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# Determinants of Bank Failure in Nigeria: An Empirical Investigation

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**ABSTRACT:** This study investigates the determinants of bank failure in Nigeria from 1970-2013. It uses Autoregressive Distributed Lag (ARDL) approach in the analysis and further examines the extent to which these determinants lead to bank failure in Nigeria. The study found that there is significant long run relationship between bank failure and exchange rate, interest rate, capital adequacy ratio, non-performing loans and liquidity ratio, but an insignificant relationship with inflation in Nigeria. On the direction of causality, the study found a bidirectional causal relationship between bank failure and, capital adequacy ratio and non-performing loans (NPL), while a unidirectional causal relationship was found between bank failure and exchange rate but shows no causal relationship between bank failure and, inflation and interest rate. The study therefore conclude that bank failure is chiefly determined by capital adequacy ratio (CAR), exchange rate, interest rate and liquidity ratio in Nigeria, and that Non-Performing Loans (NPL) leads to the degradation of the financial sector thereby making the financial institutions vulnerable to failure. It is recommended that monetary authorities in Nigeria must ensure that all banks operating in the country comply with the CAR guideline to guard against sudden bank failure, and that financial institutions should make sure that all necessary checks prior to the advancement of credit such as adequate collateral and viable financial projection be dully carried out and satisfied in order to forestall the incidence of bank failure in Nigeria.
**KEY WORDS:** *bank failure, Non-performing loans, CAR, ARDL, Nigeria* JEL:

## I.  INTRODUCTION

T he problem of bank failure has gained prominence over the years as a result of the realization of the continuing importance of the banking sector to effective economic functioning, growth and development. The extent and depth of bank failure can be generalized or systemic in dimension. Generalized failure exists when its occurrence spread fast and cuts across in terms of the ratio of total deposits of failed institutions to total deposits of the industry. On the other hand, the problem may become systemic when its prevalence and contagious effects become endemic and pose threats to the stability of the entire system. Under this situation, public confidence in the system would be completely eroded (Abdullahi 2002). It is therefore natural that issues surrounding the operations of banks, as well as their problems would resonate among scholars and researchers.

Though previous studies such as Waweru and Kalani (2009), Egbo (2012), Mayuku and Ohwofasa (2012), Ogude *et al* (2012) and, Calomiris and Mason (2003) were carried out to analyze and appraise bank failure, the major determinants of this failure were not exhaustively discovered and investigated, as the studies dwelt mainly on the impact and consequences of bank failure while paying little attention to enunciating the major determinants. While Calomiris and Mason (2003) emphasized the consequences of banking crisis on an economy, Demirguc-Kunt and Detragiache (1998) did an analysis on the determinants of banking crisis in developed and developing countries. The former emphasized on the consequences, and not the determinants of bank failure in the U. S during the World Economic recession of 1930 covering a period of three (3) years which can be said to be too limited for any study to come up with credible findings and make viable contributions. The latter had a scope that can also be said to be limited both in period and the number of banks captured in the study. Furthermore, the method adopted by these studies also casts doubt on the viability of their findings as they used discrimant approach which relied on the probability of a failure occurring or not. In another development, Waweru and Kalani (2009) carried out a study on commercial banking crisis in Kenya pointing to the fact that Non-Performing Loans (NPL) accounted for the crisis thereby leading to failure. It is a fact that NPL could be a factor leading to bank failure, but it can certainly not be the only factor as advanced by the above study.

Furthermore, Egbo (2012) examined the universal basis for bank failure using Nigeria as a case study. Though this study is relevant to Nigeria's financial system, however, the findings cannot be said to be worthwhile as there was no stated clear-cut methodology. Mayuku and Ohwofasa (2012), investigated the determinants and impact of bank distress/failure on Nigerian economy, the authors in the study, argued that macroeconomic variables such as inflation rate, real exchange rate, interest rate and GDP can best explain bank failure in Nigeria. However, as a rule of thumb, bank failure cannot be adequately examined without putting into consideration some bank specific variables such as Capital Adequacy Ratio (CAR), Liquidity and Non-Performing Loans (NPL). On the other hand, Ogude *et al* (2012) carried out an appraisal of the impacts of bank failure on Nigerian economy. The study opined a negative impact between bank failure and Nigeria's economy but unable to unravel the factors leading to this failure. This study therefore is set to examine such factors that are assumed to be responsible for bank failures and the extent to which each one of them could explain bank failure. In achieving this objective the study is divided into five sections, including this introductory section. Section two reviewed related literature, section three is the methodology employed in the study, section four presents the results while section five concludes and offered suggestions.

