Macro-Stress Testing in Nigerian Banking Sector: Episode of Pre and Post Global Financial Crisis

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Abstract
The study modifies Wilson's (1997) credit risk model to reveal the relationships between a set of macroeconomic variables and liquidity risk in Nigeria from 1981 to 2016 using time series data sourced from CBN Statistic bulletin. The study found that that financial deepening (measured as ratio of money supply to gross domestic product), unemployment and economic growth rate are most important variables that influence the liquidity position of banking sector in Nigeria. The study concluded that with or without the advent of global financial crisis, the Nigerian banking sector liquidity position is influenced by interest rate, inflation rate and unemployment rate. Thus, we recommend that the CBN should maintain policy consistency on the money market and ensure that interest rate is determined effectively.

Keywords: *Macroeconomic variables; Liquidity risk; Wilson; Global Financial Crisis*

1.0 Introduction

Stress testing is a risk management method used to test the stability of the banks and banking sector against various scenarios reflecting severe but potential market, interest, exchange rate, credit and liquidity risks. Stress testing method puts a more dynamic analysis when compared with the history based methods. This method measures the possible impulses against various situations that are always uncertain. In a competitive environment surrounded by risks, unexpected conditions can be determined by stress tests by banks. Thus, the imperative uses of the stress tests have been identified by Banking International Settlements (2012) which include; forward looking evaluation of risks; eliminating the limitations caused by models and historical data; supporting internal and external communication, supporting capital and liquidity planning process, determining risk tolerance of banks, among others. In the light of inter-country financial crises, the potential impact of the banking sector on economic stability that can be quantified through stress testing or scenario analysis has attracted the interests of monetary authorities, investors and scholars to different magnitudes.

The empirical study of stress testing is originally introduced by Wilson (1997). In his study, he models default risk to be explicitly linked with some set of macroeconomic variables and this model is based on relatively simple logistic function employed in regression analysis. Also, Cihak (2007) suggests the logistic model for estimating inputs to stress testing modelling. In the same token, Virolainen (2004) and Jokivuolle, Virolainen and Vahamaa (2008) initiate the macroeconomic variables for finish economy among others. All of these studies are similar and they are rooted on the logistic credit risk model of (Wilson, 1997). Besides, it is obvious that most of the studies carried out on stress test have been documented in advanced countries, leaving emerging African countries including Nigeria uninvestigated on this subject matter. Even when studies are conducted on stress test many efforts are concentrated on credit risk exposure. Without equivocation, this seemingly gap attracted our

concern to examine the liquidity risk exposure of Nigerian banks in the era of global financial crisis, pre and post global financial crisis which other studies have not explored. The rests of the paper are organized as: section 2 literature review; section 3 methodology and data; section 4 empirical results; section 5 conclusion and recommendations.

2.0 Literature Review

This section captures some of the studies on stress testing in different countries. Jakubik and Schmieder (2008) built a comparing credit risk model of German Economics and Check Republic Economics. The study included the data of Check Republic between 1998-2006 and the data of German between 1994-2006. Analysis is made both at sectoral and individual level. The study found that a macroeconomic shock has more severe effect on Check Republic Economy twice more than German Economy. Jakubik and Hermanek (2008) answered the question whether the developing loan volume would have negative impacts on banking sector stability in Chinese Economy. The study concluded that the banking sector is resistant against mentioned macro-economic shocks. In a similar study, Zeman and Jurca (2008) tested the effect of a depression in Slovakian economy on Slovakian Banking Sector using a VEC model including the data between1995-2006. The study employs interest risk, credit risk and exchange rate risk as macroeconomic variables. The study found that depression in Slovakian economy would not have negative effects on Slovakian Banking Sector. In the same token, a study was conducted in Nigeria by Blaauw (2009). He observed that banks had not been active in developing effective stress testing programs due to lack of data and the potential complexity of appropriate models.

