



Agency Cost and Credit Risk Management: Empirical Evidence from Listed Commercial Banks in Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This study explores the relationship between agency cost and credit risk of quoted commercial banks in Nigeria. Five hypotheses were formulated following the dependent variable of credit risk which we proxy as non-performing loan. The independent variables employed for this study include agency cost, profitability, income diversification, corporate governance and firm leverage. This study is based on ex-post facto research design and made use of panel data set collected from twelve (12) quoted commercial banks within thirteen years of 2007 and 2019 financial year. We analyzed the data set using a random effect regression analysis. The result showed that agency cost which is measured as managerial inefficiency is strongly and positively related to the non-performing loan of commercial banks in Nigeria during the period under investigation. However, in light of the obtained result, we recommend that bank managers in Nigeria should take a keen look at the activities that make up agency cost. Hence, they should consider new policies that will lower the size of its agency cost to reduce the level of nonperforming loans which will ultimately create room for greater profit.

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1. INTRODUCTION

Several strands of literature have it that financial institutions play a crucial role in the economy by allocating capital from surplus agents to deficit agents in various activity sectors. The implication is that a sound banking sector is necessary for economic growth as it ensures macroeconomic stability and promotes sound financial institutions [1,2,3]. However, in the business of lending; prevalent among the day to day activities of commercial banks, managers have been faced with defaulters which result in non-performing loans (NPL): this is a hindrance to the efficiency of bank activities [4].

In Nigeria, NPLs is classified into substandard, doubtful, very doubtful and loss. According to Akpan, [5] one major source of bank failure among other things in the Nigerian banking industry is the continuous deterioration of the quality of risk assets held by these banks. Particularly, in 2012 the Nigerian Deposit Insurance Corporation (NDIC) noted that out of every #1.00 loan granted by the Nigerian Deposit money banks, only 57/kobo was capable of being recovered. Consequently, the injuries suffered as a result of losses prompted by bad debts have deepened the capital position of many banks. Hence, it is not out of place to say that a high level of bad debts can cripple a bank's operations and survival.

[6, Kashif, 2008;7] documents that key among factors contributing to the deterioration of asset portfolios, is the lack of adherence to corporate governance principles vis a vis distorted credit management. This is a clear indication that good corporate governance is critical in determining the failure or success of the organization. Board of directors is criticized for being responsible for the mismanagement of shareholders' wealth, both in developed and developing economies, more especially, in Nigeria. [8, Ogbonna and Ebimobowei, 2011; Ajibolade, 2008) the document that poor corporate governance necessitated the failure of some Nigerian banks, such as Oceanic bank plc, Wema bank plc, Fin bank, Spring bank, Afribank, Intercontinental Bank Plc, Bank PHB, and most recently Skye bank Plc.

Diversification opportunities may also be related to loan quality since diversification lowers credit risk. Some authors posit a negative relationship

between diversification and Non-Performing Loan while employing bank size as a proxy for diversification opportunities. In line with the views of Hu Yang, Li., Yung-Ho. [9]; Rajan and Dhal [10]; Salas and Saurina [11] find a negative relationship between bank size and non-performing loan and argue that bigger size allows for more diversification opportunities.

The moral hazard of too-big-to-fail banks represents another channel relating bank-specific characteristics with Non-Performing loan. A policy concern is that too-big-to-fail banks may resort to excessive risk-taking since market discipline is not imposed by its creditors who expect government protection in the event of bank's failure [12]. Consequently, large banks may increase their leverage too much and extend loans to lower-quality borrowers. Furthermore, this linkage between the financial condition of the banking sector and its asset quality is modelled at the aggregate level, where asset quality of banks is a function of corporate leverage and a set of control variables. Specifically, a highly leveraged bank implies more vulnerable to macroeconomic shocks that could precipitate defaults, aggravating the bad loan problem [13-16]. Again, as the corporate sector becomes more leveraged, the risk premium in the lending rate rises, reducing the incentive for greater leveraging. Therefore, the amount of leverage depends on the capacity of the banking system to extend credit, which is reduced by the deterioration in asset quality owing to increased corporate defaults when leveraging is high.

Return on asset determines the profitability of the bank based on its assets. Growing non-performing loans slowdown interest-earning capacity due to their non-recognition of interest, and on the other hand, provision for non-performing loans increases interest suspense but reduces realized profits. In the context of emerging market economies, the findings of Godlewski [17] indicated that there is a negative impact of return on assets on the level of non-performing loans.

In recent years, studies on non-performing loan have taken cost-efficiency into account (agency cost). The omission of such a variable might lead to an erroneous bank efficiency measure (Mester, 1996). This is particularly true since a large proportion of non-performing loans may

signal that banks use fewer resources than usual in their credit evaluation and loans monitoring process. Besides, cost inefficiency leads to a high level of non-performing loan Altunbas., Liu. Molyneux., Seth [18], Fan and Shaffer (2004) and Girardone., Molyneux& Gardener [19]. This is because cost-efficient banks are better at managing credit risk Berger and DeYoung [20].

Extant studies of [21,22,23] have argued that the factors that affect non-performing loans cannot be the same across different sizes of banks due to certain factors which include: varying levels of market discipline, risk management strategies, sources of capital together with regulatory and supervisory measures. This reveals that related empirical studies in Nigeria have neglected the heterogeneity components of these banks concerning asset size. Kanu and Himilton [24], Akinlo and Mofoluwaso [25]; Onwe [26], Mensah and Adjei [27] and Kolapo et al. [28]. It is against this backdrop, that this study seeks to find out the determinants of non-performing loans among deposit money banks in Nigeria. This we tend to achieve by splitting our sample size into small-sized and big sized banks (about assets) to specifically examine the factors which affect the levels of Non-Performing Loan.

