Determinants of Excess Liquidity in the Nigerian Banking System

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Abstract: This study examines the determinants of excess liquidity in the Nigerian banking system using generalized autoregressive conditional heteroscedasticity (GARCH) for the period January 2008 to December 2015. The identified determinants of banking system excess liquidity are capital importation, Federation Account Allocation Committee (FAAC) distribution, exchange rate premium and policy instruments such as cash reserve ratio, special lending facility rate, Treasury bill rate and interbank rate. The empirical result revealed that the identified determinants have significant effect on banking system excess liquidity in Nigeria. Based on the findings, the study recommends that Nigerian monetary authority could rethink liquidity management in terms of developing robust strategies for mopping up the excess liquidity from the identified sources, rather than concentrating liquidating management strategy on the banking system

Keywords: Banking System, Excess Liquidity, Monetary Policy.

I. INTRODUCTION

Definitions of banking system excess liquidity vary across jurisdiction because of differences in the liquidity composition and classification of liquid assets. Agenor and Aynaouni (2008) for instance, focused on compulsory gathering of liquid reserves by commercial banks. Khemraj (2007), Eickmeier, Gambacorta and Hofmann (2014), and Guntner (2015) identified two major types of banking system excess liquidity using the Keynes model. First is the precautionary or voluntary motive of holding excess liquidity, which is considered extremely useful as a buffer for insuring bank capital and uncertainty surrounding customers' withdrawal. This portion of excess liquidity, according to these scholars, does not have negative effect on monetary policy. In practice, precautionary excess liquidity should not always be considered as pernicious because operating environment and other contingencies could compel a bank to hold excess liquidity. Secondly, the involuntary motive or excess liquidity could be above the desired level (Khemraj, 2007a, b; Barik, Nur and Wahyu, 2012).

This paper looks at excess liquidity as banks reserves in excess of their operational needs. This study essentially focuses on the involuntary excess liquidity, which is above the operational needs of the banks in relation to the effectiveness of monetary policy.

Major determinants of banking system excess liquidity, have been traced to the degree of financial development and risk aversion approach of deposit money banks. Risk aversion among banks is a common phenomenon of developing economies, which has led to high risk premia and abysmal decline in the demand for bank loans. To remunerate for marginal cost of transaction and risks, banks expect to receive minimum loan rates, before extending credit to lenders.

Since the small lenders are not willing to pay the lending rate, banks may accumulate involuntary liquidity. Excess liquidity therefore, becomes a common feature of banking system in developing countries. Khemraj (2007a), Aikaeli (2006), Nguyen and Boateng (2015a,b), Bathaluddin, Adhi and Wahyu (2012), and Saxegaard (2006) found persistent excess liquidity problem in Guyana, Tanzania, China, Sub-Saharan Africa and other developing economies. Khemraj (2007b) attributed it to structural or cyclical factors. According to him, the oligopolistic loan markets in developing economies ensure that banks set minimum interest rate so high to the extent that marginal borrowers are unwilling to pay. Banks therefore accumulate excess or unproductive liquidity as near or perfect substitutes to loans at very high interest rate. The implication is flat liquidity preference curve at relatively high interest rate, which contrasts sharply with one of the assumptions of financial liberalization theories that surplus liquidity and bank credit sought to turn into alternates at a zero credit rate (Arestis and Demetriades, 1999).

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Involuntary surplus liquidity could have the possibility of hindering the efficacy of monetary policy, since banks could use the surplus liquidity to disrupt this. Typically, empirical literature has clearly identified three channels of monetary policy that could be disrupted with excess banking system liquidity, such as the interest rate channel, credit channel and exchange rate channel (Ganley, 2002; Eickmeier, Gambacorta and Hofmann, 2014; and Khemraj, 2007a).

The accumulated excess reserves by banks could negatively affect the efficacy of monetary policy and the profitability or risk-taking of commercial banks (Nguyen and Boateng, 2015). Banks could use the excess liquidity to build up asset bubble. This provides justification for sterilisation of such fund by monetary authorities. However, the sterilisation of banks excess reserves could impact negatively on bank profitability and encourage risk taking behaviour. Prior literature on the economic effect of excess liquidity was dominantly influenced by Keynesian, Post-Keynesian monetary theory and quantity theory of money (Gurley, 1953; and Nguyen and Boateng, 2015).

Nigeria is one of the economies with the problem of persistent excess banking system liquidity. The persistency of the banking system excess liquidity in Nigeria, despite robust liquidity management instruments employed by the monetary authority, brings to the fore the urgent need to rethink the existing liquidity management strategy.

