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# Monetary Policy and Bank Behaviour in Nigeria

Muhammad A. Abba, Abdullahi U. Musa, Mustapha A. Adigun and  
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## Abstract

This paper analyses monetary policy and bank behaviour in Nigeria. Existing evidence shows that banks alter their lending behaviour in a specific way following a change in monetary policy. This study investigates the dynamic relationship between the actions of the monetary authorities, through changes in the monetary policy rate (MPR), and the behaviour of deposit money banks in Nigeria through their allocation and pricing of credit. We employed aggregate time-series data as in several studies on bank lending. Two variables, credit to the core private sector and lending rate, which measure whether banks change their behavior when CBN changes the direction of monetary policy were employed. Impulse response analysis was also employed to study the dynamic interaction of the variables. The findings of the study revealed that while other factors are considered by the banks before they change their lending behaviour, variation in maximum lending rate is also associated with changes in MPR, suggesting the fact that banks in Nigeria watch closely the movement in MPR for their credit pricing.

**JEL Classification:** E4, E5, E51

**Key Words:** Monetary Policy, Credit, ISLM Model,

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## I. Introduction

Theoretical and empirical evidences have since established that monetary policy affects the economy through, among others, its impact on deposit money banks' (DMBs) balance sheet. For instance, a monetary contraction will reduce DMBs reserves which in turn curtail their credit creating ability and invariably reduce investment and aggregate demand. Thus, the behaviour of the DMBs whenever there is a monetary impulse becomes crucial in our understanding of the monetary policy transmission mechanism. However, the changing behaviour of banks following the contagion effects of the global financial crisis and especially CBN's interventions/bailout has made DMBs to become more conservative (significantly altering their lending to SMEs and real sector): electing only to strengthen their books with holdings of risk free government securities. Banks would only venture to broaden the scope of

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their risk assets particularly towards the real sector when investments in government papers become less profitable. This behaviour by the banks will definitely limit the potency of monetary policy to cause changes in the real economy. Consequently, this special role of banks had been studied extensively both at the theoretical and empirical levels.

As had been submitted already, DMBs alter their lending behaviour in a specific way following a change in monetary policy. Of particular interest, a change in monetary policy rate affects lending behaviour, risk-taking appetite and to a large extent the profitability of banks, all of which have important implications for the entire economy. Using aggregate time series data on bank lending in response to changes in monetary policy, this study investigates the dynamic relationship between the actions of the Central Bank of Nigeria, through changes in the monetary policy rate (MPR), and the behaviour of deposit money banks in Nigeria in terms of allocation and pricing of credit. The Impulse Response Function analysis (IRF) shows that a shock to the monetary policy induces a slight positive effect on credit to the private sector, a situation which tend to fizzle out after the third month. A similar shock to the MPR however, shows an initial slight negative effect on the maximum lending rate which quickly changed to positive and rose significantly and persistently.

The rest of this paper is organised as follows. Section 2 provides some theoretical and empirical literature about the relationship between monetary policy and bank behaviour. Section 3 discusses the monetary policy framework in Nigeria, analysing policy instruments, monetary policy framework under various regimes and the outcomes. Section 4 describes the econometric analysis and Section 5 presents the empirical results. Finally, Section 6 summarizes the paper and offers some advice for policy directions.

## **II. Review of Literature**

### **II.1 Theoretical Framework**

The manner in which banks behave when the central bank changes its monetary policy stance is entrenched in the transmission mechanism of monetary policy. The transmission mechanism is usually described as the channels through which initial decisions or changes in any monetary policy instrument (policy variable) impacts the ultimate goal of monetary policy including investment, inflation, output, etc. The major channels that have been identified in the literature include the bank lending, interest rate, exchange rate and the asset price channels.

It is unarguable that banks play a pivotal role in the efficacy of monetary policy. This becomes clear when one considers that banks are directly or indirectly



involved in each of the channels of monetary policy transmission. For instance, because banks play a key role in international trade, changes in monetary policy that affects the exchange rate creates a corresponding reaction in banks' behaviours. Similarly, when the monetary authorities change the direction of monetary policy that affects the quantum of money supply or the rate of interest, banks generally react by altering their portfolios of investments in order to maximize their returns. In effect, banks serve as conduit for the delivery of the objectives of policy.

The impact of monetary policy changes on bank behaviours can be studied using the bank lending channel of monetary policy transmission mechanism. The lending channel usually emphasizes the effect that changes in monetary policy has on banks' balance sheet in the presence of certain distortions. It states that in the presence of capital market imperfections (as is the case in developing countries like Nigeria), whenever there is a decline in deposit liabilities, banks may find it difficult to substitute with other forms of financing such as equity or debt. Thus, a monetary policy contraction that lowers banks' deposits may lead to a reduction in the available loanable funds at their disposal, eventually affecting credit availability to the private sector. This in turn translates to a fall in investment and output.