2. LITERATURE REVIEW

2.1 Non-performing Loan

A loan is non-performing when payments of interests and principal are past due by 90 days or more, or at least 90 days of interest payment have been capitalized, refinanced or delayed by agreement, or payments are less than 90 days overdue, but there are other good reasons to doubt that payment will be made in full (IMF, 2009).

Loan defaults are inevitable for any lending institution. In this case, banks minimize the risk of defaults therefore, NPL is loans that have defaulted or in danger of defaulting, when payment is no longer able to be made. Typically, loans that have not received payments for three months are considered to be non-performing though specific contract terms may differ occasionally (Mikiko, 2003). The Nigerian banking regulation also defines NPL as a loan whose credit quality has deteriorated and the full collection of principal and/or interest as per the contractual repayment terms of the loan and advances are in question [29]. By and large, NPLs are loans that are outstanding both in its

principal and interest for a long period disagreeing to the terms and conditions under the loan contract [30]. Thus, the amount of nonperforming loan measures the quality of bank assets [31].

2.2 Profitability

Several authors have considered the influence of banks' past performance measured by profitability (ROA) on future problem loans ratios. It is expected that more profitable banks will have lower levels of NPLs [32] hence, the connection is negative. According to Boudriga.,Taktak and Jellouli [33], inefficient banks with lower profitability are tempted to resort to less reliable and risky placements to increase profitability and/or meet the demands of regulatory authorities [34-36]. The negative correlation between bank performance (profitability) and credit risk is confirmed by Godlewski [37]. In this regard, Berger and DeYoung [38], explain the hypothesis of "bad management" by ROA. Specifically, the poor performance of the company can be linked to the characteristics of managers that result in decreased profitability (expressed by low ROA or equity). This further motivates managers to lend to riskier borrowers, which, in the end, leads to the growth of NPLs [39].

Return on assets (ROA) indicates the ability of management to generate profits by utilizing the available assets of the company. Specifically, extant literature has shown that the impact of ROA on non-performing loans is ambiguous [40-42]. A positive impact can be rationalized through the behaviour of bank management. To increase short-term earnings, bank management may portray a wrong picture to investors relating to future profitability and positive return prospects [43]. Conversely, the negative influence of ROA on non-performing loans can rest on the view that banks with strong profitability have less incentive to generate income and are less inclined to engage in granting of risky loans.

2.3 Agency Cost (Cost Inefficiency)

Agency cost defined as total operating expense divided by total operating income for the period is used to identify '*bad management hypothesis*' unethical practices and skimming in corporate failures. Corporate failures are categorically determined by the ratio of inefficiency (operating expense) to operating income. Similarly, Abid et al. [44] defined inefficiency as a symbol of bad

management and skimping. They further reported that bad management is the poor management control over operating expenses and high level of inefficiency, which increases the bank's probability of default. Chaibi and Ftiti, [45], in their empirical findings also confirm that inefficiency is significant and positively correlated with non-performing loans.

2.4 Diversification

The theory provides no clear prediction regarding the impact of non-interest income on the non-performing loan. On the one hand, a higher share of non-interest income make banks less dependent on interest income and improve risk diversification which should make them more stable [46]. On the other hand, non-interest income is usually more volatile than interest income, because it is more difficult for borrowers to switch their lending relationship due to information costs (DeYoung and Roland, 2001). Non-interest income also increases operational leverage, since expanding into non-interest income may imply a rise in fixed costs. Financial leverage is also higher because regulators require banks to hold less capital against non-interest income activities (DeYoung and Roland, 2001). However, both cases increase the volatility of non-interest income and make it riskier than interest income. Consistent with this view Altunbas et al. [47] and Demirgüç-Kunt and Huizinga (2010) show that banks with a high share of non-interest income are riskier.

While previous studies find that banks become riskier if they increase their share of non-interest income, Köhler, (2012) shows substantial benefits from income diversification, in particular, for smaller banks. Larger banks, in contrast, should increase their share of interest income to become more stable since they have a more investment-oriented business model and are more active in volatile and risky trading and off-balance sheet activities such as securitization which may increase risk.

2.5 Corporate Governance

Banks internal structure and policies are interchangeably related to its total operation. Good governance depends on structural hierarchy and it is denoted as corporate governance. However, corporate governance is a set of principles that helps an organization conduct its activities with integrity, fairness and transparency [48-50]. With the help of corporate

governance, an organization can make necessary disclosures and decisions of its transactions ethically. In the views of Chowdhury, (2012) corporate governance is the widest control device, which is a hybrid of internal and external control mechanisms to achieve efficient utilization of corporate resources. In this regard, Azofra and Santamaria, [51] empirically proved that there is a direct and positive influence of corporate governance and banking performance.