Objective of the Study

The objectives of this study therefore are:

- To identify the main determining factors of banking system excess liquidity,

- To estimate the influence of these determinants on banking system excess liquidity, and

- To evaluate the marginal effect of the sources on banking system liquidity in Nigeria.

Structure of the Paper

This paper is structured as follows: Section II contains on the indicators of excessive liquidity in the Nigerian banking system; Section III presents the literature review of research works related to the research problem; Section IV identifies the sources of banking system excess liquidity in Nigeria; Section V explains on the methodology adopted for the study; Section VI includes conclusions of this research work.
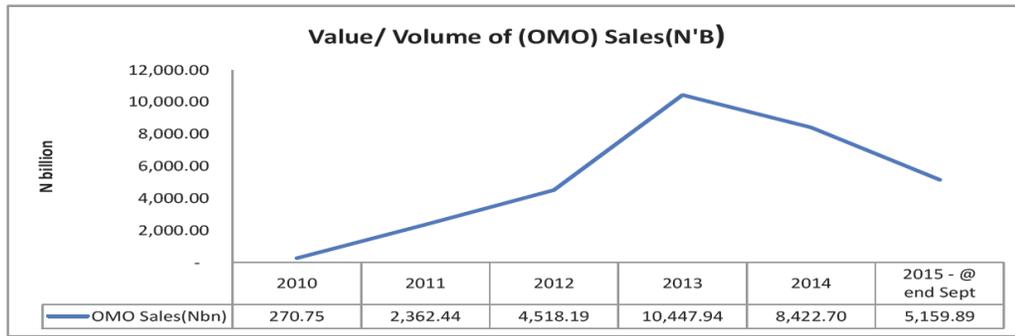
II. INDICATORS OF BANKING SYSTEM EXCESS LIQUIDITY NIGERIA

The indicators of banking system excess liquidity are: Interest rate movement; closing balances of the deposit money banks; volume and value of transactions in standing deposit facility and standing lending facility; and volume of activity in the money market. On bank balances, low (or even negative) combined accounts of Deposit Money Banks (DMBs) is an indication of a tight monetary condition, while large positive balances on their accounts, especially with the central bank, indicates that the system is highly liquid. Similarly, the attractiveness to customers of central bank standing loan instrument by operatives of money market is also an indication of constricted financial situations in the money market. However, large deposits at the deposit facility window are indications that the system is awash with liquidity. Finally, the great scale of transactions with regards to re-purchase trading is a sign of liquidity tightening, owing to insufficient funds in the market, and vice-versa.

In establishing the excess liquidity of the Nigeria banking system, interest rate movement might be misleading. Lower interest rate should indicate presence of excess liquidity, but because of risk aversion by deposit money banks and risk pricing, lending rates have remained at double-digit in the face of surplus liquidity. In terms of Open Market Operations (OMO), the value of OMO sales rose from N270.75 billion in 2010 to N4, 518.19 billion in 2012. It rose further to N8, 422.70 billion in 2014, before declining to N5, 159.89 billion by the end of September 2015. See Figure **1** below for details on of OMO sales.

Similarly, the cost of OMO sales rose from N6.65 billion in 2010 to N257.16 billion in 2012 and further to N353.46 billion in 2014. By the end of September 2015, it was N406.87 billion. There was a rise between 2010 and end-September 2015. The year 2013 saw the peak of OMO activities, resulting in the cost of OMO at N524.82 billion. See Figure **2** for details on the cost of OMO sales.

Activities in the remunerable Standing Deposit Facility (SDF), which allow deposit money banks to keep their involuntary excess liquidity with central bank is a strong indication of the persistence of banking system excess liquidity (see Figure **3** for SDF transactions).
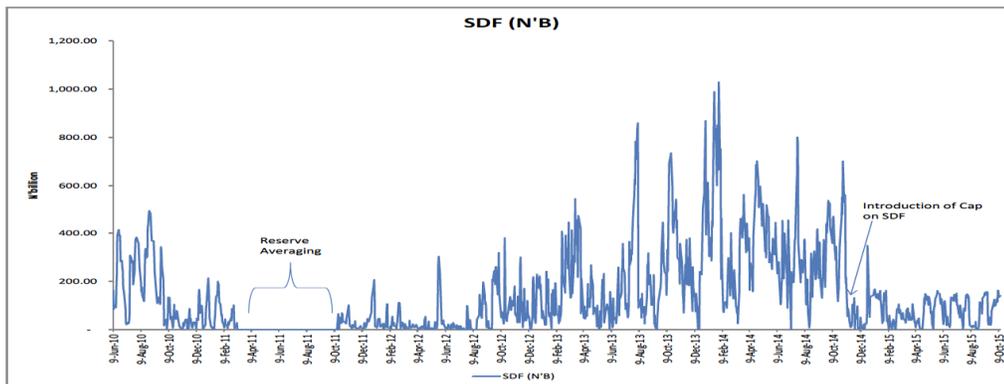
Figure 1: Volume/Value of OMO Sales from 2010 – 2015 End-September.

