Managing Banks Liquidity Risk with Interbank Market Liquidity in Nigeria: Matters Arising

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ABSTRACT
This paper articulates with an exploratory research design further thinking on the issues arising from the Nigerian inter-bank market as central bank of Nigeria review and implement monetary policy to ensure availability of funds for effective management of bank's liquidity risk. Aside from inefficiencies arising from interaction of market forces, regulatory interventions sometimes hinder the effective allocation of funds in the market. For instance, the upward review of cash reserve requirements (CRR) on public sector funds with commercial banks by the central bank of Nigeria resulted in various market inefficiencies which include inter-bank market rate volatility, scarcity of funds, hoarding and utilization of market power by big banks. Similar policy impulse was unleashed on the Nigerian banking system in 1988 and 1989 when the central bank of Nigeria directed banks to lodge naira backing for foreign exchange application and further transfer public sector deposits to the apex bank.

Keywords: regulation, liquidity, risk, bank, intermediation

I. INTRODUCTION

The modern theory of financial intermediation justifies the existence of banks on the performance of two central roles in the economy: liquidity creation and risk transformation (Berger and Bouwman, 2009). Bryant (1980) and Diamond & Dybvig (1983) provide a formal analysis of the centrality of liquidity creation. Both theories contend that banks create liquidity on the balance sheet by financing relatively illiquid assets with liquid liabilities. Holmstrom and Tirole (1998) as well as Kashyap et al (2002) maintain that banks equally create and provide liquidity off their balance sheet through loan commitments and similar claims to liquid funds. The liquidity creation role distinguishes banks from other financial intermediaries with private information from the business checking accounts placing them at a vantage position to lend over other intermediaries (Fama, 1985, and Gatev et al, 2009). Banks create liquidity not only to demand depositors, but equally to borrowers via lines of credit and undrawn loan commitments; hence, providing them with liquidity insurance. Both contracts enable customers to receive cash on demand. The liquidity insurance role of banks exposes them to the risk of insufficient cash to meet random demands from their depositors or borrowers i.e. liquidity risk (Gatev et al, 2009).

Banks' risk transformation role is well studied in the literature. There is a vast literature on bank risk taking and prudential regulation, supervision and market discipline to control risk taking behaviour. Accordingly, banks transform risk by issuing riskless deposits to finance risky loans (see for instance, Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986). Risk transformation may coincide with liquidity creation; for example, when banks issue riskless liquid deposit to finance risky illiquid loans. However, liquidity creation and risk transformation do not move in perfect tandem, hence imposing liquidity constraint on banks (Berger and Bouwman, 2009). Along this line, Diamond and Rajan (2001) and Pauzner & Goldstein (2005) maintain that banks perform valuable activities simultaneously on either side of their balance sheets. While on the asset side, they provide loans to illiquid borrowers and enhance the flow of credit in the economy; on the liability side, they offer liquidity on demand to depositors. Banks can equally transform illiquid assets into more liquid demand deposits. There appear to be incompatibility between the two activities fundamentally as the demands for liquidity by depositors may arrive at an inconvenient time thus creating liquidity constraint on banks which may result in the force sale liquidation of illiquid assets.

Virtually every financial transaction or commitment has implications for a bank's liquidity; hence, effective liquidity risk management helps ensure a bank's ability to meet cash flow obligations, which are uncertain as they are affected by external events and other agents' behaviour. Liquidity risk management is of paramount importance because a liquidity shortfall at a single institution can have systemic repercussions (BIS, 2008). Financial market developments in the past decade have increased the complexity of liquidity risk and in response to this; banks and regulators have embarked

upon an upgrading of risk management and control system. Along this line, the new Basel III accord aims to address liquidity risk in banks through the Liquidity Coverage Ratio (a liquidity requirement) and the Net Stable Funding Ratio (a restriction on maturity mismatch that limits the volume of refinancing coming due each period (see Basel Committee, 2010). Over the years several measures have been devised to better manage liquidity risk in banking including, the use of deposit contracts (Gatev and Strahan, 2006, Gatev et al, 2004); the superiority of deposit contracts over traded 'mutual fund' contracts for interim withdrawal (Jacklin,1987); the optimal choice between the above two mechanisms, given information about asset returns and the possibility of bank runs (Jacklin and Bhattacharya,1988); interventions such as suspension of convertibility and deposit insurance (Gorton,1985; Chari and Jagannathan,1988); deposit interest rate controls (Smith,1984) etc.