2.6 Leverage

Leverage entails how much firms collateralize their assets by adopting outside funds. These funds are those having repayment (interest and principal amount) with negotiated terms and conditions. Leverage predicts optimal capital structure which reveals that firms have proportionately the owner's capital. Leverage has a significant impact on non-performing loan, in other words, there is a positive and significant correlation between Leverage and non-performing loans [45]. They suggest that debt to assets is a factor of NPL in favour of "Too Big to Fail" hypothesis. The hypothesis states that banks with high leverage tend to extend loans to low-quality borrowers, which in turn leads to more NPLs. Furthermore, it is reported that as total debt to total assets ratio increases the possibility of profitability falls. Louzis et al. (2012) document that higher leverage ratio increases the level of NPLs and noted that the positive impact occurs only up to a certain threshold of 20%, 10%, and 5% level after which leverage has no significant impact on non-performing loans.

3. THEORETICAL FRAMEWORK

The theory of non-performing loans as it relates to the stability of banks rests on 3 key pillars: (a) Information Asymmetry, (b) Adverse Selection and (c) Moral Hazard Theories.

3.1 Information Asymmetry Theory(IAT)

Asymmetric information, also known as "information failure," occurs when one party to an economic transaction possesses greater material knowledge than the other party. This typically manifests when the seller of a good or service possesses greater knowledge than the buyer. The information asymmetry theory was first applied by Akerlof in [52]. The theory states that it may be complex to differentiate between good and bad borrowers and this may lead to adverse

selection and moral hazard problems. In line with the theory, Cottarelli et al. (2005); Kraft and Jankov (2005) show the role of loan growth in bank risk-taking and resultant instability effect. The theory also relates to contagious withdrawals when depositors are improperly informed about the type of shocks hitting banks and about interbank exposures (De Bandt and Hartmann, 2000).

3.2 Adverse Selection Theory

Adverse selection refers generally to a situation in which sellers have information that buyers do not have, or vice versa, about some aspect of product quality—in other words, it is a case where asymmetric information is exploited. Rothschild and Stiglitz (1976), describes the adverse selection theory as a situation where the probability of loan default increases with rising interest rate and the quality of borrowers worsens as the cost of borrowing rises (Musara and Olawale, 2012). The theory is founded on the assumption that banks are not certain in selecting credit-worthy borrowers from a pool of loan seekers with different credit risk exposures ex-ante. Thus, financial intermediaries are more likely to lend to high-risk borrowers who are not concerned about the harsh lending conditions and are prone to loan default [53].

3.3 Moral Hazard Theory

Moral hazard is a situation in which one party gets involved in a risky event knowing that it is protected against the risk and the other party will incur the cost. It arises when both parties have incomplete information about each other. Arrow (1963) documents that moral hazard is a phenomenon of using private information to benefit from an incomplete contract in the presence of information asymmetry. Musara and Olawale (2012) also noted that moral hazard exists where the borrower of bank credit takes action that adversely affects the returns to the lender. Gorton and Pennacchi (1995) posit that a bank that makes and sells loans is subject to a moral hazard problem concerning screening borrowers. The theory is based on the assumption that the likelihood of borrowers engaging in activities that will guarantee repayment of bank credit extended to them cannot be determined ex-post by banks.

3.4 Empirical Review of Related Studies

Atoi (2019) carried out a study on Non-performing Loan and its effects on banking stability in

Nigeria with a study scope ranging from 2014:Q2 to 2017:Q2. In analyzing the data set the author employed a "restricted" dynamic GMM to estimate the macroeconomic and bank-specific drivers of NPL. Z-Score is used as a proxy for banking stability, and its response to shocks NPLs is examined in a panel vector autoregressive framework [54-56]. However, the results reveal that drivers of NPLs vary across banks, but, the weighted average lending rate is a vital macroeconomic driver of NPLs. The results also confirm the moral hazard hypothesis and risk-return tradeoff of efficient market theory. The study recommends that weighted average lending rate, anchored on monetary policy rate should be the focus of banks' regulators when addressing issues of NPLs.

Martinez-Miera and Repullo [57] attributed varying drivers of non-performing loans across different sizes of banks to factors such as bank customer relationships, ownership structure; geographic operational coverage (regional versus national); access to external finance; capital market discipline exposure; and differential regulatory treatment. The authors argue that since NPLs vary across bank categories, it, therefore, suggests that drivers of NPL could as well vary across bank type.

Adebola., Sulaiman., Yusoff and Dahalan, [58], explore the factors that explain the NPL of Islamic banks in Malaysia for the period from 2007 to 2009. They employ the ARDL (Auto-Regressive Distributed Lag) to examine the effects of certain macroeconomic variables including industrial production index, interest rate and the index of producer prices. The results indicate long-term relationships between variables and note that the interest rate has a significant positive long-term impact on bad loans. The study reveals that producer prices seem to harm bad loans.

Hanifan Fajar and Umanto, [59], in a study of 20 banks listed on the Indonesia Stock Exchange (IDX) between Q1 2005 and Q4 2014, using dynamic panel data GMM, reveal that the previous period of NPL, GDP growth and inflation rate, have a significantly negative impact on NPL and that operating expenses to operating income ratio (BOPO) and the Return on Equity (ROE) have a significantly positive relationship with NPL.

Louzis et al. (2010) in the Greek banking sector, employed dynamic panel data to examine the

determinants of NPL for different categories of loan. A set of basic macroeconomic indicators, such as real rate of GDP growth, unemployment rate and real interest rate for each loan type are studied. They used a data set of new large Greek banks for the period 2003 to 2009. The results show that impaired loans are related to macroeconomic variables (GDP, unemployment rate, the interest rate) and the quality of management. It also shows that NPL on mortgages is less sensitive to macroeconomic conditions.