Source: Based on Author's Fieldwork.

Figure 2: Cost of the Volume/Value of Open Market Operations (OMO) Sales.

Source: Author's computations from CBN statistical Bulletin 2015.

Figure 3: Volume of Standing Deposit Facility (SDF) Transactions.

Source: Based on Author's Fieldwork.

The Central Bank of Nigeria (CBN) is not unmindful of the effect of involuntary excess liquidity on macroeconomic stability. CBN employs several instruments to mop-up the surplus liquidity within the Nigerian banking system. The instruments include Open-Market-Operations (OMO), foreign exchange market (selling foreign currencies in exchange for local currency) and the standing deposit facility to sterilize the excess liquidity in banking system.

III. REVIEW OF RELATED LITERATURE

Keynesian views excess liquidity to have direct and indirect effect on inflation. Gurley (1953) echoing the Keynesian lines argument noted that, *"liquid assets holding… influences private spending only through changes in interest rates…or direct inflationary influence on the disbursements behaviours of both household and business organisations"*. The Post-Keynesian monetary theory introduced investors'

perception of the economy, by arguing that when venture capitalists are positive about the economy, they shrink additional liquid assets and extend their investments into more solid assets … [as such] supply of money surges absolutely towards the purchase of solid assets as opposed to liquidity preference (see Moore, 1988 and Liu and Wray, 2010).

The quantity theory of money has argued that the level of price in the economy is determined by the quantity of money in circulation in relation to the quantity of output, which is dominant in explaining the occurrence of surplus liquidity in developing economies and the impact on such economy. This theory has been used to establish a strong link between the twin surplus (current and capital account surplus) and persistent excess liquidity in developing economies. That is, the accumulation of external foreign reserves whether for precautionary and/or for mercantilist motive builds economy confidence, attracts more foreign capital inflows and promotes banking system excess liquidity.

Determinants of banking system excess liquidity in developing economies are government deposits in banks, weak loan demand, foreign aid, oil revenues, unsterilized foreign currency, remittances inflow, foreign portfolio inflows, foreign direct investment inflows, low degree of financial development, and high degree of risk aversion by banks and borrowers (see Khemraj, 2006; Chen, Chou, Chang and Fang, 2015; Agenor and Aynaoui, 2008 and Sacegaard, 2006). Studies that identify these sources use several theories like credit rationing, money overhang hypothesis, minimum rate hypothesis and foreign currency constraint hypothesis to elucidate the concept of persistent surplus liquidity in developing countries and why banks always want non-remunerative surplus reserves.

On the excess liquidity and monetary policy nexus, there is a consensus among scholar that surplus liquidity could stymie monetary policy efficacy. These studies identify three channels of monetary policy transmission mechanism that could be disrupted by excess liquidity. These channels are: interest rate channel, exchange rate channel and credit channel (Ganley, 2002). Lovin (2014) assessed the efficiency of monetary policy towards improving liquidity position in Romania during the year 2007 global financial crisis and found that monetary policy improved banking system liquidity but credit growth did not return to the initial level. Bathaluddin, Adhi and Wahyu (2012) investigated the impact of banking system surplus

liquidity on monetary policy in Indonesia and found that excess liquidity reduces monetary policy effectiveness in controlling inflation. Agenor and Aynaoui (2008) examined the repercussions of surplus liquidity on the efficiency of monetary policy and provided new explanations of the price puzzle or stagflation effects.

The adverse effect of surplus liquidity on monetary policy effectiveness of (delete) in Nigeria is exacerbated by the peculiarity of the structure of the Nigerian financial system. For instance, Nigerian banks possess market power, government securities market and the loan markets. Unlike advanced countries, where government securities market is highly developed and banks accept rates given by the market, government securities market in Nigeria is not developed, with the presence of very few formal venture capitalists. Banks also lead when it comes to the acquisition of government securities and have the market power to influence the rates.

Similarly, determining factor of surplus liquidity within the Nigerian banking system may appear slightly different from what has been documented in other jurisdictions because of institutional specifics. For instance, the monthly injection of liquidity into the banking system through the Federation Account Allocation Committee (FAAC) is a peculiar feature of the Nigerian financial system. Despite these peculiarities, previous studies have not documented the determining factor for surplus liquidity in the Nigerian banking system and the influences of the determinants in the building-up to excess liquidity, which is a major contribution of this paper. Recent attempt along this line was the work of Tule *et al.*, (2015). However, the study adopted Agenor, Aizenman and Hoffmaister (2004), Agenor and Aynaoui (2008), and Nguyen and Boateng (2013, 2015a) framework, with the objective of establishing the liquidity threshold of the Nigerian banking system. The study also decomposed excess liquidity into involuntary and precautionary excess liquidity.