The IS-LM framework can become a convenient way of studying this transmission<sup>2</sup>. The IS and LM equations describe the goods and money markets equilibrium:

Consider the IS schedule

$$Y = \alpha_G(\bar{A} - bi) \quad (1)$$

And the LM schedule

$$i = \frac{1}{h} (kY - \frac{\bar{M}}{P}) \quad (2)$$

Where,

$Y$  = output

$\bar{A}$  = Autonomous components of aggregate demand

<sup>2</sup> This analysis draws from "Macroeconomics" by Dornbusch, R and Fischer, S. Chapter 4, section 4-5, page 116.

$$\alpha_G = 1/[1 - c(1 - t)]$$

$i$  = interest rate

$b$  = interest response of investment

$c$  = marginal propensity to consume

$t$  = tax rate

$\bar{M}/\bar{P}$  = real money supply

$k$  = sensitivity of real money balances to the level of income

$h$  = sensitivity of real money balances to the level of interest rate

$$k, h, c, t, b > 0$$

At equilibrium, both the goods and the money markets intersect. To derive this position, we substitute equation 2 into 1 and solve for the equilibrium level of output.

Substituting 2 into 1, we get

$$Y = \alpha_G \left[ \bar{A} - \frac{b}{h} \left( kY - \frac{\bar{M}}{\bar{P}} \right) \right]$$

And rearranging terms, we obtain the equilibrium output

$$Y_e = \gamma \bar{A} + \gamma \frac{b \bar{M}}{h \bar{P}} \quad (3)$$

Where

$$\gamma = \alpha_G / (1 + k \alpha_G b / h)$$

Now substituting equation 3 into 2, we finally obtain the equilibrium interest rate

$$i_e = \frac{k}{h} \gamma \bar{A} - \frac{1}{h + k b \alpha_G} \frac{\bar{M}}{\bar{P}} \quad (4)$$

Equation 4 shows that a monetary impulse represented by the money supply variable has an impact on the interest rate.

Overall, a general consensus in the literature, especially in the last two and half decades which has focused largely, on macroeconomic evidence indicates the simplest implication for lending channel is that bank loans should be closely correlated with monetary policy measures Bernanke and Blinder (1988). In a different study Kashyap and Stein (1993) found that a tight monetary policy may operate through standard interest rate channels to depress economic activity and to reduce the demand for credit. Consequently, there can be an induced correlation between activity and bank lending even if there is no lending channel.

Rodrigo Alfaro *et al.* (2003) noted that the transmission mechanism process begins with the monetary authority setting the monetary policy rate, which invariably leads to the regulation of liquidity of the financial system through the activation of different mechanisms in the transmission channel. The chain of transmission is activated via the convergence of inter-bank rate which ultimately defines the interest rate (cost of capital) with implications for domestic aggregate demand through a fall or rise in investment and consumption of durable goods. Furthermore, the exchange rate channel (in open economies) is activated through the effect of the uncovered interest rate parity on net imports, while the asset price channel (stocks, bonds, and real states) is triggered via the generation of a wealth effect that has an impact on consumers' decisions. However, in other studies credit channel, which has assumed greater importance in contemporary research, has been found to emphasize the role of asymmetric information and how the costly enforcement of contracts creates agency problems in financial markets (Bernanke and Gertler, 1995). Such studies added that, two basic channels, the traditional bank lending channel and the balance-sheet channel are identified.

The role of banks in the monetary transmission mechanism especially through the bank lending channel has received wide promotion in the literature in the last few decades. The arguments have been around the fact that the asymmetry of the loan response to policy, usually arose from differences in the strength of banks' balance sheet. In other words, bank size determines the sensitivity of loans to changes in monetary policy such that the loan growth of small, undercapitalized banks is more responsive to changes in monetary policy than loan growth at larger and better-capitalized banks (Kishan and Opiela 2000). In a further study to distinguish between the effects of expansionary and contractionary policy on bank loans for banks of different sizes (Chang and Jansen 2005) found evidence that banks play an important role in the monetary



transmission. The study showed that that big bank loan growth has a much greater response to monetary policy, compared to that of small banks. These and other issues are the subject which current studies attempts to explicitly investigate.