Bhattacharya and Gale (1987) pursued a different line of investigation. In that paper, the authors investigated a scenario in which insurance for their depositors' inter-temporal preference shocks could only be imperfectly provided at each individual bank, since local shocks could systematically increase or decrease on the proportion of depositors seeking early withdrawal at each bank. Given the assumption in their model of lower rates of return on short-term (liquid) versus long-term (illiquid) investments in banks' portfolios, such withdrawal shocks are optimally coped with by sharing of liquid resources across banks, through a borrowing and lending program (i.e. interbank transaction). However, the possibility of panic-based runs has been the major drawback of deposit contracts, while Calomiris and Khan (1991) view suspension of convertibility and interest rate controls as disruptive and costly. While the provision of deposit insurance and other forms of central bank's intervention is necessary, it is important to mention that such actions can affect bank behaviour; for instance, it can lead to moral hazard and mismanagement of liquidity and credit risk (Repullo, 2005 and Acharya, and Yorulmazer, 2008). Qi (1994) in his study of bank liquidity and stability in an overlapping generation's model maintain that bank runs may result from either excessive withdrawals or lack of new deposits and that the latter cause which cannot occur in Diamond and Dybvig's one generation model implies inability of suspension of convertibility to prevent bank runs. Consequently, he argues for government intervention in maintaining bank stability. The notion that runs which impose liquidity constraint can emanate from excessive legitimate withdrawal and inadequate deposit inflow to cater for outflow requires alternative measure to manage liquidity risk in banks. The relevance of interbank market in this regard has received tremendous attention in the literature. For instance, King (2008) maintain as follows: "Depository institutions are subject to a variety of unpredictable liquidity shocks that determine their needs for short-term funding, and these shocks can impose real costs when they result in reserve shortfalls or overdrafts in Federal Reserve accounts. In the face of such shocks, such institutions (hereafter, 'banks') typically purchase short-term funds from their peers to avoid these costs".

Along this line, Allen, Carletti and Gale (2009) maintain that the interbank markets are among the most important in the financial system. They allow liquidity to be readily transferred from banks with a surplus to banks with a deficit. Goodfriend and King (1988) remarking on Bagehot's doctrine of lender of last resort argue that with efficient interbank markets, central banks should not lend to individual banks, but instead provide liquidity via open market operations, which the interbank market would then allocate among banks. However, the failure of the interbank market to provide adequate hedging opportunity and allocate liquidity efficiently due to frictions and inefficiencies such as asymmetric information about banks' assets (Flannery 1996, Freixas and Jorge, 2008), banks' free-riding on each other's liquidity (Bhattacharya and Gale, 1987), or on the central bank's liquidity (Repullo, 2005); others include, hoarding by banks, extreme interbank rate volatility, moral hazard and market power as well as relationship lending (Ashcraft et al, 2009, Vidon & Kharroubi, 2009; Acharya et al, 2011; Cocco et al, 2009). Interestingly, the interbank market plays a crucial role in the conduct of monetary policy. It is the starting point for the transmission of monetary policy impulses, and in most industrialised countries, the rate on these overnight loans is the central bank's operating target (Neyer and Wiemers, 2003 and Perez Quiros & Mendizabal, 2006). As the operational target for the Monetary Policy Rate (MPR), the Interbank Money Market Rate (IR) stands at the shortest end of the yield curve; its movements may have effects on the whole term structure (Taylor and Williams, 2008). Indeed, an effective monetary policy requires that the overnight interest rate remains "at an average of around" the MPR (Ahumada et al, 2009). Therefore, understanding the factors behind the dynamics of the Inter-bank Rate (IR) is relevant not only for participants in the interbank market, but also for private investors and monetary authorities. What are the determinants of the interbank market rate? Central banks try to control it by using various instruments in their hands, namely, open market operations, reserve requirements, and standing facilities. Control entails an attempt to keep the rate around an "official rate", which in some countries is a "target rate" and in others is just the rate of the open market operations. One consequence of this control is that daily rates closely follow the rates determined by central banks. However, since this control is not perfect, the spread between market rates and official rates is usually different from zero. This difference gives an indication of the part of the daily rate which is driven by market forces (Perez Quiros & Mendizabal, 2006).

Various inefficiencies which impinge on the efficient reallocation of funds in the market require central banks' intervention. While the need for central banks' intervention is quite appreciated, however, a contending issue is the platform upon which such intervention can be executed. In this regard, Goodfriend and King (1988) (see also Bordo 1990; Kaufman 1991; and Schwartz 1992) remarking on Bagehot's doctrine of lender of last resort maintains that it was elaborated at a time when financial markets were underdeveloped. They argue that, whereas central bank intervention on aggregate liquidity (monetary policy) is still warranted, individual interventions (banking policy) are not anymore: with sophisticated interbank markets, banking policy has become redundant. Open market operations can provide sufficient

liquidity, which is then allocated by the interbank market. The discount window is not needed. In other words, Goodfriend and King argue that, when interbank markets function well, a solvent institution cannot be illiquid. According to Rochet and Xavier (2004), banks can finance their assets with interbank funds, negotiable Certificates of Deposit (CDs), and Repurchase Agreements (repos). They added that well-informed participants in this interbank market will distinguish liquidity from solvency problems. Aside from inefficiencies arising from interaction of market forces impinging on the market ability to provide sufficient hedging opportunities, regulatory interventions sometimes hinder the effective allocation of funds in the market. For instance, the upward review of cash reserve requirements (CRR) on public sector funds with commercial banks by the central bank of Nigeria and the impending withdrawal of commercial banks contribution to AMCON'S sinking fund which resulted in various market inefficiencies including: interbank market rate volatility, scarcity of funds, hoarding and utilization of market power by big banks (Business Day, 2013 & Daily Newswatch, 2013) etc. It is against this background that this paper analyses matters arising from the regulators' policy intervention in ensuring availability of funds in the market including the dynamics of the interbank market rate as it majorly determine the tempo of activities in the market and hence funds availability for banks in need of funds; the potency of the market in providing funds for bank liquidity risk management given the identified inefficiencies as well as the platform of the required central bank's intervention. The paper has five sections including the introduction. Section two reviews related literature while section three presents the methodology; section four examines various impacts (matters) of monetary policy review on interbank market and section five concludes the paper.

