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Impact of Banking Supervision on Liquidity Risk and Credit Risk: Evidence from Nigeria

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ABSTRACT

This study investigates the effect of banking supervision on liquidity risk (LR) and credit risk (CR) in Nigeria. This research aims to determine the extent to which liquidity and CR has on banking supervision as well as to investigate the interdependence of LR, CR and banking supervision on themselves. It is also imperative to state that a study of this nature provides an independent platform through which the regulators can appraise fundamental tools for supervision in a bid to make reasonable adjustment where necessary. This study deployed the unit root test, vector autoregressive model, the system equation for P-value, and the autocorrelation test for its analysis. The data used in this thesis is a time series data from the National Deposit Insurance Corporation from the year 2007 to 2017. The implication of this study will be of great benefit not only to the Nigerian banking industry and related institution but also to the public and the economy as a whole. The result (findings) showed that banking supervision does have an impact LR as "LR in both periods 1 and 2 have a positive coefficient of 0.042402 and 0.004716 respectively has a positive relationship with banking supervision." This research found that banking supervision has a positive impact on CR in the Nigerian economy. But at certain time periods they will be initially negative, thereby taking some time to make impact in the economy, as this is based on policy lag, as "CR in period 1 has a coefficient of 1.65 and a coefficient of −5.73 at period 2 which means a positive relationship with banking supervision and a negative relationship with banking supervision respectively. My recommend is that financial institutions should adhere to the rules and regulations guiding the banking industry, as lack of adherence can lead to bankruptcy or losing the banking license, and the central bank should ensure proper enforcement of the banking laws set by the banking regulators and the banking supervisors should abide by the laws strictly devoid of corrupt practices.

Keywords: Banking, Central Bank, Bank Supervision, Credit Risk
JEL Classifications: G38, G10, G23

1. BACKGROUND OF THE STUDY AND STATEMENT OF PROBLEM

The banking sector holds a pivotal part in the evolution of an economy; it is a central driver of economic growth of the country and has a dynamic character to play in converting the idle resources for their optimum utilization to achieve maximum productivity. The foundation of any healthy economy depends on how healthy the banking sector is (Kishor, 2014). Financial institutions must take the risk but must do so consciously. However, the banks are weak institutions which are built on costumers trust, brand, and reputation, above. In case something goes wrong, banks can plummet, and bankruptcy of one bank is sufficient to send shock waves right through the economy (Set, 2016). Banking supervision is implemented to ensure an efficient and safe financial system in the economy, liquidity is essential in the operations of any bank, and lack of liquidity is a big problem which can lead to the liquidation of the bank. Credit is also crucial in banking activities as it is the process of stimulating the economy, leading to growth and development, but credit-spillover is a big challenge for the banks. The quality of management and other corporate governance is another problem. However, inadequate supervisory framework and lack of an effective risk asset database and information distribution system have contributed in no small measure in disrupting the actions of the banks, thereby leading to the often distasteful incidence of banking distress and liquidation by the regulators.

The primary objective of this research work is to determine the extent to which liquidity risk (LR) affects banking supervision, examine the extent to which credit risk (CR) affects banking supervision and to ascertain whether there is interdependence among banking supervision, CR and LR. The research hypothesis includes the following:

$H_0$1: LR has no impact on banking supervision.

$H_0$2: CR has no impact on banking supervision.

$H_0$3: There is no interdependence among banking supervision, CR and LR.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. CR and LR

CR occurs when a debtor defaults on a loan or other line of credit. It may also originate from a change in the credit quality of a counterparty resulting from a market- based revaluation; perhaps following a rating agency downgrade, or from the actual default (Qiao et al., 2013). This type of risk is widely that of the financier and incorporates the loss of principal and interest, and the loss may be complete or partial. One of the crucial functions of banks is to advance loans to its customers (Maheshwari, 1997). Banks charge interest from the borrowers, and this is the chief source of their income.