## II. Theoretical and Empirical Literature

Table 2: Literature on Monetary Policy and Bank Behaviour

Author(s)	Scope	Methodology/ Hypothesis	Results/Outcome	
			Indices of Monetary Condition	Implications/Policy Notes
<b>Amidu, M (2006)</b>	<b>Ghana</b>	Simple ISLM model adapted to the case where there is more than one policy instruments.  Deposit (D) is taken to be equal to money supply.	<ul style="list-style-type: none"> <li>i. Central bank prime rate</li> <li>ii. Bank liquidity</li> <li>ii. Bank size</li> <li>v. Inflation rate</li> <li>v. Changes in money supply.</li> </ul>	<ul style="list-style-type: none"> <li>i. There was evidence to support the validity of the bank lending channel for Ghana.</li> <li>ii. That Ghanaian banks' lending behaviour is affected significantly by the country's economic activities and money supply.</li> <li>iii. Central banks' prime rate and inflation rate are negatively affected by bank lending</li> </ul>
<b>Farinha, L. and Robalo, M. C (2003)</b>	<b>Portugal</b>	Standard ISLM model for analysing the monetary transmission mechanism at the bank level.	<ul style="list-style-type: none"> <li>i. Bank reserve requirement</li> </ul>	<ul style="list-style-type: none"> <li>i. Existence of a lending channel in Portuguese data.</li> <li>ii. Importance of channel is larger for the less capitalised banks.</li> <li>iii. Size as well as liquidity does not appear to be relevant bank characteristics to determine the importance of the lending channel.</li> </ul>
<b>Gersl A. et al (2012)</b>	<b>Czech Republic</b>		<ul style="list-style-type: none"> <li>i. Time to loan failure model</li> <li>ii. Survival and Probit analysis</li> </ul>	<ul style="list-style-type: none"> <li>i. Expansionary monetary conditions promote risk-taking among banks.</li> <li>ii. Lower short-term interest rate reduces the riskiness of outstanding loan portfolios.</li> <li>iii. Banks accumulating</li> </ul>

				liquid assets tend to be more prudent and grant less hazardous loans.
<b>Kashyap &amp; Stein (2000)</b>	<b>United States of America</b>	Two-step Regression (First step: estimate measures of liquidity constraints using cross sectional regression for each size class. Second step: use the measures as dependent variables in a purely time series regression. Data (1976Q1 – 1993Q2)	viii. Federal funds rate, Bernanke-Mihov indicator of monetary policy stance & Boschen-Mills index of monetary policy stance  ix. Is the impact of monetary policy on lending behaviour stronger for banks with less liquid balance sheet?	Impact of monetary policy on lending is stronger for banks with less liquid balance sheets (banks with lower ratios of securities to assets)
<b>Kishan, Ruby P. and Timothy P. Opiela (2000):</b>	<b>United States of America</b>	Representative model of bank faced with loan demand and large time deposit Demand, both of which depend on capital and asset size assumed to have three assets; required reserves (RR), securities (SEC), and loans (LN); and three liabilities, demand deposits (DD), large time deposits (TD), and capital (K).	<ul style="list-style-type: none"> <li>• Policy rate</li> <li>• Bank lending</li> </ul>	<ul style="list-style-type: none"> <li>• Loans of small undercapitalized banks are the most responsive to monetary policy.</li> <li>• Large time de-posits of small undercapitalized banks are unresponsive to policy.</li> </ul> <p>These support the hypothesis that small undercapitalized banks are unable to raise alternative funds to continue financing loans during contractionary monetary policy times. In other words If bank capital is significant in defining banks' loan response to policy, bank capitalization should be used to gauge the strength and distribution of</p>



				monetary policy.
<b>Nyong , M. O. (1996)</b>	<b>Nigeria</b>	Simultaneous equation linking banks' profitability to capital investment in banking.  $P=f(x_i, x_{ii}, \dots, x_n)$  $K=f(y_i, y_{ii}, \dots, y_n)$	i. Regulatory requirement on risk asset ratio ii. Bank reserve requirement	iv. High level of profitability with under-capitalisation implies excessive risk taking that is incompatible with prudent bank behaviour.
<b>Uchendu , O. A. (1995)</b>	<b>Nigeria</b>	Commercial banks' profit function constrained by regulatory position of the monetary agency.  $P= f(r, er,rv,cr,pl,w)$	i. Bank's Cash Reserve requirements ii. Non-performing loan provision requirement	i. Oligopolistic industry. i. Three Big banks influence on effective monetary policy transmission. i. Strong relationship between monetary policy instruments and commercial bank profitability.  * Appropriate monetary and bank policy are important factors to continued stability and profitability of the commercial banking industry.
<b>Vazquez (2001)</b>	27 selected Developed and developing countries	Panel regressions (832 banks, 27 countries: 1986 – 1998  Does sensitivity of loan growth to monetary conditions varies systematically across banks and among group of countries?	k. Money market rates, exchange rate depreciation, international interest rates & reserve requirements	. The sensitivity of loan growth to monetary conditions is larger for banks operating in developing countries  iii. Bigger banks are more able to isolate loan growth from changes in monetary conditions iv. Loan growth of banks paying higher effective interest rates on non-deposit debt is more sensitive to changes in monetary conditions

### III. Overview of the Evolution of Monetary Policy Framework in Nigeria

Monetary Policy is the deliberate attempt by the monetary authority (like Central Bank of Nigeria) to use monetary instruments to influence the availability, supply and cost of credit in order to achieve certain overall macroeconomic and welfare objectives. The CBN has the role as an institution of government to conduct appropriate monetary policy which is consistent overall economic objectives of policy makers. Over time, the overall objective of monetary policy in Nigeria as in most other jurisdictions has remained the maintenance of macroeconomic stability through the pursuit of price stability. Specifically, monetary policy in Nigeria, from the early 1970's has been designed to promote not just price stability but also to stimulate high rate of employment, sustenance of economic growth and viable balance of payment. In its most recent form, the objectives of the nation's monetary policy have also included specific targets of stable long-term interest and real exchange rates. In other words, as developing economy, monetary policies in Nigeria have a largely dual objective of price stability and sustainable growth. However, while the objectives have remained relatively stable, the implementation process has evolved over time moving from reliance on direct controls to indirect controls.

