An Empirical Analysis of the Interaction between Monetary Policy and Commercial Bank Lending in Nigeria

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Abstract

In this study, we examined the transmission mechanism from policy instruments of the monetary authorities to real development objectives through credit availability in Nigeria. The study employed a Recursive SVAR using quarterly data (1986Q1 to 2019Q4) to capture the responses of target outcomes such as output (RGDP), prices (CPI) and credit to the private sector (CPS) to innovations in monetary policy instruments. The findings of the study show that it is difficult to adjudge a single monetary tool most effective in Nigeria, rather the effectiveness of each monetary policy tool depends on the economic problems it is intended to solve. Specifically, the results reveal that where the target of monetary policy is to maximally increase output and/or credit to the private sector, the use of money supply (M2) is advised as both variables respond most substantially to innovations in money supply. However, M2 is equally the most inflation-inducing. By contrast, while real exchange rate (RER) increases output and credit to the private sector (CPS) by almost as much as money supply does, its effect appears more sustained as well as has least effect on inflation. The use of policy interest rate, the MPR, is probably the weakest among the variables. The results of the pre and post banking consolidation periods show that the 2005 banking consolidation altered the responses of some target variables to innovations in some monetary policy instruments. Also, the study tried to empirically ascertain the presence of fiscal dominance and crowding out in Nigeria. Utilising the Error Correction Model (ECM), the study found no evidence of fiscal dominance and crowding out in Nigeria within the study period. Consequently, we discuss the implications of the findings with respect to the conduct of monetary policy in Nigeria, looking particularly at what needs to change and why.

I. Introduction

Two regimes broadly characterize monetary policy operation in Nigeria – the pre and post Structural Adjustment Program (SAP) regimes. The pre-Structural Adjustment Program (SAP) period (before 1986) was characterised by direct application of monetary policy instruments such as credit ceilings, selective credit controls, administered interest and exchange rates, prescription of cash reserve requirements and special deposits by Central Bank of Nigeria (CBN). During this period monetary policy transmission was largely direct, policies were pre-determined and regulation was tight. Interest rates were fixed at relatively low values to encourage investment growth while special deposits were allowed to reduce the amount of free reserves and to boost the credit creating ability of banks.

The post-SAP period was different and involved the use of indirect instruments. The deregulation of interest rates that accompanied introduction of SAP led to fluctuations in rates as banks were allowed to determine the cost of capital based on negotiations with customers. Meanwhile, to signal direction for commercial bank rates, the CBN varied the monetary policy rate (Minimum Rediscount Rate – MRR)[1] based on its reading of economic indices and the direction it intends to move them. Changes in MRR are structured to reflect either monetary contraction or expansion, guiding output through commercial bank lending (Chukwu, 2009). In addition, the CBN uses Open Market Operations, conducted on Treasury

[1] Minimum Rediscount Rate (MRR) was replaced with Monetary Policy Rate (MPR) in 2006.

Bills (TBs) and Repurchase Agreements (REPOs) to complement its use of the policy rate. Other instruments generally available to it include the reserve requirements, CBN securities and moral suasion ((Ajayi and Atanda, 2012; Chukwu, 2009; Okwo, Eze and Nwoha, 2012, Neaime, 2008). Under the post-SAP indirect regime, monetary policy instruments operate through transmission mechanisms where initial impacts are on the demand, supply and availability of credit. Focus channels include money supply, interest rate, security prices, and liquidity of commercial banks. When for instance, the Central Bank decides on contractionary/expansionary monetary policy, it raises/lowers the policy rate and subsequently decrease/increase volume of loan advancement and output. This discourages/encourages total bank lending.

The challenge with indirect transmission is that outcomes are not guaranteed. Particularly given that it works through incentives, the incentive for right behaviour must outweigh the incentive for wrong ones for operators in the industry. Alternatively, the sanctions for wrong behaviour must outweigh the incentives for wrong behaviour. Where either of these conditions are not met, the entire logic underpinning indirect transmission would crumble. For example, while the Central Bank can reduce the policy rate to increase liquidity, and therefore lending to the private sector, it does not follow that deposit money banks and other financial institutions would automatically invest the excess funds in private sector lending. For every fund, there is an alternative use. Where returns to investment in Government securities or any other guaranteed sector are higher than returns to lending to private businesses, financial operators may choose the former. For poor countries where the private sector faces challenging operating environment, the task of accessing funds from financial institutions become more uphill.

For many years in Nigeria, round-tripping of funds through foreign exchange purchase and resale was much more commercially viable than lending to the real sector with all the attendant risks. Loads of moral suasion by the Central Bank or other Government agencies could do nothing to change that. For a long time too, demand for credit by (especially sub-national) Governments has been so strident that it seemed to crowd out private sector credit. Under such circumstances, though the Central Bank relaxes its monetary policy to enhance the capacity of deposit money banks, the private sector continued to compete with Government on access to such additional liquidity. When any of such scenarios applies, the transmission channel for using monetary policy to alter economic decisions and improve long term real sector growth is aborted. As part of the efforts to strengthen banks to respond to the incentives set out by the Central Bank, the apex bank in July 2004 initiated a banking sector consolidation programme to strengthen the capital base of commercial banks in Nigeria. monetary policy implementation framework was also modified leading to the replacement of the MRR with the MPR as the anchor rate in 2006.

As crucial as monetary policy tools are to any economy, there has been a growing concern over the effectiveness of the indirect monetary policy tools especially among low income countries (LICs). Adams et al. (2019) suggest that monetary policy transmission mechanism may be weak and unrealistic in many low-income African countries. This concern is

heightened by Nigerian financial environment that appears weak, with inherent imperfection in goods and labour markets and sticky prices that combine to reduce pass-through of monetary policy innovations to prices. Thus, it is possible such innovations end up having little or no real effects on the economy (Chukwu, 2009). Thus, though monetary authorities are genuinely committed to the use of monetary policy tools to engender long term real sector development, they may not have been achieving the required results. And worse still, they may not also have been aware of this failure because the transmission from policy to effect is hardly measured. As with Nigeria, so it is with many other less developed countries of Africa, Asia and Latin America. It is, therefore, very important to explore the transmission of monetary policy to real economic outcomes. In particular, ascertaining the relative effectiveness of different monetary policy tools will also help reduce the ambiguity faced by the policymaker in identifying specific instruments for specific purposes. This is the motivation for this study.

There is preponderance of literature on monetary policy transmission mechanism in African countries (see, Adam et al., 2019; Mishra et al., 2012; Mishra and Montiel, 2013; Raghavan et al., 2011; Mbowe, 2016; Afrin, 2016, among others). A few of these such as Ogbonna and Uma (2014) and Anyawu et al. (2017) focused on Nigeria, but adopted atheoretical methods of analysis. Only Chukwu (2009) adopted a structural vector auto-regression and his study is at least a decade old. But in addition, none of these studies took on the transmission through deposit money banks nor did any particularly account for changes that might have arisen in the transmission mechanism on account of the 2004 consolidation programme.

The objective of this study is therefore to evaluate the transmission mechanism from policy instruments of the Central Bank to real sector development objectives through credit availability in Nigeria, taking into consideration the 2005 banking sector consolidation. The specific objectives of the study include:

1. Determine the effectiveness of monetary policy transmission from policy instruments to target outcomes like inflation and lending to the private sector.
2. Evaluate effect (if any) of the 2005 banking consolidation programme on monetary policy transmission in Nigeria.
3. Ascertain (if any) crowding out effect and presence of fiscal dominance in Nigerian economy.

II. Monetary Transmission Mechanism in Nigeria: Some Stylised Facts

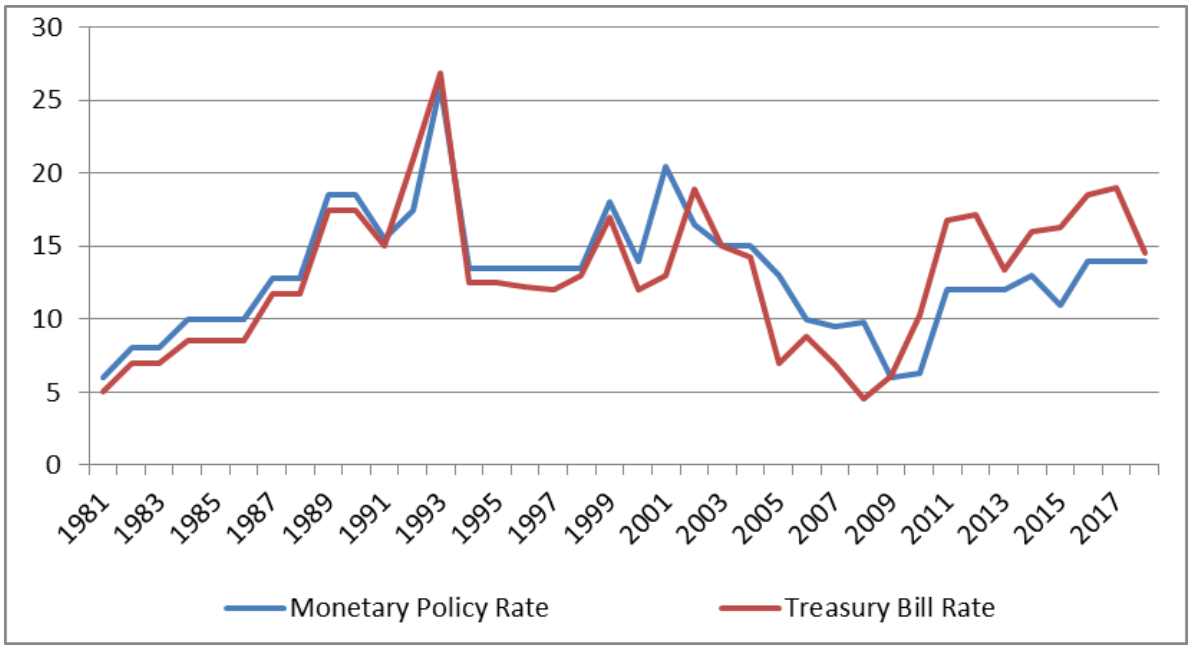
Prior to 1986, the Central Bank of Nigeria (CBN) operated direct monetary instruments such as credit ceilings, selective credit controls, administered interest and exchange rates, among other measures. During this period, interest rate was fixed at relatively low rate to encourage investment growth. In 1986, it deregulated interest and exchange rates as part of measures undertaken in the Structural Adjustment Programme (SAP), allowing commercial banks to determine deposit and lending rates while it focused on regulatory roles. But importantly too,

the Central Bank and other Monetary Authorities had to rely on incentivizing 'correct' behaviour on the part of Deposit Money Bank and other financial institutions through indirect instruments. Most instruments were designed and expected to affect operations of banks through their response to set incentives meant to get them to behave in particular desirable ways. However, it is not clear that the policy instruments have had expected effects on financial institutions. The deregulation period was characterized by rapid fluctuations in both MRR and other interest rates. Following the banking consolidation, the CBN continuously reduced the monetary policy rate from 15 per cent in 2004 to 9.25 per cent in 2010. The MPR also replaced the MRR as the policy rate in 2006. A range of other reforms were introduced with intent at stabilizing both short and long-term interest rates as well as exchange rates. A few stylized facts can be gleaned from the engagement of monetary policy instruments and the outcomes they have had over the last 34 years. We outline some of these underneath:

1. Engagement of Monetary Policy Rate as a tool for managing prices has had mixed outcomes. The Central Bank's deregulation of the interest rate system is based on the understanding that there should be transmission of changes in the policy rate through the market mechanism to the commercial bank rates and that this should lead to increase in credit. But outcomes of changes in policy instruments have not been consistent. Between 2011 and 2013, the CBN reduced MPR to 12 per cent but the maximum lending rate rose marginally over the same time. Meanwhile, in 2014, it tightened its policy stance by increasing the MPR to 13 per cent to guard against uptick in inflation rate emanating from overflow spending towards the 2015 national elections. The measure appeared helpful in that inflation rate reduced from 12.24 per cent to 8.52 per cent and remained at single digit till 2015. The MPR was equally stable at 14 per cent between 2016 and 2018, but inflation rose from 9.01 per cent in 2015 to 16.55 per cent in 2017. Overall, then it appears a number of other factors affect the potency of the MPR in influencing aggregate prices at each particular time.

