelity Bank	2005	1987	Selected
4	First Bank of Nig. Plc.	1971	1894	Selected
5	First City Monument Bank Plc.	2004	1982	Selected
6	GT Bank Plc.	1996	1990	Selected
7	JAIZ Bank Plc.	2017	2011	Selected
8	Stanbic IBTC	2005	1989	Selected
9	Sterling Bank Plc.	1993	1960	Selected
10	Union Bank Plc.	1972	1969	Selected
11	UBA Plc.	1970	1961	Selected
12	Unity Bank Plc.	2005	1987	Selected
13	Wema Bank Plc.	1990	1945	Selected
14	Zenith Bank Plc.	2004	1990	Selected

Source: Nigerian Stock Exchange and Websites (2022)