In addition, the monetary policy regimes have also changed over time to reflect the adopted implementation framework by the monetary authority. These changes which involved the adoption and use of different strategies and instruments were done to cope with the changing financial and general economic environment at varying period. Consequently, along with the shift from direct to indirect (market-based) monetary management, the Central Bank of Nigeria (CBN) has implemented two major policy frameworks involving exchange rate targeting (1959-1973) and monetary targeting (1974 till date). Focus has also shifted away from short-term towards a medium term time frame, majorly to free the implementation from the problem of time inconsistency.

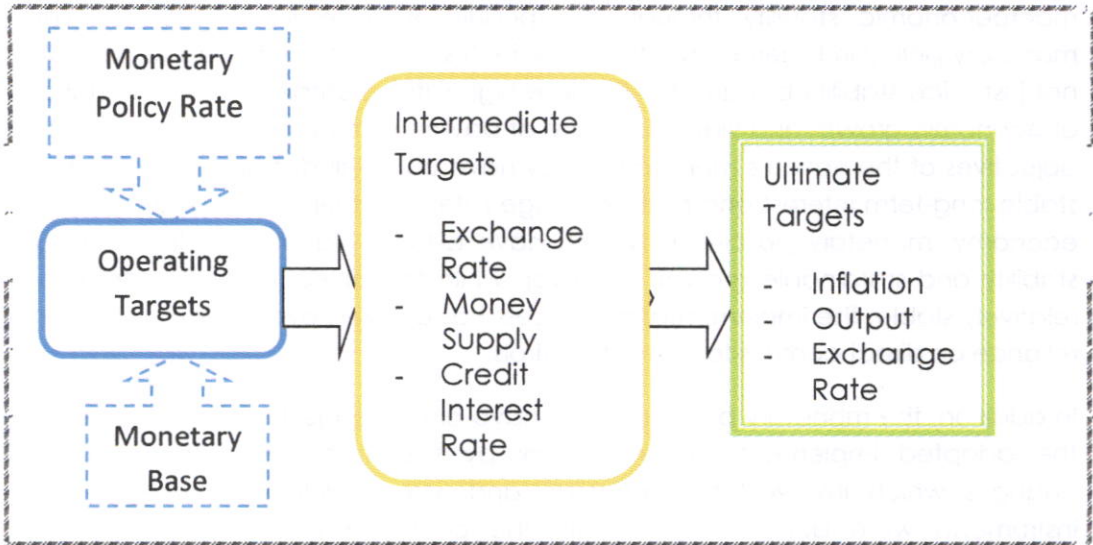
#### III.1 Objective(s)/Targets and Instruments of Monetary Policy

Prior to early 1990s, the CBN relied majorly on a combination of direct instruments (credit ceilings, stabilisation securities, sectoral credit allocation, interest controls and imposition of special deposits among others) for the conduct of its monetary policy operations. Following wide spread macroeconomic reforms various market-based tools were introduced from mid-1993. Some of the new instruments include open market operations (OMO), discount window, reserve requirements and standing facilities among others. Due to the lack of direct influence of the instruments on the overall objectives of monetary policy otherwise known as the ultimate targets (macroeconomic growth and stability), the CBN has identified certain measurable variables (operating and intermediate targets) through which



the ultimate targets can be influenced. The CBN directly influences the base money (reserve money) as the operating target to move the intermediate targets like money supply (M2), credit, interest rate and exchange rate in a desired direction. Movement and changes in the intermediate targets effectively influence the ultimate target of high employment, price stability, viable balance of payment and economic growth.

**Figure 1: Structure of Monetary Policy Framework**



### III.2 Monetary Policy Framework under Various Regimes

The CBN seek alternative approaches and frameworks in the implementation of monetary policies to address the sometimes changing targets of macroeconomic dynamics. "Long histories of unintended outcomes and dissatisfactory performance of monetary policy often compel monetary policy designers to look alternative frameworks" (Okafor, 2009 pg. 1). Some of the reasons for occasional outside target performance of monetary policies have been identified as less than adequate information, conflicting workings of the measures or external shocks which invalidates underlying assumption of previous policy measures. The Nigeria monetary policy framework at the time when operations were largely by direct control with focus of exchange rate targeting operated on a short-term basis. In other words, instruments and targets were adopted within a one-year monetary framework. OMO was conducted wholly using Nigerian Treasury Bills during this time until 2001 and also involve the mandatory sales of special NTBs to banks with requirement of 200 per cent



treasury instruments cover for bank's foreign exchange transactions. Major focus of the CBN was to ensure sound management and maintenance of a healthy balance sheet position for the deposit money banks (DMBs). According to Uchendu (2009), major problem for the inability to meet most targets during this time could be attributed to expansionary fiscal policies and lack of coordination of monetary and fiscal policy implementation.