2. Though the goal of monetary policy has been to encourage credit to the private sector, the management of different rates to incentivize this has not been consistent. For example, Monetary Policy Rate has trended together, and at very close values, to Treasury Bills rate. As shown in Figure 1, returns to Government financial instruments like the TB rate and expected returns from private investment (mirrored by the policy rate) have been close to each other. In an environment where power failure, infrastructure deficit, rudimentary technology, instability in government policies are just a few of several factors that further tax returns to private investment, risks to funding private investment are sometimes too high. Thus, even with the best intentions, real sector outcomes may not mirror monetary policy intentions.

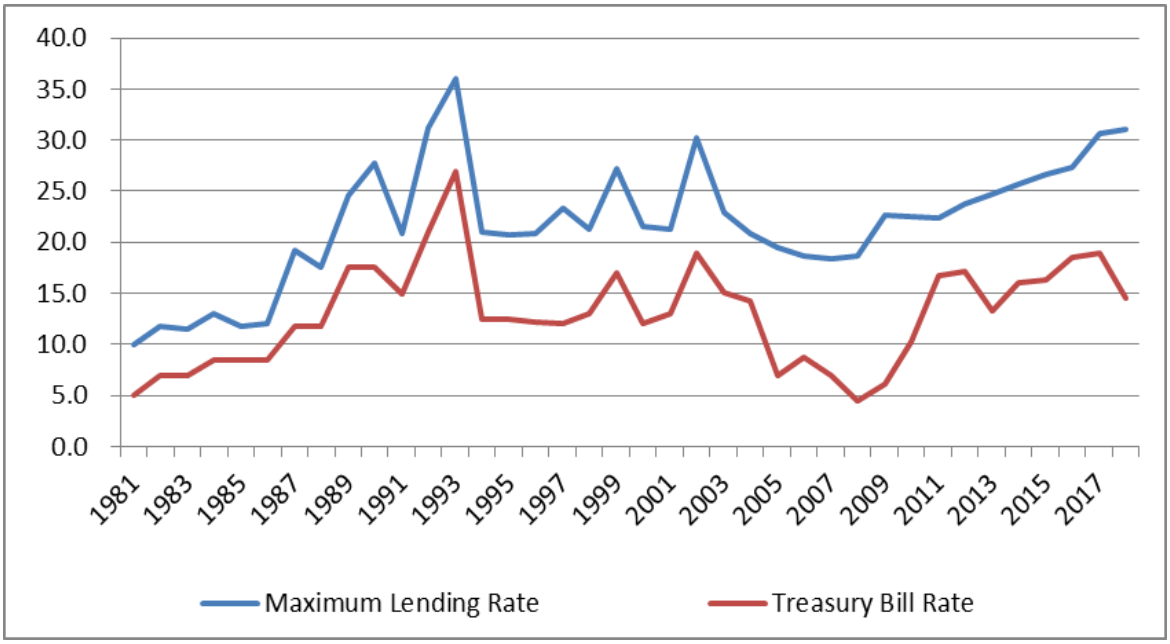
Figure 1: Trend of Monetary Policy Rate and Treasury Bill Rate (1981-2018)



Source: CBN Statistical Bulletin

3. The elephant in the room is fiscal dominance. A major concern deducible from item 3 above is the role of fiscal policy instruments on monetary policy in Nigeria. While monetary policy is supposed to complement fiscal policy, the latter has posed a key challenge to the former. Revenue for all tiers of Government in the country is mainly from oil receipts, which depend on an international market that is outside the control of policymakers in the country. By contrast, expenditure items are many, varied and across many tiers. But worse is that fiscal policy in the country is bedevilled by a range of challenges, including budget indiscipline, poor accounting, high debt, incoherent expenditure patterns and other institutional and process hiccups. Consequently, the Government is persistently under pressure to meet its obligations, often introducing distortions into the economy. The Central Bank, in a bid to control the challenge from fiscal policy, consistently appear to fire-fight, either mopping up excess liquidity or pushing out resources on ad hoc basis to combat illiquidity. In part then, government treasury bills rate regularly competes with lending rates as shown in Figure 2

Figure 2: Trend of Treasury Bills Rate and Maximum Lending Rate (1981-2018)



Source: Data Sourced from CBN Statistical Bulletin

4. There are co-movements between credit to the private sector and Treasury Bills rate, but it cannot be ascertained that such co-movements translate to causality. For example, between 2009 and 2011 Treasury Bills rate rose from 6.13 per cent to 16.8 per cent. Within the same period credit to private sector fell from N102.47 billion to N97.34 billion. What is known from the literature, however, is that rise in Treasury Bills rate could shift preference of commercial banks away from advancing loans to the private sector to investing in Treasury Bills. And this appears to be the case in Nigeria, but it needs to be proven.

5. The Banking Consolidation of 2004 seems to have had some effect on credit to the private sector relative to credit to the public sector. Total credit to the public sector has moved closely to credit to the private sector. Following the consolidation in 2004, credit to the private sector significantly outstripped credit to the public sector as banks began to provide margin facilities for purchase of shares and other trading activities. However, following the focus of the Bank on risk management, credit to the private sector stagnated while credit to the public sector shot up again.

Table 1: Trend of Credit to Private Sector and Credit to Public Sector (1981-2018)

Year	Credit to Private Sector (N' Bn)	Credit to Public Sector (N'Bn)
1995	12.65	1.65
1996	13.37	2.85
1997	16.76	2.23
1998	17.13	2.43
1999	18.24	8.07

2000	18.21	9.81
2001	23.76	7.30
2002	23.78	12.39
2003	26.14	9.50
2004	28.74	12.81
2005	30.94	11.53
2006	31.96	14.99
2007	47.72	26.64
2008	81.32	21.94
2009	102.47	24.06
2010	101.57	27.48
2011	97.34	33.56
2012	122.42	24.23
2013	124.33	34.29
2014	129.20	34.64
2015	136.92	38.01
2016	141.12	36.97
2017	133.07	136.27
2018	123.06	100.90

Source: CBN Statistical Bulletin, Various Issues

6. The effect of sentiments by Monetary Authorities can be very important, probably as important as the effect of instruments, on outcomes of monetary policy. While the consolidation was a major success, the Administration that came after Soludo inherited or found itself in the midst of the challenges emanating from the 2008 financial crises. The Governor, Mallam Sanusi, applied some rules which led to clamping down on Managing Directors of some banks like Union Bank, Intercontinental Bank, Oceanic Bank, Afribank and Finbank. The atmosphere created by these actions was that of fear and a general sense of insecurity in the financial system. This led to stagnation in growth of credit to the private sector, which has been spurred away from its historical trends by the consolidation exercise. By 2017, as shown in table 1, credit to the public sector has once again caught up with credit to the private sector.

III. Theoretical Literature

a. Neo-Keynesian Theory

Neo-Keynesian theory adopted the classical assumption of exogeneity of monetary base but maintains that money multiplier is endogenous conditional on banks and non-bank portfolio management (Palley, 2001). The neo-Keynesian theory differentiates between outside money supply and inside money supply. According to him, the inside money supply depends both on the volume of high-powered money and the size of multiplier. As such, the elasticity of the inside money largely lies on the sensitivity of the money multiplier to interest while the size of money multiplier depends negatively on the magnitude of reserve requirement. By

implication, higher reserve requirement implies that banks will have to keep larger proportion of their deposit and as such lend out less than they ought to have lent out (Palley, 2017)

b. Post Keynesian Structuralist Theory

Post Keynesian structuralist theory is anchored on the endogeneity of money supply. It holds that money supply is determined endogenously which gives prominent to bank lending activities (Pollin, 1991). The theory argues that monetary supply process begins with bank credit and given that the commercial banks try to maximize profits affects the way they respond to changes in the market. As such, commercial banks try to respond to monetary policy changes by revising their portfolio of assets and liabilities in line with the changes (Palley, 2001). The theory provides a micro-founded theory of the endogenous money supply used in deriving the LM schedule for an endogenous money supply in an economy. A major feature of the endogenous money LM schedule is that it can be positively or negatively sloped depending on the relative income elasticities of commercial banks' loan demand and money demand (Palley, 2017). However, following the post-Keynesian view, Palley (2001) and Misati, Nyamongo and Kamau (2011) proposed the use of a Monti-Klein profit maximization model where the objective of commercial banks is profit maximization conditional on bank's balance sheet.

c. Theory of Multiple Lending

The theory predicts a greater use of multiple-bank lending when banks have lower equity, firms are less profitable and monitoring costs high. It further predicts that the attractiveness of sharing lending decreases with the amount of banks' equity and firms' prior profitability, while it increases with the cost of monitoring. According to von Thadden (2004), sharing lending avoids the expropriation of informational rents and improves firms' incentives to make proper investment choices. Multiple-bank lending helps with the soft-budget-constraint problems in that it enables banks not to extend their insufficient credit further thus reducing firms' strategic defaults (Dewatripont and Maskin, 2005). According to the theory, greater diversification improves banks' monitoring incentives, as it reduces the variance of the return of their portfolios and allows banks to be residual claimants of any additional marginal benefit of monitoring (Carletti et al, 2007).

d. Credit Market Theory

Credit Market theory holds that if collateral and other restrictions remain constant, that it is only the bank lending rate that will determine the amount of credit the banking sector will be able to dispense. Also, given fixed supply of credit, increasing demand for credit will lead to increase in interest rate. It therefore means that any additional risk to a project that is funded by the bank should be reflected through a risk premium which is also added to the lending rate in order to match the risk of default (Amano, 2014). The theory postulates a positive relationship between the borrower default probability and the interest rate charged on the loan and advance implying that the higher the borrower's failure risks, the higher the interest premium Ewert et al (2000).

IV. Empirical Literature

A good number of studies have been conducted around monetary policy transmission both in developed and developing countries, among the literatures identified, it was observed that changes in monetary policy causes bank loan supply schedules to shift. Obviously, banks' sensitivity to monetary policy shocks determines how much loan deposit money banks (DMBs) can give to the private sectors. The work by Abuka, Alinda, Minoiu, Peydro and Presbitero (2019) using the Ugandan economy as a case of a developing economy, the authors proxied the effect of monetary policy with the changes in short time interest rates (7-day interbank rate) while allowing the effect of monetary policy to vary with bank capital and liquidity. They used the time fixed effect to capture all macroeconomic factors that change simultaneously with policy rates while the bank and firm fixed effect was used to control for unobserved bank and firm characteristics. Their finding showed that a tightening of the monetary policy will cause a reduction in the supply of bank credit to firms, as better capitalised banks transmit changes in monetary policy significantly less than lower capitalised banks as such banks tend to further invest in government securities at the expense of new lending firm, and this "crowding out" effect seem common in developing countries.