In 2010, Havrylchyk developed a macroeconomic credit risk model for stress testing the banking system. Trial results suggest that macroeconomic shocks have a large impact on credit losses. Vazquez, Tabak and Souto (2011) built a credit risk model selecting the scenario analysis a baseline to test Brazilian banking Sector. Data for the study is chosen at Bank level between the periods of 2001-2009. Results supported a credit risk quality moving with the conjuncture. Results also revealed a significant negative relationship between NPL and GDP. Also, Zribi and Boujelbene (2011) conducted a study in Tunisia and employed ratio of risk weighted assets to total assets as proxy of credit risk and document negative trade-off between exchange rate and credit risk and the same result is evident in north Cyprus by (Gunsel, 2008). Castro (2012) conducts study in Greece, Ireland, Portugal, Spain and Italy (GIPSI) from 1997 to 2011 and discovers monotonic relationship between long term interest rate and credit risk. This overwhelmingly supports the convention that high interest rate increases the obligation of borrowers and thus increases the banks credit risk or failure.

In a more recent study, Bernanke (2013) reported that SCAP (Supervisory Capital Assessment Program) provided one of the critical turning points of the crisis. It focused on the impact of common exposures, the effects of possible fire sales of assets, the risk of reduced access to funding in stressed environments, and the importance of considering the impact on a cross-section of banks, as key macro-prudential elements of stress tests. Public disclosure of SCAP results provided economic agents credible information about prospective losses at banks and helped restore confidence in the banking system, he added. Basarir (2016) examined macroeconomic credit risk model based on Wilson's Credit Portfolio View for Turkish Banking Sector between the period 1999Q1-2012Q4 therefore 2013Q1-2014Q4 period is forecasted using historical simulation analysis. The historical scenarios are built for the macroeconomic credit risk model of banking sector. The study found responses of the sector's default rates against the macro- shocks. The study concluded that responses of the default rates are compared with the historical date and financial soundness of the sector are

analysed. Anthony, Aboagye and Ahenkora (2017) investigated plausible losses resulting from concentration of individual bank loan portfolios in sectors of the Ghanaian economy. The study found that the capital adequacy ratios of many banks would have been negatively impacted, some to the point of becoming insolvent. The study concluded that bank loan portfolios are too concentrated.

3. Methodology

The study employs and modifies Wilson's, (1997) credit risk model. The specification of Wilson apparently relates default risk to some set of randomly selected macroeconomic variables and it is rooted on the relatively simplicity of the logistic equation often employed in ordinary Least Square regression analysis. Wilson's model was first developed for Mckinsy Company as credit portfolio specification which placed credit risk proxied by default rate as an explained variable on macroeconomic variables. Thus, our specification expresses a relationship between liquidity risk and some macroeconomic variables. The specification follows a logical process. In the first place, we have to develop the banking sector-specific index which is arrived as follows:

$$cc_{b,t} = (1 + e^{-y,t})^{-1} \quad (1)$$

The equation can be rewritten as follows

$$cc_{b,t} + cce^{-yb,t} = 1 \quad (2)$$

$$cce^{-yb,t} = 1 - cc_{b,t} \quad (3)$$

$$\text{In } \frac{[cc_{bt}]}{[y_{b,t}]} = 1 - cc_{b,t} \quad (4)$$

Therefore,

$$Y_{b,t} = \frac{\text{In}[cc_{b,t}]}{[1 - cc_{b,t}]} \quad (5)$$

Where: $y_{b,t}$ is the banking sector-specific index at time (t), ln is the natural log, $cc_{b,t}$ is the classified credit ratio (i.e. default at time (t)). Therefore, we employ Boss' (2002) approach to formulate the banking sector-specific index ($y_{b,t}$) which is contrary to the approach adopted by Virolainen (2004). From the equation above, lower value of $y_{b,t}$ with lower $cc_{b,t}$ implies healthy state of the economy. Hence, index ($y_{b,t}$) represents overall state of the economy and it can be expressed as the linear function of any exogenously selected economic factors, thus:

$$Y_{b,t} = \lambda_0 + \beta_t \sum_{t=1}^{n} x_{,t} + \mu_t \quad (6)$$

t = 1, 2'……,n

n = number of explanatory variables.