The CBN moved to medium-term monetary policy framework from 2002 to take care of the issue of time inconsistency and to minimise the over-reaction arising from temporary shocks. This decision also followed on the heels of the realisation that monetary policy actions affect the ultimate objectives with considerable lag.

**Table 3: Monetary Policy Regimes and Features**

Period	Instruments	Features/Issues	Framework
Up to 1986 <b>Direct Control</b>	Sectoral credit allocation, credit ceilings, interest rate controls, stabilisation securities, special deposits, exchange controls	Credit allocation, Distortions & bottlenecks resource allocation.	<b>Short-term (1year)</b>
1986 – 2001 <b>Indirect Control</b>	Open Market Operation, Cash Reserve Requirement, Liquidity Ratio, Discount Window, NTBs cover for AFEM FX transactions, unified exchange rate regime,	Liquidity overhangs from expansionary fiscal policy, below/above target monetary and financial targets, sluggish aggregate output.	<b>Short-term (1 years)</b>
2002 - 2005 <b>Indirect Control</b>	Open market operations, discount window, moral suasion, and standing facilities.	Bank consolidation	<b>Medium-term (2 years)</b>
	Open market	MPR as anchor	

<p>2006 – Date</p> <p><b>Indirect/Market Driven Control</b></p>	<p>operation, fiscal and monetary authority coordination, foreign exchange sales debt instrument restructure</p>	<p>rate, standing facility, RTGS credit facility for operators, Liquidity Management, Price Stability, Banking reform measures, stable inflation and exchange rate</p>	<p><b>Medium-term (2 years)</b></p>
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Consequently, under this present framework monetary policy guidelines are open to half-yearly review in the light of developments in monetary and financial market conditions in order to achieve medium-to-long term goals. The OMO remain the primary tool of monetary policy, complemented by reserve requirement, discount window operations and foreign exchange market intervention with the focus of moving inflation to single digit and ensuring stable exchange rate. Uchendu (2009), concluded that the CBN has been able to achieve more of particularly the set ultimate targets over time due to various proactive measures put in place. This has also been complemented by improved fiscal discipline.

This new monetary framework has been continually strengthened from 2006 with the aim of reducing interest rate volatility and ensuring that the money market becomes more responsive. Post consolidation, the major challenge for monetary policy has been the persistence of excess liquidity accounted for majorly by increased private capital inflows. To effectively tackle this challenge, the monetary policy strategy has took additional form of running down of CBNs holding of treasury bills, unremunerated reserve, increased coordination between monetary and fiscal authorities, occasional foreign exchange swap and restructuring of debts into longer tenor debts. A very important development in the Nigeria monetary policy framework is the establishment of enduring institutional arrangements which has over the past period greatly affected the efficiency and outcome of the process. After 1999, decisions and implementation of monetary policy ceased to be the sole responsibility of CBN's management. The Monetary Policy Committee (MPC) which includes membership outside the CBN was established to deliberate on decisions and outcome of policies while other committees existed in the CBN to provide support for the MPC. While the committee's perform varying functions, they all play a complementary role in the formulation and implementation of monetary policy (CBN 2010).



### III.3 Outcome of Monetary Policy

Increased coordination between monetary and fiscal authorities especially since 1999 has provided an environment for improved effectiveness of monetary policy. Prior to this, time fiscal dominance often hampers effective implementation, leading to inability to achieve most monetary targets. Except in the area of real economic growth and inflation rate where the divergence between targets and outcome has tended to converge, movements in major monetary aggregates have differed largely from target over time. The reason for this has been strongly attributed to particularly the disconnection between major sectors of the economy.

The direct control period before the adoption of SAP in 1986, which coincided with a period of relatively underdeveloped money and capital market was characterised by sectoral credit allocation, credit ceilings and administrative fixing of exchange rate. However, the bottleneck created by the distortions in the market lead to wide spread inefficiencies in resource allocation and utilization. Okafor (2009), noted that the flow of credit to priority sectors during the direct monetary control era did not meet the prescribed target in most cases. Notwithstanding the fact that sectoral allocation policy requires the banks to advance credit to promote the growth of non-oil sector, including agriculture and manufacturing, the sectors did not witness appreciable growth. A major factor that undermined the success of monetary policy during this period was that because the Federal Ministry of Finance played a major role, policies were mainly influenced by short-term political considerations.