IV. EVALUATION OF THE SOURCES OF EXCESS LIQUIDITY IN THE NIGERIAN BANKING SYSTEM

Sources of liquidity in the Nigerian banking industry could be broadly categorized into structural/cyclical sources and policy instruments or sources within the purview of monetary authority.

1. Structural/Cyclical Sources

These are factors that are outside or not within the purview of monetary authorities. Some of these

sources are Federation Account Allocation Committee (FAAC), remittances; capital importation and underground activities. These are vital sources because they have the potential of increasing the inflow of fund to the banking system and fuel banking system excess liquidity.

A. Large Underground Economy

The underground financial system raises bank deposits exogenously and endogenously. Underground activities are broadly classified into legal – that is, legal economic activities that escape official records – and illegal activities – such as shadow banking, money laundering, drug trafficking, prostitution, arm smuggling, illegal importation of currencies, funding of terrorism among others. Uche (2009) identified the poor banking habit and the ever-increasing disparity in the structure of both developed and developing countries financial system as valuable assets for increasing underground activities in Nigeria. This huge underground economy generates huge bank deposits that could fuel excess liquidity in the banking system, especially, laundered money with the aim of escaping audit trail.
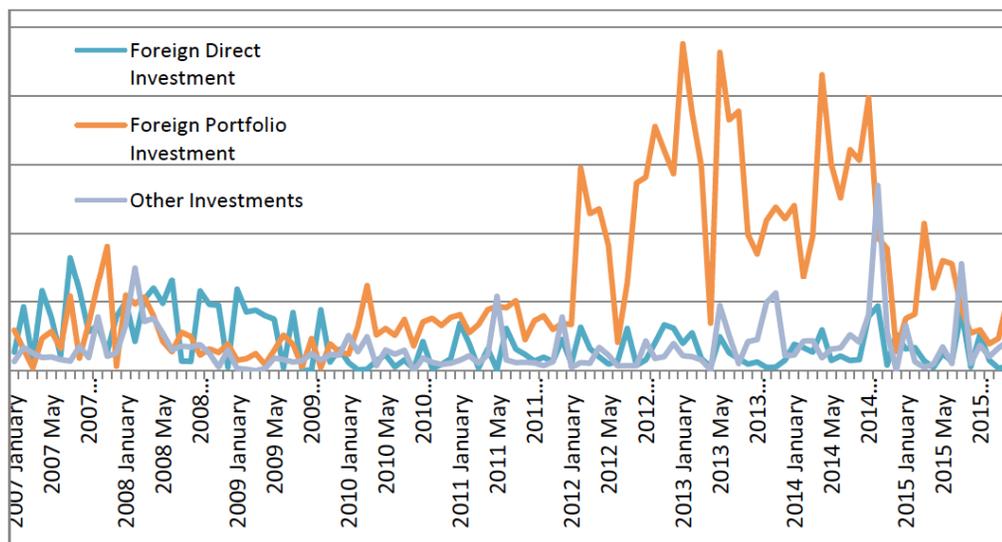
B. Capital Importation

Capital importation could cause increase in bank deposits and reserves, especially, as the foreign currencies are converted into local currency. Capital importation could be viewed by type of investment – that is foreign direct investment (equity and non-equity), foreign portfolio investment (equity, bonds, and money market instruments) and other investments (trade credits, loans, currency deposits and other claims) – and by remittances inflow through the official and unofficial channels. Figure **4** presents the capital importation by investments type trend from January 2007 to March 2015.