## II. REVIEW OF EMPIRICAL LITERATURE

Several empirical studies were conducted on bank failure and related issues but the concern of this study is on bank failure. Never the less, there are quite a number of studies on bank failure such as Mayuku and Ohwofasa (2012), Adeyemi (2011), Chete (2001), Kunt and Detragiache (1998), Adeyeye *et al* (2012) and Adebiyi (2012), which have touched on some determinants of bank failure. In reviewing literature for this study, the specific factors that determine bank failure were treated one after the other.

### 2.1. Inflation

Mayuku and Ohwofasa (2012) examined the determinants of bank distress and their effect on Nigerian economy from 1986 to 2011. The objective of the study was to identify the major determinants of bank distress in Nigeria a well as their impact on the economy. It employed the use of Johansen model for Co-integration found that inflation which is one of the macro-economic variables play significant role in determining bank failure in Nigeria. The study found inflation rate in the economy to be potent source of bank failure in Nigeria. In a different study, Demirguc-Kunt and Detragiache (1998) investigated the determinants of bank failure in developing and developed countries. The objective of the study was to investigate the major determinants of bank distress as well as finding out the features of failed banks in developing countries using multivariate logic econometric model and panel data. The study suggested that crises tend to erupt when the macroeconomic environment is weak, particularly when growth is low and inflation is high. Augmenting the above view is the study of Brenda *et al* (1997) which examined the determinants of banking system fragility, a case study of Mexico using survival analysis and quarterly data for 1991 to 1995. They found that the degree of soundness of banks or their probability of failure is determined by bank-specific factors as well as macro- economic conditions, such as high inflation, and the overall fragility of the banking system when systemic risk is present. In another study, Chete (2001) examined the role played by macro-economic variables in the Nigerian banking crises, with more emphasis on inflation, interest rate, exchange rate and liquidity ratio. The study employed discrete-time hazard model and logistic regression analysis. The study revealed that the process of financial liberalization contributed to banking sector fragility. By the same logic, the implied macroeconomic management mirrored by the inflation coefficient impacted negatively on banking sector soundness in a significant way.

### 2.2 Exchange Rate

Ogude *et al* (2012) examined bank distress determinants in Nigeria with particular emphasis on revealing the contributions of macroeconomic variables to the crisis. The study made use of multiple regression analysis with Error Correction Model (ECM) and the co-integration test indicated that the real exchange rate in the economy contributes to distress among Nigerian banks, though the extent of impact was shown to be non-significant. In a similar study, Chete (2001) examined the role played by macro economy in the Nigerian banking crises using discrete-time hazard model and logistic regression analysis. The study showed that real exchange rate enhances bank fragility and consequently bring about crises in the financial sector. Though the real exchange rate played a lesser role on the probability of a banking failure, depreciation is adversarial to banking sector soundness.

### 2.3 Interest rate

Raulin (2009) analyzed the theory of linkage between monetary policies and bank failure in developing countries using specific data. It was revealed that increase in interest rates induces an increase of asymmetric information. An efficient bank should decrease its loan portfolio to deal with asymmetric information. The study showed that if the interest rate is so high to the extent that loan portfolio should be null there will be a banking

crisis. According to the study, there is a threshold of interest rate which is referred to as a threshold of crisis, which the interest rate on the treasury bills should not exceed.

Kobir (2011) investigated the relationship between interest rates and financial performance of commercial banks in Kenya using multiple regressions and a time series data of 2006 to 2010. The findings of the study revealed that interest rates have an effect on financial performance of commercial banks in Kenya. The study used regression analysis to establish the relationship between interest rates and Return on Earnings (ROE). The results obtained from the study shows that there is a positive relationship between interest rates and financial performance of commercial banks in Kenya. It recommended that Banks should therefore prudently manage their interest rates to improve their financial performance. The analysis shows that the effect of interest rates on profitability is not significant in the short term for all the banks.

Englund (1999) analysed Swedish banking crisis, roots and consequences. The study used country specific data. The study revealed that subsequent crises resulted from a highly leveraged private sector being simultaneously hit by three major exogenous events: a shift in monetary policy with an increase in pre-tax interest rates, a tax reform that increased after tax interest rates, and the ERM crisis. The study also indicated that combined with some overinvestment in commercial property, high real interest rates contributed to breaking the boom in real estate prices and triggering a downward price spiral resulting in bankruptcies and massive credit losses.