LR is the plausibility that customers could exceed cash available to a bank calls on it, or the income introduced by a bay window, along with the fund it can raise through equity or debt issuance and or/borrowing are insufficient to cover operating duties (suppliers, employees, operations) forcing the bank to stop operations (Credfinrisk.com, 2016). It can also be caused by a thin market sometimes resulting from disruptions, which result in the unavailability of the hedging instrument at economical prices or the inability to sell assets without lowering their values. Senior managers must also evolve procedures to identify and supervise the firm's liquidity sources to secure it, so as it to fit the funding needs of its activities (Panico, 2008). This is achieved by monitoring the differences in the maturities between assets and liabilities and by analysing future funding requirement based on various assumptions, including the firm's ability to liquidate positions quickly in adverse conditions (Set, 2016).

2.2. Risk-based Banking Supervision

Risk-based banking supervision is a regulatory approach that has either been implemented or is in the process of being carried out, by many supervisory authorities. Also, risk-based supervision concepts are embedded in the Basel core principle for effective banking supervision and are part of the International Monetary Fund and World Bank's Financial Sector Assessment Program of countries (Helsinki, 2014). In today's fast-moving and interconnected world, along with carrying on-site and off-site activities at banks, supervision need to be forward-looking and establish plans for intervening early. The role of supervisory authorities undertaking potential supervision is to promote the maintenance of efficient, fair, secure and stable insurance market for the interest and protection of policymakers (Kim, 2017). An effective supervisory authority can require an insurer to take timely preventive and corrective measures if the insurer fails to work in a way that is consistent with sound business practice or regulatory requirements (Tony, 2009). There are fundamental issues that need to be seen and are beneficial not only by the supervised bodies but also the regulatory and supervisory community, for ensuring a vibrant banking sector (Chakrabarty, 2013). No amount of supervision or regulation can save an institution if the Board/Top Management is not sure enough about what is proficient for their bank (Maaka, 2013). The board and the senior management are the first line of defense at the money boxes and we, as supervisors, place much religion in them to identify, manage and mitigate risk in banks' day to day affairs. Therefore, I would reiterate that ensuring the readiness of the banks' success, the risk banking supervision is a management function (Chakrabarty, 2013). The requirement for the success of risk-based supervision include Effective management system, the need for a management information system, risk-based pricing of product and services, the role of auditors and risk-focused internal audit, the role of the board, human resources issues, allocation of supervisory resources and capacity building among supervisors (Vazquez and Federico, 2015).

2.3. Empirical Reviews

The apex bank implements monetary policy by steering short-term market interest rates around a target level. They do this mainly by controlling the supply of liquidity, i.e., the deposits held by banks with the central bank, mostly utilising open market operations. Specifically, major central banks carry out open market operations in which their working capital is provided on a temporary basis (Nikomaram, 2013). In the case of the Euro system, an amount of around €400 billion was provided in the last quarter of 2005, mostly through operations with a 1-week maturity (Bindseil, 2004).

Unsecured lending is a risky art, requiring discretion, which is neither compatible with these principles nor with the accountability of the central bank (Don, 2006). Central banks need to act quickly in monetary policy operations and, exceptionally, also in operations aiming at maintaining financial stability. Unsecured lending would require careful and time-consuming analysis and limit setting (Simone, 2011).

Calomiris develop a theory on banking liquidity requirement where they show that banks should be regulated on the side of the assets instead of that of capital, (Calomiris et al., 2015). For them, banks should hold more liquid assets that will enable them to face LR and better manage and monitor the risks to which they are exposed. However, the interaction between credit and LR influences the stability of the banks (Calomiris et al., 2015).

Imbierowicz analyses the relationship between liquidity and CR, and their impact on the soundness of 4300 US commercial banks over the period 1998-2010, including 254 failure banks during the crisis (Imbierowicz, 2014). The result shows that credit and LRs jointly influence the banks' default probability. Moreover, (Ejoh, 2014) examined the effect of credit and LRs on Nigerian banks default probability. The study includes the First Bank Plc., and the Pearson's correlation reveals that there is a joint influence of liquidity and CR.