II.   REVIEW OF RELATED LITERATURE

This paper relates to several strands of literature on interbank market including: its' viability in coping with liquidity risk and implementation of monetary policies, inefficiencies of the market arising from participants and regulators actions and the need for intervention by regulatory authorities.

2.1 The Viability of Interbank Market in Coping with Liquidity Shocks
The potency of the interbank market in enabling banks to cope with bank specific liquidity shocks and avoid unnecessary liquidation of long-term investments was first acknowledged in Bhattacharya and Gale (1987) who show that banks can optimally cope with idiosyncratic liquidity shocks by borrowing and lending; but tend to under-invest in liquidity reserves when moral hazard and adverse selection problems are present. Later contributions built upon this role while introducing either moral hazard (Rochet and Tirole, 1996), aggregate liquidity risk (Allen and Gale, 2000) or else by introducing either credit risk (Freixas, Parigi and Rochet, 2000). Allen and Gale (2000) maintain that interbank markets provide optimal liquidity insurance when banks are subject to idiosyncratic shocks, but may lead to contagion when aggregate shocks are present with connections among banks. Freixas, Parigi and Rochet (2000) maintain that interbank credit lines allow banks to cope with liquidity shocks while reducing the cost of maintaining reserves. However, the interbank market exposes the system to a coordination failure even if all banks are solvent such that the insolvency of one bank affects the banking system's stability depending on the patterns of payments across locations. They further opine that depositors are uncertain about where they have to consume and such consumption location uncertainty provides the need for a payment system or an inter-bank market. They equally emphasize system-wide financial fragility and central bank policy issues in a context where liquidity demand arises from the strategies of agents in respect of the coordination of their actions. Bhattacharya and Fulghieri (1994) examine the Diamond and Dybvig (1983) model of optimal contracting given the uncertain liquidity needs affecting depositors' demands for early withdrawal of their invested funds which compels banks to obtain insurance against such withdrawal shocks. While examining an insurance mechanism among banks facing idiosyncratic shock with private information about the realized idiosyncratic liquidity needs that prevent the achievement of the optimal insurance allocation; they derive interbank contracting through which such withdrawal shocks could optimally be coped with by sharing of liquid resources across banks, via a borrowing and lending programme. Allen, Carletti, and Gale (2009) develop a framework in which interbank markets are efficient in allocating liquidity from banks with a surplus to deficit ones. They demonstrate how the market is characterised by excessive price volatility when there is no opportunities for banks to hedge aggregate and idiosyncratic liquidity shocks; hence, requiring central bank implementation of the constrained efficient allocation by using open market operations to fix the short term interest rate.

Freixas and Holthausen (2004) study the effects of cross-country asymmetric information on the structure of financial markets with a focus on the design of money markets and the role of repo and (unsecured) interbank markets in an international framework, and a more general framework of the analysis of cross-country direct investment, covering the cross-country market both for bonds and equity. They maintain that the creation of an integrated interbank market is particularly relevant in order for banks to cope efficiently with liquidity shocks. Again, that interbank markets are instrumental in allowing for a smooth working of the payment systems (so that a bank that is lacking liquidity in the payment system is able to borrow from another bank), and in channelling liquidity to the banks and countries that need it most. Both repo and unsecured interbank lending allow banks to cope with liquidity shocks. Freixas, Martin and Skeie (2009) reflecting on the global financial crises that started in 2007 view the interbank lending market as crucial for banks that face uncertainty regarding their liquidity needs. They examine the efficiency of the interbank lending market in allocating funds and the optimal policy of a central bank in response to liquidity shocks; and show that, when confronted

with a distributional liquidity-shock crisis that causes a large disparity in the liquidity held by different banks, a central bank should lower the interbank rate. Equally they show that, during an aggregate liquidity crisis, central banks should manage the aggregate volume of liquidity with two different instruments-interest rates and liquidity injection, which are required to cope with the two different types of liquidity shocks. Accordingly, failure to cut interest rates during a crisis erodes financial stability by increasing the probability of bank runs.

2.2 Interbank Market Imperfections

The existence of interbank market imperfections has been established empirically by Kashyap and Stein (2000), who show the role of liquidity positions, the so-called "liquidity effect". Building on such evidence, Freixas and Jorge (2008) analyze the functioning of the interbank market in order to show the consequences of its imperfections for monetary policy. In particular, they establish the relevance of heterogeneity in banks' liquid asset holdings for policy transmission. Caballero and Krishnamurthy (2008) provide a model of crises that features liquidity hoarding, and provides a motivation for lender of last resort intervention.

Other papers with focus on interbank market inefficiencies include the following among others: Acharya, Gromb and Yorulmazer (2011), Donaldson (1992), Heider, Hoerova and Holthausen (2008), Aschcraft, McAndrews and Skeie (2009), Kharroubi and Vidon (2009), Akram and Christophersen (2010), Flannery (1996). Acharya, Gromb and Yorulmazer (2008) model the interbank markets as being characterised by moral hazard, asymmetric information and monopoly power in time of crisis. In their model, a bank with surplus liquidity is able to bargain with a bank that requires liquidity for investment purposes. This bargaining enables the surplus bank to extract surplus from the deficit bank culminating in an inefficient allocation of resources. Central bank in their model has a role of providing alternative option to the deficit bank for acquiring the required liquidity. Even if the central bank does not actually provide the liquidity, the inefficient bargaining can be avoided. With a number of historical examples, the authors indicate how some banks utilized their monopoly power over others in times of crisis. An important issue with their analysis is the extent of it relevance in modern interbank market. Donaldson (1992) shows that even if aggregate liquidity is in surplus, if some surplus banks have a significant proportion of the excess cash such that other cash-rich banks cannot satisfy the total liquidity demand, the surplus banks can charge higher than competitive rates. Heider, Hoerova and Holthausen (2008) find that when a bank's credit risk cannot be observed directly, safer borrowers drop out of the interbank market and lenders hoard liquidity despite the high prevailing interest rate when the counterparty risk in the market rises sufficiently.