As earlier noted, the objectives of monetary policy have remained basically the same over time, while monetary aggregate and inflation have also remained the intermediate and ultimate objective respectively. To properly capture changes in the economic landscape, authorities have varied the conduct and framework for the implementation of monetary policy. Likewise, the outcomes have been as varied with most monetary aggregates sometimes over-shooting or falling below their targets (table 3).



Table 4: Major Monetary Variables (per cent except otherwise stated)

	2004		2005		2006		2007		2008		2009		2010		2011		2012	
	Target	Outcome	Target	Outcome	Target	Outcome	Target	Outcome	Target	Outcome	Target	Outcome	Target	Outcome	Target	Outcome	Target	Outcome
Growth in Base Money	12.6	5.2	6.5	4.2	7.5	27.8	3.3	22.6	20.8	29.6	3.6	6.8	35.9	11.6	12.7	50.9	8.2	26.9
Growth in broad money (M <sub>2</sub> )	16.0	14.0	15.0	24.4	27.0	43.1	24.1	44.2	45.0	57.8	20.8	17.1	29.3	6.9	13.8	15.4	24.6	13.7
Growth in narrow money (M <sub>1</sub> )	13.4	8.6	11.4	29.7	N/A	32.6	37.6	36.6	65.4	113.0	32.2	3.3	22.4	11.1	15.8	21.5	34.7	4.3
Growth in aggregate bank credit	22.5	12.0	22.5	17.3	-72.3	-69.9	-29.9	276.4	66.0	84.2	87.0	59.6	51.4	10.0	27.7	57.2	52.2	1.9
Growth in bank credit to private sector	22.0	26.6	22.0	30.8	30.0	32.1	30.0	90.8	54.7	59.4	44.9	26.8	31.5	-3.8	29.1	44.3	47.5	7.8
Inflation	10.0	10.0	10.0	11.6	9.0	8.5	9.0	6.6	9.0	15.1	10.0	13.9	11.2	11.8	10.1	10.3	11.2	12.0
Growth in real GDP	5.0	6.5	5.0	6.5	7.0	6.0	10.0	6.5	7.5	6.0	5.0	6.0	6.1	7.9	7.2	7.7	7.3	6.6

Source: Monetary Policy Transmission Mechanism CBN Publications (2010), CBN Annual Report and Statement of Accounts (Various Issues)

The circumstances under which the monetary policy has been operating remain a great concern to policymakers and major impediment to policy effectiveness. The goal of promoting employment is occasionally undermined by the enormous size of the informal sector which invariably shrinks the sphere of influence of monetary policy. This creates huge disconnect between monetary policy, production and real growth.

There is also the concern about the changing behaviour of banks since the aftermath of the contagion effect of the global financial crisis and especially the humbling affect CBN's intervention/bailouts. Banks have simply become extremely conservative (stopped lending to SMEs and real sector) electing only to fortify their books with holdings of high return government bills/papers. This trend has been constantly under the scrutiny and x-ray of analysts who believe that banks will only venture to broaden the scope of their loans/assets particularly towards the real sector when investments in government paper become less profitable. These circumstances underscore the limited potency of the monetary policy especially as it affects real growth and by extension employment promotion.

## **IV. Econometric Analysis**

### **IV.1 Data and Variables**

The study uses aggregate time-series data as in several studies on bank lending (see Bernanke and Blinder, (1992); Gertler and Gilchrist, (1993); and Kashyap *et al.*, (1993). It is important to note that, though most of the recent studies in this area (see Brssimis *et al.*, 2003; Ehrmann *et al.*, 2003; Gambacorta, 2003; and Worms, 2003) have shifted to the use of bank level data to address the challenges of separating the demand and supply effects, this study prefers the aggregate data given the paucity of bank level data in Nigeria.

The variables employed in the study include DMBs' credit to the core private sector (CCPS) defined as credit extended to all private firms except private financial firms. This represents the part of the aggregate credit to the domestic economy by the banking system given based on the market interest rates. It is the portion of the loans granted and known to be most sensitive to changes and shocks in the monetary policy. It is used as one of the two variables that will capture the behaviour of the banks given any changes in monetary policy. The other variable is the maximum lending rate which will also measure whether banks change their behaviour when the CBN changes the direction of monetary policy. The maximum lending rate represents the lending rate of every bank including all charges, fees and commissions that borrowers pay on loans and advances from commercial banks and thus best reflects the general pricing



behaviour of banks. Given that the Nigerian monetary policy regime is largely driven by the open market operations guided by the MPR, the last variable is the MPR which will track the changes in monetary policy. It is the indicative rate for the monetary policy stance and represents operating target of the monetary policy framework.

## IV.2 Methodology and Model Specification

By modelling each endogenous variable as a function of its own lagged values and the lagged values of the other variables in the model, the VAR methodology avoids the need to specify a structural model which usually requires extensive knowledge of economic theory behind the hypothesis. Although VAR has been criticized as a theoretical, it has been found to be very useful in tracing the dynamics that exist among macroeconomic variables of interest in terms of impulses or shocks and responses to such impulses.