Foreign Portfolio Investment (FPI) dominated capital importation for the period under review. Specifically, FDI constituted 35.45% of total capital importation into Nigeria in 2007, and increased precipitously to 64.84% and 80.08% in 2010 and 2012 respectively, but declined slightly to 70.54% and 64.10% in 2014 and 2015 respectively. Figure **5** below presents the trend of FPI contribution to capital importation for the period under review.
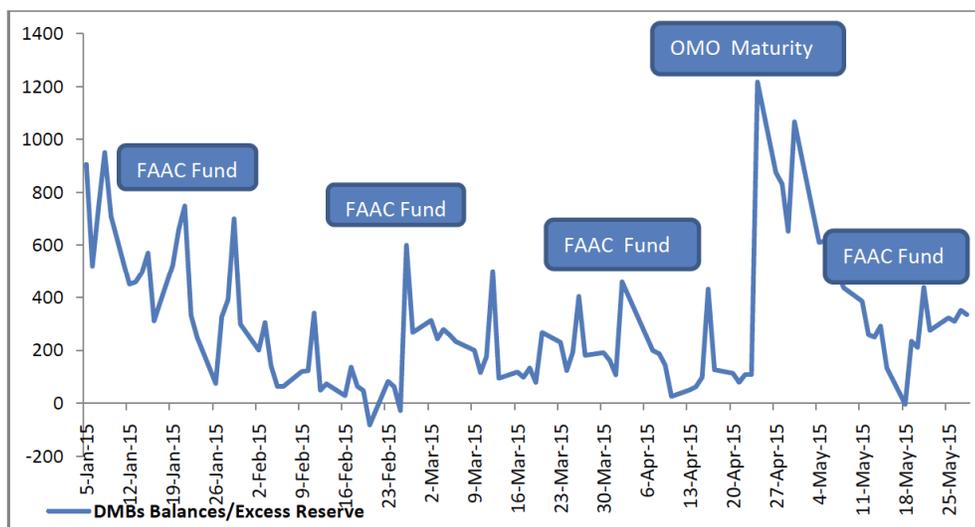
C. Federation Account Allocation Committee (FAAC)

Recounting the 1999 Constitution of the Federal Republic of Nigeria, 'any amount situated to the tune of the Federal Account, minus the equivalent amount of 13 per cent of the income accruing to the Federation Account, which comes directly from any natural resources as a first line charge for sharing to the recipients of the derivative funds in line with the Constitution will be allocated amongst the Federal Government, State Governments and the Local Government Councils in every State of the Federation'. Thus, FAAC distribution is a major source of surplus liquidity to the banking system. Importantly, the bulk of the distributed revenue is from crude oil receipts, which amounts to fresh liquidity injection into the banking system. Tule et al., (2015) in examining DMBs' closing

Figure 4: Capital Importation by Investment Type (2007 – Dec 2015).

Source: Central Bank of Nigeria Database (2015).

Figure 5: Deposit Money Banks (DMBs) Closing Balances and FAAC Disbursement from January – May, 2015.

Source: Tule *et al.* (2015).

balances with the CBN observe "a cyclical pattern of low balances in the days leading to the Federation Accounts Allocation Committee (FAAC) meeting and high balances in the immediate aftermath of FAAC disbursements". Figure **5** demonstrates clearly the behaviour of DMBs balances immediately and some days after FAAC allocation.
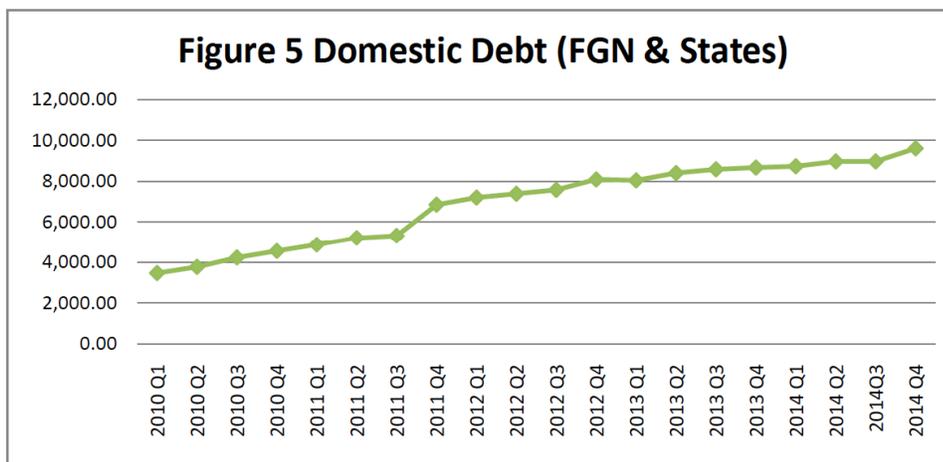
D. Government Borrowing

Government borrowing, whether domestically or externally, is a major source of excess liquidity to the banking system. When government borrows from the public, especially domestic borrowing, it could increase currency outside the banking system, as most risk-averse investors are enthusiastic in terms of investing in government instruments because of the riskless nature of those instruments. The funds subsequently find their ways into the banking system and increase DMBs balances. Figure **4** presents a snapshot of government total domestic debt, which has maintained an upward trend for the period under review (first quarter of 2010 to the last quarter of 2014). In terms of the rationale for this study, Figure **5** presents trends of total government (State and Federal Government) domestic debt. The external debt component is in capital importation under loans.