In the study of Akinlo and Mofoluwaso [60] on the determinants of non-performing loans in Nigeria during the period 1981 and 2011, the authors document that economic growth is negatively related to non-performing loan in the short run while unemployment, credit to the private sector and exchange rate exert a positive influence on nonperforming loans. Furthermore, the error correction model analysis also reveals that in the short run, credits to the private sector, exchange rate, lending rate and stock market index are the main determinants of non-performing loans. Specifically, the result reveals a significant positive association between domestic credit and NPLs.

Kure, Adigun and Okedigba [61] investigated the determinants of non-performing loans (NPLs) and its feedback on the macroeconomy. Pool Mean Group (PMG) estimator and a panel vector autoregressive (PVAR) distributed lag models were applied to quarterly data, spanning 2007 - 2016. Major drivers of NPLs were credit growth, inflation and lending rate. The result reveals evidence of a negative relationship between economic growth and NPLs. Furthermore, the study found a moderate impact of NPLs on the economy: the decline in credit and bank assets, increase in risk-taking by banks and a reduction in economic growth. Based on the result, the study recommends moderation of interest rate to enhance bank's risk management practice and intensified efforts to expand employment; and improved productivity.

Rossi Schwaiger and Winkler [62] considered a sample of 278 banks in nine transition countries, between the periods 1995 to 2002. In employing the Granger-causality techniques to test the relationships among loan quality, cost efficiency, and bank capital, they found that increases in NPLs are usually followed by decreasing cost efficiency. This occurs since banks increase spending on monitoring, working out, and/or

selling off these loans, becoming more diligent in administering the portion of their existing performing loan portfolio. On the other hand, decreasing cost efficiencies are usually followed by increasing NPLs, because of bad management practices, such as excessive expenditure, subpar underwriting and monitoring practices. Specifically, the study highlight that low bank capital ratios may encourage management to take on more portfolio risks which will, in turn, increase the level of NPLs.

Rajha (2017) empirically examined the variables that are associated with the growth of Non-Performing Loan in Jordan. In explaining the abrupt rise in the level of NPL in Jordan, he considered the period 2007 to 2012. He employed NPL, Loans to Total Assets ratio and Bank Size as the proxy for Bank specific factors. Adopting the Ordinary Least Square Regression Technique in estimating the data, the result showed that Lagged NPL & Loans to Total Assets Ratio affect NPL significantly. He added that Large Banks (In terms of Total Assets) are not efficient enough in assessing the credit quality of the client, as a result, they experience a higher amount of NPL.

Bussoli et al. (2015) analyzed to find the impact of corporate governance on the loan quality of Italian cooperative banks. Their result showed that board dimension and quality of loan were significantly and negatively related but the number of committee members harmed loan quality. It extends the meaning that more board members ensure the quality of bank management hence fewer committees members depletes the quality of the loan and the performance of banks in Italy.

Maria et al. (2016) claimed that board size and non-performing loan are significantly and negatively related to each other. This denotes that when board size increases then the level of the non-performing loan will decrease and vice-versa. Therefore, this ensures the quality and transparency of the board member towards their activity. This study concluded that independent directors have a positive and significant relationship with the level of non-performing loan, and it established a question mark on the performance of non-executive directors on the board.

Hanifan Fajar and Umanto [59], in a study of 20 banks listed on the Indonesia Stock Exchange (IDX) between Q1 2005 and Q4 2014, using

dynamic panel data GMM, reveal that the previous period of NPL, gross domestic growth and inflation rate, have a significantly negative impact on NPL and that the ratio of operations expenses to operations income and the Return on Equity (ROE) have a significantly positive relationship with NPL

Jameel [63] uses time series multiple regression analyses on data collected from the Pakistani banking sector, between the period 2000 and 2010, to explain and determine the factors affecting NPLs. He found a negative association between capital adequacy ratio, GDP growth rate, credit deposit ratio and maturity period of loans and NPLs. The findings also suggest that there is a positive relationship between the weighted average lending rate and NPLs.

Kaaya and Pastory [64] analyzed the effect of credit risk (measured by ratios of non-performing loan, loan loss to gross loan, loan loss to net loan and impaired loan to gross loan) on banks' performance (measured by return on assets) by controlling the effect of deposits and bank size. A sample of 11 banks in Tanzania has been used for this analysis. According to correlation and regression results, credit risk measures of non-performing loans, loan loss to gross loan, loan loss to the net loan have a significant negative influence on banks' performance. It is concluded that the performance of banks can be increased by effective risk management as it helps to reduce nonperforming loans and loan losses.

Klein [65] investigates determining factors and their impact on NPLs and also on the macroeconomic performance of Central, Eastern and South-Eastern European (CESEE) countries, for the period between 1998 and 2011, using time series analysis. He found that NPLs responded to macroeconomic conditions, such as unemployment, GDP growth and inflations and highlights that high NPLs in these countries affect the economic recovery negatively.

Kolapo, Ayeni, and Oke [66] also analyzed the influence of credit risk on the performance of five banks in Nigeria by taking data from 2000-2010. Credit risk is measured by taking the ratio of non-performing loans to loans plus advances, total loans to advances plus deposits and ratio of loan loss provisions while performance is measured by return on assets. Fixed effect model is used in the study and according to the results, non-performing loans and loan losses provisions are adversely affecting performance while total loans

to advance plus deposit ratio has a positive significant effect on the performance.