Similarly, Chileshe (2017) traced the bank-specific factor on loan supply response to monetary policy shock as well as if the level of bank competition affects the bank lending channel in any way. The results of the study showed that there is an existence of a bank lending channel in the country. It further revealed that there exists a negative correlation between loan supply and monetary policy rate in Zambia. The finding also showed that while bank size has negative impact on credit supply, liquidity and market power enhance credit supply and capitalization does not have impact on credit supply. Earlier study by Kishan and Opiela (2000) argued that disparate adjustments in short-term market interest rates which is possibly associated with market frictions is the main channel through which monetary policy affects bank profitability and their motivation to reallocate portfolios including their loan supply.

In a study by Akinci et al. (2013) they found that monetary policy influenced Turkish bank lending between 1991 and 2007 through the money and bank lending channels. Their result show that bank characteristics that play important role are bank capital and three-way interaction term of interest rate with lagged liquidity and lagged capital. Similarly, Apergis and Alevizopoulou (2012) investigated how the operation of the bank lending channel changes when short-term interest rate is allowed to be endogenously determined by the target rate the central bank sets through a monetary rule. According to them, the central banks' decision for the target rate which is primarily influenced by expectations concerning inflation and output affects private sector's expectations by distorting the loan supply from the commercial banks in the European banking institutions. Robert (2014) also looked at short term interest rate in the money market compared to the movements in share valuation in the capital market in the Euro area. His findings showed that despite the fact that Europe is a bank based financial system, the stock market plays more role in the lending decision and allocation of resources in Europe.

In addition to monetary policy shocks, monetary policy innovations seem to affect both real activity and prices within the domestic economy of advanced or emerging economies, Mishra, Montiel and Spilimbergo (2012) argued that this assertion would not hold for low-income countries as the financial structure of such countries is fundamentally different from that of advanced and emerging economies in any case. Due to the size of the economy, formal financial system tends to be small making Banks the dominant formal financial intermediaries in such countries. Chuku (2009) in a study on the Nigerian economy showed that monetary policy innovations on money supply has a modest impact on the output and price with speed that could be regarded as being very high, however, Chuku could not capture transmissions through the deposit money banks (DMBs) which is considered the major player in the financial market in the case of Nigeria. With focus on monetary transmission in LICs, Mishra, Montiel and Spilimbergo (2012) argued that due to imperfect competition in the banking sector coupled with weak institutional framework, have the effect of increasing the cost of bank lending to private firms as banks maintain very high excess reserves and invest in domestic public bond or in foreign bonds when possible, and by extension, the bank lending channels become impaired.

Researchers have also tried to analyse the impact of monetary policy on loan granting through the bank balance sheet. Jiménez et. al. (2012) investigated the relationship and their finding suggest that the negative effect of positive changes in the short-term interest rate on the probability that a loan application is granted is stronger for banks with low capital or liquidity than stronger ones. According to them, the estimated effects are sizeable, however they argued that the total impact on bank lending could be even larger if banks are not quick to react to changes in monetary conditions, for instance. The estimates strongly suggest that the bank balance-sheet channel of monetary policy is very potent in monetary policy transmission. Mahathanaseth and Tauer (2018) Also used the bank balance sheet data to capture bank behaviour in their investigation of the bank lending channel in the transmission of monetary policy in Thailand. Based on their estimates, the pass-through differentials among retail interest rates followed an increase in the policy rate and it translates to high cost of loan relative to the return on loans, this motivate banks to contract their lending. Small banks show a greater degree of loan contraction than large banks because large banks are better able to fund continued lending through debt issuance. Like the European study, the Thai economy relies on bank loans, their findings therefore suggest that the bank lending channel is an important conduit for the transmission of monetary policy in Thailand

Conscious of the different scenarios/regimes within the financial sector of an economy, for instance, sometimes banks held excess reserves and at other times they do not, Saxegaard (2006) compared the effects of monetary policy innovations in Nigeria, Uganda and the CEMAC countries under the two possible regimes. His investigation showed evidence that monetary policy innovations had weak effects on the aggregate demand indicators under both regimes in the CEMAC countries, it equally found monetary policy shocks have weaker effects on output and inflation in Nigeria and Uganda in the excess-reserve regime, suggesting that the central bank had little leverage on bank behavior under these circumstances. In another study in Nigeria, Abdulrasheed and Etudaiye-Muhtar (2010) showed that monetary policy on banks consolidation which resulted in increased capital base

of commercial banks led to both an increase in loans and advances and profit after tax. The finding means that Nigerian banks did not feel any bank capital shock, rather a positive monetary policy shock.

Similarly, the study by Olivero et al. (2011) which investigated the connection between monetary policy innovation on bank consolidation in the financial sector and transmission channels of the policy in eighteen Asian and Latin American economies, they found that the consolidation activities make bank lending channel less potent and by extension, the monetary policy transmission mechanism becomes less effective. Gabriel et al. (2012) on the Spanish economy showed that monetary policy on commercial banks' balance sheet is very potent, though this impact according to them, on bank lending could be larger if banks react slowly to changes in monetary policy innovations and economic conditions. They went on to advice that in the event of crisis, monetary policy rates should be used to support credit supply to the private sector.

Sometimes banks tend to ration the credit to the private sector, the periods of credit rationing are periods of uncertainty following economic shocks which indicates that banks exercise caution in their lending behaviour and are risk averse in an environment of uncertainty, Craigwell and Kaidou-Jeffrey (2010), assessed total and sectoral commercial bank lending behaviour in an environment of credit rationing and non-credit rationing in Barbados over the period 1974 to 2009. Three periods of credit rationing were examined and the finding showed that credit rationing was prevalent in all but one of the sectors investigated. Djiogap and Ngomsi, (2012) in a multivariate test of cross-countries differences in the bank lending decisions reveals that smaller banks, less capitalized banks, banks with low levels of long term funding sources, banks with higher nonperforming loans and operate in recession environment are more averse to lend long term loans to the private sector.

Available literatures have also shown that government borrowing can crowd out banks credit to the private sector. Fayed (2012) studied the economy of Egypt and found that there is a statistically significant negative effect of government borrowing on private credit and the crowding out is more than one to one. The study also found that government borrowing is not the sole reason behind crowding out private credit. The increase in banks' holding of securities and treasury bills also reflects banks' preference to invest excess liquidity in a low risk high return investment.

V. Methodology

a. Theoretical Framework

The methodology for this study is based on Monti-Klein theory which places emphasis on commercial banks active role in money supply process in a given economy. Following Benerjee et al (2012) this study derives the Monti-Klein theoretical framework as follows:

First, assume that there are N banks, indexed $n = 1, \ldots, N$, that are using the same technology to hold deposits, D_n, for the households and supply loans, L_n, to borrowers, who from the perspective of banks are homogenous.

If we assumed that there is only one type of deposit and loans for the moment, then the banks face downwards sloping demand for loans and an upward sloping for supply of deposits. As such in this simplest scenario the bank could use deposits to fund loans, and also generate profits by creating a distinction between loan and deposit rates, but can as well borrows or lend on an interbank market (the latter representing any other use of funds).

Therefore, if interbank loans, M_n ,is considered, then quantity for each bank becomes:

$$D_n = L_n + M_n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (3.1)$$

If the supply of deposit is taken as $D(r_D)$ and the demand for loans is represented as $L(r_L)$. This can be written inversely as $rr_D(D)$ and $rr_L(L)$. Given this, the profit of the n^{th} bank becomes:

$$\pi_n = \left(rr_L(L_n + \sum_{0 \neq n} L_0^*)L_n + mrM_n - rr_D(D_n + \sum_{0 \neq n} D_0^*)D_n - C(D_n, L_n) \right) ....(3.2)$$

where:

L_0^* =the optimal loan volume of all other banks

D_0^* = the optimal deposits of all other banks

mr = the market rate of interest on interbank loans

$C(D_n, L_n)$ = the cost of administration of banking services.

As such, the unique Cournot equilibrium will have optimal bank loans and deposits for each bank as:

$$L_n^* = L^* / N \text{ and } D_n^* = D^* / N ....(3.3)$$

Monti-Klein is unique in that it can also be adapted for macro studies. Palley (2001) shows the possibility of tinkering with the model specification of the LM schedule while keeping endogenous money within the old Keynesian macro IS-LM framework to arrive at Monti-Klein macro model. This implies explicitly modelling the credit market. The tractable macro model wherein the IS schedule is replaced by commodities and credit as well as embeds equilibrium in both the goods and credit markets was provided by Bernanke and Blinder (1988). The argument is that they relied on the “black box” of the money and loan multipliers in order to endogenize the money supply and develop the model. The model is therefore derived as thus:

$$D = (i_B, y) = m_D(i_B)R \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

$$L\left(\overset{+}{i}_L, \overset{+}{i}_B, \overset{+}{y}\right) = m_L\left(\overset{+}{i}_L, \overset{+}{i}_B\right) D\left(\overset{-}{i}_B, \overset{+}{y}\right) (1-k) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

where:

$D(.)$ = the demand for bank deposits

$L(.)$ = the demand for loans

m_D = the money multiplier

m_L = the loan multiplier

R = the money base

i_B = the bond interest rate

i_L = the loan interest rate

k = the reserve requirement ratio.

Equation (3.4) refers to the money market equilibrium while equation (3.5) is the credit market equilibrium. Therefore, substituting equation (3.4) into equation (3.5) yields:

$$L(.) = m_L(.)m_D R(1-k) \quad \ldots\ldots (3.6)$$

Equation (3.6) implies that amount of bank lending is therefore determined by multiplicative interaction of the loan and money multipliers. By this, a rise in interest rates will in turn raise both multipliers as well as the quantity of bank liabilities and assets. On the other hand, increased loan demand is taken care of by increase in interest rates, which in turn increases the loan and money multipliers, as such allowing financial intermediaries to meet increased loan demand.

b. The Model

Several studies (Palley (2001); Mbowe (2017); Misati, Nyamongo and Kamau (2011); etc) have followed Monti-Klein theory because of its emphasis on the active role of deposit money banks in monetary transmission. Mbowe (2017) for instance used bank-level data to characterize the effects of monetary policy on commercial banks' lending. There are also many other studies that used Structural VAR approach to estimate the effects of monetary policy transmission such as Sims (1986), Bernanke (1986), Blanchard (1989), and Bernanke and Blinder (1992) whose approaches focus on finding identification assumptions based on sound economic theories.

As such, following the approach earlier developed by Sims (1980), refined by Christiano et al. (1999) and also adopted by Chukwu (2009), the study adopts Structural Vector Autoregressive (SVAR) approach with a recursively orthogonalized identifying restriction with underlying economic assumptions.