3. RESEARCH METHODOLOGY

The data used in this paper is secondary data gotten from the Nigerian deposit insurance company. The data are monthly data from 2007 to 2017. The economic analysis used in this model is the unit root test, (vector autoregression [VAR] model), the system equation for P-value, and the autocorrelation test. From the literature previously reviewed, most of the researchers deploying the linear equation approach in finding relationships amongst these variables. This thesis is modifying previous research by using the simultaneous equation model to find the interdependence of these variables. The data obtained includes CR and LR which are the dependent variables and Banking supervision which is the independent variable. Liquidity ratio, liabilities sundry to creditors, loans to deposit ratio.

Where,

- Banking supervision (RBBS) by proxied for loans to deposit ratio.
- CR is proxied by liabilities sundry to creditors.
- LR is proxied by liquidity ratio.

3.1. Model Specification

The model specification in determining the impact of banking supervision on CR and LR is explained in the models below. The functional form of the model is thus represented as;

$$RBBBS = f(LR, CR) \tag{1}$$

Where,

RBBS is

$$RBBS_t = \beta_0 + \beta_1 RBBS_{t-1} + \beta_2 RBBS_{t-2} + \beta_3 LR_{t-1} + \beta_4 LR_{t-2} + \beta_5 CR_{t-1} + \beta_6 CR_{t-2} + \mu_t \tag{2}$$

$$LR_t = \beta_0 + \beta_1 RBBS_{t-1} + \beta_2 RBBS_{t-2} + \beta_3 LR_{t-1} + \beta_4 LR_{t-2} + \beta_5 CR_{t-1} + \beta_6 LR_{t-2} + \mu_t \tag{3}$$

$$CR_t = \beta_0 + \beta_1 RBBS_{t-1} + \beta_2 RBBS_{t-2} + \beta_3 LR_{t-1} + \beta_4 LR_{t-2} + \beta_5 CR_{t-1} + \beta_6 CR_{t-2} + \mu_t \tag{4}$$

Where,

$\beta_{0,}$ $\beta_{1,}$ β_2 and μ_t are the intercept, coefficients as well as an error term

RBBS: Apex bank supervision

LR: Liquidity risk

CR: Credit risk

A lag of 2 will be taken in this model to check the impact of the variables at two different periods.

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1. Unit Root Test

The unit root test is employed in this research to check the stationarity of the data deployed in this research.

In this section, this empirical result is adequately discussed and analysed.

Table 1 presents the unit root test carried out using the Augmented Dickey-Fuller test to check the stationarity of the variables. From the results, it is observed that all the variables are stationary at the 1st difference. This means that the null hypothesis is rejected at 5% level of significance.

Table 1: Unit root using Augmented Dickey-Fuller test

Variables	Level	Remark	1st difference	Remark
RBBS	0.8991	Not Stationary	0.0000	Stationary
LR	0.0797	Not Stationary	0.0000	Stationary
CR	0.1026	Not Stationary	0.0000	Stationary

RBBS: Apex bank supervision, LR: Liquidity risk, CR: Credit risk

Table 2: VAR estimates

	RBBS	LR	CR
RBBS (−1)	0.795986	−0.136187	−689.9182
	(0.08912)	(0.13314)	(298.068)
	[8.93148]	[−1.02290]	[−2.31463]
RBBS (−2)	0.150003	0.126222	589.6815
	(0.08901)	(0.13297)	(297.691)
	[1.68526]	[0.94925]	[1.98085]
LR (−1)	0.042402	0.487044	−225.8815
	(0.05723)	(0.08550)	(191.421)
	[0.74085]	[5.69625]	[−1.18002]
LR (−2)	0.004716	0.375488	120.6740
	(0.05722)	(0.08548)	(191.365)
	[0.08242]	[4.39285]	[0.63060]
CR (−1)	1.65E-05	2.51E-05	0.695455
	(2.7E-05)	(4.0E-05)	(0.08943)
	[0.61849]	[0.62746]	[7.77619]
CR (−2)	−5.73E-05	2.53E-06	0.152175
	(2.7E-05)	(4.0E-05)	(0.08945)
	[−2.14285]	[0.06321]	[1.70131]
C	3.835036	4.824030	18845.37
	(3.05844)	(4.56900)	(10229.0)
	[1.25392]	[1.05582]	[1.84235]
R-squared	0.938707	0.697163	0.761219
Adj. R-squared	0.935591	0.681765	0.749078
Sum sq. resids	2195.675	4900.164	2.46E+10
S.E. equation	4.313631	6.444130	14427.00
F-statistic	301.1978	45.27484	62.69618
Log likelihood	−356.4880	−406.6617	−1370.873
Akaike AIC	5.815808	6.618587	22.04596
Schwarz SC	5.974194	6.776973	22.20435
Mean dependent	65.84656	40.72592	50783.42
S.D. dependent	16.99686	11.42326	28800.94
Determinant resid covariance (dof adj.)		1.60E+11	
Determinant resid covariance		1.35E+11	
Log-likelihood		−2133.820	
AIC		34.47712	
SC		34.95228	