*2.4 Capital Adequacy Ratio*
Okezie (2011) investigated capital adequacy ratio as a predictor of bank failure in Nigeria. It employed time series data from 1991 to 2004 using Early Warning Systems (EWS) model, Auto regression and Granger Causality tests were employed to examine capital ratio as predictor of distress. The study revealed that capital adequacy ratio predicted bank distress significantly and the continued use of capital adequacy ratio in the prediction of bank distress was recommended by the study. The study also revealed that leverage capital ratio and the gross revenue capital ratio may be used to replace the risk-weighted capital ratio since they are simpler and may not be influenced by the ever changing risk pattern of the banks.  Aspal and Nazneen (2014) on the other hand, empirically examined capital adequacy in the Indian private sector banks using time series data from 2008 to 2012. The study found that capital adequacy has an important bearing on the performance of banks. It further observed that the Indian private sector banks maintained a higher level of capital requirement than prescribed by Reserve Bank of India. Finally in the study, it was also found that Indian private sector banks have excessive funds to meet their obligations and have opportunity to give more advances to the public by protecting owner's stake and this will avert any possibility of a failure.

According to CBN (2009) on the assessment of the health of the banking sector in Nigeria using CAMEL parameters indicated that no bank was rated A, rather, the rating saw some banks at B, C, D and E given their CAR. The assessment also concluded that some banks exhibited concerns with their inability to meet the stipulated capital ratio. The study recommended that in order to maintain a healthy banking sector, the minimum CAR should be maintained and the incidence of granting credit facility to unsecured sources be discouraged.

Ganiyu (2010) while examining perspectives on the Nigerian financial safety-net using a qualitative research method observed that the Nigerian banking industry witnessed steady and large scale deterioration in capital positions until 1998 when a large number of banks were closed. The study concluded that some banks were established with inadequate capital and failed to increase the capital base to meet the growth in their risk assets portfolio. It also concluded that soundness of banks rests with the board and management.

Meanwhile, Adeyemi (2011) in his study "bank distress in Nigeria, a consequence of capital inadequacy, lack of transparency and non-performing loans" employed both primary and secondary data and Chi-square method of hypotheses testing. He identified capital inadequacy, lack of transparency and huge non-performing loans as major causes of bank failure in Nigeria. These factors were examined and the extent to which they have been accountable for bank failure in Nigeria were determined.  It was observed that these three variables combined dealt a serious blow to the banking sector in Nigeria thus, leading to the demise of some of these banks. It was also observed that aside these factors, there are other factors that may be accountable for bank failure in Nigeria, such as ownership structure, weak/ineffective internal control system, poor management among others. Choon *et al* (2013) investigate factors influencing failure among Malaysian commercial banks using panel data for 2003 to 2012 and multiple regression analysis. The study found that bank capital, bank size, non-performing loan ratio, gross domestic product, financial crisis and return on equity have significant effects on bank's liquid assets holdings. The study categorized the determinants into bank specific factors and macroeconomic factors. According to the study, bank specific factors include Bank Size, Capital Adequacy, Profitability, Non-

Performing Loans, while the macroeconomic factors include Gross Domestic Product, Inter-Bank Rate and Financial Crisis.

Furthermore, Wheelock and Wilson (1995) examined explain bank failure, deposit insurance regulation and efficiency using panel data, non-parametric linear programming framework and proportional hazard model to reveal that deposit insurance system membership increased the probability of failure, and that technically inefficient banks were more likely to fail than technically efficient banks. According to the study, weak capitalized banks, those holding few reserves, and those relying heavily on short-term borrowed funds ex ante, had a higher probability of failure than their more conservatively managed competitors. Furthermore, members of state deposit insurance system had a higher probability of failure than non-members, consistent with the hypothesis that insurance encourages banks to hold higher-risk portfolios than they otherwise would. The study then recommended that capital requirements of bank be strictly implemented and that financial institutions operate efficiently to forestall failure in the sector.

### 2.5 Non-performing Loans
Ganiyu (2010) while studying the perspectives on the Nigerian financial safety-net using qualitative analysis method revealed that a number of banks had poor credit policies and loan were granted without due regard to ability of the borrowers to repay. The study also found that several loans were granted without collateral. It therefore concluded that the above contributed to the large sum of Non-Performing Loans in the banking sector thereby making the institutions unsound. The study recommended unsecured advancing of credit be discouraged.