The model for our study is therefore stated thus:

$$AY_t = B_0 + B_1 Y_{t-1} + \ \ldots \ + B_k Y_{t-k} + \mathrm{v}_t \ldots\ldots\ldots\ldots\ldots\ldots \ldots (3.7)$$

where:

Y_t = vector of policy and non-policy variables

A = vector of structural parameters of the endogenous variables

B_{t-k} = vector of coefficients of the endogenous variables

B_0 = vector of constants

v_t = vector of white noise process where $E(v_t) = 0$ and $E(v_t v') = \sum_v$ The variance-covariance matrix ($\sum_v$) is constant and diagonal

k = the number of lags

The challenge with equation 3.7 is that given that the vector of coefficients are unknown and the variables have contemporaneous effects on each other as such it becomes quite impossible to identify the model and determine the actual values of the parameters. To this effect, equation 3.7 is further transformed into a reduced form VAR to facilitate estimation of the parameters in the model as well as identification of monetary policy innovations through specification about variable ordering. The reduced form VAR is therefore stated as:

$$Y_t = B_0 + B_1 Y_{t-1} + \ \ldots \ + B_k Y_{t-k} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots \ldots (3.8)$$

The choice of the approach is guided by the assumption that in Nigeria, monetary authorities cannot observe shocks on output, prices and credit to private sector in the same period. This inadvertently imposes a recursive restriction on the disturbances of SVAR necessary in generating impulse response functions capable of tracing the impact of monetary policy shocks on the target outcomes (real output, prices and credit to private sector).

Also, the study adopts as a benchmark the five variable SVARs model built by Chukwu (2009) for Nigerian economy which was broadly categorised in two bock recursive ways, namely non-policy variables (GDP, CPI) and policy variables (M_2, MRR, REER). Y_t was therefore defined as:

$$Y_t = \left(GDP,\ CPI,\ M_2,\ MRR,\ REER\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.9)$$

where:

GDP = Gross Domestic Product

CPI = Consumer Price Index

M_2 = Money Supply

MRR = Minimum Rediscount Rate

$REER$ = Real Effective Exchange Rate

And Y_t is as defined above

The study therefore extends the model to seven variable SVAR to include deposit money banks credit to private sector (CPS). Deposit money banks' credit to private sector (CPS) is introduced because of its importance as a channel of transmission mechanism, In the case of Nigerian economy, it is expected that given a contractionary monetary policy, say increase in reserve ratio (RR), interest rates are expected to rise. The rise in interest rate is expected to decrease bank reserves and deposit, which in turn is expected to reduce the deposit money banks' credit to private sector and this will impact negatively output level. Another angle to this is that given a contractionary monetary policy, say increase in monetary policy rate (MPR), deposit banks' lending rates would rise. Increase in deposit money banks' lending rates is expected to discourage investors from borrowing which in turn would reduce output level.

As such the recursive blocks for this study are categorized into two, as:

$$\left(RGDP,\ CPS,\ CPI\right)\ldots \textit{ for the non}-\textit{policy block } \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \left(3.10\right)$$

$$\left(M_2,\ MPR,\ RER\right)\ldots \textit{ for the policy } \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \left(3.11\right)$$

While the recursive model for this study is stated thus:

$$Y_t = \left(RGDP,\ CPS, CPI,\ \mathrm{M}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \left(3.12\right)$$

Where M is monetary policy instruments or the policy block and are introduced individually into the model in order to also ascertain the effectiveness of the instruments in the case of Nigeria[2].

As stated above the major identification restrictions for this study follow recursive structure assumption. This implies that monetary policy blocks are orthogonal to the information set of the monetary authority and correspond to the notion that the economic variables are also determined in a block recursive way (Raghavan, et al. 2011). To this effect, the non-policy variables are determined first, then followed by policy variables.

The variables are therefore ordered as stated above such that non-policy variables enter first before the policy variables in the manner that reflect their respective likely degree of endogeneity. Specifically, for non-policy recursive block, $RGDP$ enters first, then CPS,

[2] MPR replaces MRR in the policy recursive block since it was replaced with MPR in 2006.

before CPI. The justification for $RGDP$ entering first is predicated on the economic reality peculiar to the Nigerian economy. For Nigerian economy it is assumed that among all the variables of interest in this study RGDP adjusts most sluggishly. On the other hand, CPI enters last in the nonpolicy block because in the case of Nigeria prices are relatively flexible and as such adjust faster. $RGDP$ was introduced into the model to capture Nigeria's real economic activity; Consumer Price Index (CPI) reflects nominal price changes in the economy; Money Supply (M_2) enters as a quantity based monetary policy variable; Monetary Policy Rate (MPR) and Real Exchange Rate (RER)[3] serve as a price based monetary policy variable; while deposit money banks' credit to private CPS captures the credit channel of Nigerian economy.

Objective two of this study was addressed by independently evaluating monetary policy shocks before and after the banking consolidation of 2005. Bacchiocchi and Fanelli (2012) provided two ways of investigating identification issues that arise in SVARs whenever a structural break that occurs at a known date affect both the reduced form unconditional covariance matrix of the reduced form VAR disturbances and the structural parameters. Option A (or strategy A) treats the SVARs before and after the break as independent models characterized by independent identification rules, while option B treats the SVARs before and after the break as a model capable of identifying its shocks in one solution. As such, following Bacchiocchi and Fanelli (2012) this study adopted option A (or strategy A) to address objective two with pre banking consolidation period covering 1986Q1 to 2004Q4 while post banking consolidation period covers 2005Q1 to 2019Q4.

Objectives one and two of this study relied on impulse response function (IRF) to ascertain the actual shocks of monetary policy instruments given Nigeria's prevailing economic environment. However, the theoretical derivations as well as that of SVAR and reduced form VAR are not stated in this study (see Sims (1980) and Christiano et al. (1999) for full derivation).

The last objective will be addressed with Error Correction Model (ECM). This approach is considered because of its ability to capture linear interdependencies among multiple time series. Ahead of the ECM estimation, co-integration tests will be conducted.

To ascertain variables with potential crowding out effect on commercial banks' lending, the commercial banks' lending is therefore proxied as credit to private sector (CPS). The estimable equation is therefore stated below:

$$\triangle CPS_t = \delta_0 + \delta_1 \triangle TBR_{t-1} + \delta_2 \triangle M2_{t-1} + \delta_3 \triangle CPUS_{t-1} + \delta_4 \triangle FDEF_{t-1} + \delta_5 \triangle DOD_{t-1} + \delta_6 \triangle GDP_{t-1} + \delta_7 ECM_{t-1} + \omega_t \quad (3.13)$$

Where:
BMG = Growth of Monetary Base

[3] REER also represents pass through channel.

TBR = Treasury Bills Rate
M2 = Money Supply
CPUS = Credit to Public Sector
FDEF = Fiscal deficit
DOD= Domestic Debt
GDP= Gross domestic product.
ECM = Error Correction Term

Also, to ascertain the existence of fiscal dominance (if any) in Nigeria, equation (3.13) is modified to introduce other relevant variables such as the growth of monetary base and Inflation rate. Therefore, the estimable equation for fiscal dominance is stated thus:

$$\triangle BMG_t = \delta_0 + \delta_1 \triangle TBR_{t-1} + \delta_2 \triangle INF_{t-1} + \delta_3 \triangle FDEF_{t-1} + \delta_4 \triangle DOD_{t-1} + \delta_5 \triangle GDP_{t-1} + \delta_6 ECM_{t-1} + \omega_t \quad (3.14)$$

where:
BMG = Growth of Monetary Base
INF = Inflation Rate

For proper scaling and ease of results interpretation, Gross Domestic Product (GDP), Money Supply (M_2), Deposit money banks' credit to private sector (*CPS*) were log transformed.

c. Scope and Sources of Data

The study employed quarterly data covering the period $1986Q_1$ to $2019Q_4$, marking the deregulation of interest rates period in Nigeria where interest rates were determined by forces of demand and supply. The set of quarterly data for this study consist of Real GDP; Consumer Price Index (CPI) reflecting nominal price changes; Money Supply (M_2) which shall reflect quantity based monetary policy; Monetary Policy Rate (MPR), Real Exchange Rate (REER), which represent price based monetary policy variable; deposit money banks' credit to private sectors (CPS) reflecting credit channel. The study also utilized other variables such as Fiscal Deficit (FDEF), Growth of Monetary Base (BMG), Treasury Bills Rate (TBR), Credit to Public Sector (CPUS), Domestic Debt (DOD), and Inflation Rate (INF).

The data were sourced from Central Bank of Nigeria because very many of the datasets outlined to be used study are not published online on quarterly basis. The team therefore contacted and worked closely with officials of the Statistics Department of the Central Bank of Nigeria for access to such data. Efforts were particularly made to keep sources of data limited to one reliable source (the Central Bank of Nigeria) for consistencies in units of measurement as well as to ensure that results of the study are not unduly affected by variations in data owing to diversity of sources.

VI. Empirical Analysis

a. Unit Root Test

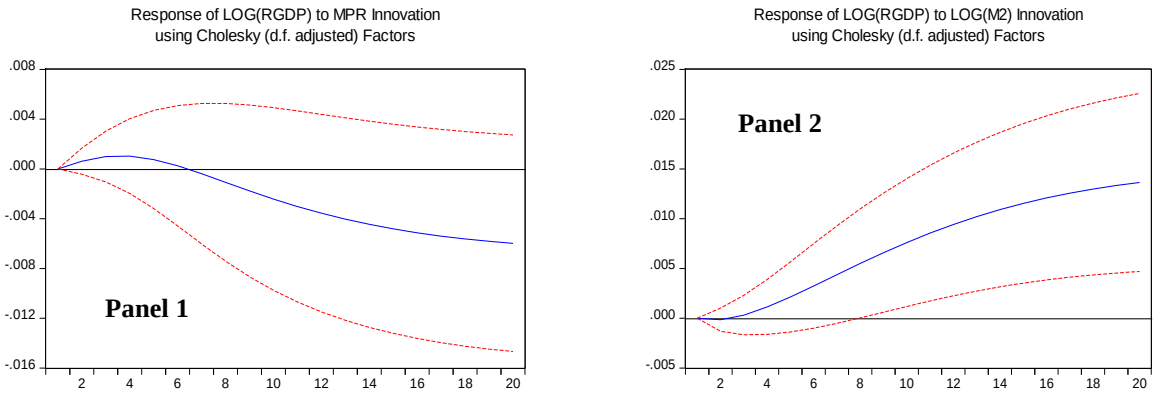
As is the case with time series data, unit root test was conducted to ascertain the time series properties of the data that were used for the study. Although there are a number of methods used to test for stationarity and the presence of unit roots, the study employed the Augmented Dickey-Fuller (ADF) tests. The unit root results of all the variables used for all the estimations in this study are presented in Appendix Table 1. As indicated in the Appendix table, all the variables of interest for this study were found to be stationary at first difference I(1). This is important as it informed our incorporation of the variables into the estimable equations as I(1).

For fiscal dominance and crowding out effect estimations, the tests for stationarity and the subsequent finding that all the explanatory variables are of the same order of integration with the dependent variables (BMG and CPS respectively) necessitated cointegration tests ahead of further analyses. Accordingly, the study went on to test for cointegration and, thereafter, estimation of Error Correction Model (ECM).

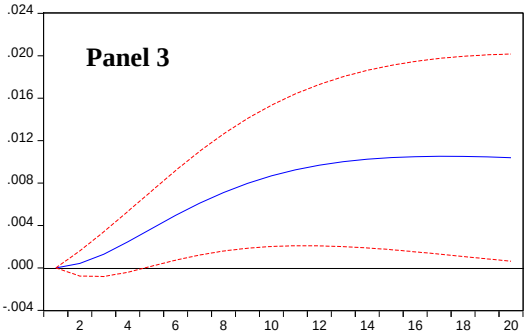
b. Effects of Innovations in Monetary Policy Variables on Credit to Private Sector, Prices and Output

A popular approach to analysis of the effectiveness of monetary policy transmission from policy instruments to target outcomes is to rely on the path of the impulse response functions generated from the recursive Structural Vector Autoregression (SVAR) estimations. Impulse response functions reveal the responses of target outcomes associated with innovations in the monetary policy tools.