Shingjergji (2013) studied the impact of different bank-specific factors on non-performing loans of Albanian banks by taking quarterly data from 2002-2012. The dependent variable used in the study is non-performing loans (NPLs) while independent variables include capital adequacy ratio (CAR), loan to asset ratio (LTA), return on equity (ROE), natural log of total loans, and the natural log of net interest margin (NIM). Regression results revealed the negative insignificant relationship between CAR with NPLs. Loan to asset ratio has been found to be negative but total loans level is positively influencing NPL. This implies that increased loans level will result in an increased level of NPLs. On the other hand, net interest margin and return on equity are negatively linked with NPLs depicting that high NPLs deteriorate the performance of banks

Boahene, Dasah, and Agyei [67], analyzed the relationship between credit risk and performance by taking six banks in Ghana from 2005 to 2009. The dependent variable in the study is the return on equity while credit risk has been measured by nonperforming loan rate, net charge-off rate and the pre-provision profit as a percentage of net total loans and advances. Size, growth and total debt ratios have been used as a control variable in the study. Based upon the result of Hausman test, the fixed-effect model which was used to analyze the panel data revealed that credit risk, size, growth and debt structure play a vital role in banks' performance. In-depth analysis depicted significant positive relation instead of negative of all the three measures of credit risk with performance meaning that banks in Ghana can increase their profit as customers' default risk increases

4. METHOD OF DATA ANALYSIS

The secondary data were analyzed using summary statistics, correlation and regression analysis. The summary statistics were used to evaluate the characteristics of the data: Mean, median, maximum, minimum and sum of the data. The correlation analysis is used to evaluate the association between the variables. Multiple ordinary least square regression analysis technique was applied to evaluate the relationship between the independent variables and the dependent variable. It revealed the degree of influence and effect which the

independent variables have on the dependent variable. However, we test the basic assumption of the ordinary least square for Best Linear Unbiased Estimates (BLUE) when compared to other estimating techniques. The statistics tested are the significance of variables in the regression equation, coefficient of determination (R^2), Individual T-Statistics and the Fisher test (F-test). The co-efficient of Determination (R^2) was employed to measure the explanatory power of the independent variables on the dependent variable. T-Statistics measured the individual effect of these estimated independent variables on the dependent variable. F-test statistic measured the overall statistical significance of the model.

4.1 Model Specification

We proxy firm profitability with Earnings per Share as we adopt the empirical model employed by Dimitrios., Helen and Mike [68] to examine the determinants of non-performing loans of selected commercial banks in Nigeria. The panel regression with an error term (μ_i) is expressed in the equation below

Non-Performing Loan Model

$$npl_{it} = \partial_0 + \partial_1 corp_govt + \partial_2 a_cost_{it} + \partial_3 leverage_{it} + \partial_4 div_sifca\sim n + \partial_5 npat_{it} \sum_{it} \quad (1)$$

npl = Non-Performing Loan

corp_govt = Corporate Governance

a_cost = Agency Cost

leverage = Firm Leverage

div_sifca~n = Diversification

npat = Net Profit after Tax

∂_0 = constant/Intercept

$\partial_1 \partial_5$ = variables that vary across companies but do not vary over time

\sum_{it} = error terms over the cross-section and time.

it = cross-section of listed companies time-variant

5. DATA ANALYSIS FINDINGS AND DISCUSSION

The study evaluates the determinants of the non-performing loan of commercial banks in Nigeria drawing samples from twelve (12) quoted banks on the Nigerian stock exchange market. While the non-performing loan is the dependent variable, the independent variables that we adopted for this study include: profitability (net profit after tax), agency cost, (operating expenses), diversification, corporate governance (ownership concentration) and firm leverage.

Our data set span through the periods of 2006 – 2018. In identifying the possible determinants of the non-performing loan in Nigeria, we conducted summary statistics, correlation matrix, and Panel fixed and random effect regression analysis. However, some ordinary least square regression post estimation test of multicollinearity employing the Variance Inflation Factor Test (VIF), misspecification and omitted variable bias test and the test for heteroskedasticity were equally conducted. The results are analyzed as follows: Table 1 shows the mean (average), median maximum, minimum, and sum for each of the variables in terms of companies and in terms of the firm-year. The result provides some insight into the nature of the selected Nigerian quoted companies that were used in this study.

Following the results obtained from the descriptive statistics, we find that on the average the variable of the non-performing loan was unstable for Wema bank as it rose to a peak of about 235.36 percent in the year 2009. However, it is revealed that all the sampled banks showed a fair rate in providing for non-performing loan during the period under investigation. Furthermore, in providing/managing the level of non-performing loan the descriptive statistics reveal that Zenith Bank Plc outperformed other banks in the sample and was closely followed by UBA Plc. Particularly, the average level of non-performing for Access Bank Plc is (4.07), Fidelity Bank Plc (10.4) First bank Holding Plc (7.9), First City Monumental Bank Plc (6.34), Guaranty Trust Bank Plc (4.2) Stanbic IBTC Bank Plc (9.43), Union Bank Plc (22.64), United Bank for Africa Plc (3.56), Unity Bank Plc (23.11) and Wema Bank Plc is (38.53). In terms of corporate governance, we find Guaranty Trust Bank Plc to have the highest concentrated ownership which peaked at 78% in the year 2006 and averaged at 51.15% during the period under review. On the average ownership concentration of the sampled banks stood at 29% which indicate 71% of the company stock is allocated to other forms of shareholders. Specifically, we find that concentrated ownership stood at 23% for access bank, 5% for fidelity bank, 29% for FCMB, 51% for Guaranty Trust bank, 59% for Stanbic IBTC, 35% for Sterling bank Plc, 70% for UBA 31% for unity Bank, 22% for Zenith bank and 20% for Wema Bank Plc. Agency cost was highest for union bank during the review period. Specifically, the descriptive statistics show that Wema bank performed best in terms of minimizing agency cost during the period under review. We find the variable of agency cost rising to a peak of 255%