Aschcraft, McAndrews and Skeie (2009) develop a model with payment liquidity shocks, credit constraints and limited interbank market participation to study the precautionary behaviour of banks facing liquidity shocks and credit constraints, and how this affects the interbank market equilibrium. Banks rationally hold large precautionary balances intra-day and overnight, which may be described as hoarding and which leads to volatility in the interbank market rate. The model shows that Banks' limited participation constraint may be responsible for overnight excess reserves holding and fed funds rate volatility; while credit constraints may explain small banks additional intraday precautionary reserve balances and net fed funds lending from small to large banks. Essentially, the paper show that credit constraints and limited participation arising from incomplete markets can explain hoarding and a shortening of maturities for lending as a more general result of liquidity problems for financial intermediaries more broadly. Kharroubi and Vidon (2009) propose a framework to analyze the functioning of the inter-bank liquidity market and the occurrence of liquidity crises. The model relies on three key assumptions: (i) ex ante liquidity provisioning is not verifiable -it cannot be contracted upon (ii) banks face moral hazard when confronted with liquidity shocks-unobservable effort can help overcome the shock (iii) liquidity shocks are private information-they cannot be diversified away. Under these assumptions, the equilibrium risk-adjusted return on liquidity provisioning increases with the aggregate equilibrium volume of ex ante liquidity provision. As a consequence, banks may provision too little liquidity compared with the social optimum. The paper equally investigates how policy can prevent or dampen a collapse of the market for liquidity. Essentially, the paper argues that a proper modelling of the collapse in the market for liquidity involves a keen observation of the incentives to provision/hoard liquidity and moral hazard mechanisms in the inter-bank market. On the prevention of further collapse of the market, the paper maintain that policies aimed at tackling the collapse of the inter-bank market ex post, i.e. after the collapse has happened, are unlikely to reach their goal. In particular liquidity injections as well as interest rate cuts cannot help distressed banks overcome their liquidity shocks. By contrast ex ante policies, especially those which modify the return of liquid assets compared to illiquid assets can be successful in preventing a collapse of the interbank market. In other words, monetary policy, by setting short term interest rates which provide incentives to invest in liquid assets, can be helpful in reducing the occurrence of liquidity crises. Regulatory policies requiring liquidity provision can also be useful.

Akram and Christophersen (2010) study overnight interbank interest rates paid by Norwegian banks from the period 2006 to 2009. They observe large variations in the rate across banks and over time. During financial crisis, the rates are found to be substantially below indicative quotes of interest rates provided by major banks. With econometric model, they attribute the interest rate variation partly to differences in banks' characteristics including relative size and connectedness, implying favourable terms for banks of systemic importance. Moreover, interest rates are also found to depend on overall liquidity and possibly on its distribution among banks suggesting exploitation of market power by banks with surplus liquidity. The paper equally investigates effect of aggregate liquidity on interbank rate in the market as it amplifies interest rate response to the central bank's liquidity supply measures. Arguably, a more even liquidity

distribution may reduce liquidity risk as more banks can act as possible counterparts when in need of liquidity. This may equally reduce the scope for exploiting possible market power in liquidity supply. Along this line, the empirical analysis by McAndrews et al (2008) suggest that a more efficient allocation of liquidity helps reduce interbank interest rate, while Taylor and Williams (2009) do not find significant evidence of such effect. Flannery (1996) observes various concerns raised on the potential failure of the payment system which the interconnection of financial firms can generate. He analyse various means of resolving such issues including liquidity provision by the government and private market arrangement. In this regard the relevance of the role of a government lender of last resort (LLR) in producing payment system stability and how it should be performed as been argued in various ways. The paper investigates whether private credit markets can, in fact be relied upon to channel liquidity to the appropriate banking firms during a financial crisis. It equally evaluate the efficacy of direct discount window lending in the context of a payment system crisis as private credit arrangement appear most likely to fail in this situation. With a model of private credit extension under asymmetric information, the paper analyses a payment system liquidity crisis and develops policies to govern the Federal Reserve's discount window operations. Most importantly, the paper maintains that the discount window's value arises when there is disarray in private financial markets. That where lenders cannot assess other firms' conditions, they may rationally withdraw from the inter-bank loan market leaving solvent but illiquid firms unable to fund themselves. Private lenders who seek to fill this gap would confront a non diversifiable adverse selection bias, which the discount window need not experience. It further maintain that in this type of financial crisis, government may need to do more than providing aggregate liquidity through open market operation. In this regard, the paper suggests that the short-term discount window lending- unsecured and at (perhaps) subsidized rates, may constitute the least-cost means of resolving some forms of widespread financial uncertainties, including those that affect payment systems settlement.