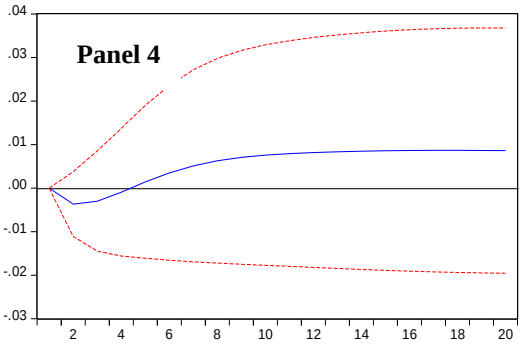
Figure 3: Responses of Target Variables to Innovations in Monetary Policy Variables



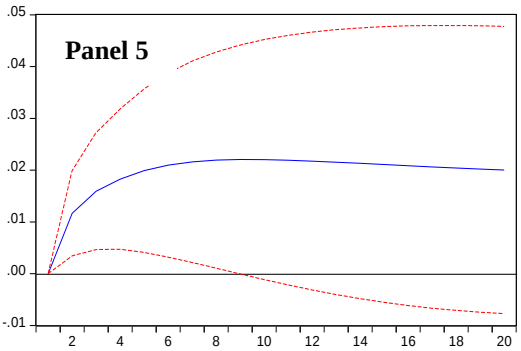
Response of LOG(RGDP) to LOG(RER) Innovation
using Cholesky (d.f. adjusted) Factors



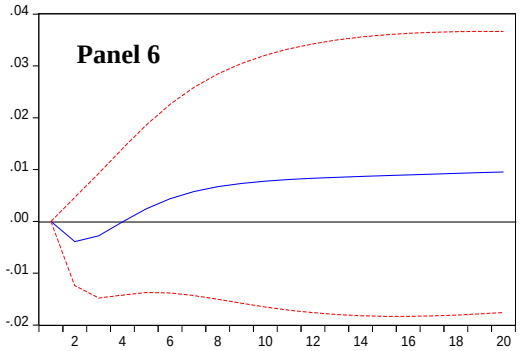
Response of LOG(CPI) to MPR Innovation
using Cholesky (d.f. adjusted) Factors



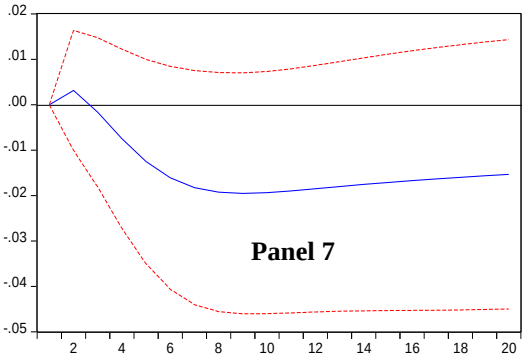
Response of LOG(CPI) to LOG(M2) Innovation
using Cholesky (d.f. adjusted) Factors



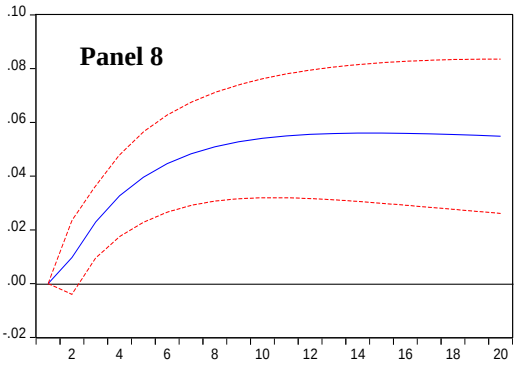
Response of LOG(CPI) to LOG(RER) Innovation
using Cholesky (d.f. adjusted) Factors



Response of LOG(CPS) to MPR Innovation
using Cholesky (d.f. adjusted) Factors



Response of LOG(CPS) to LOG(M2) Innovation
using Cholesky (d.f. adjusted) Factors



Response of LOG(CPS) to LOG(RER) Innovation
using Cholesky (d.f. adjusted) Factors

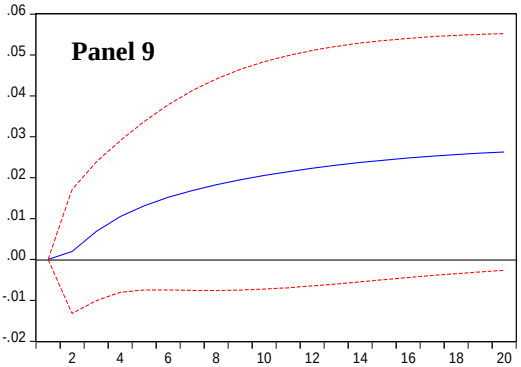


Figure 3 presents the responses of target outcomes (output, prices and credit to private sector) given a one standard deviation shock or innovation in respective monetary policy variables in Nigeria over a period of 20 quarters. The panels show that the estimated effects (the solid lines) appropriately fall within the 95% confidence interval (the dotted lines) which characterizes good estimates.

Panels 1, 2 and 3 depict the responses of real output to shocks in monetary variable tools. Specifically, panel 1 shows the response of real GDP to a one standard deviation shock to monetary policy rate (MPR) in Nigeria. It reveals that a contractionary monetary policy, say increase in monetary policy rate causes real GDP to slightly rise up to third quarter and thereafter falls continuously over the periods. By the 7^{th} quarter, the change becomes negative and the fall continues, though reducing in slope up till the 20^{th} quarter. A reduction of the monetary policy rate will have the opposite effect. This agrees with economic expectation since increase in MPR is expected to lead to increase in deposit money banks' lending rates. The major consequence of lending rates increase is usually discouragement of borrowing by investors as a response to the high cost of borrowing. Output falls with the fall in investment. In Nigeria, a key constraint to investment that have been harped on for a very long time is the very high interest rate. Double digit interest rates are very common with banks charging as much as 28 percent for loanable funds. Several factors including but not limited to supply constraints, infrastructure deficits, insecurity of investments, default risks, among several others have been (and continue to be) blamed for this interest rate anomaly. Yet, one can argue that it is difficult to imagine a more important rationale for the high interest rates than the fact that Central Bank's policy rate stands at over 10 percent on a continuing basis[4]. The Central Bank itself argues that it anchors its own policy rate on inflation rate i.e. it does not want to set interest rates that are below inflation rate so that it will remain profitable to loan funds. This appears to curiously make the determination of the rate of inflation exogenous and outside the realm of the CBN. Yet this has far-reaching effects given that when the Central Bank takes inflation rate as given and anchors its policy interest rate on that, the real sector is left to bear all the risks.

On the other hand, it was discovered as seen in panel 2 that a positive shock in money supply leads to sluggish response in real GDP up to the third quarter before a continuous and sustained increase over the rest of the period. Again, this aligns with a priori expectation because an increase in money supply (M2) is expected to increase loanable funds as well as reduce the cost of borrowing. This leads to increase in investment which will in turn leads to increase in output (real GDP). However, and expectedly, real sector response is a bit sluggish. This is not unexpected, nor is it peculiar to Nigeria. The interface between monetary policy and real sector output depends on the efficiency of financial intermediaries. Even where these are at their very best, there could still be significant lag in time between the initiation of a policy move and actual investment and growth. In the case of Nigeria and other developing countries with environments that have myriad other constraints to investment, such lag time could be significantly longer.

4. The Central Bank of Nigeria is reported to have slashed its monetary policy rate by 100 bps to 11.5% during its September 2020 meeting, bringing borrowing costs to the lowest since 2016.

The response of real GDP to a one standard deviation shock in real exchange rate (RER) is somewhat similar to response to a shock emanating from M2. A one standard deviation shock (say via depreciation of the real exchange rate) brought about a steady increase in real GDP up to the 12th quarter. Thereafter, though the effect remains positive, the rate of increase slows down and the curve flattens. Also, this is consistent with apriori expectation especially for a small open economy such as Nigeria with many trading partners.

Panels 4, 5 and 6 focus on responses of prices (represented by the consumer price index – CPI) to innovations in monetary variables. The result as presented in panel 4 shows that a shock in monetary policy rate, say an increase in MPR, causes prices to fall sharply first (up to the third quarter) and thereafter starts rising, stabilizing at around quarter 8 and flattening for the remaining period. This, however disagrees with apriori expectation. Ideally, an increase in monetary policy rate (MPR) is expected to operate through the credit markets (i.e. increase in lending rate) to bring about fall in consumer price index (CPI). In fact, MPR is usually adopted as a monetary tool in curbing inflation in an economy. However, the results show that the reverse is the case in Nigerian economy and this supports the likely existence of price puzzle in the country. The finding is consistent with those of Raghavan, et al (2011) who using recursive SVAR found presence of price puzzle in Malaysian economy.

In panel 5, it was found that a one standard deviation shock in money supply (M2), i.e. an increase in money supply leads to a sharp increase in prices (CPI) within the first 3 quarters. Afterwards, the rate of increase is much lower up to quarter 7 and then the slope stabilizes. By the 12th quarter, the response begins to decline, but very gradually. By implication, the overall effect of a rise in money supply is very fast, but then fizzles out over time. Again, the quick response of prices reflects the fact that prices are relatively flexible in the Nigerian economy as has been established by previous studies. In other words, the sticky price assumption of the Keynesian LM-IS model does not apply for Nigeria. This corroborates the findings of Chukwu (2009) that an increase in money supply instantly leads to sustained increase in prices.

Panel 6 presents the response of prices (CPI) given a positive shock or innovation in real exchange rate (RER). It was discovered that real exchange rate depreciation causes prices to fall quickly and then start rising, stabilizing after quarter eight. This is consistent with economic expectation since RER depreciation is expected to lead to readjustments in major economic fundamentals that might increase domestic output, but have tendency to also lead to increase in prices. In effect, the increased prices are output-driven.

Panels 7, 8 and 9 consider the response of credit to private sector (CPS) to a positive shock in monetary policy variables in Nigeria. Panel 7 shows the interaction between monetary policy rate (MPR) and deposit money banks' credit to private sector (CPS). It shows that one standard shock (increase in MPR) causes credit to private sector to rise quickly and starts falling in Nigeria. Increase in the monetary policy rate is expected to cause lending rates to rise and eventually results to fall in credit to private sector since most investors will be discouraged from borrowing at high cost. While this is consistent with apriori expectation, it

is somewhat not reflective of findings of a few other works conducted on other African countries. For example, Chileshe (2017), working on Zambia found negative correlation between loan supply and policy rate. This is an indication of the varying influences that may be at work in these economies. For example, the Nigerian banking consolidation structurally affected the capitalization of banks in Nigeria, and this clearly affected their response to lending to the private sector on account of minor changes in the monetary policy rate. The same may not be said to apply to banks in other African countries that may not have gone through the same restructuring programme.

Panel 8 shows that a positive shock (increase in monetary policy rate) results to increase in credit to private sector (CPS). The monetary authorities usually reflect the economy when the need arises in which case it may choose to increase money supply (M2) in conducting expansionary policy. They operate through the deposit money banks or credit markets to bring about increase in CPS since increase in M2 implies increase in loanable funds of deposit money banks.

