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Article

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Cogent Economics & Finance

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Suggested Citation: Adegboye, Alex; Ojeka, Stephen; Adegboye, Kofo (2020) : Corporate governance structure, bank externalities and sensitivity of non-performing loans in Nigeria, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 8, Iss. 1, pp. 1-21,
<https://doi.org/10.1080/23322039.2020.1816611>

This Version is available at:

<https://hdl.handle.net/10419/269974>

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To cite this article: Alex Adegboye, Stephen Ojeka & Kofo Adegboye | (2020) Corporate governance structure, Bank externalities and sensitivity of non-performing loans in Nigeria, Cogent Economics & Finance, 8:1, 1816611, DOI: [10.1080/23322039.2020.1816611](https://doi.org/10.1080/23322039.2020.1816611)

To link to this article: <https://doi.org/10.1080/23322039.2020.1816611>



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Received: 26 May 2020
Accepted: 20 August 2020

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Reviewing editor: David McMillan, University of Stirling, UK

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Corporate governance structure, Bank externalities and sensitivity of non-performing loans in Nigeria

Alex Adegboye^{1*}, Stephen Ojeka¹ and Kofo Adegboye²

Abstract: This study highlights the effect of corporate governance structure and bank externalities on non-performing loans in Nigeria covering the period 2009–2017. This study constructs corporate governance index for Nigerian Banks using Principal Component Analysis to establish the influence of corporate governance structure on non-performing loans. This study conducts a panel data analysis using static and dynamic estimators to examine the sensitivity of non-performing loans and corporate governance structure. From the empirical analysis, corporate governance structure of banks in Nigeria has a negative and significant influence on non-performing loans in Nigerian banks. This result reveals that sound corporate governance structure enhances the loan quality and bank stability. In addition, the study affirms that stringent policy imposed by the bank regulators has a negative impact on non-performing loans. Thus, effective corporate governance mechanism and bank regulations could help to curb excessive risk appetite that could mutilate probable performance and loan

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PUBLIC INTEREST STATEMENT

This study highlights the effect of corporate governance structure and bank externalities on non-performing loans in Nigeria, which covers a period 2009–2017. This study is motivated by the increasing level of nonperforming loans in Nigerian banking sector. As non-performing loan seemingly reflects the health of the financial sector, it therefore is necessary to establish the factors that contribute to the present level of non-performing in Nigeria.

This study examines mainly the influence of corporate governance structure, relative impact of the policy provided by regulators, the bank-specific characteristics and macroeconomic indicators on non-performing loans.

We pose that the corporate governance structure reduces the trends of non-performing loans in Nigeria. Therefore, we recommend that given that increased inflation rate and lending rate could directly contribute to growth in the non-performing loans, the Central Bank of Nigeria tends to face ambiguous results relating to non-performing loans when navigating for economic growth. Hence, Central Bank of Nigeria should implement expansionary monetary policy to sustain quick economic recovery.

quality. This study recommends that banks should continue to implement high quality of corporate governance mechanism with positive effects at eliminating excessive risk-taking.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: corporate governance index; non-performing loans; principal component analysis; bank externalities

1. Introduction

The stability of every economy depends on the safety and soundness of its financial institutions. The financial institution especially banks in this context serves as an intermediary between the economy's surplus and deficit players of the economy with positive effects on economic growth and development. The industry as financial intermediary channels the wealth stored by the depositors to the borrowers as a predictable source of loans (Isaac, 2014). Thus, a country's financial stability and sustainable economic development thrive on an efficient flow of investment. However, financial institutions face multiple financial risks such as credit risk, interest rate risk and counterparty risks. Many financial institutions focus primarily on a persistent increase in rates of return by employing diverse financial & physical instruments and venture into risky lending exercise without adequate risk assessment impairing financial stability (Zagorchev & Gao, 2016).

Nigerian financial sectors experienced financial crisis following the 2008 global economic crisis and this event contributed to the undercapitalization of Nigerian banks. The global crisis affected many world-renowned financial institutions, which eventually led to the meltdown of economies like the United States of America. In Nigeria, approximately 70% of the stock value was lost in the stock market. Prior studies identified that corporate governance was the principal contributor to the event coupled with other factors such as instability of macro-economic indicators, lack of shareholders' activism, inadequate disclosure and transparency of financial position of banks, negligent risk management, unstructured governance of Central Bank of Nigeria, and weaknesses in the business environment (Adegbite, 2015a; Nakpodia & Adegbite, 2018). Necessary reform programmes were implemented to stabilize the banking system. Among others, Central Bank of Nigeria injected N620 billions of liquidities to rescue the affected banks and had to replace directors of eight (8) banks to restore the stakeholders' confidence (Central Bank of Nigeria, 2010). The Nigeria banking system continuously seeks to circumvent any perpetual event that may lead to a concurrent financial crisis. Hence, any negative signal in the sector always triggers concerns of both the regulators and the stakeholders.

The level of non-performing loan seemingly reflects the health of the financial sector, which implies that a higher percentage of non-performing loan indicates difficulty in the collection of interest and principal on loans by banks. The recent increase in non-performing loans has sped the concerns of the stakeholders. In 2009, the non-performing loans were approximately 37% of all loan in Nigerian banks. This dropped to 2.97% in 2014 after interventions of the regulators (Central bank of Nigeria, 2015). Recently, a survey by Nigerian Deposit Insurance Corporation (NDIC) disclosed that the non-performing loan is approaching 20% as of December 2017 against the 5% regulatory threshold. A financial stress test, which examined twenty (20) banks and four (4) merchant banks to assess credit, liquidity, interest rate and contagion risks resilience of banks, also revealed that only large banks would survive if nonperforming loan should rise by 50% (Central Bank of Nigeria, 2017). International Monetary Fund (2018) expressed its concern about some lower-middle-income countries including Nigeria experiencing deteriorated loan as growth has debilitated and corporate financial positions have deteriorated quality in recent years. These recent trends in bad loans have provoked some concerns and questions among stakeholders, which include; why are the figures rising? What are the implications? What role has internal abuse played in all these? What are the actions of the regulators? Is the Nigerian financial sector heading towards another financial crisis?