Where: λ_0 is the intercept; β_t takes value from β_1 β_2, β_3 …… β_n for the set of regression coefficients related to the selected macro-economic factors; x_t takes value from x_1 x_2, x_3, …….. x_n for the selected economic variables, and μ_t is the stochastic error term which is assumed to be independent and identically distributed i.e. $\mu_{s,t} \sim Ɔ(o, \delta_t^2)$. In line with the literature, the macro-economic variables that are selected are economic growth rate (GDP), financial deepening measured by (ratio of money supply to gross domestic product (RMSGDP) and ratio of credit to private sector to gross domestic product (RCPSGDP)) , interest rate (INR) inflation rate (INF) and unemployment rate (UNEP). Thus, equation (6) can be restated as follows:

$$Y_{b,t} = \alpha_0 + \alpha_1 GDP_t + \alpha_2 RMSGDP_t + \alpha_3 RCPSGDP_t + \alpha_4 INR_t + \alpha_5 INF_t + \alpha_6 UNEP_t + \varepsilon_t \quad (7)$$

To capture the effects of global financial crisis on banking sector specific index, we proxy them with dummy variables in which pre financial crisis takes dummy (1) during financial crisis take dummy (2) and post financial crisis takes dummy (3); then equation (7) becomes:

$$Y_{b,t}=\alpha_0+\alpha_1 GDP_t+\alpha_2 RMSGDP_t+\alpha_3 RCPSGDP_t+\alpha_4 INR_t+\alpha_5 INF_t+\alpha_6 UNEP_t+\alpha_7 dum(1)+w_t \quad (8)$$

$$Y_{b,t}=b_0+b_1 GDP_t+b_2 RMSGDP_t+b_3 RCPSGDP_t+b_4 INR_t+b_5 INF_t+b_6 UNEP_t+b_7 dum(2)+z_t \quad (9)$$

$$Y_{b,t}=c_0+c_1 GDP_t+c_2 RMSGDP_t+c_3 RCPSGDP_t+c_4 INR_t+c_5 INF_t+c_6 UNEP_t+c_7 dum(1)+V_t \quad (10)$$

The data that are applied in this study are secondary data which are extracted from Central Bank of Nigeria Statistical Bulletin from 1981 to 2016. The stepwise regression method was employed to analyse the data.

4. Result and Discussion

The conducts of unit root test and other similar tests are hinged on maximum lag length. Therefore, we determine the maximum lag strength applicable in this study using the appropriate information criteria as selection techniques. The results of these techniques are reported in table 4.1

Table 4.1 Optimum Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-102.7637	NA	1.83e-06	6.652343	6.969784	6.759152
1	56.72910	241.6557	2.42e-09	-0.044188	2.495340	0.810286
2	123.2211	72.53672	1.29e-09	-1.104309	3.657306	0.497829
3	234.2584	74.02489*	1.26e-10*	-4.864148*	2.119554*	-2.514344*

*Note: * implies lag order selected by the criterion, LR: means sequential modified LR test statistic. FPE: Final prediction error. AIC: Akaike Information criterion. SC:Schwarz Information criterion. HQ: Hannan-Quin Information criterion.*
Source: Output from E-view result (2018)

Table 4.1 presents the optimum lag order selected by each of the all information criteria. The optimum lag is given by the smallest value of the information criteria. In the table above all the information criteria- LR, FPE, AIC, SC and HQ have the smaller value at lag 3; implying that 3 is the optimum lag selected by these information criteria. Thus, to avoid doubt and spurious regression result, we conduct a unit root test using Augmented Dickey Fuller (ADF) technique. The ADF test is conducted for the specified variables series under the assumption of intercept, based on 3 maximum lag lengths as selected by the Information criteria. Also, for the purpose of uniformity 5 percent Mackinnon critical value is chosen for comparison with the ADF statistic in all the variables series. The results of the ADF test are reported in table 4.2