in 2017 and was exhibited by Unity bank. On the average, the ratio of total debt to total asset stood at about 87% for all the sampled banks. Although leverage ratio rose to 255% in 2017 and this event coincided with the period when managerial inefficiency was highest. The most leveraged bank in the sample during the period is

revealed to be Unity bank while the least leveraged bank in the sample is Zenith bank. The statistics suggest that unity bank employed more diversified income while UBA employed the least diversified income during the period under investigation.

Table 1. Descriptive statistics

Access Bank	mean	p50	max	min	N
	4.073077	2.18	21.020	0	13
	23.15385	23	35	6	13
	62.08615	62.75	77.61	50.67	13
	85.43154	86.78	91.36	75.74	13
	29.31308	23.65	51.2	11.09	13
	23.18231	24.93	38.97	5.52	13
Fidelity Bank	10.43615	4.63	43.53	0	13
	5384615	0	7	0	13
	57.73154	55.28	75.58	36.51	13
	81.77154	84.88	88.7	71.72	13
	36.38462	39.59	60.14	.84	13
	17.54923	13.23	44.33	2.79	13
First-Bank Hol	7.932308	2.76	27.39	0	13
	0	0	0	13	13
	56.17154	58.01	86.6	21.61	13
	87.60615	87.11	100	76.72	13
	38.39462	35.81	63.65	19.91	13
	18.53231	19.2	42.66	3.02	13
First CityMonu	6.347692	2.83	43.28	0	13
	29.53846	33	14	13	13
	60.56923	57.21	82.8	37.13	13
	81.68077	84.75	88.17	71.41	13
	31.08385	28.7	72.87	0	13
	18.11154	15.74	51.05	-10.62	13
Guaranty Trust	4.250769	3.37	12.57	0	13
	51.15385	38	78	32	13
	49.06538	45.8	61.57	37.17	13
	83.88	83.8	89.73	81.09	13
	30.49539	29.75	60.98	11.85	13
	43.99077	43.38	60.15	22.24	13
			25.2	0	13
StanbicHoldin	9.436923	7.26			
	59.23077	58	65	58	13
	76.80461	78.93	117.96	42.26	13
	80.56154	85.33	87.9	68.92	13
	24.86538	22.27	54.41	-3.29	13
	34.63	32.61	62.88	17.57	13
Sterling Bank	9.827692	4.51	30.72	0	13
	35.76923	33	51	23	13
	59.81462	61.38	100.08	37.34	13
	89.26154	89.73	100	76.57	13
	38.98692	42.68	62.2	12.67	13
	11.01	12.72	30.03	-26.52	13
UnionBank Plc	22.64455	64455	7.3	75.64	0
	47	82	89	0	11
	85.70727	74.02	175.1	39.75	11

Access Bank	mean	p50	max	min	N
	86.41818	81.1	116.48	76.25	11
	49.92182	50.94	68.67	22.97	11
	-18.61636	15.28	127.19	-338.91	11
United Bank	3.56	2.04	13.74	0	13
	16.07692	19	23	0	13
	70.80923	65.94	111.7	49.38	13
	90.05385	89.68	100	86.28	13
	- 45.94539	50.6	85.59	-1280.01	13
	20.06308	24.36	35.06	-7.63	13
Unity Bank	23.10667	19.275	104.74	0	12
	30.91667	24	68	8	12
	80.84667	85.68	121.37	28.24	12
	110.3692	84.645	254.75	81.37	12
	47.98667	52.21	96.45	-6.35	12
	-4.9825	5.5	42.82	53.36	12
Wema Bank	38.52769	13.56	235.36	0	13
	40.38462	41	70	10	13
	66.47231	59.74	148.08	21.19	13
	91.30308	88.56	123.29	82	13
	43.92615	45.17	68.1	15.18	13
	1.446923	5.75	123.92	-63.93	13
Zenith Bank	2.527692	2.13	6.93	0	13
	21.53846	15	33	15	13
	59.69077	56.24	76.82	45.38	13
	76.69769	80.82	88.03	8.63	13
	42.98077	45.88	62.09	22.23	13
	32.85308	31.73	45.49	10.65	13
Total	11.67536	3.53	235.36	0	153
	29.37255	25	89	0	153
	65.11595	61.31	175.1	21.19	153
	86.94281	85.7	254.75	8.63	153
	30.33523	39.6	96.45	-1280.01	153
	17.07993	19.2	127.19	-338.91	153

Descriptive Statistics by companies

Summary for variables: nplcorp_govmgr_inef_cy leverage div_sificationnpat
by categories of: fiscalyear (Fiscal Year)

: fiscalyear	mean	p50	max	N	min	N
2006	22.369	17.12	78.74		1.15	10
	24.5	14	78		10	10
	73.058	75.325	100.08		42.26	10
	83.284	83.175	100		70.99	10
	52.58	51.07	85.59		13.27	10
2007	23.661	34.645	56.16		-63.93	10
	19.46	4.58	104.74		.71	11
	22.54545	15	78		0	11
	71.87909	71.8	121.37		46.16	11
	88.13455	88.17	100		68.92	11
2008	54.97273	55.47	74.9		25.43	11
	29.02	29.52	45.7		6.7	11
	14.38333	6.76	67.08		21	12
	21.16667	14	78		0	12
	68.91583	58.875	112.71		50.67	12