Non-performing loan is a significant factor used by regulators to determine financial stability and bank asset quality. Non-performing loans have contributed largely to prior bank failure and envisaged an indicator of the banking crisis (Us, 2017). Increase in non-performing loans signifies the unascertained banking crisis (Louzis et al., 2012). In addition, increased nonperforming loans relate to weaknesses in the financial system, which exposes the bank's vulnerability to credit risk. This has drawn the attention of several studies to explore the determinants of banks' asset quality such as bank-specific and macroeconomic factors in developing and developed economies (Abid et al., 2014; Dimitrios et al., 2016; Ghosh, 2015; Louzis et al., 2012; Maharmah & Saadeh, 2015; Wairimu & Gitundu, 2017).

Since the recent global financial crisis, corporate governance has extensively received unusual consideration especially in the banking industry. Proactively, studies have begun to explore how corporate governance affects banks' loan quality in developed countries. Evidence reveals that ineffective corporate governance structure fails to recognize and prevent the excessive risk appetites, which lead to the vulnerable financial practice (Grove et al., 2011; Tarchouna et al., 2017a). However, a strand of literature in developing countries has identified non-performing loans as one of the causative factors to bank failure but literature on the effect of corporate governance on non-performing loans languishes especially in Nigeria. This study intends to bridge this knowledge gap. Based on this, this study attempts to extend the existing body of literature in developing economies by exploring the influence of corporate governance mechanisms, bank externalities and non-performing loans in Nigeria.

Overall, this study contributes to existing literature in several ways. First, the study builds an index that captures the overall corporate governance structure in Nigeria, which sheds light on the importance of sound corporate governance structure in the enhancement of loan quality in developing countries. Second, the study also examines the sensitivity of loan quality to regulations imposed by the regulators, which extends the direct contributions of bank regulations on non-performing loans. Third, the adopted diverse methodological specifications for banks provide robust results and expand the strand of the corporate governance literature. Four, this study explores the risk appetite of banks aftermath of the 2008 financial crisis period to shed light on the resultant effect of the implementation of corporate governance and regulations imposed by the regulators.

The remainder of this paper is divided into the following section: Section 2 deals with the theoretical framework underpinning the study and the literature reviews. Section 3 discusses the research design and methodology. Section 4 presents descriptive statistics and empirical analysis. Section 5 makes the final conclusions and suggestions.

2. Literature Review

2.1. Theoretical Framework

Corporate governance literature across countries has been entrenched within the agency theory. The agency relationship involves the engagement of management by the owners to perform responsibilities on behalf of the latter, which include delegation of decision-making endeavour (Jensen & Meckling, 1976). The theory provides a framework unveiling the possible relationship between the principals and agents (Fama, 1980). In addition, the framework posits that shareholders guarantee that managers protect their interest and maximize their wealth alongside (Shleifer & Vishny, 1997). The Agency theory argues that managers are custodians of the organizational activities while managing the business in the best interest of the shareholders. From the perspective of the agency theory, other stakeholders are irrelevant. This means that they are not entitled to any benefits from the corporation as it tends to contradict the best interest of the shareholders. Ignoring the interest of the stakeholders has been questioned with the argument that business cannot operate in a vacuum. Equally, the stakeholder theory argues that every stakeholder deserves some portion of returns generated by the organization. The theory posits

that management should operate the business in a way that is advantageous to all stakeholders while all returns are shared suitably on an acceptable basis. Unfortunately, the acceptable proration mechanism is lacking, which frustrates the proposition of stakeholder theory (Del Briano-Turrent & Rodríguez-Ariza, 2016).

Although the principal-agent framework proposes ways by which shareholders can protect their interest and maximizing their wealth through adopting mechanisms for sound corporate governance (Shleifer & Vishny, 1997), the theory is built on Anglo-Saxon markets, which tends to limit both academic and structural approach to corporate governance globally (Learmount, 2003). For instance, prior empirical studies posit that substantial misalignment tends to transpire when the normative mechanism of sound corporate governance is adopted across countries (Chang, 1992; Demirag et al., 2000; Hove, 1986). In addition, the principal-agency conflict is dealt with in different approaches across countries (Adegbite, 2015b). Thus, agency theory fails to completely account for jurisdiction differences in its operationalization. Furthermore, agency and stakeholder theory assumes strong efficient and competitive markets in its operationalization, minimal information asymmetry and strong stakeholders' activism (Udayasankar et al., 2005). This proposition tends to be invalid in most developing countries like Nigeria. For instance, the advancement of Nigerian corporate governance is characterized by the establishing families and friends who recurrently retain control on the board and manage activities (Nakpodia & Adegbite, 2018).

The theoretical basis of this research is based on the Institutional Theory, which compliments agency and stakeholder theory. Scott (2004) suggests that institutional theory avers the resilient characteristics of the socio-cultural structure and accounts for the establishment of organizational values, standards and rules consistent with an acceptable guiding principle for corporate conduct. The corporation reflects the rationalized instructional norms that organization imbibe within the jurisdiction (Meyer & Rowan, 1977). From the intuitionists approach, they emphasize on the complication of corporate governance practices across countries peculiarities (Boehmer, 1999). The peculiarities are dominant when dealing with the comparison between strong and weak institutions such as Nigeria (Adegbite, 2015b). The World Bank Report on the Observance of Standards and Codes (ROSC) validates that corporate governance practice in Nigeria is plagued with institutional weaknesses considering aspects such as rule, compliance and implementation capacities (ROSC, 2004).

2.2. Corporate Governance and Non-performing Loans

It is expected that well-governed banks have lower non-performing loans. There exist several reasons to expect well-governed bank to be more efficient in their operations and enhanced loan quality. Love and Rachinsky (2015) suggest that this proposition could be traced to: (1) limited amount of related-parties and self-dealing transactions (2) lower cost of capital exhibited by well-governed banks and (3) more efficient operations by better-governed banks. On the premise of extremely weak institutions, the benefits accruing from voluntary adoption of corporate governance "best practices" could be minimal since the provisions are deemed not to be enforceable. Well-functioning corporate governance could mirror the rule of law and the regulatory environment of the respective countries (Love & Rachinsky, 2015). Thus, a weak regulatory environment could render the firm's best corporate governance practices to be likely ineffective.