Rabeya (2014) examined the impact of Non-Performing Loans (NPL) on the profitability of state owned banks in Bangladesh using time series data of 47 state owned banks from 2006 to 2013 and a multiple regressions analysis. The study found that NPL as percentage of total loans of State Owned Banks was very high and they holds more than 50% of total NPLs of the banking industry and was also found to be one of the major factors influencing banks profitability and it had statistically significant negative impact for the study periods. The study also revealed that if the situation was not checked, it can plunge the entire banking sector in crisis due to a significant ratio of Credit/Default risk and Liquidity risk which will consequently lead to depositors' loss of confidence in banks and may be tempted to withdraw their deposits for fear of collapse of the banking sector.

Adeyanju (2014) studied code of ethics and professionalism; implication for bank failure in Nigeria using a well structured questionnaire and Pearson's Moment Correlation. He empirically investigated the various causes of Bank failure with particular emphasis on the need to enforce compliance by Banks with the Banking Code of Ethics and Professionalism (BCEP) in order to achieve standardized and efficient banking environment. The study discovered that factors such as insider's abuse on lending, lending to high risk borrowers, microeconomic instability, deficiency in bank regulation and supervision made significant contribution to failure of banks in Nigeria. The study also confirmed that many banks in Nigeria are not necessarily distressed due to unethical practices, but may be due to other means of mismanagement and abuse such as maintaining a high proportion of non-performing loans.

### 2.6 Liquidity
Natacha (2014) in studying the likely causes of Chicago bank failure in the great depression using Vector Error Correction Model (VECM) showed that banks' long-term investments in illiquid assets (especially mortgages) severely weakened their position when they came to face large withdrawals on their deposits. Though restricted to Chicago, these results reassert the role that liquidity issues played in the Great Depression, both on the liability and the asset sides of the balance sheet. More specifically, they suggest that a solvent but ex ante less liquid bank is not necessarily healthy, and that liquidity risk management is just as important as credit risk management when the occurrence of bank runs cannot be completely excluded. In another development, Wu and Hong (2012) examined liquidity risk, market valuation, and bank failures. The study observed that systematic liquidity risk was the major predictor of bank failures in 2008 and 2009, while idiosyncratic liquidity risk played only a minimal role. To enhance the safety and soundness of the banking system, an effective liquidity risk management framework needs to target liquidity risk at both the idiosyncratic and the systematic levels.

Furthermore, Zuzana *et al* (2013) examined bank failure and excess liquidity in Russia utilized Excess Liquidity Creation Hypothesis (ELCH). The study showed that excess liquidity creation significantly increases the probability of bank failure. The study further suggested that the cost of bank failure can be reduced through an early identification of excessive liquidity creators and enhanced monitoring of their activities by financial authorities.

## III.     METHODOLOGY

### *3.1 Type and source of data*

The study utilized secondary data in the form of time series spanning the period of forty three (43) years (1970-2013). The data was sourced from the CBN Statistical Bulletin and the World Bank data base. As widely known, time series macroeconomic data are notably not stationary due to change in their time trend. As such, this study will apply Augmented Dickey Fuller (ADF) test for stationarity to investigate unit root. This is to find out whether the series used are stationary or not.

In order to investigate the determinants of bank failure in Nigeria, this study employs Autoregressive Distributed Lag (ARDL) model as developed by Pesaran *et al* (2001). The model is a more robust econometric technique for estimating level relationship between a dependent variable and a set of independent variables that may not necessarily be integrated of the same order. ARDL model provides consistent estimation in the presence of a mixture of stationary and non-stationary series (Pesaran *et al.* 2001).

### Variables measurement

The variables captured in the model for this study were measured as follows;

### Dependent variable

The dependent variable used in the study as a proxy for bank failure is Financial Deepening in line with the study of Mayuku and Ohwofasa (2012). It is the ratio of money supply to GDP, and it also refers to liquid money. The more liquid money is available in an economy, the more opportunities exist for continued growth and a robust banking sector. It can also play an important role in reducing risk and vulnerability of the financial sector of the economy (Okoli 2009).

### Independent variables

    i.     **Inflation**: Consumer Price Index (CPI) was used as a proxy for inflation in line with the study of Mayuku and Ohwofasa (2012).

    ii.     **Real Exchange rate**: This was measured by $\dfrac{\text{nominal exchange rate} \times \text{domestic price}}{\text{foreign price}}$ in line with the work of Chete (2001).

    iii.     **Real Interest rate**: This was measured by nominal interest rate minus inflation. That is, $\dfrac{(i-p)}{(1+p)}$ where, i stands for nominal lending rate and p stands for inflation similar with the work of Chete (2001)

    iv.     **Capital adequacy**: It was measured by Capital Adequacy Ratio (CAR) which evaluates the amount of a bank's core capital expressed as a percentage of its risk weighted asset It can be measured as $\dfrac{\text{Tier 1 capital} + \text{Tier 2 capital}}{\text{Risk weighted asstes}}$, where; Tier 1 capital is the core capital that includes equity, Tier 2 capital is the supplementary capital that include undisclosed reserves, revaluation reserves and hybrid instruments while Risk weighted assets are the loans in line with the study of Khalafalla (2013).

    v.     **Non-performing loan**: This was measured as a percentage of non-performing loans to total loan portfolio in line with Khalafalla (2013).

    vi. **Liquidity**: This was measured by liquidity ratio in line with the study of Aremu (2011).