Table 4.2 Unit Roots Test

Variable	ADF Stat	Mackinnon	Remark
Y(-1)	-5.625099	-2.951125	Stationary
RMSGDP (-1)	-5.319235	-2.951125	Stationary
RCPSGDP (-1)	-5.730811	-2.957110	Stationary
GDP (-1)	-4.178773	-2.951125	Stationary
UNEP (-1)	-7.399729	-2.951125	Stationary
INF (-1)	-5.730149	-2.951125	Stationary
INR (-1)	-5.024324	-2.954021	Stationary

Note (-1) represents lag one values of the variables
Source: Output from E-view result (2018)

Table 4.2 summarizes the results of the unit root test at first difference. It is observed that the ADF statistics are larger than the Mackinnon critical statistics for each of the variables. Therefore, all the specified variables are stationary when they are integrated of order one I (1). Since the variables are I (1) compliant, further empirical investigation can be conducted as follows:

4.1 Examining the Nature, Size and Magnitude of the Short-run Relationship among the Specified Variables

In this study, we apply step-wise regression analysis to select the macro economic variables that explain liquidity position of Nigerian banking industry properly. However, in consonant with the work of Jakubit, et al. (2008), the estimated values of the model (i.e. equation3.7 in section three) are reported in Table 4.3

Table 4.3 Estimated Values of the Static Macro Stress Model for Testing Liquidity position in Nigerian Banking Sector

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	4.172435	0.287884	14.49347	0.0000
LRMSGDP	0.149336	0.113342	1.317575	0.1970
LUNEP	0.136453	0.070346	1.939744	0.0613
LGDP	-0.088811	0.026077	-3.405725	0.0018
R-squared	0.303820			
Adjusted R-quared	0.237526			
F-statistic	4.634409			
Prob(F-statistic)	0.008413			

Source: Output from E-view result (2018)

Table 4.3 depicts the results of the liquidity risk model for Nigerian banking sector over a period of 1981 to 2016. The results show that the jointly most 'important' explanatory variables from a set of candidate variables that influence the liquidity position of the Nigerian banking sector are financial deepening (measured as ratio of money supply to gross domestic product), unemployment and economic growth. From the table, it was revealed that financial deepening and unemployment and economic growth have positive effect on the liquidity position while the economic growth has negative effect on the liquidity position of the Nigerian banking sector. Thus, the liquidity risk position of the banking sector in Nigeria is significantly influenced by the combination of unemployment and economic growth. The coefficient of determination show that the combination of the three macro-economic factors have 30.38% on the liquidity position of the Nigerian banking sector while 69.62% were caused by other external factors. The probability of the f-statistics shows that the model is significant and this implies that meaningful generalisation can be made from it.

4.2 Effects of Pre Global financial Crisis on the Liquidity Position of the Nigerian Banking Sector

The study considers the pre global financial crisis that spans from 1981-2006, as a dummy one variable in the liquidity risk model stated as equation 3.8. The estimated values of this equation are presented in table 4.4.

Table 4.4 Estimated Value of Effects of Pre Global financial Crisis on the Liquidity Position of the Nigerian Banking Sector

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	3.606154	0.553690	6.512943	0.0000
DUM1	0.022827	0.173673	0.131439	0.8963
LINR	-0.131382	0.041607	-3.157669	0.0037
LUNEP	0.076632	0.057838	1.324935	0.1955
LRMSGDP	0.375726	0.333669	1.126045	0.2694
LINF	0.060463	0.057483	1.051849	0.3016
LRCPSGDP	-0.260055	0.332853	-0.781289	0.4410
R-squared	0.335250			
Adjusted R-squared	0.197716			
F-statistic	2.437571			
Prob(F-statistic)	0.049603			

Source: Output from E-view result (2018)