Since the recent global financial crisis, corporate governance has received unusual consideration especially in the banking industry. Evidence reveals that ineffective corporate governance structure fails to recognize and prevent the excessive risk appetites, which lead to the vulnerable financial practice (Grove et al., 2011). Taking cognizance of the recent collapse of a financial institution, the misconduct illustrates the extent by which the financial systems are vulnerable to systemic risk when effective corporate governance targets remain unattainable (Zagorchev & Gao, 2015). Thus, regulators have stressed the importance of effective corporate governance in the banking industry since the recent failures are traceable to weak corporate governance.

A strand of literature has examined the determinants of non-performing loans (Love & Rachinsky, 2015; Tarchouna et al., 2017b; Zagorchev & Gao, 2015). These studies categorize the determinants of NPLs into bank characteristics and macroeconomic indicators. Other empirical findings have identified the effect of corporate governance on banks' loan quality. It is, however, noticeable that the majority of the literature is conducted in the developed countries especially the United States. Based on this, this study attempts to extend the existing body of literature in developing economies by looking at the relationship between corporate governance mechanisms and non-performing loans in Nigeria, with evidence from deposit money banks in Nigeria.

2.3. Bank Regulations and Non-performing loans

Bank regulators tend to play a vital role in the banking industry, which could influence the oversight functions of the directors and shareholders. Regulator functions can be considered as active monitoring force, which could handicap the board's incentive to monitor (Grove et al., 2011). In the real sense, regulators tend to act in the best interest of the public and interfere in the banks' activities consequentially complicating corporate governance issues. The Basel Committee on Banking Supervision introduced a proposed Basel II Capital Accord in January 2001. The proposal navigates three pathways in which include an improved requirement for minimum bank capital, better supervision practices and more transparent information disclosed by the banks. The Committee believes that the adoption of the Best Practices will instigate growth and financial stability (Barth et al., 2004).

Theoretically, economic models suggest a conflicting prediction on the effect of bank regulations on bank stability and performance. A school of thought supports the proposition that neither private and public entities could effectively monitor the activities of complex banks where information symmetries tend to exist and the level of power exhibited by the complex bank could impair competition, which could harmfully influence policies. Another school of thought believes that the effect of information asymmetries is limited and fewer restrictive guidelines enable the banks to maximize the economics of scope thus provide more efficient services. In addition, the school of thought predicts the conditions where regulations could enhance bank stability and performance. Some models suggest that individual countries regulations depend on other institutions and policies (Barth et al., 2004).

Interestingly, empirical evidence has established the possible outcome of bank restrictions on banking risk. Boyd et al. (1998) pose that restrictions on bank practices such as minimum capital requirement tends to enhance social welfare in countries characterized with liberal deposit insurance. In addition, Klomp and Haan (2015) further emphasize that banking regulations and supervisory control significantly decrease banking risk. They also establish that the bank restrictions tend to reduce risk in the foreign-owned and large bank while the liquidity regulations affect the risk of unlisted and commercial banks.

Moreover, the effect of corporate governance structure on performance can be attributable to the regulatory environment and the practices of the banking industry (Mülbart, 2010; Ungureanu, 2008). Regulators could formulate and implement better policies, which could improve banking practices and efficiency. In Nigeria, the Central Bank of Nigeria adopted mechanisms such as the credit and other monetary circulars, rules, regulation and standards of professional ethics to regulate the activities of Nigerian banks (Ajibo, 2015).

3. Methodology

This study examines the effect of corporate governance mechanisms and bank externalities on non-performing loans in the Nigerian Banking Sector covering the period 2009–2017. The population for the study consists of 21 deposit money banks as stated in the Central Bank Nigeria Bulletin (Central Bank of Nigeria, 2016). The population is based on the virtue of its risk vulnerability, which remains a highly regulated industry unlike non-financial institutions (Klomp & Haan, 2015). However, the sample is determined after some filtering criteria. First, firms are discarded from

the sample provided desired data are unavailable. Second, only firms with at least five consecutive years for all desired data are selected following Thakur and Kannadhasan (2019) to ensure the robustness of the study estimation results. With these filtering criteria, only firms with non-performing loans are selected to situate the position of this study resulting in 12 banks between 2009 and 2017.

3.1. Measurement of Variables

To unveil the objective of the study, panel data for the period 2009–2017 were extracted from Annual reports, Corporate Websites and Nigeria Stock Exchange Factbook, Central Bank of Nigeria Statistical Bulletin and World Development Indicator. The choice of the period is necessitated by the fluctuation in the non-performing loans with the year 2009 marking the highest rate of nonperforming loans. The study adopts non-performing loans as the dependent variable. Independent variables for this study are corporate governance index, bank-specific characteristics and macroeconomics indicators identified by prior studies, which could influence the trends of non-performing loans.

3.1.1. Non-performing Loans

The dependent variable is proxied by the ratio of non-performing loans to gross loans and advances. Non-performing loans equal to the total of all past unfulfilled loans as a point of time. Although measurements of non-performing loans differ among countries, but this study adopts non-performing loans as the total sum of non-accrual loans and other loans due for ninety (90) days and above (Ghosh, 2015; Kingu et al., 2018; Mpofu & Nikolaidou, 2018; Pop et al., 2018; Radivojevic & Jovovic, 2017). Non-performing loan signifies the financial stability of financial institutions, which have a significant influence on the respective economy (Adeola & Ikpesu, 2017).