### *Autoregressive Distributed Lag Bound Testing Approach*

The ARDL approach to co-integration analysis involves estimation of Unrestricted Error Correction Model (UECM). Hence the ARDL model for testing the relationship between bank failure and its determinants is stated as thus:

$$\Delta FDEP_t = \beta_0 + \sum_{t-1}^{m} \beta_1 \Delta FDEP_{t-1} + \sum_{t-1}^{m} \beta_2 \Delta INFL_{t-1} + \sum_{t-1}^{m} \beta_3 \Delta EXCH_{t-1} + \sum_{t-1}^{m} \beta_4 \Delta INTR_{t-1} + \sum_{t-1}^{m} \beta_5 \Delta CAR_{t-1} +$$

$$\sum_{t-1}^{m} \beta_6 \Delta NPL_{t-1} + \sum_{t-1}^{m} \beta_7 \Delta LIQ_{t-1} + \alpha_1 FDEP_{t-1} + \alpha_2 INFL_{t-1} + \alpha_3 \ EXCH_{t-1} + \alpha_4 INTR_{t-1} + \alpha_5 CAR_{t-1} + \alpha_6 NPL_{t-1} + \alpha_7 LIQ_{t-1} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \ (3.1)$$

Where *m* is the optimum lag length which will be determine using Akaike Information Criteria (AIC) and Schwartz Information Criteria (SIC), $\Delta$ is difference operator, $\alpha_0$ in each equation represent the constant parameter of that equation, $\alpha_1$ to $\alpha_5$ also in each equation represent the coefficients of level lagged value of the explanatory variables captured in the model, while $\beta_1$ to $\beta_7$ are vectors of the coefficient of the first difference lagged values of the variables captured in the model.

### Model specification

The basic model for this study is specified in equation (6) below. The model is a modification of Mayuku and Ohwofasa (2012).

$$FDEP_{t-1} = \beta_o + \beta_1 INF_{t-1} + \beta_2 EXC_{t-1} + \beta_3 INT_{t-1} + \beta_4 CAR_{t-1} + \beta_5 NPL_{t-1} + \beta_6 LIQR_{t-1} + \mu_{t-1} \dots\dots\dots\dots\dots (3.2)$$

Where:

| | |
|---|---|
| FDEP | = Dependent variable |
| $\beta_o$ | = Constant parameter |
| $\beta_1$-$\beta_6$ | = Coefficient of independent variables |
| $FDEP_{t-1}$ | = Lag value of financial deepening |
| $INFL_{t-1}$ | = Lag value of inflation |
| $EXC_{t-1}$ | = Lag value of real exchange rate |
| $INT_{t-1}$ | = Lag value of real interest rate |
| $CAR_{t-1}$ | = Lag value of capital adequacy ratio |
| $NPL_{t-1}$ | = Lag value of non-performing loan |
| $LIQR_{t-1}$ | = Lag value of Liquidity Ratio. |
| $t$ | = Lag value of other determinants of bank failure |
| $\mu$ | = Error term |

## IV. RESULTS AND DISCUSSION

This section presents the results of the data so anlysed, it comprises of four components. The first is the result of unit roots test followed by bound test result and then integration result. The fourth and final is the discussion of results, which is further decomposed to discuss long run and short run relationships separately.

### Unit Root Test

As a pre-condition for applying the ARDL/bound testing approach to cointegration and to ensure that none of the series is beyond integrated of order one i.e. I(1) testing for unit root became inevitable in this study. Giving the outcome of the unit root test, the above condition has been satisfied. For instance, the Augmented Dickey Fuller (ADF) and Philip Perron (PP) unit root test approaches applied show that at first difference, the financial deepening (FDEP) which is the dependent variable and a proxy for bank failure is stationary. This is because in absolute term, its actual value is greater than its critical values, which implies that the null hypothesis which says the series is not stationary is rejected for FDEP. Furthermore, though the results of ADF and PP was I(1) for the explanatory variables show that some of them were not integrated at the same order. For instance, inflation, interest rate and liquidity were integrated at level 1(0).