RBBS: Apex bank supervision, LR: Liquidity risk, CR: Credit risk, AIC: Akaike information criterion, SC: Schwarz Criterion, SD: Standard deviation

Table 3: System: Systems equation for - Values

Coefficient	Coefficient value	Std. error	t-statistic	Prob
C (1)	0.795986	0.089121	8.931478	0.0000
C (2)	0.150003	0.089009	1.685262	0.0928
C (3)	0.042402	0.057234	0.740849	0.4593
C (4)	0.004716	0.057218	0.082419	0.9344
C (5)	1.65E-05	2.67E-05	0.618493	0.5366
C (6)	−5.73E-05	2.67E-05	−2.142850	0.0328
C (7)	3.835036	3.058440	1.253919	0.2107
C (8)	−0.136187	0.133138	−1.022897	0.3071
C (9)	0.126222	0.132970	0.949251	0.3431
C (10)	0.487044	0.085503	5.696248	0.0000
C (11)	0.375488	0.085477	4.392846	0.0000
C (12)	2.51E-05	3.99E-05	0.627456	0.5308
C (13)	2.53E-06	4.00E-05	0.063206	0.9496
C (14)	4.824030	4.569000	1.055817	0.2918
C (15)	−689.9182	298.0680	−2.314634	0.0212
C (16)	589.6815	297.6906	1.980853	0.0484
C (17)	−225.8815	191.4215	−1.180022	0.2388
C (18)	120.6740	191.3649	0.630596	0.5287
C (19)	0.695455	0.089434	7.776189	0.0000
C (20)	0.152175	0.089446	1.701313	0.0898
C (21)	18845.37	10229.00	1.842348	0.0663
Determinant residual covariance		1.35E+11		
Equation: RBBS=C (1)*RBBS (−1)+C (2)*RBBS (−2)+C (3)*LR (−1)+C (4)*LR (−2)+C (5)*CR (−1)+C (6)*CR (−2)+C (7)				
Observations: 125				
R-squared	0.938707	Mean dependent var		65.84656
Adjusted R-squared	0.935591	S.D. dependent var		16.99686
S.E. of regression	4.313632	Sum squared resid		2195.675
Durbin-Watson stat			1.960551	
Equation: LR=C (8)*RBBS (−1)+C (9)*RBBS (−2)+C (10)*LR (−1)+C (11)*LR (−2)+C (12)*CR (−1)+C (13)*CR (−2)+C (14)				
Observations: 125				
R-squared	0.697163	Mean dependent var		40.72592
Adjusted R-squared	0.681765	S.D. dependent var		11.42326
S.E. of regression	6.444130	Sum squared resid		4900.164
Durbin-Watson stat			1.799477	
Equation: CR=C (15)*RBBS (−1)+C (16)*RBBS (−2)+C (17)*LR (−1)+C (18)*LR (−2)+C (19)*CR (−1)+C (20)*CR (−2)+C (21)				
Observations: 125				
R-squared	0.761219	Mean dependent var		50783.42
Adjusted R-squared	0.749078	S.D. dependent var		28800.94
S.E. of regression	14427.00	Sum squared resid		2.46E+10
Durbin-Watson stat			2.058963	

RBBS: Apex bank supervision, LR: Liquidity risk, CR: Credit risk, SD: Standard deviation

4.2. VAR Estimate

The VAR is a stochastic process model used to capture the linear interdependencies among multiple time series. The Table 2 below presents the VAR estimates.