Similarly, the response of credit to private sector (CPS) to an innovation in real exchange rate (RER) is captured in panel 9. It was found that in Nigeria, depreciation of the real exchange rate leads to a sustained increase in credit to private sector (CPS). This is consistent with the understanding that RER depreciation increases domestic competitiveness and production, directly increasing the local demand for credit as producers/investors borrow to expand productive capacity. The increase in CPS is initially sharp, up to the 6^{th} quarter before gradually slowing down. However, it continues to rise over the rest of the period (up to quarter 20) as captured in Panel 9.

What does all the above imply in terms of the relative effectiveness of the different monetary policy tools? The effectiveness of each monetary policy tool depends on the economic problem it is intended or designed to solve, and this is neither invariant to time nor target outcome variable. The analysis thus far has focused on three potential outcomes – output, prices and credit to the private sector. Where the target of monetary policy is to maximally increase output and/or credit to the private sector, the use of money supply is advised as both variables respond most substantially to innovations in money supply. However, of the three instruments examined, money supply is equally the most inflation-inducing. By contrast, while RER increases output and credit to the private sector by almost as much as money supply does, its effect appears more sustained (rising for much longer periods particularly in the case of credit to the private sector). It equally has the least effect on inflation, implying ability to deliver rise in both output and credit to the private sector while keeping inflation within acceptable limits. The use of policy interest rate, the MPR, is probably the weakest among the variables. Even though it equally delivers a relatively low inflation rate, this comes at the cost of directly slowing down output growth and credit to the private sector over time. A little over a decade ago, Chuku (2009) working on Nigeria, also noted the large influence of money supply on the outcome variables relative to the other two and came to the conclusion that money supply is the most effective instrument of monetary policy. But we think this is a simplistic conclusion given that it is difficult to generalize over the effectiveness of a policy instrument without comparative analysis of its impact on the

different target variables, particularly given that these target variables do not have a common denominator. For policy purposes, effectiveness of an instrument is in maximizing the positives while minimizing the negatives. As the panels show, money supply maximizes both output and credit to the private sector, both of which are desirables. However, it also maximizes inflation, which is non-desirable. By contrast, RER maximizes both desirables and has the least effect on inflation. So, it actually yields the best combination of outcomes.

c. Effects of Banking Consolidation Programme on Monetary Policy Transmission in Nigeria

In 2005, Central Bank of Nigeria embarked on consolidation of banking sector targeted at achieving more efficient and sound financial system in Nigeria. Under the programme, emphasis was laid on recapitalization of the banks, and the minimum capital base allowable for a bank operating in the country was raised from N2 billion to N25 billion. As a result, 89 deposit money banks (DMBs) that were in operation before the policy were reduced to only 25 at the expiration of the deadline given for the consolidation exercise. Most of the reduction in number occurred through mergers and acquisitions, with Zenith Bank Plc being the only bank that neither merged with nor acquired other banks. Ideally, a reform of this nature and magnitude is expected to cause a change in the monetary policy transmission mechanism. As one of the expected outcomes of the policy, it is expected that monetary policy transmission would be more effective and seamless given that deviant behaviours (like margin trading, foreign exchange round-tripping, concentration of short term loans) would be reduced while banks' ability to extend credit for heavy infrastructure and real sector productive activities would increase substantially.

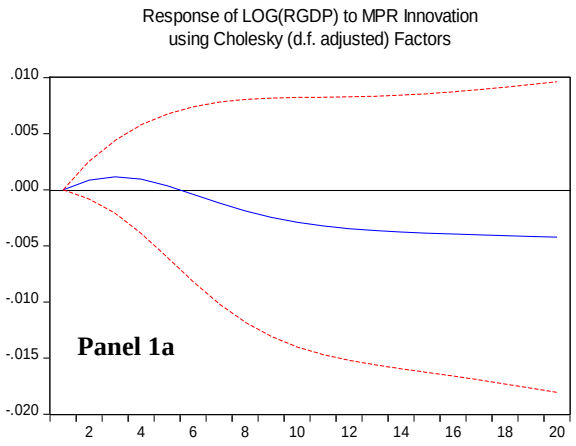
This study therefore intends to ascertain the possible impacts of the consolidation exercise on the relative effectiveness of monetary policy tools (MPR, M2 and RER) on target outcomes (GDP, CPI and credit to the private sector) in Nigeria. In other words, did the implementation of the consolidation exercise and the consequent changes it brought into the Nigerian financial sector enhance the ability of the policy tools in leading to the target outcomes. Set out in figure 4 below are the comparative impulse response results of target variables pre-consolidation (1986 – 2005) and post-consolidation (2006 – 2019) given an innovation on monetary policy variables.

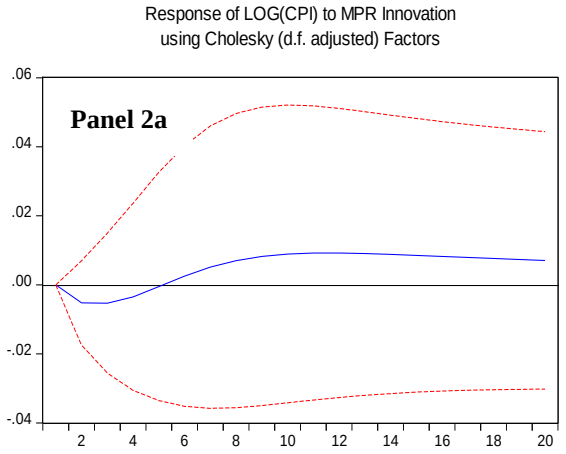
Panels 1a to 3b present the responses of target variables to a standard shock in the monetary policy rate.

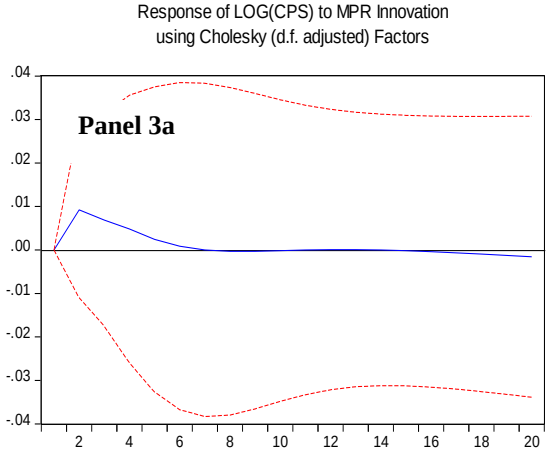
Figure 4: Responses of Pre and Post Consolidation Target Variables to Innovations in Monetary Policy Instruments

Responses of Target Variables to Monetary Policy Rate (MPR)

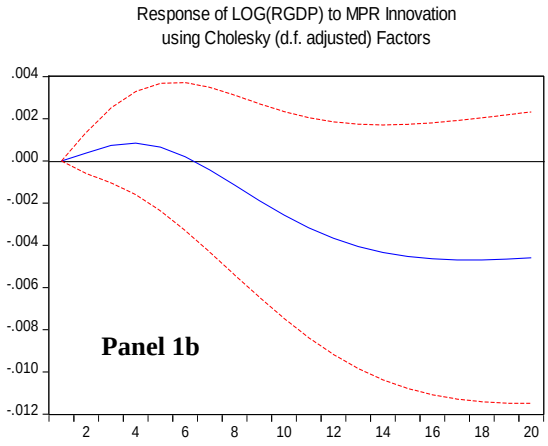
Pre-Banking Consolidation

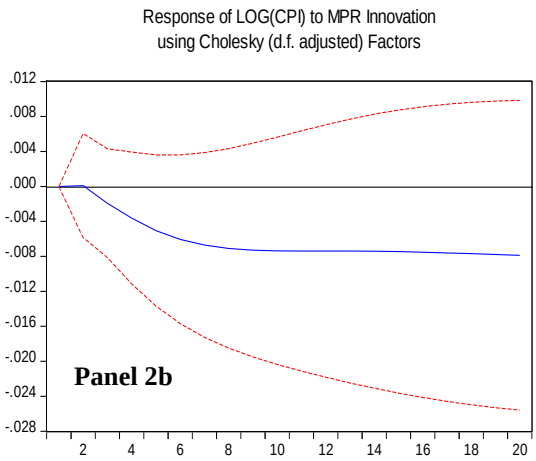


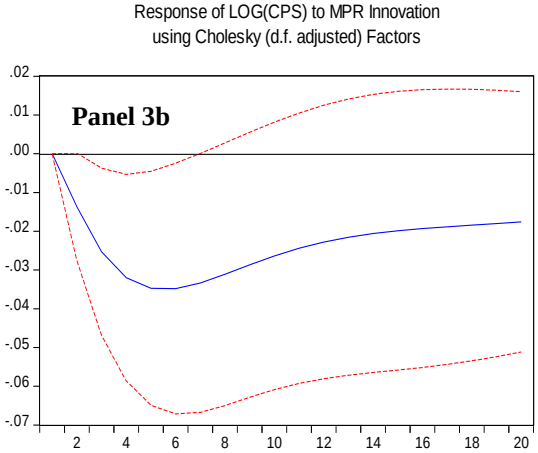




Post Banking Consolidation







A look at the panels results reveal that given a positive shock in monetary policy rate (MPR), banking sector consolidation led to changes in responses of two target variables, prices (CPI)

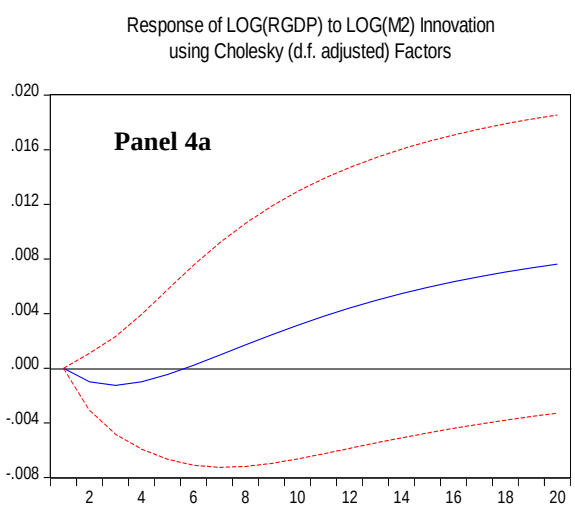
and credit to private sector (CPS). Before consolidation, the response of prices to an increase in MPR is positive. Consumer prices fell for up to the 3rd quarter and rose afterwards to be positive by the 5th quarter and remained positive the rest of the period (Panel 2a). This is not only inconsistent with a priori expectation, it smacks of price puzzle, as explained in Section. Following the consolidation though (Panel 2b), the impact of changes in the monetary policy rate on CPI became decidedly and expectedly negative, consistent with apriori expectation. By implication, the consolidation exercise led to more compactness and robustness in the banking sector, which in turn ensured more effective transmission of changes in monetary policy rate on prices. This could have been as a result of increased adherence of deposit money banks (DMBs) and other financial institutions to policy guidelines by the Monetary Policy Committee. Of course, with less number and more homogenous banks in operation, this is easier to monitor. The banking consolidation was complemented by the introduction of Monetary Policy Rate (MPR) about the same time (2006) to replace the erstwhile Minimum Rediscount Rate (MRR) as the monetary policy anchor. This followed the thinking (and possibly evidence) at the time that the latter had inadvertently become docile and ineffective as a monetary policy instrument. In effect, the consolidation reforms were reinforced by reactivation of an interest rate anchor. The result was that policy pronouncements that used to dissipate within an amorphous, difficult-to-monitor financial system became more focused, better monitored and consequently more impactful. The policy rate which used then to yield the exact opposite of intended results became more effective in delivering expected outcomes. This is also a testament of the fact that the price puzzle obtained in the earlier analysis of the impact of MPR on prices in the previous section (…) was the result of the overwhelming impact of the operating environment (captured in the data) prior to 2005 when the banking sector was a lot more fragmented and disorganised. A corollary is that the effect of monetary policy instruments, particularly that of monetary policy rate, largely depends on the structure of the financial system. This, of course, has been attested to by diverse studies in the past (see Gomez-Gonzalez et. al. 2020; …). yielding monetary policy rate began to have effect in the determination of prices.