However, most macroeconomic variables are known to be non-stationary at level and as such, a vector error correction (VEC) model which is a restricted VAR designed for use with non-stationary series that are known to be co-integrated may be used. With co-integration relations built into the specification of the VEC, it restricts the long run behaviour of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics (Eviews, 2009).

In this study, a 3-variable VEC is estimated. Since the three variables were not stationary at level and the Johansen co-integration results suggested one co-integrating relationship, we estimated a vector error correction (VEC) model for the three variables of credit to private sector (CCPS), maximum lending rate (MLR) and monetary policy rate (MPR). The tables below present the test results for order of integration, johansen co-integration and vector error correction.



**Table 4: Test Results for Order of Integration**

	Variable	Order of Integration	Probability
1	CCPS <sub>t</sub>	I(1)**	0.0000
2	MLR <sub>t</sub>	I(1)**	0.0000
3	MPR <sub>t</sub>	I(1)**	0.0000

Table 1: Test results for Unit Root Using ADF Test

Note: \* and \*\* denotes 5 and 1 per cent significance level respectively

Probability is the probability of accepting the null hypothesis of unit root

Scenarios (Total GDP set)	Model	Cointegrating Equation(s) (Trace, Max. Eigenv.)*	Conclusion
CCPS <sub>t</sub> , MLR <sub>t</sub> & MPR <sub>t</sub>	1	(1,1)	Cointegrated

Table 2: Test Results for Johansen Cointegration Analysis

Note: 1. Cointegration coefficients are normalized on CCPS<sub>t</sub>

2. Test was at 5% level of significance

#### IV.2.1 Impulse Response Analysis

The study employs the impulse-response analysis in order to study the dynamic interactions of the variables. These functions trace out the effect of a one standard deviation shock to the orthogonalized residuals of each equation on current and future values of the endogenous variables in the system. Because of the dynamic structure in which each equation consists of its own lagged values and the lagged values of all the other endogenous variables, a shock in one variable is transmitted to all other variables. The variables are ordered in such a way as to reflect credit to private sector as the most endogenous variable in the system. MPR is assumed to be least sensitive to contemporaneous innovations in the other variables, reflecting the fact that it is predominantly the outcome of exogenous decision by the central bank. Other orderings did not change the result qualitatively.

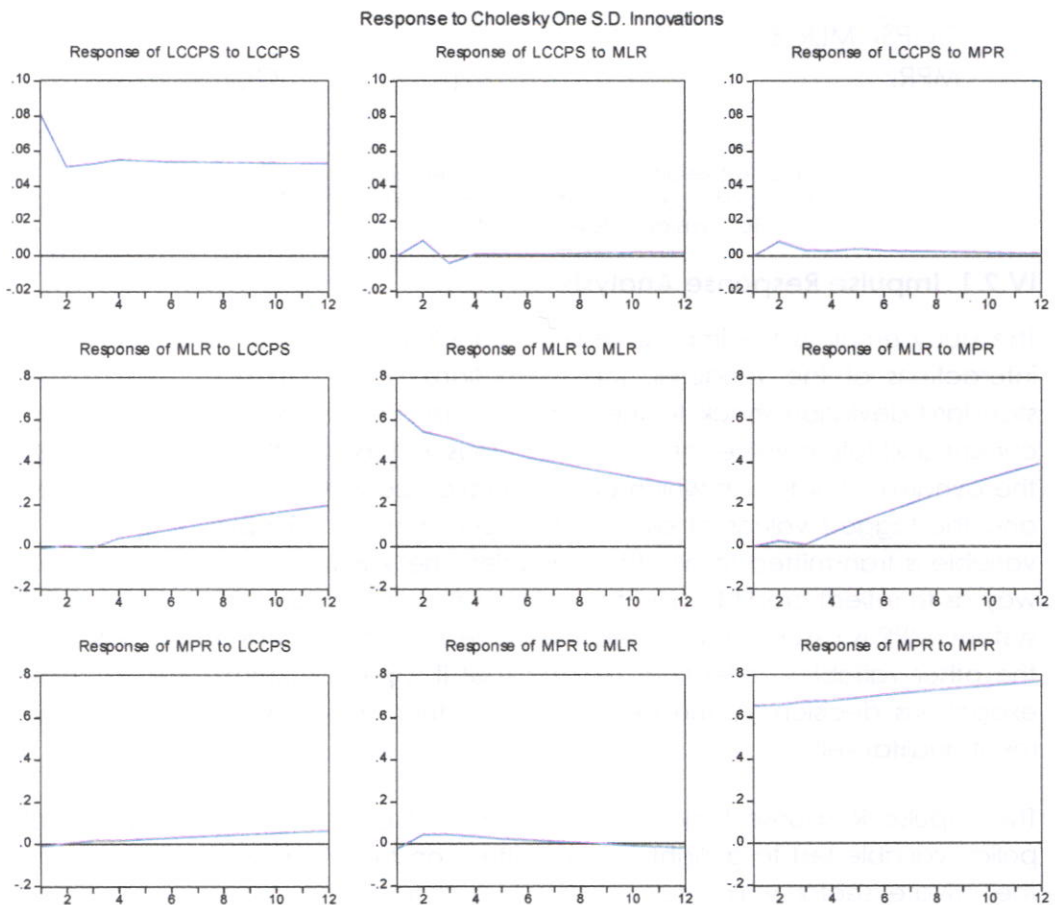
The Impulse Response Function (IRF) show that an impulse from the monetary policy variable led to a slight positive effect on the credit that banks extend to the private sector which fell by the third month and continues to decrease persistently. A similar shock to the MPR however, shows an initial slight negative effect on the maximum lending rate which quickly changed to positive and rose