: fiscalyear	mean	p50	max	N	min	N
2009	81.19417	81.545	94.43		70.11	12
	43.80917	42.315	83.8		-3.29	12
	27.61833	33.9	50.04		-53.36	12
	38.15667	15.36	235.36		6.93	12
	25.75	23	78		0	12
	78.73333	67.42	175.1		45.17	12
	87.48083	83.825	123.29		69.02	12
2010	38.37333	39.8	68.1		12.49	12
	-33.83083	2.415	22.24		-338.91	12
	21.97833	8.435	86.85		4.21	12
	26.41667	24.5	78		0	12
	85.58583	75.68	148.08		56.81	12
	84.005	82.445	110.37		71.72	12
	38.475	45.45	68.67		11.74	12
2011	39.58417	23.775	127.19		.51	12
	5.568333	4.255	15.93		1.8	12
	22.83333	24	58		0	12
	74.38917	69.805	144.16		23.77	12
	85.80083	84.95	97.08		79.74	12
	46.57833	50.215	66.83		2.28	12
	-2.3575	8.625	39.45		-132.38	12
2012	4.213333	3.05	13.56		1.41	12
	24.16667	28	58		0	12
	58.17833	58.88	84.38		21.19	12
	86.47167	85.83	99.48		78.53	12
	46.2325	49.845	68.43		18	12
	21.49917	20.305	50.9		-20.12	12
2013	4.946667	3.025	29.49		1.11	12
	32.58333	32.5	85		0	12
	62.33833	60.38	99.41		33.46	12
	86.32417	85.725	93.01		80.12	12
	39.89333	40.275	56.62		10.93	12
	16.44667	18.785	48.56		-43.26	12
2014	3.704167	2.185	21.33		0	12
	30.75	32	82		0	12
	59.50833	57.665	84.98		39.49	12
	85.99917	86.555	90.39		77.98	12
	30.07667	28.89	50.6		15.78	12
	24.92333	23.595	49.2		6.69	12
2015	6.448333	3.285	24.33		65	12
	32.5	30.5	86		0	12
	57.76167	57.415	75.06		42.04	12
	85.04	85.905	88.39		76.7	12
	27.67	29.87	50.2		-6.35	12
	17.89	14	43.38		3.82	12
2016	7.890833	3.46	33.58		1.45	12
	40.58333	37	86		0	12
	54.93833	54.27	78.93		37.98	12
	85.6375	86.18	89.73		78.31	12
	-90.0575	19.895	42.58		-1280.01	12
	18.865	13.58	50.39		3.15	12
2017	5.091667	3.545	24.53		0	12
	39.25	37.5	89		0	12
	44.55167	44.015	69.99		21.61	12
	99.4225	86.815	254.75		76.25	12

	31.0675	32.65	96.45	.84	12
	16.85917	10.33	52.08	-17.22	12
2018	0	0	0	0	12
	37.41667	32.5	89	0	12
	58.55667	55.455	80.76	41.41	12
	90.95167	89.145	203.27	8.63	12
	40.4475	44.71	81.95	13.23	12
	23.9525	15.655	62.88	4.3	12
Total	11.67536	3.53	235.36	0	153
	29.37255	25	89	0	153
	65.11595	61.31	175.1	21.19	153
	86.94281	85.7	254.75	8.63	153
	30.33523	39.6	96.45	-1280.01	153
	17.07993	19.2	127.19	-338.91	153

Authors Computation 2020

5.2 Data Normality Test

In statistics, tests for data normality distribution are used to determine if a data set is well-modelled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed. Here, the rule of thumb states that if the probability value of the variable/s of interest is significant at 1% or 5% then the variable is not normally distributed. However, the probability z values for normality seen in the Table 2 shows that all the variables of interest are not normally distributed since they show 1% and 5% significance level.

Autocorrelation implies the existence of a linear association between two or more variables of

interest. Autocorrelation makes it difficult to differentiate the individual effects of the explanatory variables hence, the regression estimators may be biased in that they tend to have large variances (Murray, 2006). If there is a perfect linear association among the variables, the estimates for a regression model cannot be uniquely computed. However, the possible existence of autocorrelation is tested based on the Shapiro Wiki Test of correlation incorporating all the variables of interest. The Table 3 show that the correlation coefficients among the variables are less than 0.8, which is the limit or cut off correlation point commonly suggested by prior studies after which the consequences of autocorrelation is likely to be present (Gujarati 2003).