There are other literatures which examine the implementation of monetary policy based on incomplete markets or partial equilibrium models of payments shocks to bank reserves. Excess reserves are held because either no bank can trade after payments shocks occur. Payments shocks are modelled as withdrawn from the banking system, or there are autonomous shocks to the supply of reserves held by banks that the central banks cannot fully offset. This literature includes Ennis and Weinberg (2007), Whitesell (2006a, b), Perez-Quiros and Rodriguez-Mendizabal (2006).

2.3 The Need for Government Intervention in Interbank Market

There are a number of papers where some form of government intervention is required in the interbank market when it fail to work given inefficient liquidation of assets. The optimal form of intervention generally depends on the reason why the liquidation market does not allocate liquidity efficiently. Holmstrom and Tirole (1998) and Diamond and Rajan (2005) analyse the optimal liquidity provision by a central bank or a government authority when interbank markets are subject to liquidity shocks and contagious failures generated by the illiquidity of bank assets. Gorton and Huang (2004) show that government may optimally supply liquidity by issuing bonds when banks need to dispose distressed assets in an illiquid market. Gorton and Huang (2006) further explain the lender of last resort function of central banks with the need of monitoring banks and providing them with liquidity in times of crises in order to prevent inefficient panics. In a context where banks may herd and generate banking crises by forcing a reduction in bank asset prices, Acharya and Yorulmazer (2011) show that it may be optimal for the regulator to bail out some failed banks. Such an ex post policy, however, is dominated by an ex ante liquidity assistance policy to the surviving banks in the purchased of failed banks. While the need for central banks' intervention is quite appreciated, however, a contending issue is the platform upon which such intervention can be executed. In this regard, Goodfriend and King (1988) (see also Bordo 1990; Kaufman 1991; and Schwartz 1992) remarking on Bagehot's doctrine of lender of last resort maintains that it was elaborated at a time when financial markets were underdeveloped. They argue that, whereas central bank intervention on aggregate liquidity (monetary policy) is still warranted, individual interventions (banking policy) are not anymore: with sophisticated interbank markets, banking policy has become redundant. Open market operations can provide sufficient liquidity, which is then allocated by the interbank market. The discount window is not needed. In other words, Goodfriend and King argue that, when financial markets function well, a solvent institution cannot be illiquid. According to Rochet and Xavier (2004), banks can finance their assets with interbank funds, negotiable Certificates of Deposit (CDs), and Repurchase Agreements (repos). They added that Well-informed participants in this interbank market will distinguish liquidity from solvency problems.

III.   METHODOLOGY

This study is a theoretical analysis and exploratory in nature. This is because apart from non-usage and manipulation of secondary data, the study goes beyond description to explanation of the variables of interest. This is because, available literatures on monetary policy impact on interbank market, the viability of the market in managing liquidity risk, the market imperfections and the need for government intervention in the market. That is why relevant materials sourced from journals, newspapers, textbooks and other official documents on various scenarios evidenced in the Nigerian interbank market as a result of monetary policy review and implementation were utilised.

IV.   MATTERS ARISING

It has been observed that the interaction of market forces impinge on the market ability to provide sufficient hedging opportunities. Besides, regulatory interventions via monetary policy review sometimes hinder the effective allocation of funds in the market. A case in point is the upward review of cash reserve requirements (CRR) on public sector funds with commercial banks by the central bank of Nigeria and the impending withdrawal of commercial banks contribution to AMCON'S sinking fund which resulted in various market scenarios including: interbank market rate volatility, scarcity of funds, relationship lending, hoarding and utilization of market power by big banks (Business Day, 2013 & Daily News watch, 2013) etc. Similar policy impulse was unleashed on the Nigerian banking system in 1988 and 1989 when the central bank of Nigeria directed banks to lodge naira backing for foreign exchange application and further transfer public sector deposits to the apex bank (Chete Louis, 2001); hence the need for an analysis of these market scenarios evidenced in the Nigerian interbank market arising from monetary policy review.

4.1 Interbank Rate and Monetary Policy Transmission

The Monetary Policy Rate (MPR) is the Monetary Policy Committee's primary policy instrument. Financial market participants constantly speculate about the movement in this rate, and whenever the Monetary Policy Committee meets, market participants eagerly await the announcement of either an upward or downward review of the monetary policy rate. It is important to note that while the monetary policy rate is set by the Central Bank's Monetary Policy Committee, the interbank funds rate is the rate at which transactions between banks take place. The inter-bank money market rate (IR) stands at the shortest end of the yield curve, and is the operational target for the monetary policy rate. Therefore, understanding the factors behind the dynamics of the IR is relevant not only for participants in the inter-bank market, but also for private investors and monetary authorities. Indeed, the interbank rate is a key benchmark for interest rates in the short term money market and its movement may have effects on the whole term structure (Taylor and Williams, 2008).

Equally important is the fact that the inter-bank market represents the first stage of the monetary transmission channel, where monetary policy actions first come in contact with the rest of the financial system. An effective monetary policy requires that the overnight interest rate remains at an average around the MPR (Ahumada, et al, 2009). The monetary policy rate is generally expected to be the signal rate to Deposit Money Banks' (DMB) credit operations, such that when the monetary authority considers interest rates too high beyond what is judged appropriate to stimulate investment, a cut in monetary policy rate (which implies ease of access to funds by DMBs through the Central Bank discount window) is expected to induce DMBs to lower the cost of lending (Bulus, 2010). He further maintained that a case where a cause-effect relationship cannot be established implies that changes in the MPR are exercises in futility as the credit market would have been operating outside the influencing factor of the Central Bank. Similarly such a lack of cause-effect relationship indicates non transmission of monetary policy's impact to the rest of the economy. This scenario played out in the Nigerian interbank market where decrease in MPR resulted in a corresponding decrease of a related monetary policy tool rate and interbank market value respectively as shown in table 1 in appendix.