The regression results computed from equation 3.9 are summarized in table 4.4. the pre global financial crisis proxied by dummy one has observed t-value of 0.131439; meaning that there is positive but insignificant relationship between pre global financial crisis and liquidity position of the Nigerian banking sector. Therefore, pre global financial crisis era has no significant effect on the liquidity position of the Nigerian banking sector. However, it has positive effect on liquidity position of the Nigerian banking sector. Furthermore, the Adjusted R-squared of the liquidity Risk Model without dummy one is 0.23 while that of the model with dummy one is 0.19. This is an indication that pre global financial crisis era has reduced the joint contribution of all the explanatory variables stated in equation 3.7. In other words, pre global financial crisis era has increased the number of residual factors that could determine the changes in liquidity position. This is not consistent with a-priori.

4.3 Effects of Global financial Crisis on the Liquidity Position of the Nigerian Banking Sector

The study considers the global financial crisis era that spans from 2007-2008, as a dummy two variable in the liquidity risk model stated as equation 3.9. The estimated values of this equation are presented in table 4.5.

Table 4.5 Estimated Value of Effects of Global financial Crisis on the Liquidity Position of the Nigerian Banking Sector

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	4.241013	0.249088	17.02620	0.0000
DUM2	0.220138	0.139467	1.578424	0.1250
LINR	-0.099111	0.064053	-1.547327	0.1323
LINF	0.047537	0.052991	0.897087	0.3768
LUNEP	0.080439	0.079280	1.014611	0.3184
LGDP	-0.029362	0.042812	-0.685840	0.4981
R-squared	0.356572			
Adjusted R-squared	0.249334			

F-statistic	3.325053
Prob(F-statistic)	0.016569

Source: Output from E-view result (2018)

The regression results computed from equation 3.9are summarized in table 4.5. The global financial crisis are proxied by dummy two has a coefficient 0.220138 with associated probability of 0.1250; meaning that there is positive but insignificant relationship between global financial crisis and liquidity position of the Nigerian banking sector. However, this result is not consistent with a-priori. Furthermore, the Adjusted R-squared of the liquidity Risk Model without dummy variable is 0.23 while that of the model with dummy two is 0.24. This is an indication that global financial crisis era has increased the joint contribution of all the explanatory variables stated in equation 3.7.

4.4 Effects of Post Global financial Crisis on the Liquidity Position of the Nigerian Banking Sector

The study considers the post global financial crisis that spans from 2008-2016, as a dummy three variable in the liquidity risk model stated as equation 3.10. The estimated values of this equation are presented in table 4.6.

Table 4.6 Estimated Value of Effects of Post Global financial Crisis on the Liquidity Position of the Nigerian Banking Sector

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Constant	3.834823	0.333976	11.48233	0.0000
DUM3	-0.224348	0.104960	-2.137462	0.0408
LINR	-0.122791	0.038199	-3.214508	0.0031
LUNEP	0.072875	0.053722	1.356523	0.1851
LRCPSGDP	0.112676	0.116337	0.968531	0.3405
LINF	0.048437	0.051041	0.948964	0.3502
R-squared	0.381079			
Adjusted R-squared	0.277926			
F-statistic	3.694297			
Prob (F-statistic)	0.010063			

Source: Output from E-view result (2018)

The regression results computed from equation 3.10 are summarized in table 4.6. the post global financial crisis proxied by dummy three has coefficient value of -0.224348 with associated probability of 0.0408; meaning that there is negative but significant relationship between post global financial crisis and liquidity position of the Nigerian banking sector. Therefore, post global financial crisis era has negative significant effect on the liquidity position of the Nigerian banking sector. This is in tandem with a-priori expectation. Furthermore, the Adjusted R-squared of the liquidity Risk Model without dummy variable is 0.23 while that of the model with dummy three is 0.27. This is an indication that post global financial crisis era has increased the joint contribution of all the explanatory variables stated in equation 3.7.