significantly and persistently. Expectedly, an innovation from the MPR created a positive and permanent effect on itself over the time horizon (Figure 1).

### IV.2.2 Variance Decompositions

From table 3, it is clear that in the given horizon, a significant share of the variation in the quantum of credit banks extend to the core private sector is due to own innovations (above 99 per cent by the 12<sup>th</sup> month) suggesting that many other factors are considered by the banks before altering their lending behavior. Similarly, variation in the MLR is mostly due to its own innovations (about 75 per cent) and also to an extent, the movements in the MPR (about 20 per cent). This supports the fact that banks in Nigeria watch closely the movement of the monetary policy anchor as a basis for their own credit pricing.

**Figure 2: Impulse Response Functions**





**Table 5: Variance Decomposition**

Period	Variance Decomposition of LCCPS:			
	S.E.	LCCPS	MLR	MPR
1	0.081411	100.0000	0.000000	0.000000
2	0.097165	98.37887	0.870501	0.750628
3	0.110880	98.52681	0.790920	0.682274
4	0.124051	98.74753	0.640111	0.612361
5	0.135702	98.84676	0.539650	0.613588
6	0.146185	98.94881	0.469474	0.581713
7	0.155988	99.03346	0.418067	0.548477
8	0.165136	99.10250	0.380734	0.516762
9	0.173746	99.16175	0.352426	0.485823
10	0.181904	99.21253	0.331196	0.456272
11	0.189669	99.25613	0.315326	0.428548
12	0.197089	99.29365	0.303646	0.402704

Period	Variance Decomposition of MLR:			
	S.E.	LCCPS	MLR	MPR
1	0.651391	0.007477	99.99252	0.000000
2	0.851487	0.007623	99.88575	0.106629
3	0.996761	0.006777	99.90607	0.087150
4	1.108128	0.138692	99.44306	0.418244
5	1.205547	0.367763	98.34735	1.284890
6	1.291791	0.733079	96.55932	2.707596
7	1.372506	1.232251	94.11074	4.657007
8	1.450443	1.852142	91.04260	7.105263
9	1.527597	2.571012	87.45988	9.969104
10	1.605406	3.368404	83.47142	13.16018
11	1.684853	4.219709	79.19848	16.58181
12	1.766569	5.101638	74.75931	20.13905

## V. Conclusion and Recommendations

This study examined the bank lending channel of monetary policy in Nigeria. We conclude that the bank lending channel operated as monetary policy transmission mechanism in Nigeria with the period under review as obtainable in international observed evidence, though with significant difference in variations due to the peculiarity of the Nigeria economy. We found that credit to private sector (loan supply) by the banking sector is determined largely by its own lagged value and behaviour indicating that suggesting that a lot of other factors are considered by the banks before the change their lending behavior. On the other hand, though variation in the maximum lending rate is mostly due to its own innovations, over a fifth of its change is determined by changes and variations in MPR. This supports the fact that banks in Nigeria also watch closely the movement of the monetary policy rate as one of the considerations for their own credit pricing in addition to other factors, particularly non-financing related cost

components (including infrastructural cost, personnel cost, other cost) to set their lending rate. By advancing the understanding of how the banking lending channel of the Nigerian banking system interacts with the monetary policy of the monetary authority, this paper seeks to help improve the nation's monetary policy formulation framework.

The outcome of this study indicates that for the bank's, a huge quantum of other factors are critical in their price (lending interest rate) fixing process other than just the monetary policy and inter-bank rate – primary cost of fund. Generally speaking, a tight monetary policy may not significantly influence the quantum and direction of credit, however the influence on pricing by commercial banks may move in same direction as the trend of movement in the monetary policy rate. Most importantly, this study has shown that the monetary authority and government need to examine closely other cost components considered by commercial banks in the pricing process. This will afford the authority opportunity to drive down the margin between the maximum lending rate and the monetary policy rate.



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