2. Non-Structural Sources

These are sources that are within the control of monetary authority. They include unsterilized foreign exchange market interventions, Central Bank of Nigeria (CBN) interventions, as well as the use of policy instruments like currency reserve ratio (CRR) and monetary policy rate (MPR).

Source: Based on Author's Fieldwork.

A. Unsterilised Foreign Exchange Market Interventions

CBN periodically intervenes in the foreign exchange market through the sale of foreign exchange to dealers in the market. Such transactions could inject liquidity into the banking system. Though, some scholars are of the opinion that unsterilized foreign exchange market intervention does not trigger liquidity in the banking system. In their view, such intervention amounts to the sterilization of local currency equivalent. While this argument might be somewhat correct, in Nigeria, the difference between the authorised conversation rate of dollar and that of the Bureau de Change (BDCs), also known as exchange rate premium, could enhance liquidity in the banking industry.

B. CBN Interventions

As part of its developmental roles, CBN from time to time provide funds for certain sectors of the economy as a way of fast-tracking economic development and growth in the country. Such interventions include the Agricultural Credit Guarantee Scheme (ACGSF), whose main purpose was to encourage bank extended loan towards investment in agriculture (CBN, 1990).The Interest Drawback Programme (IDP)offers assistance to those who borrowed for interest rate paid on credits under the Agricultural Credit Guarantee Scheme Fund (CBN, 2002). Similarly, Agriculture Credit Support Scheme (ACSS) which has the objective of extending loan to agriculturists at one digit interest rate (CBN, 2006). In addition, to that was the Six Hundred and twenty billion naira (N620 billion) bailout for distressed banks during the financial economic crisis. Other intervention include Restructuring/Refinancing Fund to the Manufacturing

Sector, in addition to the fast-tracking of growth in the production sector of the Nigerian economy by making credit facilities easily accessible to industrialists (CBN, 2010); Power and Aviation Intervention Fund to hasten the advancement of electric power projects, particularly in the recognized industrial clusters in Nigeria (CBN 2012), such as Nigeria Incentive-Based Risk Sharing for Agricultural Lending; Small and Medium Scale Enterprises Credit Guarantee Scheme; and Commercial Agricultural Credit Scheme. These interventions overtly or covertly inject funds into the financial system, which increases banking system excess liquidity. Table **1** presents a snapshot of CBN interventions.

C. Other Policy Instruments

Policy instruments such as Cash Reserve Ratio (CRR), Standing Lending Facilities (SLF), Standing Deposit Facilities, Monetary Policy Rate, Open Buy Back (OBB), Inter-Bank Rate (IBR), Open Market Operations (OMO), among others are also important. In as much as these instruments are used to manage liquidity, it could also be sources of liquidity to the banking system.

V. DATA AND METHODOLOGY

A. Data

The study used monthly dataset from January 2008 to December 2015 collated from CBN Statistical database. The data include DMBs aggregate closing balances, treasury bill rate, FAAC allocations, exchange rate premium (see Forssbeck and Oxelheim, 2007), capital importation, monetary policy rate,

Table 1: Central Bank of Nigeria Interventions (N' Billion)

Year	Interventions	Amount (Billion)
1977	Agricultural Credit Guarantee Scheme	3
2003	Interest Draw-Back programme	2
2006	Agricultural Credit Support Scheme	50
2006	Entrepreneurship Development Centres	0.27
2010	Bailout for Banks	620
2010	Restructuring/Refinancing to the Manufacturing Sector	200
2010	Power and Aviation Intervention Fund	300
2010	Small and Medium Scale Enterprises Credit Guarantee Scheme (SMECGS)	200
2012	Nigeria Incentive-Based Risk Sharing for Agricultural Lending	USD 0.500
2014	Commercial Agricultural Credit Scheme	200

Sources: Author's calculations based on Central Bank of Nigeria Database.

standing lending facility rate, interbank rate, and open buy-back. To estimate banking system excess liquidity, the study considers Nguyen and Boateng (2015a) which describes excess liquidity as the difference between the DMBs closing balances and the optimal liquidity threshold. To achieve, this, Tule *et al.*, (2015) liquidity threshold for the Nigerian banking was adopted. Tule *et al.*, (2015) defined excess liquidity as the actual industry balances available to DMBs after the investment and borrowing activities (SDF, SLF and REPO) and the liquidity management operations of the CBN (OMO) – (i.e. sales or purchases of CBN and Treasury Bills) and REPO. This measure is regarded as the most robust measure for banking system excess liquidity.