4.5 Examining the Break-down Effects or Shock in the Liquidity Risk Model adopted in the study

To analyze the break-down effect or shock of the system, we employ the forecast error variance decomposition (FEVDC) and impulse response functions (IRF) which are computed from the moving average (MA) represented of the VECM. In computing IRF and FEVDC, our ordering is as follows: liquidity risk, gross domestic product, inflation rate, interest rate, financial deepening and unemployment rate, rate of money supply, interest rate, monetary policy rate and credit risk. By introducing a one-period standard deviation shock to one of the endogenous variables, the observable response of the system to the effects, either positive or negative are reported in table 4.7.

Table 4.7 Impulse Response Functions (IRF)

Period	LLDR	LGDP	LINF	LINR	LRCPSGD	LRMSGDP	LUNEP
1	0.179302	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.189295	-0.088729	-0.034573	-0.001010	0.001766	0.033112	0.082588
3	0.116718	-0.068924	-0.023226	0.015086	0.009056	0.019131	0.076279
4	0.134578	-0.090512	-0.037321	0.029221	-0.020569	0.028541	0.081974
5	0.100161	-0.088982	-0.069175	0.091588	-0.013247	0.048110	0.043532
6	0.094712	-0.074693	-0.045031	0.105785	-0.000179	0.052062	0.043677
7	0.129864	-0.059383	-0.041367	0.096921	-0.017409	0.053943	0.038357
8	0.135758	-0.077325	-0.043494	0.060733	-0.010783	0.042693	0.042553
9	0.150184	-0.103866	-0.012982	0.034817	-0.013464	0.030174	0.057013
10	0.167885	-0.102493	-0.015486	0.035766	-0.021928	0.032631	0.057155

Source: Output from E-view result (2018)

The results of the impulse response functions (IRFs) are presented in table 4.7 show the effects of changes in economic growth rate, inflation rate, interest rate, financial deepening (measured by ratio of credit to private sector to gross domestic product and ratio of money supply to gross domestic product) and unemployment rate on changes in liquidity risk. The results reveal that for the period of ten years horizon liquidity risk displays positive relationships in the period with the specified variables in the system. This suggests that the relationships of the liquidity risk with the other variables break or change intermittently for the observed period. The graphical illustration of the shock is shown below

Figure 4.1 Graphical Illustrations of Impulse Response Functions (IRF)