4.2.1. Discussions of results

We have three models in the VAR, and the Dependent variables are the RBBS, CR and LR. The Independent variables are the RBBS (−1), RBBS (−2), LR (−1), LR (−2), CR (−1), and CR (−2). We took two (2) lags of each variable in the model.

To know whether a variable is significant in explaining the dependent variable, we check for the Probability value (P value). If the P < 5%, then we conclude that that variable is significant. To know the P value, we check for the system equations;

$$RBBS = C(1)*RBBS(-1) + C(2)*RBBS(-2) + C(3)*LR(-1) + C(4)*LR(-2) + C(5)*CR(-1) + C(6)*CR(-2) + C(7) \quad (5)$$

$$LR = C(8)*RBBS(-1) + C(9)*RBBS(-2) + C(10)*LR(-1) + C(11)*LR(-2) + C(12)*CR(-1) + C(13)*CR(-2) + C(14) \quad (6)$$

$$CR = C(15)*RBBS(-1) + C(16)*RBBS(-2) + C(17)*LR(-1) + C(18)*LR(-2) + C(19)*CR(-1) + C(20)*CR(-2) + C(21) \quad (7)$$

In the whole VAR model, we have 21 coefficients. Hence to estimate the p-value.

4.2.2. The system equation

It is a statistical technique used to check the probability values of the coefficient of the variables analysed by the autoregression estimates. This method helps to check the level of significance based on the critical value of 5%. The results of system equations are presented in Table 3.

4.3. Discussions of Results

The pertinent variables to be discussed in the analysis is going to be explained in the test of hypothesis section 4.5.

Table 4: Autocorrelation test

Lags	LM-Stat	Prob
1	17.63505	0.0397
2	12.60898	0.1811

Probs from Chi-square with 9 df

4.4. Discussions of Results

The problem of autocorrelation does not exist in the first lag of the model because its probability value (0.0397) is <0.05 (Table 4). However, the problem of autocorrelation exists in the second lag because the probability value (0.1811) is higher than 0.05. Therefore, autocorrelation in the model shows that we accept the null hypothesis that, there is no presence of autocorrelation in the three equations generated by the VAR model because the Durbin Watson value is equal to 2 in all the equations.

4.5. Test of the Research Hypothesis

The first hypothesis "$H_0$1: Based on the methodology used, LR at period one has a positive impact on banking supervision as it has a positive coefficient of 0.042402. Therefore, we accept the alternative hypothesis and reject the null hypothesis. More so, LR at period 2 has a positive impact on banking supervision as it has a positive coefficient of 0.004716. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

The second hypothesis "$H_0$2: Based on the economic analysis used, CR at period one has a positive impact on banking supervision as it has a positive coefficient of 1.65E-05. Therefore, we reject the null hypothesis and accept the alternative hypothesis. More so, CR at period 2 has a negative impact on banking supervision as it has a negative coefficient of −5.73E-05. Therefore, we accept the null hypothesis and reject the alternative hypothesis.

The third hypothesis "$H_0$3: There is no interdependence among banking supervision, CR and LR" based on the methodology deployed, the three variables are interdependent of each other. Taking a look at how the result of the first and second hypothesis turned out, both hypotheses had positive and negative impacts on each other, which means that any of these variables can determine the state of other variables. Therefore, we accept the alternative hypothesis and reject the null hypothesis.

5. CONCLUSION AND POLICY RECOMMENDATIONS

Based on the economic analysis done, we conclude that banking supervision has a positive impact on LR and CR of financial institutions in the Nigerian banking industry. More so, we found out that despite the impact banking supervision has a positive impact on both liquidity and CR in Nigeria, sometimes the impact will be negative showing that monetary policies developed by the apex bank will have a negative impact at the beginning and later becomes felt in the economy through the banking industries. This is as a result of policy lag which is embedded in the VAR model that aims at forecasting policies implemented by the government. The recommendations include the following:

1. The study recommends that financial institutions should adhere to the rules and regulations guiding the banking industry, as a lack of adherence can lead to bankruptcy or losing the banking license.
2. The central bank should ensure proper enforcement of the banking laws set by the banking regulators and the banking supervisors should abide by the laws strictly devoid of corrupt practices.

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