3.1.2. Corporate Governance Index

Extending prior studies on corporate governance (Love & Rachinsky, 2015; Tarchouna et al., 2017b; Zagorchev & Gao, 2015), this study employs basically eight relevant corporate governance mechanisms with the integration of risk and credit management committee characteristics in the construction of the corporate governance index using principal component analysis. Due to complexity of banking industry, the risk management mechanisms are implemented to enhance sound corporate governance implementation while mitigating excessive risk appetite (Wijaya & Atmoko, 2015). Thus, the linear correlation between various corporate governance mechanisms can be condensed to a unique corporate governance index, since the mechanisms are implemented to address the agency problems (Allen et al., 2018; Lakshan & Wijekoon, 2012; Matei & Drumasu, 2015; Qian & Yeung, 2015). These eight variables include board magnitude, board independence, director ownership, board composition, board engagement, the size of the board risk committee, board risk committee meeting and board risk committee independence.

3.1.3. Bank Regulation

Prior studies have identified several variables, which intensify and enhance the bank regulations within the sector and the country level (Barth et al., 2004; Boudriga et al., 2010; Laeven & Levine, 2009; Magar et al., 2008). For instance, Barth et al. (2004) developed an index that proxies bank regulations such as capital regulatory index, private monitoring index, official supervisory index, banking entry requirement index, restriction on bank activities index and government ownership index. For the purpose of this study, we adopt the monetary policy rate in line with the study of Faphunda and Eragbhe (2017) and capital adequacy ratio to capture the effectiveness of bank regulations in Nigeria. We proxy capital adequacy ratio with the measures of the total bank capital to its risk-weighted credit exposure expressed in a percentage.

3.1.4. Firm-specific characteristics

To establish the relationship between the corporate governance structure and non-performing loans, we use the bank-specific control variables from prior literature on non-performing loans

(Dimitrios et al., 2016; Kauko, 2012; Konstantakis et al., 2016; Louzis et al., 2012; Zagorchev & Gao, 2016). The control variables include the firm size, return on asset ratio and loan to deposit ratio. To unveil the firm’s managerial efficiency to transform its assets and equity into profits, we control the return on asset. We also control for the risk preference of the banks by employing the loan to deposit ratio. In addition, firm size is proxied by the natural logarithm of the firm’s total assets to control for correlation between bank size and non-performing loans.

3.1.5. Macroeconomic Factors

In addition, we include the macroeconomic indicators of Nigeria to control for the economic condition, which possibly influence the trends of non-performing loans. We adopt three macroeconomic variables in this study such as inflation rate, lending rate and the real gross domestic product. The inflation rate reveals the macroeconomic instability level and lending rate measure the volatility of interest paid while gross domestic product growth rate measures economic growth in the country.

3.2. Model Specification

To achieve the objectives of the study, we first adopt the static panel data estimators such as the ordinary least square, fixed and random effect while Hausman test is used to select the more appropriate estimator. Then we use the system generalized method of moment to evaluate the influence of corporate governance structure on non-performing loans for robustness purposes.

The model is firstly expressed in its implicit form:

$$y_{it} = \beta_1 + X_{it}\beta_2 + \varepsilon_{it} \tag{1}$$

Where: y_{it} is the dependent variable, X_{it} is the explanatory variable and ε_{it} is the error term. Furthermore, the model expressed in explicit form as follows:

$$NPL_{it} = \beta_0 + \beta_1 CGI_{it} + \beta_2 \sum REG_{it} + \beta_3 \sum Firm-specific_{it} + \beta_4 \sum Macro_{it} + \varepsilon_{it} \tag{2}$$

ε_{it} = Error term, t = year and i = firm

All variables are appropriately defined in Table 1.

Table 1. Definition of variables		
Variables	Acronym	Measurement
Non-performing Loan	NPL	The ratio of non-performing loans to gross loans and advances
Corporate Governance Index	CGI	Computed using Principle Component Principle based on Code of Governance by Central Bank of Nigeria
Firm Regulation Indicators	REG	<ul style="list-style-type: none"> Cash Reserve Ratio Monetary Policy Rate
Firm-specific	Firmspecific	<ul style="list-style-type: none"> Firm size: natural logarithm of firm total assets Loan to Deposit Ratio
Macroeconomic Indicators	Macro	<ul style="list-style-type: none"> Inflation rate of Nigeria Lending rate
Board size	Bsize	Number of people on the board of the firm
Board Risk Committee	BRs	Number of people on the board risk committee
Board Credit Committee	BCs	Number of people on the board credit committee
Board Audit Committee	Audit	Dichotomous variable that equals one (1) where the board audit committee is established and zero (0) where otherwise

Table 2 reports the results of the descriptive statistics of each variable adopted to unveil the objectives of this study. This includes the mean, the standard deviation, the minimum value and maximum value of each variable. **Note: Note: BM** is the board magnitude defined as the total number of existing board members. **BIN** is the board independence measured by the ratio of an independent director to total members on the board. **DOH** is the Director ownership calculated as Percentage of the number of shares held by directors to total shares. **BC** is board composition measured as the ratio of non-executive directors to total board members and **BE** is the board engagement measured by the number of meetings held yearly for board engagement. The risk management characteristics include: Board Risk Committee Size (**BRCs**) is total number of personnel on the committee, Board Risk Committee Meeting (**BRCM**) measured by total number of the committee meeting yearly and Board Risk Committee Independent (**BRCI**) measured as the ratio of independent member to the total member on the committee. **NPL** is the ratio of non-performing loans to gross loans and advances. **ROA** is Total Profit after Tax/Total Asset. **LDR** is the year-end changes in the Consumer Price Index. **MPR** is the Monetary Policy Rate. **CAR** is the Bank Capital Adequacy Ratio. **IR** is the year-end changes in the Consumer Price Index. **LR** is the yearly nominal lending rate. **GDP** is the real GDP growth rate in Nigeria. In addition, **CGI** is the Corporate Governance Index developed using Principal Component Analysis. **REG** is Bank Regulations. **Firmspecific** is the Bank-specific characteristics and **Macro** is the macroeconomic characteristics.