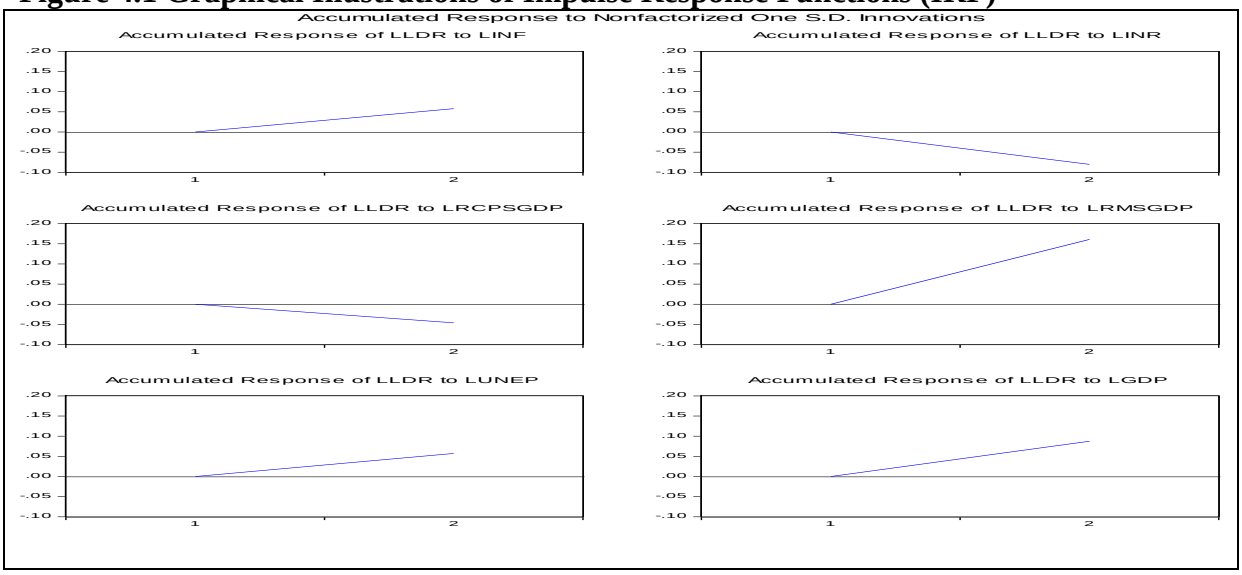


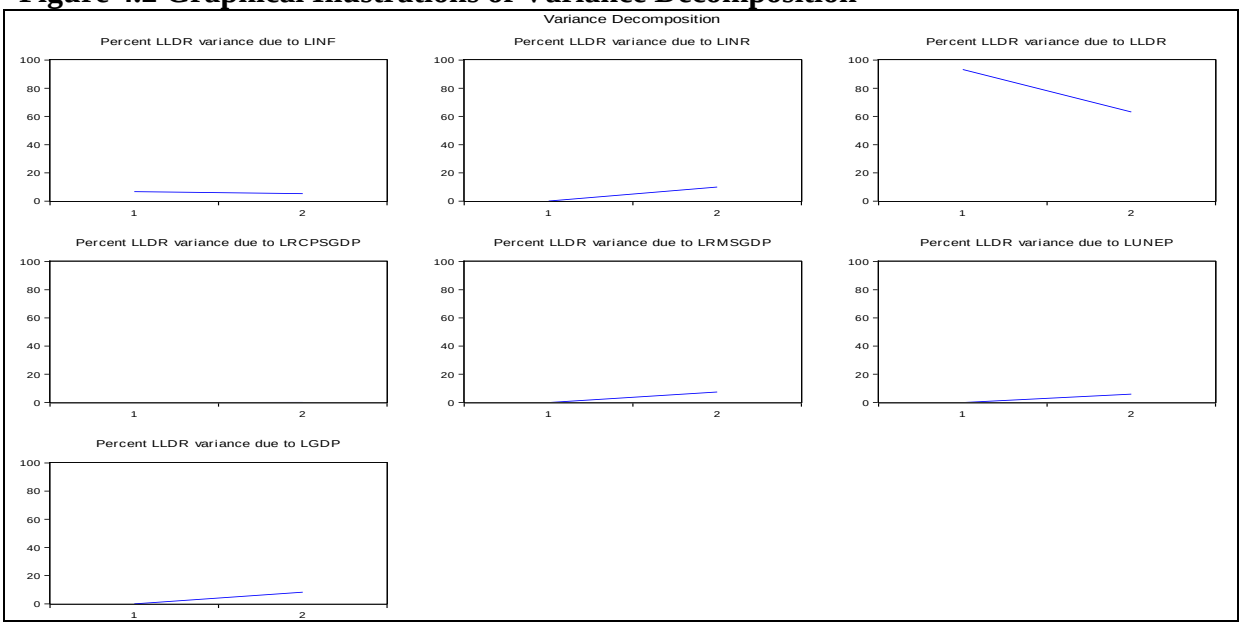
Table 4.8 Variance Decomposition

P	S.E.	LLDR	LGDP	LINF	LINR	LRCPSGD	LRMSGDP	LUNEP
1	0.179302	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.291498	80.00560	9.265318	1.406725	0.001199	0.003670	1.290299	8.027187
3	0.332233	73.93196	11.43646	1.571653	0.207107	0.077118	1.324876	11.45083
4	0.383258	67.88662	14.17141	2.129278	0.736959	0.345991	1.550136	13.17961
5	0.427077	60.17071	15.75353	4.338302	5.192492	0.374844	2.517327	11.65279
6	0.463444	55.27439	15.97567	4.628279	9.619717	0.318338	3.399697	10.78391
7	0.500960	54.02573	15.07764	4.642919	11.97594	0.393205	4.069059	9.815503
8	0.533573	54.09680	15.39098	4.757168	11.85225	0.387450	4.227054	9.288299
9	0.569005	54.53590	16.86592	4.235207	10.79654	0.396689	3.998216	9.171528
10	0.607279	55.52088	17.65539	3.783206	9.825378	0.478641	3.798844	8.937653

Source: Output from E-view result (2018)

The results of the variance decomposition as shown in table 4.8 reveal that about 100 per cent of the forecast error of the Nigerian banking sector liquidity risk is explained by its own innovations in the first period of estimation, and throughout the ten years estimation period, its own shocks fluctuate consistently over time. Also, the shocks of economic growth rate, inflation rate, interest rate, financial deepening (measured by ratio of credit to private sector to gross domestic product and ratio of money supply to gross domestic product) and unemployment rate appear to be inconsistent and respectively explain about 17.66, 3.78, 9.83, 0.48, 3.80 and 8.94 per cents variations in liquidity risk for the last period. However, we discover that among all the variables, growth rate is the most sensitive variable to liquidity risk in Nigerian banking sector.

Figure 4.2 Graphical Illustrations of Variance Decomposition



4.6 Discussion

The study found that that financial deepening (measured as ratio of money supply to gross domestic product), unemployment and economic growth are most important variable that influence the liquidity position of banking sector in Nigeria. However, in the pre global financial era, the estimated value of the model reveals that interest rate, unemployment rate, financial deepening, inflation rate are the most important variable that influence the liquidity position of the banking sector in Nigeria. More so, the study found that the liquidity position of the Nigerian banking sector is jointly influence by the combination of interest rate, inflation rate, unemployment rate and economic growth rate during the short period of global financial crisis. Furthermore, the