Cash reserve ratio and standing lending facilities rate entered the model as sources of excess liquidity, since these instrument could influence DMBs decision either to hold excess liquidity or transfer the funds to the monetary authority for sterilisation. Monetary policy rate also influences the level of liquidity or excess liquidity in the banking system. While tightening spending by increasing borrowing cost, loosening encourages borrowing by reducing borrowing cost. The direction of monetary policy therefore has direct influence on banking system liquidity. However, because the monetary policy rate is deterministic, the study used the interbank rate as a proxy for monetary policy. To determine the robustness of interbank rate as a proxy for monetary policy, the monetary policy rate entered into a second model.

B. Methodology

The study adopts the generalized autoregressive heteroscedasticity (GARCH) in estimating the influence of sources of liquidity on banking system excess liquidity. To achieve this, functional model of ARCH as stated by Engel (1982)

$$h_t = \alpha_0 + \alpha_1 e_{t-1}^2 + \alpha_2 e_{t-2}^2 \cdots + \alpha_q e_{t-q}^2 \tag{1}$$

Where, h_t is the ARCH, α_0 is constant variance, $\alpha_1 e_{t-1}^2$ is the square of the error in the previous period, $\alpha_2 e_{t-2}^2$ is the square of the error in lag 2, and $\alpha_q e_{t-q}^2$.

Equation 1 assumes that the variance or volatility in a particular period hinges on the magnitude of the square errors in the past q periods. As such, estimating, forecasting, and testing are normal extensions of the case with a single lag (Hill, Griffiths and Lim, 2008, p.371). The major shortcoming of the

equation usually referred as ARCH(q) model is that there are q+1parameteres to estimate. If q is a large number, we may miss correctness of the estimate, given the long lagged effects in our study. The GARCH will be another approach to capture the extended lagged impacts with lesser parameters. To migrate to GARCH model, equation 1 is re-written as:

$$h_t = \alpha_0 + \alpha_1 e_{t-1}^2 + \beta_1 \alpha_1 e_{t-2}^2 + \beta_1^2 \alpha_1 e_{t-3}^2 + \cdots \tag{2}$$

In equation 1, geometric lag structure has been imposed on the lagged coefficients of the form $\alpha_s = \alpha_1 \beta_1^{s-1}$. To transform the model into GARCH (1, 1), we add and subtract $\beta_1 \alpha_0$ by re-writing equation 2 as follows:

$$h_t = (\alpha_0 - \beta_0 \alpha_0) + \alpha_1 e_{t-1}^2 + \beta_1(\alpha_0 + \alpha_1 + \alpha_1 e_{t-2}^2 + \beta_1 \alpha_1 e_{t-3}^2 + \cdots) \tag{3}$$

Then, since

$$h_{t-1} = \alpha_0 + \alpha_1 e_{t-2}^2 + \beta_1 \alpha_1 e_{t-3}^2 + \beta_1 \alpha_1 e_{t-4}^2 + \cdots \tag{4}$$

We simplify (4) to;

$$h_t = \alpha + \alpha_1 e_{t-2}^2 + \beta_1 h_{t-1} \tag{5}$$

Where $\sigma = (\alpha_0 - \beta_1 \alpha_0)$

Essentially, equation 5 could be re-written in the simplest GARCH (1,1) specification:

$$Y_t = X_t^\theta + \in_t \tag{6}$$

$$\sigma_t^2 = \alpha_{\varepsilon_{t-1}^2} + \beta_{\sigma_{t-1}^2} \tag{7}$$

Where (6) is the mean equation written and a function of exogenous variable with an error term and (7) is the variance. To adapt the model to the study, (6) is rewritten as follows:

$$EL = (FAAC, CIP, MPR, IBR, CRR, TBR, EXP) \tag{8}$$

Where EL = Banking System Excess Liquidity; FAAC = Total monthly amount distributed by Federation Account Allocation Committee; CIP = Capital Importation; EXP = Exchange Rate Premium; MPR = Monetary Policy Rate; IBR = Inter Bank Rate; CRR = Cash Reserve Ratio; and TBR = Treasury Bill Rate.

VI. DISCUSSION OF RESULTS

To determine the order of integration and ensure the stationarity of the (delete) variables used, the paper performed the Augmented Dickey-Fuller (ADF). Evidence from Table **2** indicates that all the series

Table 2: Unit Root Results

Variable	T-stat	Tau(probability)	Root
CIP	-7.84236	0.00	1
EXCL	-3.20392	0.02	1
EXPR	-5.02796	0.00	1
IBR	-3.9368	0.00	1
MPR	-3.89931	0.00	1
SLFR	-9.05308	0.00	1
TBR	-7.83114	0.00	1
FAAC	-6.00344	0.00	1

Author's Fieldwork from estimation Model.