4. Empirical Analysis and Discussion of Results

4.1. Corporate Governance Index

This study adopted the Principal Component Analysis (PCA) to build a corporate governance index, which assesses the inclusive corporate governance mechanism of selected banks in Nigeria. The motive of adopting this method is to control the degree of data dimensionality by altering highly correlated data into condensed uncorrelated variables, usually called principal components, thereby

VariableN		Mean	Standard Deviation	Min	Max
<i>Corporate Governance Mechanisms</i>		14.602	3.261	6	20
BM	108				
BIN	108	.107	.076	0	.333
DOH	108	.081	.114	0	.429
BC	108	.656	.107	.5	.917
BE	108	6.315	2.22	2	12
BRCs	108	7.13	2.304	0	14
BRCM	108	3.87	1.177	0	8
BRCI	108	.132	.128	0	.5
<i>Bank Specific Factors</i>					
NPL	108	.083	.104	.009	.69
ROA	108	.013	.04	-.241	.061
LDR	108	.632	.184	.015	1.004
Firm Size	108	20.927	.812	18.68	22.445
<i>Economic Factors</i>					
IR	108	.118	.029	.081	.165
LR	108	.17	.007	.16	.184
GDP	108	.047	.037	-.016	.113
<i>Regulation Factor</i>					
CAR	108	.194	.119	-.636	.44
MPR	108	.108	.031	.06	.14

retains the high variability in the set of data (Larcker et al., 2007). The arrangement of principal components allows the first components to explain the most variability in the dataset, while the consecutive components predict the less variability compared to the previous set (Jolliffe, 2002).

The principal component analysis is meant to build a corporate governance index for Nigerian

Banks. This method transforms available individual firm's corporate governance mechanisms to an aggregate representing the corporate governance structure. Agrawal and Knoeber (1996) affirmed that PCA can control for the statistical problem of multicollinearity of various data set when regressing simultaneously. The method also produces the weights for the aggregate variable automatically.

Interestingly, the principal components analysis condenses eight corporate governance variables into corporate governance index. We adopt the identified corporate governance attributes to construct a corporate governance index for Nigerian Banks. The adopted governance indices include Board Magnitude, the ratio of Board Independent, Degree of Director Ownership, Board Composition, Board Meeting, Board Risk Committee Size, Board Risk Committee Meeting and Board Risk Committee Independence. In the process, the first principal components are selected, which represent the existing variability in the dataset in line with the study of Ellul and Yerramilli (2013), Florackis and Ozkan (2009a), Tarchouna et al. (2017a).

Panel A of Table 3 presents the correlation between the corporate governance variables used to construct the corporate governance index. Relatively, the low and weak correlation coefficients between the variables depict that the adopted indices mirror diverse features of the corporate governance systems in the selected Nigerian banks.

Panel B reports the principal component loadings for the Index, which is mainly characterized by the Board Magnitude and the Board Risk Committee Size, as their absolute loadings exceed 0.5. Like Tarchouna et al. (2017a) and Dalton et al. (1999), the positive contribution of Board Magnitude to the overall corporate governance structure indicate larger board size enables the firm to access expertise skills and available resources to navigate high-risk endeavours.

Based on the result in Table 3, the degree of board ownership contributes positively to the overall corporate governance structure. This implies the prominence of directors' ownership in the corporate governance structure in Nigerian Banks. However, the positive weight of director ownership predicts that higher degree of incentives might promote effective corporate governance (Shleifer & Vishny, 1997). However, the negative contribution of non-executive directors to the overall corporate governance structure validates the argument that the dominance of non-executive directors might be inefficient (Florackis & Ozkan, 2009b).

Similarly, the size of the board risk committee (BRCS) has a positive weight in the corporate governance index of the sampled banks, which implies that the committee has an effective influence on the overall index. However, the risk committee meeting (BRCM) has a positive contribution to the built index, which has effective contribution implication. It is also identified that the risk committee independence (BRCI) has a negative contribution to the corporate governance index, which implies a passive role played by the independent directors on the committee.

Additionally, the principal component analysis further requires two additional statistical tests, which include Bartlett's sphericity and Kaiser-Meyer-Olkin tests to validate the instrument (Maddala, 2001). The Bartlett's test with its null hypothesis tests that the correlation matrix is not factorable (Pett et al., 2003). For the data used to be appropriate for factor analysis, the p-value of Bartlett's test should be less than 0.05% or 5%. Under this study, the p-value of Bartlett's test reports

Table 3. Principal component analysis for adopted corporate governance variables

BSBIN		DOH	BC	BM	BRCM	BRCI
Panel A: Correlation Matrix						
BM	1					
BIN	-0.0797	1				
DOH	0.0714	1				
BC	-0.389***	-0.00816	1			
BE	0.272**	-0.0138	-0.0724	1		
BRCM	0.570***	-0.0476	-0.281**	0.0248	1	
BRCI	0.335***	0.0107	-0.152	0.0909	0.344***	1
	-0.0544	0.599***	0.145	-0.0572	-0.214*	0.00624
Panel B: Principal Component Weight						
Index	0.5477	0.1761		0.2290	0.5235	0.3435
Panel C: Descriptive statistics						
		Mean	S. D	Min	Max	
Index		0	1	-2.638	1.655	
Panel D: Validity of Principal Component Analysis						
		Bartlett test of sphericity (p-value)	0.0000			
		Kaiser-Meyer-Olkin	5.22			

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. **Note:** **BM** is the board magnitude defined as the total number of existing board members. **BIN** is the board independence measured by the ratio of an independent director to total members on the board. **DOH** is the Director ownership calculated as Percentage of the number of shares held by directors to total shares. **BC** is board composition measured as the ratio of non-executive directors to total board members and **BE** is the board engagement measured by a number of meetings held yearly for board engagement. The risk management characteristics include: Board Risk Committee Size (**BRCM**) is total number of personnel on the committee, Board Risk Committee Meeting (**BRCM**) measured by total number of the committee meeting yearly and Board Risk Committee Independent (**BRCI**) measured as the ratio of independent member to the total member on the committee. Moreover, the presence of independent directors has a negative influence on the corporate governance index over the periods 2009–2017. In line with Tarchouna et al. (2017b), the negative influence of independent director implies a passive role exhibited in the corporate governance and might unveil the alternative control by executive directors who could promote information asymmetry.