4.2 Liquidity Effects on Inter-Bank Rate

The liquidity of the market affects directly the amount of resources that commercial banks have at their disposal and which they will consequently be willing to lend in the inter-bank market. However, Hamilton, 1996 and Wurtz, 2003, among others appear to be the few studies that have considered the effect of daily liquidity conditions on the analysis of the IR. In fact, the literature generally analyzes the functioning of the inter-bank market using a general framework in which banks' reserve positions are affected by random shocks and where the inter-bank market allows banks to fulfil their monthly reserve requirement (e.g. Allen and Gale, 2000, among others). Liquidity provision in the interbank market involves drainage and injection of funds through open market operations by the central bank usually at MPR (discretionary operations), and permanent credit lines through private depositors. An added liquidity source for the market comes through deposits from pension funds. The use of discretionary operations, instead of credit facilities, could be interpreted as a high degree of commitment of the central bank to take the IR close to the MPR, which could lead to the gap between these rates being closed faster. The results of work by Ahumada, et al. (2009) on Chile indicates that the IR and the MPR move together very closely and, when these variables deviate from each other, the speed of convergence is around 30 percent per day. In terms of the explanatory variables, the calendar effects and open market operations, especially the discretionary operations are the most relevant in explaining the dynamics of the IR. Regarding the relevance of market liquidity provided by the central bank, they find that the central bank played an important role during the sample period, while private depositors do not help to significantly improve the explanation of the dynamics of the IR. The permanent credit lines are not statistically significant and this situation could be due to the fact that this instrument is available on a daily frequency and, therefore, the market has internalized its operation in the valuation of the IR. In the Nigerian interbank market, an expansionary monetary policy always culminate in more funds and hence, lowering of the market rate (IR). This is shown in table1 in the appendix. A number of other studies have confirmed that monetary policy actions have predictable effects on short-term interest rate. For example, the results of the study by Aziakpono, et al. (2007) show high responses of the overnight prime interbank lending rates (PIBR) and the three month negotiable certificate of deposit (NCD) to monetary

policy actions in South Africa between 1973 and 2004. Roley and Sellon (1995) show that short term rates in the US follow the same trend as the federal funds rate. Dale (1993) measures the short term response of the UK market rates to monetary policy actions by the Bank of England. The results of Dale's study show that policy actions by the Bank of England have significant positive effect on interest rates of all maturities. Nevertheless, these effects decline as maturity lengthens.

4.3 Impact of Lending Relationships on Interbank Market Operations

Lending relationships are essential feature of the inter-bank market which enables banks to obtain insurance against liquidity shocks (Cocco, et al. 2009). Relationships can only be established if there are frequent and repeated interactions between banks, if borrowers and lenders may set terms for the loan that depend on the identity of the counterparty, or on the ongoing relationship (Boot, 2000). This is indeed the case for direct loans in the interbank market. Direct loans are the result of private negotiations between borrower and lender, who agrees on the amount, interest rate and maturity of the loan. The interbank market is fragmented in nature. For direct loans which account for the vast majority of lending volume, the amount and the interest rate on each loan are agreed on a one-on-one basis between borrowing and lending institutions. Other banks do not have access to the same terms, and may not even be aware of such transaction. Cocco e tal further maintain that bank relationships are an important determinant of their ability to access funds, and of the amount of liquidity available in the market. From their finding, banks with a larger imbalance in their reserve deposits are more likely to borrow funds from banks with whom they have a relationship, and to pay a lower interest rate on these loans than they would otherwise. Essentially, their result supports the prediction of Carlin et al (2007) model that under repeated interaction, cooperation among banks is an equilibrium outcome that involves refraining from predation, and that allows those with a larger reserve imbalance to transact at more favourable prices. Relationship may be an important feature of behaviour in fragmented markets, particularly given that each agent chooses whom to interact with. Again, in as much as transactions are negotiated on a one-on-one basis, agents may condition the terms of the transaction on the identity of the counterparty (Cocco, et al. 2009). Stigum (1990), quoted in Cocco (2005), further expound on the idea of the importance of relationship in the interbank market when he wrote: *"To cultivate correspondents that will sell funds to them, large banks stand ready to buy whatever sums these banks offer, whether they need all these funds or not. If they get more funds than they need, they sell off the surplus..." p 25.* The study by Cocco, et al (2009) found that borrowers and lenders of fund in the Portuguese interbank market tend to rely, more than they usually do, on loans from, and to banks with which they have a close relationship when they have a larger imbalance of funds. In this way, lending relationships provide insurance against the risk of a shortage or excess of funds during the reserve maintenance period. With this, Cocco et al in line with Furfine (2002) position opine that lending relationships play an important role in promoting the stability of the interbank market during periods of low liquidity and time of crisis. Bulus (2010) identifies two purposes why banks establish lending relationships in the interbank market:

1. In interbank markets, financial institutions engage in unsecured borrowing and lending of funds to insure against idiosyncratic liquidity shocks arising from the behaviour of retail depositors (Freixas and Jorge, 2000). When a given bank is faced with unexpectedly large number of withdrawals from its retail customers, it may borrow the funds required to meet these withdrawals from other banks in the interbank market.