(CIP, EXPR, IBR, MPR, SLFR, TBR, CBDOR, OBB and FAAC) are non-stationary at that level; but stationary first difference.

Table **3** presents the results of the effect of sources of various liquidity sources on banking system excess liquidity. The GARCH (1,1) model satisfy the covariance stationary conditions that $\alpha + \beta \prec 1$ since $\alpha + \beta$ = 0.999. The results also reveal that ARCH term

and coefficients of the GARCH term β are both positive and significant at 5% level, which confirms the presence of GARCH effect in the model. The results further reveal that the identified sources of excess liquidity estimated in the model have significant effect on banking system excess liquidity. Specifically, capital importation, FAAC distribution, and standing lending facility rate, exchange rate premium have significant positive effect on excess liquidity. However, interbank

Table 3: GARCH Estimation Results of Mean and Variance Equation

Parameters	Without MPR	With MPR
CIP	0.22 (0.01)*	0.23 (0.01)*
FAAC	8.20 (2.16)*	-6.73 (1.78)
TBR	-0.087 (0.012)*	-0.062 (0.014)*
SLFR	0.23 (0.04)*	0.509 (0.07)*
IBR	-0.09 (0.01)*	-0.02 (0.01)
CRR	-0.38 (0.04)*	-0.38 (0.05)*
EXPR	0.33 (0.06)*	0.21 (0.05)*
A	0.479*	0.463*
β	0520*	0.527*
a+b	0.999	0.990
LogL	-97.85	-88.25
AIC	2.23	2.05
SIC	2.44	2.29
Obs	95	95

Parentheses indicate standard error.
*Significant at 5% level.

rate used as a proxy for monetary policy, treasury bill rate and cash reserve ratio has significant negative effect on excess liquidity.

The introduction of Monetary Policy Rate into the model, to a Great extent, gives results that contradict a priori expectations. For instance, interbank rate becomes significant at approximately 9%, while FAAC distribution is negative and insignificant. The result justifies the decision to proxy MPR with interbank rates exclude, since the values of MPR are deterministic and strongly correlated with interbank rate. The study therefore, adopts the result without MPR.

VII. CONCLUSION AND POLICY RECOMMENDA-TIONS

This study identifies the determinants of banking system excess liquidity and estimates the effect of these sources on banking system excess liquidity in Nigeria. The study finds that the identified determinants of excess liquidity have significant effect on the excess liquidity of the Nigerian banking system. The findings bring to the fore the importance of rethinking liquidity management in Nigeria. Central Bank of Nigeria could redesign its liquidity management framework to focus on mopping the excess liquidity from the sources before they are injected into the banking system. For instance, since the result showed that FAAC is a major source of excess liquidity to the banking, the revenues that are distributed every month among the federating units could be invested, while the proceeds are shared once in a year. That could effectively reduce the cost of liquidity management in Nigeria, as well as the cyclical effect such monthly liquidity injection may have on DBMs closing balances.

Appendix 1: Descriptive Statistics

	CBDOR	CIP	CRR	EXPR	IBR	MPR	OBB	TBR	FAAC
Mean	288.9454	1.03E+09	835220.4	5.761146	10.34833	9.695313	9.231146	8.423438	42428.87
Median	243.9566	8.32E+08	245225.4	3.215000	10.52500	10.00000	9.130000	8.540000	42466.55
Maximum	971.4115	3.03E+09	3580850.	33.04000	26.15000	13.00000	22.28000	15.00000	62081.86
Minimum	3.308420	1.02E+08	72479.52	0.330000	0.000000	6.000000	1.110000	1.040000	31740.23
Std. Dev.	224.8827	6.73E+08	992316.1	6.275301	4.527659	2.334299	3.665399	3.596095	7950.826
Skewness	1.113584	1.015985	1.210772	2.358986	0.110496	-0.396782	0.142006	-0.120411	0.767771
Kurtosis	3.900847	3.333061	3.149183	9.466690	4.002544	1.715460	4.198500	2.298187	2.948733
Jarque-Bera	23.08722	16.95934	23.54453	256.3094	4.215731	9.119147	6.068255	2.202147	9.442058
Probability	0.000010	0.000208	0.000008	0.000000	0.121497	0.010467	0.048117	0.332514	0.008906
Sum	27738.76	9.90E+10	80181157	553.0700	993.4400	930.7500	886.1900	808.6500	4073172.
Sum Sq. Dev.	4804361.	4.30E+19	9.35E+13	3741.043	1947.472	517.6504	1276.339	1228.531	6.01E+09
Observations	96	96	96	96	96	96	96	96	96

Source: Author's Computations from E-views analytical software.

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