However, it shows that the other remaining explanatory variables were stationary at first difference. This is an indication that the null hypotheses which state that the explanatory variables are not stationary are thereby rejected. In summary, the unit root test has indicated that our dependent variable (i.e. FDEP) and the explanatory variables are stationary at I(1) and 1(0). This implies that none of the series is I(2). This is represented in table 4.1
.

**Table 4.1: Unit Root Tests Results**

| | ADF | | PP | |
|---|---|---|---|---|
| **Variables** | **At Level** | **At First diff.** | **At Level** | **At First diff.** |
| FDEP | -2.642188 | -5.256084[**] | -2.592462 | -6.355583[**] |
| INFL | -3.752617[**] | | -3.407608[**] | |
| EXCH | -1.774217 | -4.193486[**] | -1.740482 | -6.200720[**] |

| | | | | |
|---|---|---|---|---|
| INT | -5.638308** | | -7.079029** | |
| CAR | -1.817725 | -5.929817** | -1.929059 | -6.814179** |
| NPL | -0.596616 | -5.239999** | -0.594643 | -8.398863** |
| LIQ | -3.623756** | | -4.254109** | |

Significant at 1% and 5%. (Values in parentheses are probability values)
Source: Author's computation

### *Bound Test for Cointegration Analysis*

Bound Test for Cointegration among the variables captured in the model is required after Unit root test and Lag selection have been carried out. The Bound Test result shows that there exists a cointegration among the variables as the F-Statistics value of 4.0205 percent is greater than the critical value of upper bound of 3.9369 at 5% level of significance. This reveals that the null hypothesis which states that there is no cointegration among the variables is hereby rejected. The above analysis is represented in table 4.4

**Table 4.2 Bound Test result**

| **Asymptotic Critical Value for Rejecting Null Hypothesis** | | |
|---|---|---|
| Critical Value | At 5% | At 10% |
| Lower Bound | 2.6872 | 2.1607 |
| Upper Bound | 3.9369 | 3.2744 |

F-Statistics 4.0205**. Significant at 5%
 Source: Author's computation

From Table 4.2, it can be said that there is a strong cointegration among the captured variables. This is owing to the fact that at 5% level of significance, the F-statistics of 4.0205 is greater than the upper bound critical value of 3.9369.

### *Regression Results*

**Table4.3: Result of Estimated Long-run coefficients (Dependent variable: FDEP)**

| Independent Variables | Coefficient | Std error | t-statistics | Prob. |
|---|---|---|---|---|
| INFL | 0.83844 | 1.8750 | 0.44717 | 0.162 |
| EXCH | -0.99545 | 2.1564 | -0.46162 | 0.058 |
| INTR | 2.9083 | 5.6401 | 0.51564 | 0.000 |
| CAR | 13.0453 | 24.6629 | 0.52894 | 0.024 |
| NPL | -0.097227 | 1.3016 | 0.074696 | 0.071 |
| LIQ | 0.11472 | 0.81874 | 0.14011 | 0.089 |
| R-Squared | 0.83817 | | | |
| Adjusted R-Squared | 0.80009 | | | |

Source: Author's computation

Having established the existence of cointegration among the variables, the long run relationship between bank failure (FDEP) and the explanatory variables has also been estimated using the ARDL approach with ARDL (1,0,0,0) specification selected based on Akaike Information Criterion as represented in table 4.3 above. The result indicates that there exist positive long run relationships between bank failure and inflation but this relationship is not significant giving the probability value of 0.162, meaning that the null hypothesis which states that there is no long run relationship between bank failure and inflation cannot be rejected. In the same vein, the result indicates a negative and significant relationship between bank failure and exchange rate giving the p-value of 0.058, meaning that the null hypothesis which states that there is no long run relationship between bank failure and exchange rate is hereby rejected, contrary to the findings of Mayuku and Ohwofasa (2012). It can also be seen from the above table that a positive and significant long run relationship exists between the dependent variable (financial deepening) and, Capital Adequacy Ratio, interest rate and liquidity. From the table, it can be seen that the null hypothesis of no long run relationship is rejected giving their respective p-values of 0.024, 0.000 and 0.089. On the other hand, the result reveals a negative long run relationship between bank failure and Non-Performing Loans (NPL). This negative long run relationship is significant giving the p-value of 0.071. The table also shows the value of R-Squared which is the multiple coefficient of determination as well as the goodness of fit of the model. It indicates the extent to which changes in bank failure is explained by variation in the explanatory variables. From the table, the R-Squared stood at 0.83817 indicating that approximately, 84% of the variation in bank failure is explained by the joint influence of the explanatory variables. And only 16% variation is explained by other variables not captured in the model.