0.000 in which the null hypothesis of the non-factorable correlation matrix is rejected. This implies that this finding reflects the linear relationship between the adopted corporate governance indices. Furthermore, Kaiser-Meyer-Olkin “K MO” takes a value between 0 and 1, with 0.50 being acceptable as a critical threshold (Florackis & Ozkan, 2009b) for sampling adequacy. It is noted that the KMO value is **0.522**, which reflects acceptable sampling adequacy. This finding indicates that the built index represents the eleven corporate governance indices wholly (Stewart, 1981). Therefore, the two tests confirm the validity of using the principal component analysis for the construction of a corporate governance index under this study.

4.2. Correlation Analysis

Table 4 reports the correlation analysis with the motive of showing the degree of linear association between dependent and independent variables adopted in the research study. The table equally presents the result of correlation coefficients with a probability value.

In addition, Table 4 reports the Pearson correlation matrix for the independent variables adopted in the analysis. The table indicates low correlation among the variables. Hence, there is no indication of serious multicollinearity in the models adopted.

4.3. Panel Data Regression Results

Table 5 presents the effect of corporate governance structure and bank regulations on Nonperforming Loans while introducing Generalized Methods of Moment (GMM) to test for the level of sensitivity of Non-performing Loans. The Hausman Test validates the use of Random Effect for appropriate analysis at $\text{Prob} > \chi^2 = 0.8154$. In addition, it is vital to examine the preliminary level of goodness of fit of the overall model and the strength of the explanatory power of the regressors. From Table 5, the R² reports that 60.2% of the independent variables explain the level of non-performing loans. This explanatory power of the regressors is statistically significant by the p-value of *F statistics* at 1% of significant level, which enhanced the model's reliability and validity.

From the reports presented in Table 5, the coefficient of corporate governance index is negative and significant at 5% level of significance except for the result presented by the Generalized Method of Moment, which indicates insignificance. This implies that Banks with better corporate governance system could effectively reduce the level of non-performing loans. This result reflects a corporate governance system capable of reducing the level of non-performing loans in the banks. This further explains effective loans evaluations by the corporate governance system to limit default loans, which could impair loan quality and performance. Nigerian Banks have undertaken diverse reforms since the 2008/2009 financial crisis due to excess default loans. Therefore, the result of this study has confirmed that the reformed corporate governance has nevertheless strengthened the Banks decisions as regards excessive risk-taking. This finding corroborates with the findings of Zagorchev and Gao (2015) in United States Banking Sectors, Love and Rachinsky (2015) in banking sector of Russian and Tarchouna et al. (2017a) among the small banks in the United States. However, these findings are at variance with the findings of Beltratti and Stulz (2012), which examined the status of corporate governance of United States banking sector during the global financial crisis, Erkens et al. (2012) who survey the corporate governance in 2007 and 2008 financial crisis from global perspective and Tarchouna et al. (2017a) findings, which suggest positive influence of corporate governance system on non-performing loans in both medium and large banks in United States.

Likewise, bank regulation indicator is applied to examine their impact on the level of nonperforming loans. Although Monetary Policy Rate is significant for the Fixed Effect and Generalized Method of Moment, the relationship remains negative. This implies that the increase in Monetary Policy Rate leads to decrease in Non-performing Loans. This implies that the tight monetary policy rate could reduce the supply of bank loans, which in turn affects the borrowers to access adequate

Table 4. Correlation matrix

	NPL	Index	Size	ROA	LDR	CAR	GDP	IR	LR	MPR
NPL	1									
Index	-0.230*	1								
Size	-0.356***	0.201*	1							
ROA	-0.677***	0.0852	0.333***	1						
LDR	-0.275**	-0.0918	0.198*	0.257**	1					
CAR	-0.507***	0.179	0.177	0.643***	0.159	1				
GDP	0.274**	0.0466	-0.376***	-0.136	-0.260**	0.0708	1			
IR	0.195*	0.0329	0.0640	0.0211	0.210*	0.0166	-0.365***	1		
LR	0.423***	-0.00599	-0.172	-0.200*	0.156	-0.0776	0.312**	0.404***	1	
MPR	-0.390***	-0.0838	0.433***	0.286**	0.218*	-0.0996	-0.813***	0.0969	-0.384***	1

* $p < 0.05$, ** $p < 0.01$ ***, $p < 0.001$

Table 5. Regression Analysis of Non-performing Loans as explained variable

Variables	Ordinary Least Square	Fixed Effect	Random Effect	Sys-GMM
NPL-1				0.554*** (0.0490)
<i>Corporate Governance</i>				
Index	-0.0210*** (0.00641)	-0.0313*** (0.00849)	-0.0260*** (0.00721)	-0.00342 (0.00580)
<i>Bank Regulation</i>				
MPR	-0.416 (0.422)	-1.184** (0.551)	-0.578 (0.418)	-0.436* (0.251)
CAR	-0.169** (0.0744)	-0.193** (0.0790)	-0.178** (0.0749)	-0.176 (0.108)
<i>Controlling Variables</i>				
Firm Size	0.000943 (0.00888)	0.0486 (0.0331)	0.00540 (0.0126)	0.0115 (0.00780)
ROA	-1.084*** (0.239)	-0.748*** (0.267)	-0.950*** (0.245)	0.287 (0.428)
LDR	-0.0986*** (0.0373)	-0.106** (0.0418)	-0.105*** (0.0387)	-0.0179 (0.0248)
GDP	0.394 (0.367)	0.287 (0.349)	0.326 (0.347)	-0.214 (0.264)
IR	0.889*** (0.296)	0.813*** (0.279)	0.864*** (0.277)	-0.0276 (0.185)
LR	2.593** (1.275)	2.943** (1.213)	2.735** (1.201)	4.648*** (1.602)
Constant	-0.348 (0.265)	-1.303* (0.693)	-0.438 (0.313)	-0.899*** (0.315)
Observations	108	108	108	96
R-squared	0.671	0.670	0.602	
F-test	22.19	19.62		
Prob > F	0	0		
Wald chi2			193.1	
Prob > chi2			0	
Hausman p-value			0.8154	
Hansen_test				0.648
Hansen Prob				0.515
AR (1)_test				-2.067
AR (1)_P-value				0.0388
AR (2)_test				1.043
AR (2)_P-value				0.297

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

loans. In addition, a regulatory restriction could discourage friendly banks' loan terms with the borrowers to access loans. Monetary policy rate tends to affect financial institutions directly as its reserves and interest rate are adjusted, which could affect the demand for credit. This is consistent with the findings of Boudriga et al. (2010), and Barth et al. (2004).