2. Borrowing to satisfy the reserve requirements may be another purpose. Over a given time period, banks' reserves must be, at least, equal to a given proportion of their short term liabilities. This is the reserve maintenance period or settlement period and it is a distinctive feature of the interbank market. This period vary from economy to economy. In case a bank cannot meet its reserve requirements, it may use the discount window to borrow from the Central Bank, which acts as a lender of last resort. To resort to that, however, is not without costs; banks must pay an interest rate higher than the prevailing market interest rate on a loan of similar maturity, and most importantly, there are large implicit costs associated with using the discount window, as the financial institution is seen by the central bank as not being able to properly manage its reserves (Stigum, 1990). For this, banks make every effort to avoid using the discount window. Therefore, since banks must hold on average a minimum of reserves, shortages of liquidity at the end of the maintenance period will often lead to special behaviour of overnight rates during those days (Hartmann, et al. 2001), as banks that have not yet satisfied their reserve requirements will be in a weak position. This suggests that banks may wish to establish relationships for insurance purposes and, in particular, against risk of a shortage of funds at the end of the reserve maintenance period.

4.4 Monetary Policy Control Instruments in Nigeria

One of the major objectives of the Central bank of Nigeria (CBN) is the maintenance of monetary stability in the economy. To achieve this, the bank applies a number of monetary control tools including open market operations (OMO), monetary policy rate (MPR), cash reserve requirements (CRR), liquidity ratio, special deposits, selective credit controls and moral suasion (CBN, 1998). It is important to emphasize that the utilization of these variables depend principally on the objectives set out to be achieved by the monetary authority. In Nigeria, OMO has become the most important market-based tool used by the CBN to control the volume of money in the economy through the purchase or sale of government securities in the open market. Due to the prevalent liquidity glut in the economy, the sale of securities, rather than purchase has been predominant. The use of OMO is complemented by Cash Reserve Requirements (CRR) which is a specified ratio

of a commercial bank's total deposit liabilities mandatorily maintained as cash deposit with the CBN. Section 15(1) of the Banks and Other Financial Institutions Decree [BOFID] 1991, as amended, empowers CBN to prescribe from time to time the cash reserve that banks are required to maintain. In line with the Decree, the CBN, through the Monetary Policy Circulars issued annually specified the minimum cash ratio for banks. The cash ratio is reviewed from time to time, depending on the policy thrust (CBN, 1998). It is important to emphasize that the deployment of these monetary policy tools is equally in tandem with the development in the entire economy. For instance, it is reported that in 2008 liquidity condition was mixed; that liquidity in the money market was relatively high in the second quarter of 2008, and that to ensure an optimum banking system liquidity, the CBN undertook a number of monetary policy measures, including a review of the monetary policy rate (MPR) and cash reserve requirement (CRR) as well as the issuance of treasury bills. Again, that when the system faced a liquidity surfeit in the second quarter, contractionary policy measures were implemented, including an aggressive utilization of open market operations (OMO) as the main tool for managing liquidity and the upward review of the monetary policy rate (MPR) from 9.5 percent in January to 10.0 and 10.25 percent in April and June respectively. In addition, the cash reserve requirement (CRR) was increased by 100 basis points, from 3.0 percent to 4.0 percent in June. In view of these monetary management challenges, the financial markets, especially the interbank segment, experienced relatively tight liquidity from end of August (CBN, 2008). From the above, it can be concluded that the utilization of these policy tools depending on the policy stance accounts for the liquidity conditions of the interbank market given the fact that the liquidity position of banks among other factors determines the tempo of activities at the interbank market with its attendant repercussions including the market rate volatility, hoarding and scarcity of funds among others. For instance, it is reported that increased activities and the value of fund traded in the market in 1996 and 1997 were attributable to among other factors high liquidity position of many participants (banks) in the market, while in 1998 tight liquidity situation in the system contributed largely to the slow-down in market activities during the year; hence, the decline in the value of transactions (fund) in the market (CBN 1996, 1997 & 1998). While the need for central banks' intervention is quite appreciated, however, a contending issue is the platform i.e., the suitable monetary policy tool upon which such intervention can be executed. In this regard, Goodfriend and King (1988) (see also Bordo 1990; Kaufman 1991; and Schwartz 1992) remarking on Bagehot's doctrine of lender of last resort maintains that it was elaborated at a time when financial markets were underdeveloped. They argue that, whereas central bank intervention on aggregate liquidity (monetary policy) is still warranted, individual interventions (banking policy) are not anymore: with sophisticated interbank markets, banking policy has become redundant. Open market operations can provide sufficient liquidity, which is then allocated by the interbank market. The discount window is not needed. In other words, Goodfriend and King (1988) argue that, when interbank markets function well, a solvent institution cannot be illiquid.