We see the same difference in effect of MPR on deposit money banks' credit to the private sector between the pre and post-consolidation eras. Panels 3a and 3b show the response of credit to the private sector on one standard deviation innovation on monetary policy rate. Again, Panel 3a shows how ineffective the minimum rediscount rate (MRR – which was the monetary policy anchor pre-2006) was. An increase in MRR seemed to make no difference either positively or negatively on credit to the private sector. With the exception of initial (but minor) spike in credit up to the 2nd quarter, which in itself is counter-intuitive, the rest of the period was simply flat at zero. Bank lending was completely non-responsive to changes in the Central Bank's rate. By contrast, panel 3b shows that the post-banking consolidation era, backed by the introduction of MPR, led to appropriate response of credit to the private sector. A positive shock in MPR resulted to a consistent fall in CPS till quarter six before a partial recovery over the remaining period, with the overall effect remaining negative all through the period. The flipside, of course, is that a decrease in MPR will increase private sector access to credit and investors' borrowing as deposit money banks reduce their lending rate. Thus, both in direction and magnitude, the response of credit meets expectation and gives the

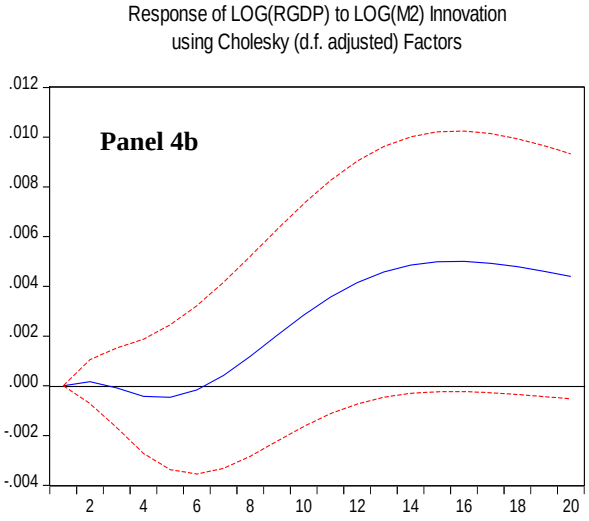
policymaker the confidence that, all things being equal, tweaking policy interest rate has the capacity to define (or at least affect), not only the direction, but equally the magnitude of credit that could be advanced to the private sector. It is possible to argue that since both the banking consolidation and change from MRR to MPR took place at about the same time (the former in 2005 and the latter in 2006), it would therefore be difficult to attribute cause to any one of the two variables over and above the other. But this is not the case. Clearly, one cannot discount the effect of improved expectations emanating from a move from an interest rate policy which the Central Bank itself admitted was not doing the required job to one that was more commonly accepted as a policy instrument. However, other factors were obviously at play. For example, confidence in the Central Bank and the banking industry increased tremendously post-consolidation as the banking industry changed from being oligopolistic (where two or three banks out of the 89 or so that were operational) controlled more than 50% of both assets and deposits in the system to being fairly competitive. There was reduced room for unorthodox financial and/or or profit-yielding activities by banks. Importantly too, more funds became available for banks to extend to potential borrowers, and individual bank's disadvantage was reduced to the barest. The perennial challenge of bank failure, which scared depositors and led to high volume of transactions outside the banking system, disappeared, making it possible for the banking sector to have more control over financial outcomes. But importantly too, it was a lot earlier for the Central Bank to monitor compliance among 25 banks than among 89. The outcome was improved policy transmission as in Panel 2b above.

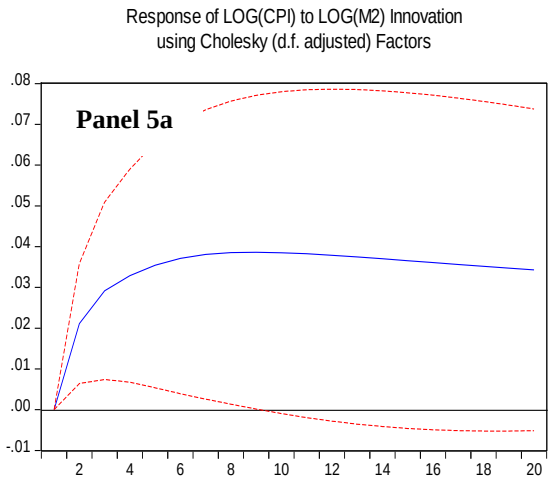
Responses of Target Variables to Money Supply (M2)

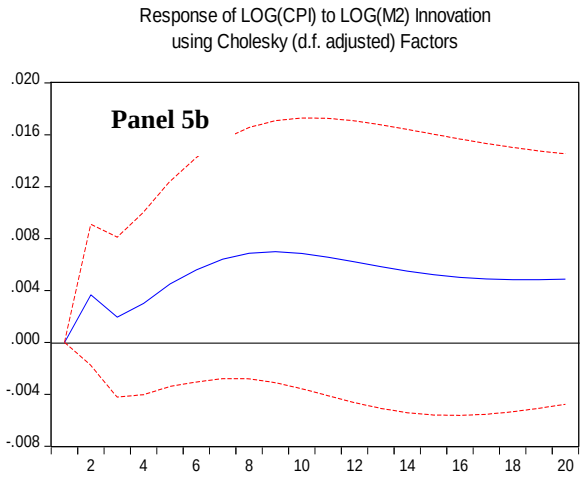
Pre-Banking Consolidation

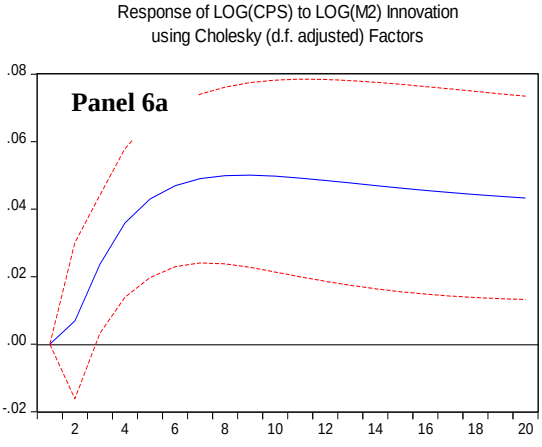


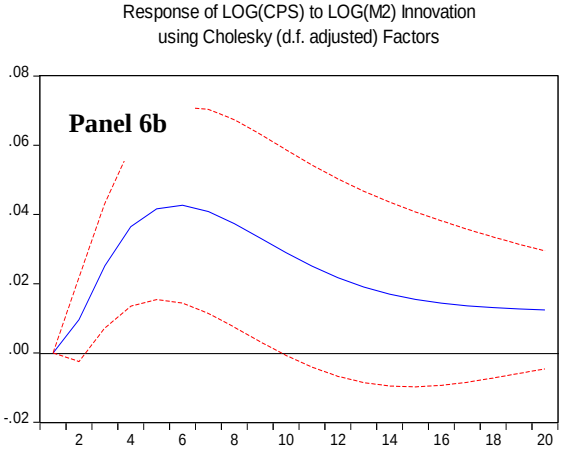
Post Banking Consolidation











The story is slightly different in regard to the effects of money supply (M2) on the target variables pre and post consolidation. Panels 4a to 6b present the responses of real output, prices and credit to private sector to positive shock in M2. About all of the target variables responded in similar direction and consistent with apriori expectation to innovation in money supply (M2) for both periods. There are minor variations in magnitude of impact across all three outcome variables though.

In Panels 4a and 4b, the positive impact of M2 on GDP is accentuated post consolidation. The initial dip in response of output to shock in M2 pre-consolidation (Panel 4a) was slightly smaller post-consolidation. Recovery to positive values seemed to appear about the same time (quarter 6) in both periods as well. The other difference lies in the slope of the curves. While pre-consolidation, the increase in output is slower and consistent throughout the 20quarter period covered by the figure, it is sharper and declines faster post-consolidation.

Likewise, in Panels 5a and 5b, the inflationary impact of M2 innovation is moderated post consolidation relative to pre-consolidation. In panel 5a showing the pre-consolidation era, the rise in prices following a shock on M2 is very rapid and steady and persists till quarter 6 and thereafter flattens. However, in panel 5b (post consolidation) similar shock brought about an irregular rise (particularly between quarters 1 and 3) that is significantly more gradual and less in magnitude up to quarter 8, and reducing afterwards. Again, these responses largely

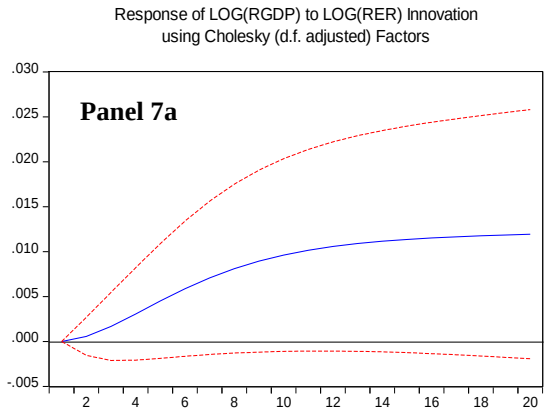
align with apriori expectation as increase in money supply is expected to increase inflation rate.

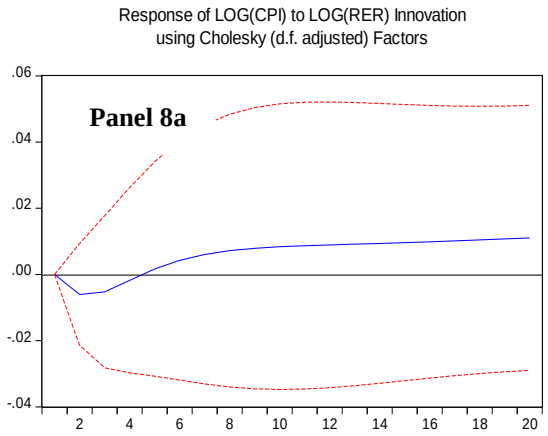
Panels 6a and 6b capture responses of credit to private sector to increase in money supply before and after the banking reform. As the figure shows, a positive shock in money supply resulted to significant increase till quarter six for both periods before flattening. However, the spike in response appears to dwindle faster post consolidation than was the case pre-consolidation. The increase pre consolidation is higher and appear to last longer than the increase post consolidation.

The key message from the above is that the consolidation did not so much affect the impact of the money supply channel of monetary policy as much it did the interest rate channel. Here again we see the moderating effects of a more robust, balanced banking sector in the transmission of monetary policy instruments to the rest of the economy post consolidation.