Table 2. Shapiro wiki test for data normality distribution

Variables	Obs	W	V.	Z	Prob>z
Npl	153	0.44119	66.134	9.513	0.00000
Corp_gov	153	0.95098	5.801	3.990	0.00000
Mgr_inef_cy	153	0.89424	12.516	5.735	0.00000
Leverage	153	0.43779	66.537	9.526	0.00000
Div_sification	153	0.16375	98.969	10.427	0.00000
npat	153	0.599964	47.382	8.756	0.00000

Authors Computation 2020

Table 3. Pearson product of moment correlation result

Variables	Obs	W	V	z	Prob>z	
Npl	1.0000					
Corp_gov	-0.0597	1.0000				
Mgr_inef_cy	0.4096	-0.0994	1.0000			
Leverage	0.1073	0.0994	0.0303	1.0000		
Div_sification	0.0741	-0.0182	0.0869	0.0646	1.0000	
npat	-0.2651	0.1122	-0.3584	-0.2086	-0.0355	1.0000

Authors Computation 2020

Table 4. Variance Inflation Factor Test, Ramsey RESET Test & Test for Heteroscedasticity

Mean VIF	1.10
Ramsey RESET Test (Prob> F)	0.0016
Heteroscedasticity Test (P>chi2)	0.0000

Authors Computation 2020

Table 5. Regression Result Estimates table least square F_EFFECT R_EFFECT

Variable	Least square	F_EFFECT	R_EFFECT
Corp_gov	-0.1746225	-.16338671	-0.5736109
	0.770908	.11741624	.08809342
	-0.23	-1.39	-0.65
	0.8211	0.1663	0.5150
Mgr_inef_cy	.38421615	.37302202	.39155287
	-.08524227	.09375825	.08638674
	4.51	3.98	4.53
	0.0000	0.0001	0.4095
Leverage	.09169709	.07328134	.0816283
	.09866419	.010337715	.09896883
	0.93	0.71	0.82
	0.3542	0.4796	0.4095
Div_sification	.00769445	-.00171004	.00353868
	.0170486	.01676831	.01665738
	0.45	-0.10	0.21
	0.6524	0.9189	0.8318
npat	-.0732746	-.02467677	-.05218813
	.05086321	.05146784	.05028824
	-1.44	-0.48	-1.04
	0.1518	0.6324	0.2994
cons	-19.784619	-13.713172	-18.430452
	10.961241	12.121006	11.305989
	-1.80	-1.13	-1.63
	0.0731	0.2599	0.1031
Df			
N	153	153	153
r2	.19013631	.17267836	

Authors Computation 2020

The variance inflation factor test (VIF) was carried out to find out if there is multicollinearity among the independent variable of interest. The study showed that no two independent variables are perfectly correlated, which indicates the fact that there is an absence of multi-collinearity in the model used for the analysis. This is evident from the mean VIF value of 1.10 which is less than the benchmark of 10.00 (Gujarati 2003) at which the consequences of multi-collinearity begin to manifest. In checking for the presence of heteroscedasticity in the data set, the analysis revealed that there exist unequal variances which may lead to spurious regression estimates consequently yielding wrong conclusions. This is evident from the (P>chi2) of 0000 which is significant at 1% hence do not meet our a priori expectation. However, in correcting the heteroscedasticity in the data set, we employed a

robust standard error regression analysis Gujarati (2003) in determining the coefficient estimates that guarantee a more plausible conclusion.

Having successfully tested for the assumptions of the classical linear regression model, and find violations in some of the assumptions, we proceed to estimate the fixed and random effect regression analysis which accounts for the violations as we expect to obtain unbiased coefficients good enough for policy recommendation. The results obtained from the fixed and Random effect regression is shown in Table 5.

In testing for the determinants of a non-performing loan in the specified model, the two most widely used panel data regression

estimation techniques (fixed effect and random effect) were adopted. The results reveal a difference in the magnitude of the coefficients, signs and the number of insignificant variables. The estimation of the fixed effect panel regression is based on the assumption of no correlation between the error term and explanatory variables, while that of the random effect, considers that the error term and explanatory variables are correlated. In selecting from the two-panel regression estimation results, the Hausman test is conducted and the test is based on the null hypotheses that the random effect model is preferred to the fixed-effect model. However, a critical look at the p-value of the Hausman test of non-performing loan model, (0.0660) implies that we should reject the fixed effect model based on the fact that the coefficient is not significant even at 5% level and accept the random effect model. This implies that the accepted panel random regression coefficient is good enough in drawing our conclusion and making recommendations. Following the above discussion, the random effect results become imperative for interpretation. The Wald chi² statistics = 31.91 and its corresponding p-value (0.0000) show that non-performing loan random effect regression model is generally significant and well specified. It passes the overall significance test at 1% level.

From the Table 5, we observed an R-squared value of 0.16 which indicate that about 16% of the systematic variations in non-performing loan have been jointly explained by the independent variables over the period under investigation. This implies that the independent variables adopted in this study have not been able to explain a complete variation in non-performing loan hence the remaining unexplained 84% variations lies in the error term. In addition to the above, the specific findings from each explanatory variable from the random effect panel regression models are provided as follows.

6. CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Commercial banks, managers have been faced with defaulters which result in non-performing loans consequently hindering the efficiency of bank activities, According to Akpan, [69] one major source of bank failure among other things in the Nigerian banking industry is the continuous deterioration of the quality of risk assets held by

these banks. Particularly, in 2012 the Nigerian Deposit Insurance Corporation (NDIC) noted that out of every #1.00 loan granted by the Nigerian Deposit money banks, only 57/kobo was capable of being recovered. Hence, it is not out of place to say that high level of bad debts can cripple a bank's operations and survival. However in this study we find that the components of profitability, income diversification, corporate governance, and firm leverage are no significant determinants of non-performing loan among quoted banks in Nigeria.

6.2 Recommendations

From the findings obtained in this study we recommend that bank managers in Nigeria should take a keen look at the activities that make up agency cost. In the light of this, they should consider new policies that will lower the size of its agency cost so as to reduce the level of nonperforming loans thereby creating room for greater profit.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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