From table1 in the appendix, it is clear that frequent upward review of both CRR and MPR in a bit to manage excess liquidity impacted negatively on funds availability at the interbank market. For instance, market participants have noted that the CBN was sometimes focused on multiple objectives that could potentially require conflicting policy actions (e.g., financial stability issues vs. Price stability in the aftermath of the financial crisis). As a result, the liquidity management strategy is not effective leading to significant volatility in the liquidity base both within the month and between the months of the announced targets; that is, the MPR. Again, changes to the CRR require banks to make abrupt adjustments in their portfolios and as a consequence can induce volatility in financial market prices. Therefore, the paper supports existing position that, changes in the ratio should be infrequent and made only when there is strong reason not to use market-based instruments (i.e., government/CBN securities); thus, indicating that government/CBN securities representing open market operation is a viable architecture for the implementation of monetary policy.

V. CONCLUSIONS

The fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently susceptible to liquidity risk. Financial market developments in the past decade have increased the complexity of liquidity risk and in response to this, banks and regulators have embarked upon an upgrading of risk management and control system. Over the years several measures have been devised to better manage liquidity risk in banking including, the use of deposit contracts and interventions such as suspension of convertibility and deposit insurance, deposit interest rate controls etc. However, the possibility of panic-based runs has been the major drawback of deposit contracts, while suspension of convertibility and interest rate controls have been viewed as disruptive and costly. Moral hazard and mismanagement of liquidity and credit risk is said to be associated with deposit insurance and central banks' intervention. The notion that runs which impose liquidity constraint can emanate from excessive legitimate withdrawal and inadequate deposit inflow to cater for outflow requires a viable measure to manage liquidity risk in banks. The relevance of interbank markets in this regard has received tremendous attention in the literature. The interbank markets are among the most important in the financial system. It allows liquidity to be readily transferred from banks with a surplus to banks with a deficit. It equally plays a crucial role in the conduct of monetary policy has it is the starting point for the transmission of monetary policy impulses, and in most industrialised countries, the rate on these overnight loans is the central bank's operating target. However, the interbank market can fail to provide adequate hedging opportunity and allocate liquidity efficiently due to frictions and identified inefficiencies which could arise from interaction of market forces and most times an aftermath of regulatory interventions; most especially, interbank market rate volatility, scarcity of

funds, hoarding and utilization of market power by big banks as witnessed in the Nigerian interbank market as a result of central banks' upward review of cash reserve ratio on public sector funds with the commercial banks. While the need for central banks' intervention is quite appreciated, however, a contending issue is the platform i.e., the suitable monetary policy tool upon which such intervention can be executed. It is obvious that frequent upward review of both CRR and MPR in a bit to manage excess liquidity impacted negatively on funds availability at the interbank market. This equally leads to significant volatility in the liquidity base both within the month and between the months of the announced targets; that is, the MPR and CRR. Again, changes to the CRR require banks to make abrupt adjustments in their portfolios and as a consequence can induce volatility in financial market prices. Therefore, the paper supports existing position that, changes in the ratio should be infrequent and made only when there is strong reason not to use market-based instruments (i.e., government/CBN securities); thus, indicating that government/CBN securities representing open market operation is a viable architecture for the implementation of monetary policy. Essentially, the paper brought to the fore and equally calls our attention to the need for policy initiation, review and subsequent implementation in a manner that would ensure availability of liquidity in the interbank market as inadequate liquidity could impinge on the viability of the market in providing hedging opportunity for banks in coping with bank-specific and aggregate liquidity shocks.

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Appendix

Table1: Interbank market value/Rate and Monetary Policy Variables from 1993 to 2013

YEAR	IR (%)	IMV (N'MILLION)	CRR (%)	CRR (N'MILLION)	TBR (%)	TBDMBs (N'MILLION	MPR (%)
1993	57.5	14,266.30	6	6,744.40	26.9	7,541.60	26
1994	21	9,241.60	6	8,413.10	12.5	5,343.30	13.5
1995	20.5	10,236.70	6	10,864.10	12.5	9,099.50	13.5
1996	12.5	19276.70	7.5	16,945.60	12.5	32,028.90	13.5
1997	18.2	285,552.70	7.8	22,740.30	12	11,089.00	13.5
1998	15.02	230,277.80	8.3	27,743.00	12.95	12,864.70	14.31
1999	16.1	194,354.50	11.7	62,000.80	17	38,568.40	18
2000	12.18	943,000.30	9.8	77,781.90	12	58,257.20	13.5
2001	12.7	1,399,000.50	10.8	125,257.80	12.95	686,183.00	14.31
2002	12.7	903,000.20	11.3	139,701.80	18.88	998,915.20	19
2003	21.11	918,000.70	10.5	152,275.50	15.02	1,394.00	15.75
2004	12.14	1,096,000.00	9.5	157,694.40	14.21	1,403,052.40	15
2005	7	5,600,000.60	9.5	101,097.30	7	1,257,194.80	13
2006	8.98	11,942,000.60	0.5	206,513.60	8.8	771,570.00	12.25
2007	8.99	19,020,000.50	0.3	148,099.30	6.91	587,315.00	8.75
2008	12.17	20,403,000.60	0.3	150,706.80	4.5	383,668.90	9.81
2009	4.68	17,316,000.22	1.3	87,026.30	6.13	876,380.00	7.44
2010	8.03	19,534,000.75	0.1	95,646.00	10.25	1,478,720.00	6.13
2011	15.5	43,855,000.80	0.8	770,052.50	16.75	2,001,250.00	12
2012	11.88	23,811,000.91	12	1,338,799.70	13.39	2,141,989.80	12
2013	10.75	21331.14	12	2868.80	12.50	2581.60	12

Source: (CBN Annual Reports & Accounts and Statistical Bulletin of relevant years)