Similarly, the capital adequacy ratio coefficient shows a negative and statistically significant at 5% relationship with non-performing loans. This infers that well-capitalized and diversified financial institutions whose capacity can resist potential credit default. The negative link between the capital adequacy ratio and non-performing loans could be attributable to the level of sensitivity of banks to credit risk and the strict regulations of the Central Bank of Nigeria. Therefore, higher capitalized banks are less susceptible to aggressive risk taking. This result agrees with the findings of Djogap and Ngomsi (2012) for Central African Economic and Monetary Community, Zhang et al. (2016) for Chinese commercial banking system. However, the finding contravenes with the study of EL-Maude et al. (2017), Radivojevic and Jovovic (2017), Tomak (2013), Badar and Yasmin (2013), Konfi (2012).

4.3.1. Additional Analysis Results

Table 6 presents the result for the effect on corporate governance variables on the non-performing loans. Ultimately, it is necessary to disaggregate and identify the individual effect of the corporate governance construct on the non-performing loans in Nigerian Banks. However, the Hausman Test validates the use of Random Effect for appropriate analysis. In addition, it is vital to examine the preliminary level of goodness of fit of the overall model and the strength of the explanatory power of the regressors. From Table 11, the R2 reports that 30.4% of the independent variables explain the level of non-performing loans. This explanatory power of the regressors is statistically significant by the p-value of *F statistics* at 1% of significant level, which enhanced the model's reliability and validity.

From Table 6, all the coefficient of variables except for the independent directors and board meeting are negative and insignificant. The Board Magnitude has a negative influence on non-performing loans. This implies that large board size tends to ensure a lower level of nonperforming loans as the magnitude would provide expertise skills and reduce the board risk appetite. Conversely, the level of its influence remains statistically insignificant, which can be attributed to ineffectiveness to reduce non-performing loans. In addition, there is an inverse relationship between the degree of non-executive directors on the board and the non-performing loans. The dominance of non-executive directors tends to eliminate the high level of nonperforming loans as they are characterized to be risk-averse. However, the relationship is statistically insignificant, which could imply a lack of requisite skills and information characterized by non-executive directors to actively engage in confrontational monetary role (Florackis & Ozkan, 2009a). However, only the board meeting is positive and significant at 5% level of significance. This implies that the board interaction and activities have neglected the negative potential of default loans in Nigerian Banks.

Similarly, the number of independent directors on the Board Risk Committee has an inverse relationship with non-performing loans. This indicates the degree at which independent directors influence the level of risk appetite on default credit risk. Nonetheless, their influence is statistically insignificant, which implies ineffectiveness. Similarly, the Board Risk Committee Size has a negative influence on non-performing loans. This denotes that large board risk committee limits the level of the risk appetite of the board by reducing the extent of non-performing loans in selected firms.

4.3.2. Bank Externalities Effect and Non-performing Loans

Table 7 presents the result of the bank-specific and the macroeconomic determinants of nonperforming loans in Nigerian Financial Institutions. This examines the specific determinants of Non-performing Loans exempting the contribution of the corporate governance system. As shown in Table 7, the Hausman Test validates the use of Random Effect for appropriate analysis. In addition, it is vital to examine the preliminary level of goodness of fit of the overall model and the strength of the explanatory power of the regressors. From Table 7, the R2 reports that 62.7% of the independent variables explain the level of non-performing loans. This explanatory power of the regressors is statistically significant by the p-value of *F statistics* at 1% of significant level, which enhanced the model's reliability and validity.

Furthermore, the return on asset (ROA) coefficient reflects a negative and statistically significant relationship with non-performing loans. This implies that the Banks in Nigeria engage in less risky activities that could deteriorate loan quality and firm performance. In

Table 6. Decomposition of corporate governance and non-performing loans

Variables	Ordinary Least Square	Fixed Effect	Random Effect
Corporate Governance Measures			
BS	-0.00899** (0.00394)	-0.00646 (0.00493)	-0.00693 (0.00434)
BIN	-0.110 (0.181)	0.212 (0.210)	0.0691 (0.194)
DOH	-0.0391 (0.0824)	-0.0900 (0.278)	-0.0385 (0.139)
BC	-0.0938 (0.101)	0.00253 (0.109)	-0.0375 (0.102)
BE	0.0138*** (0.00451)	0.0107** (0.00498)	0.0125*** (0.00470)
BRCS	0.000900 (0.00505)	-0.0153** (0.00704)	-0.00877 (0.00604)
BRCM	-0.0107 (0.00852)	-0.00756 (0.00810)	-0.00866 (0.00799)
BRCI	-0.0783 (0.0941)	-0.0697 (0.117)	-0.0876 (0.105)
Control Variables			
Size	-0.0299** (0.0132)	-0.0736*** (0.0264)	-0.0473** (0.0185)
Constant	0.874*** (0.255)	1.780*** (0.556)	1.223*** (0.380)
Observations	108	108	108
R-squared	0.292	0.316	0.304
F-test	4.491	4.461	
Prob > F	5.95e-05	7.95e-05	
Wald Chi2			37.70
Prob > chi2			1.98e-05
Hausman Test			8.63
Prob>chi2			0.4720

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

addition, more profitable financial institutions have less tendency of default loans and fewer incentives to absorb in excessive risk activities. This finding is consistent with prior studies such as Zagorchev and Gao (2015), Dimitrios et al. (2016), (Ghosh, 2015), Messai and Jouini (2013), & Klein (2013). In addition, “bad management” hypothesis of Berger and DeYoung (1997) suggests that profitability negatively impact non-performing loans in which this study is consistent with. Nonetheless, the study of Gesu (2014), Makri et al. (2014) and Ahmed and Bashir (2013) find a positive and statistically significant relationship between return on asset and non-performing loans.