study reported that interest rate unemployment, financial deepening (measured as ratio of credit to private sector to gross domestic product) and inflation rate influenced the liquidity position of the Nigerian banking sector. The study deduced that with or without the advent of global financial crisis, the Nigerian banking sector liquidity position is influenced by interest rate, inflation rate and unemployment rate. Furthermore the study shows that these three macroeconomic variables have constant magnitude before, during and after global financial crisis. The interest rate shows a negative effect on liquidity position of the Nigerian banking sector and this implies that an increase in interest rate reduces the liquidity position the banking sector while a fall stimulate liquidity position and this in tandem with a-priori expectation. Also, the study shows that inflation has positive effect on liquidity position and this implies that an increase in inflation rate in an economy improves the liquidity position of the banking sector but this does not conform to a-priori expectation. More so, the unemployment rate shows a positive effect on liquidity position and this in not consistent with a-priori expectation because if banks meet their liquidity creation function well, it could improve economic conditions such as reducing unemployment.

5. Conclusion and Recommendations

The study presents a fresh empirical study on macro-stress testing in Nigeria during, pre and post global financial crisis eras; by modifying the structure of the credit risk model of (Wilson, 1997) to examine the impact of macroeconomic variables on Nigerian banking sector liquidity position. Thus, the study concluded that interest rate, inflation rate and

unemployment rate are the most important macroeconomic variables that influence the liquidity position of Nigerian banking sector before, during and after global financial crisis. Interest rate has two side coin, from the supply side an increase in interest rate affects the banks liquidity negatively as high interest rates on loans discourage the public to borrow funds, lowering the lending activity and profitability for the bank while from the demand side, a decrease in interest rate encourages the borrowing public and this affect the banks liquidity. Thus, the CBN should maintain policy consistency on the money market and ensure that interest rate is determined effectively. Also, the study recommends policy shift toward entrepreneurship development in Nigeria as this will reduce the rate of unemployment in the country.

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