**Table 4.4: Result of Estimated short-run coefficients (Dependent variable: FDEP)**

| Independent Variables | Coefficient | Std error | t-statistics | Prob. |
|---|---|---|---|---|
| ΔINFL | 0.044783 | 0.031307 | 1.4304 | 0.161 |
| ΔEXCH | 0.02487 | 0.038591 | 0.64466 | 0.042 |
| ΔINTR | 0.15534 | 0.030547 | 5.0852 | 0.010 |
| ΔCAR | 0.69678 | 0.17661 | 3.9453 | 0.034 |
| ΔNPL | -0.14385 | 0.077113 | 1.8655 | 0.070 |
| ΔLIQ | 0.0061272 | 0.039511 | 0.15508 | 0.071 |
| R-Squared | 0.69256 | | | |
| Adjusted R-Squared | 0.62022 | | | |

Source: Author's computation

Table 4.4 presents the estimated results of the short run relationship between bank failure and the explanatory variables. It can be seen from the result that in the short run, inflation which stood as 0.044783 is positively correlated to bank failure. But this relationship is insignificant giving their p-values of 0.161 which means that the null hypothesis which states that there is no short run relationship between bank failure inflation cannot be rejected. On the other hand, the result shows a positive and significant relationship between bank failure and exchange rate giving the p-value of 0.042. In the same dimension, the result also shows a positive and significant short run relationship between bank failure and liquidity ratio. Furthermore, the result reveals a positive and significant short run relationship between bank failure and capital adequacy ratio giving the coefficients of 0.69678. The p-value of 0.034 indicates the rejection of the null hypotheses which states that there is no short run relationship between them. It can also be seen that the R-Squared result stood at 0.69256. This implies that in the short run, 70% of the variation in bank failure is explained by the joint influence of the explanatory variables. The 30% of the variation is explained by other variables not included in the model.

### 4.5 Discussion of results

This study has empirically investigated the determinants of bank failure in Nigeria from 1970-2013. Giving the outcome of our unit root test which shows a mixture of integration order [i.e. I(0) and I(1)] among the variables captured in the model, bound testing approach to cointegration with an autoregressive distributed lagged model became necessary in the estimation procedure, as it is the only approach that is capable of providing consistent estimation when variables are integrated of different orders. The discussion of results will be in three folds; first, would be the long run relationship between bank failure and the explanatory variables. Second would be the short run relationship and lastly, we would look at the direction of flow among the variables.

### a. Long run relationship between bank failure and the explanatory variables

To begin with, the ARDL bound testing approach confirmed the existence of cointegration between the explained variable (financial deepening) which is a proxy for bank failure and the explanatory variables. This is in line with the study of Ogude *et al* (2012). The ARDL estimated results shows crystal clear that there exist positive and significant long run relationship between bank failure and most of the explanatory variables. For instance, in the long run, inflation, interest rate, capital adequacy ratio and liquidity ratio have positive impact on bank failure. But in the case of inflation, the relationship cannot be said to be significant giving the probability value of 0.162. This means that an increase in any of the aforementioned variables except inflation leads to a robust and viral financial sector thereby forestalling the occurrence of a failure in the financial sector. This is consistent with the findings of Mayuku and Ohwofasa (2012) and Demirguc-Kunt and Detragiache (1998).

Furthermore, it can also be deduced from the result that there exist negative and significant long run relationships between financial deepening and, exchange rate and Non-Performing Loans (NPL). It reveals that the rate of depreciation of the naira is adversarial to banking sector soundness. This is in line with the findings of Chete (2001) but contrary to the findings of Ogude *et al* (2012) and Mayuku and Ohwofasa (2012). More so, the negative long run relationship between financial deepening and NPL shows that a negative change in NPL depletes financial deepening which invariable makes the financial sector more vulnerable to shocks thereby leading to bank failure in line with the findings of Adeyemi (2011).