Likewise, the coefficient of loan to customers’ deposit ratio (LDR) indicates a negative and statistically significant at 1% significant level relationship with non-performing loans. An increased loan to deposits ratio unveils the degree of firm risk preference, which could lead to higher default

Table 7. Determinants of non-performing loans

Variables	Ordinary Least Square	Fixed Effect	Random Effect
Bank Specific Factors			
ROA	-1.072*** (0.251)	-0.829*** (0.284)	-1.004*** (0.258)
LDR	-0.0827** (0.0388)	-0.111** (0.0446)	-0.0956** (0.0405)
Firm Size	-0.00614 (0.00903)	0.0506 (0.0354)	-0.00290 (0.0122)
Economic Factors			
IR	0.844*** (0.310)	0.769** (0.298)	0.825*** (0.296)
LR	2.650* (1.336)	3.172** (1.295)	2.821** (1.281)
GDP	0.403 (0.384)	0.331 (0.373)	0.359 (0.369)
Regulatory Factor			
MPR	-0.295 (0.441)	-1.031* (0.588)	-0.372 (0.437)
CAR	-0.195** (0.0775)	-0.224*** (0.0840)	-0.203*** (0.0788)
Constant	-0.223 (0.275)	-1.387* (0.741)	-0.299 (0.315)
Observations	108	108	108
R-squared	0.635	0.618	0.627
F-test	21.50	17.82	
Prob > F	0	0	
chi-squared			162.1
Prob > chi2			0
Hausman Test			3.88
Prob>chi2			0.8681

Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

loans. However, this finding shows a negative link between LDR and NPL, which could be attributed to the firms' stringent lending policies. This means that a limited amount of customers' deposits is used for loans due to the requirement of the Central Bank of Nigeria. This finding is in conformance with the study of Ranjan and Chandra (2003) for commercial banks in India, which on the contrary, contravene with the study of Louzis et al. (2012), Swamy (2012) and EL-Maude et al. (2017). In summary, Nigerian banks are more conservative in taking excessive risks that could impair the firms' liquidity and sustainability.

The real gross domestic product growth has a relationship with non-performing loans. However, the link between the real GDP and non-performing loan remains insignificant. This implies that the real GDP growth does not directly improve the borrowers' debt-servicing capacity. In essence, the decline in real GDP could cause borrowers to have challenges in servicing their debts. This finding contradicts the theory that postulates economic growth influences the borrowers' income who in turn repay loans. This finding is in conformity with the result of Adeola and Ikpesu (2017), Louzis et al. (2012), and Wairimu and Gitundu (2017), which contravene several prior study findings such

as Akinlo and Emmanuel (2014), Abid et al. (2014), Dimitrios et al. (2016), and Radivojevic and Jovovic (2017).

Similarly, the coefficient of inflation rate (IR) shows a positive and statistically positive relationship with the non-performing loans. This finding infers inflation impairs banks' loan quality and deteriorate the real value of loans. Therefore, the increase in inflation without a corresponding increase in borrowers' income tends to reduce their loan repayment capacity thus, increase non-performing loans. This finding is consistent with the prior studies such as Skarica (2014), Ghosh (2015), and Louzis et al. (2012), (Abid et al., 2014) Wairimu and Gitundu (2017).

However, the finding contradicts the study of Akinlo and Emmanuel (2014)

Likewise, the lending rate coefficient reflects a positive and statistically significant relationship with non-performing loans. This indicates that the increase in lending rate would increase the borrowers' debt value and result in more expensive debt servicing. This finding reflects the level of sensitivity of non-performing loans to lending rates. This implies that an increase in lending rate tends to weaken the borrowers' loan repayment capacity, thus increasing the level of nonperforming loans. This finding conforms with the results of Louzis et al. (2012), Akinlo and Emmanuel (2014), and Wairimu and Gitundu (2017). In summary, these results suggest that staggering economic conditions could impair the ability of borrowers to pay back their loans as at when due.

5. Conclusion

This study is primarily stimulated by the recent increasing trends of non-performing loans and the dearth of knowledge on the influence of corporate governance structure on non-performing loans in developing countries especially Nigeria. This study examined mainly the influence of corporate governance structure on non-performing loans. This research further assessed the relative impact of the policy provided by regulators, the bank-specific characteristics and macroeconomic indicators on non-performing loans. Based on these identified objectives, prior literature relative to corporate governance structure, bank-specific characteristics and macroeconomic indicators affecting non-performing loans was reviewed and the main theoretical framework underpinning this study was the institutional theory of corporate governance.

We posit that the corporate governance structure has a negative influence on the trends of nonperforming loans in Nigeria. We also identified that stringent policy imposed by the bank regulators has a negative impact on non-performing loans. We found that the bank-specific determinant relatively has a conservative influence on non-performing loans. We also identified that the staggering economic conditions impair the loan quality. That is, the macroeconomic indicator has a positive impact on non-performing loans.

6. Recommendations

From the empirical findings of this study, the following recommendations are stipulated:

- (i) There is a necessity for banks to continue implement high-quality corporate governance mechanism, which is likely to eliminate excessive risk taking.
- (ii) The banking industry should relax their credit policies. It is identified in the course of this research that majority of the banks tend to release loans to large firms e.g., oil and gas companies that are exposed to high price risk that is high crude oil price volatility. Thus, banks should extend their credit provision to small and medium firms that could easily navigate through risk exposure compared to larger companies.
- (iii) Given that increased inflation rate and lending rate could directly contribute to growth in the non-performing loans, the Central Bank of Nigeria tends to face ambiguous results relating to non-performing loans when navigating for economic growth. Hence, Central Bank of Nigeria should implement expansionary monetary policy to sustenance quick economic recovery.

Funding

The authors received no direct funding for this research.

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Disclosure statement

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Citation information

Cite this article as: Corporate governance structure, Bank externalities and sensitivity of non-performing loans in Nigeria, Alex Adegboye, Stephen Ojeka & Kofo Adegboye, *Cogent Economics & Finance* (2020), 8: 1816611.

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