### b. Short run relationship between bank failure and the explanatory variables

From the estimated results of the ARDL bound testing model, there exist a positive but insignificant short relationship between bank failure and inflation. However, the result shows a positive and significant relationship between financial deepening and exchange rate. This implies that an increase in the value of naira brings about a

formidable financial sector. On interest rate and financial deepening, the result shows a positive and significant relationship giving the p-value of 0.010. This reveals the fact that the process of financial liberalization may have contributed positively to banking sector which is consistent with the study of Chete (2001). The result also reveals a positive and significant short run relationship between Capital Adequacy Ratio (CAR) and financial deepening. This is an indication that capital adequacy serves as the bedrock of the financial sector. It also implies that a unit increase in capital adequacy of banks leads to 69% increase in financial sector soundness thereby reducing cases of failure. This is consistent with the findings of Adeyemi (2011). In addition, the result shows an expected negative and significant short run relationship between Non-performing Loans (NPL) and financial deepening. Giving the p-value of 0.070, a unit decrease in the NPL leads to 14% decrease in financial sector soundness which will logically leads to the collapse of financial institutions. This is also consistent with the findings of Adeyemi (2011). On liquidity ratio, the ARDL short run coefficient shows a positive and significant relationship with financial deepening. This means that on the short run, liquidity ratio contributes positively to financial sector soundness.

## V. SUMMARY, CONCLUSION AND RECOMMENDATIONS

*Summary*
This study was carried out to empirically investigate the determinants of bank failure in Nigeria with a view to contribute to the ongoing debate to this effect. In doing this, data were sourced from the statistical bulletin of the Central Bank of Nigeria (CBN) and World Bank, and were subjected to both descriptive and econometrics analyses. The result of the descriptive analysis showed that series were appropriately normal. On the other hand, the econometrics analysis which began with testing for stationarity of the variables indicated that inflation, interest rate and liquidity were stationary at level values, while financial deepening, exchange rate, capital adequacy ratio and non-performing loans were stationary at first difference. The above led to the adoption of ARDL model bound testing approach to cointegration. The results of the study are summarized as follows;

    i.      There is insignificant long run and short run relationships between bank failure and inflation.

    ii.      There is significant long run and short run relationships between bank failure, exchange rate, interest rate, capital adequacy ratio, non-performing loans and liquidity ratio.

    iii.      There is a negative long run relationship between bank failure and exchange rate

    iv.      There is a negative long run and short run relationships between bank failure and Non-performing Loans (NPL).

    v.      There is a unidirectional causal relationship between bank failure, liquidity and exchange rate. Here, exchange rate and liquidity have causal effect on bank failure; while on the other hand, bank failure has no causal effect on exchange rate and liquidity.

    vi.      There is a bidirectional causal relationship between bank failure and, capital adequacy ratio and non-performing loans (NPL). This means that all of these variables have causal effect on bank failure vice versa.

    vii.      There is no causal relationship between bank failure and, inflation, and interest rate, meaning that there is no causal effect between bank failure, inflation, and interest rate vice versa.

## VI. CONCLUSION

From the above findings, it can therefore be concluded that inflation is not part of the major determinants of bank failure in Nigeria. Rather, the cause of bank failure is mainly determined by capital adequacy ratio (CAR), exchange rate, liquidity and Non-performing Loans (NPL) based on their relationships and causality. Furthermore, giving the negative relationship as well as the causality between bank failure and non-performing loans, it can be concluded that Non-Performing Loans (NPL) leads to the degradation of the financial sector thereby making the financial institutions vulnerable to failure. Following the same logic, the negative long run relationship between bank failure and exchange rate reveals that a decrease in the value of the country's currency has negative effect on the soundness of the financial sector. This can, in the long run, bring about the disappearance of some financial institutions. In addition, giving the non-causal relationship between interest rate and bank failure, it can be concluded that interest rate has no effect on bank failure in Nigeria.

*Recommendations*
It can be inferred from the above that Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), exchange rate, and liquidity ratio are the major determinants of bank failure in Nigeria. Consequently, it can therefore be recommended that the monetary authorities in Nigeria must ensure that all banks operating in the country have complied with the CAR guideline, to guard against sudden bank failure. This can be achieved through maintaining reasonable and acceptable shareholders' fund unimpaired by losses at all times and avoid capital erosion. This is on the basis that with high CAR, financial institutions can survive in the face of any financial upheaval.

Furthermore, giving the negative role of Non-performing Loans (NPL) in the viability and sustainability of the financial sector, it can be recommended that high NPL in banks be discouraged. In addition, financial institutions should make sure that all necessary checks prior to the advancement of credit such as adequate collateral and viable financial projection be dully carried out and satisfied. This will bring to bare the credit worthiness of any individual or organization thereby reducing the incidence of loan default in banks. In addition, the decrease in the value of the nation's currency which played a negative role in the soundness of the financial system as revealed by this study should be controlled. More so, a favourable and stable exchange rate and liquidity ratio should be maintained. This is on the basis that a strong and sound financial system is a function of a viable macroeconomic policy. This can only be achieved if relevant and viable monetary policies are put in place.

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