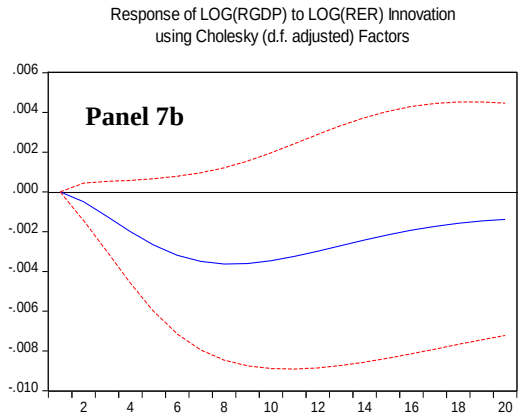
Responses of Target Variables to Real Effective Exchange Rate (RER)

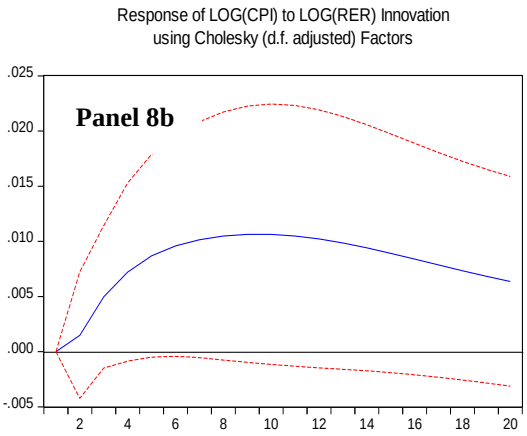
Pre-Banking Consolidation

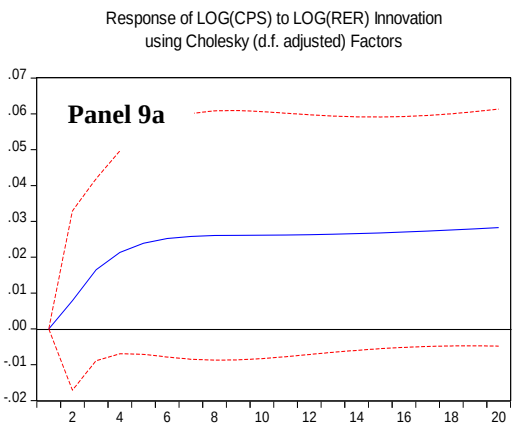


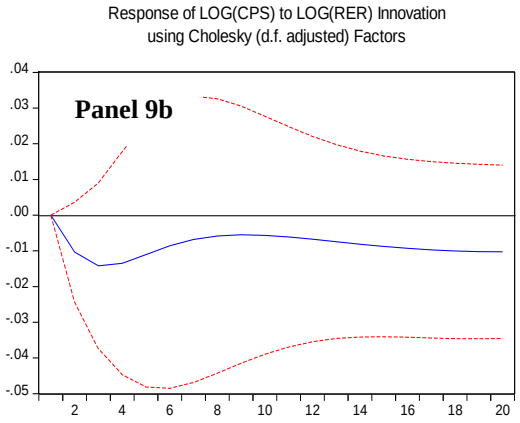


Post Banking Consolidation









We come to the impact of real exchange rate. Panels 7a to 9b depict the responses of the same three outcome variables (GDP, CPI and CPS) to one standard deviation shock in real exchange rate (RER), in this case real exchange rate depreciation before and after the banking consolidation in Nigeria. Here we begin again to have variegated, and somewhat interesting, outcomes. Panels 7a and 7b show the responses of real output to an innovation in RER and the responses in the two periods appear to be in opposite direction. While a shock in RER resulted to a gradual but steady increase in real output in Panel 7a, it led to a fall in real output in Panel 7b. The fall in real output post consolidation went up to quarter eight before reversing. In effect, while the response of output before consolidation appears to be consistent with the apriori expectation of boosting domestic competitiveness and therefore real output, the post-consolidation response is counter-intuitive.

Panels 8a and 8b describe the behaviour of prices (CPI) in two periods given a positive shock to real exchange rate. No such counter-intuitive outcome as seen in output occurred in the effect of real exchange rate on prices. However, the magnitude of response differed significantly between the two regimes. Panel 8a shows that prices initially fell to negative and rebounded to zero by the fourth quarter. Afterwards, it remained positive but flat. However, in Panel 8b similar innovation resulted to rise in prices up to the 10^{th} quarter before gradually falling for the remaining periods. Both the magnitude and relative slopes of the response of prices to RER shock differed between the pre- and post-consolidation periods. Broadly considered, both responses are in sync with apriori expectations as real exchange rate depreciation is expected to increase domestic competitiveness and demand and therefore, pressure on prices.

The responses of credit to private sector to a positive shock on real exchange rate (RER) both in pre and post-banking reform are presented in panels 9a and 9b above. In panel 9a, an innovation in RER causes credit to private sector to increase up to quarter six before flattening throughout the remaining periods of pre banking consolidation. On the other hand, in post consolidation, a positive shock (depreciation) resulted to a quick fall in CPS into negative (i.e. a decrease) up to quarter four, a gradual rise up to quarter ten and then another gradual fall. All the while remaining negative. Here again, the structure of the banking industry and its response to such policy moves play vital roles. For example, the above evidence implies that the banks were able to extend credit to the private sector as the economy's competitiveness improved with RER depreciation pre-consolidation. However,

when the same conditions applied post-consolidation, deposit money banks' credit to the private sector actually shrank. Of course, the latter is, again, counter-intuitive.

From the above, there are no questions regarding the impact of RER innovations on prices, pre or post consolidation; the impact remained positive and consistent with economic theory. However, RER innovations present challenges for both output and credit to the private sector. Both variables, contrary to standard economic postulations, dipped on account of depreciation of the exchange rate. It appears that the banking sector consolidation fundamentally changed some important relationships in the economy affecting the implications of RER depreciation on these two variables. The results indicate either of two possibilities. The first possibility can be captured with Baldwin's famous statement regarding WTO's efforts at reforming and liberalizing world trade through tariff reduction. According to him, "[t]he lowering of tariffs has, in effect, been like draining a swamp. The lower water level has revealed all the snags and stumps of non-tariff barriers that still have to be cleared away" (Baldwin, 2000). It is possible Nigeria's banking sector consolidation acted like clearing the 'banking sector swamp' which now revealed greater underlying 'macroeconomic stumps' that need to be cleared in the economy. This could be the reason why it is no longer just policy interest rate (MPR) or even money supply that are generating price puzzles, but RER which is an indicator of broader macroeconomic health, that is now raising puzzles in gross output and credit allocation. Frankly, it is possible to think of the MPR puzzle noted earlier pre-consolidation to be an indicator of a deeper tax on financial transactions that belied much greater macroeconomic challenges facing the country. Consequently, the moment it was handled, the deeper and more widespread economic challenge showed up.

The second possibility is that these 'macroeconomic stumps' emanate from sources altogether different from the ones that gave rise to the financial sector reforms. In which case, they are connected to a range of institutional bottlenecks, macroeconomic failures and external sector imbalances which may or may not have had much to do with the banking consolidation exercise itself. In the literature, possibility of 'contractionary depreciation hypothesis' as it is often termed, (see Bernanke, Gertler, and Gilchrist, 1999) states that a real depreciation causes an increase in net exports, but an even larger decrease in investment, and therefore, a fall in output. This arises when a country's debt and other liabilities are denominated in foreign currency while firm revenues are mostly denominated in local currency. Under such circumstances, depreciation increases the domestic currency value of liabilities and the debt service burden, leading to adverse effect on firm balance sheet position. Given that financial frictions are quite probable, deterioration in the balance sheet causes an increase in external finance premium and, therefore, decrease in investment. However, there is the possibility that net exports obtained from the original foreign investments would outweigh the possible negative effect of depreciation on investment. But where this fails to happen, a real exchange rate depreciation will lead to an undesirable output contraction. Melandery (2009) tested for this in Mexico and found that net exports expansions counteracted the balance sheet contractions but that a real depreciation has inflationary effects.

The view that a strategic and well managed depreciation (or even devaluation) will improve income and trade balance and potentially increase prices is widely accepted. However, over time, there have been less agreement over the overall effect on output and employment, particularly in developing countries. Krugman and Taylor (1978) synthesized some of the initial hints to the effect that output and employment may suffer negatively in the face of depreciation. But they still held, alongside others, the view that the substitution effects from a real exchange rate devaluation were likely to outweigh negative real balance and negative income distribution effects to yield expansion in output and employment. A major contribution of their work though is the formalization of several channels of output and employment contraction relevant to developing countries.

Back to Nigeria. Prior to 2004, the economy had a largely unhealthy external balance position; high external debts interlaced with high capital account deficits. However, the debts were mostly owed by the public sector but had much impact on infrastructure and social sector investments which in turn affected private sector growth. In 2004, the debts were paid off through deals with the Paris Club group of creditors wherein 40 percent were paid and the other 60 percent written off under specified terms of utilization by the Government usage conditions. Shortly afterwards, the economy a sustained period of growth. Banking sector consolidation followed shortly after in 2005, driven by private sector investments. In the rush to meet the consolidation deadline, capital solicitations through IPOs, rights issues, mergers, loans and recapitalization reached fever-pitch. Private sector exposure to foreign capital grew. Then came the 2008 global economic crisis. Nigeria was particularly hit partly because of its high exposure, not just to foreign capital, but to highly volatile foreign capital. A number of banks had high levels of toxic assets and huge liabilities that came from poor judgements during the time of growth. Unfortunately, the Central Bank's handling of the aftermath of that crisis did not quite encourage the banking sector to continue its role of advancing credit. A number of commercial bank Chief Executives were investigated, relieved, or even jailed, on account of loans and advances that occurred during the bubbles that preceded 2008. Subsequently, the banking sector became a lot more cautious with issuing credit to the private sector. Equally, in recent years, the Government has accumulated a sizable chunk of debt again. On the whole, the economic environment between 2005 and 2019 has been such as to prove conducive for contractionary depreciation.

d. Models for Fiscal Dominance and Crowding Out Effect

The results of the Error Correction Model (ECM) employed to empirically ascertain the presence or otherwise of fiscal dominance and crowding out effect in Nigeria are presented in table 2 and 3 below:

Table 2: Results of ECM Model for Fiscal Dominance

Dependent Variable: Growth of Monetary Base (BMG)		
Variables	**Coefficient**	**Prob. Value**
D(INF)	-0.846252	0.0010
D(FDEF)	0.498059	0.7073
DLOG(DOD)	24.65946	0.3678
D(TBR)	0.799666	0.2660
DLOG(GDP)	1.331101	0.5457
ECM(-1)	**-0.875115**	**0.0000**

First, unit root test was conducted to ascertain the stationarity of the data used for the study. The results of the test show that all the variables are stationary at first difference, as such they were introduced into the model at that level of difference. It is also important to note that the study adopted Engel Granger test for cointegration. Diagnostic test shows that the results are free from both serial correlation (Prob. value of Obs*R-square =0.3012) and heteroskedasticity (Prob. value of Obs*R-square =0.5787).

The results show that a unit change in fiscal deficit would have resulted to about 0.49 increase in the growth of monetary base (BMG), however this was found not to be statistically significant. Also, domestic debt (DOD) has a positive relationship with the growth of monetary base but not statistically significant. Another variable of interest is treasury bill rate which is found to be positively related and statistically insignificant. By and large, all the variables relevant for ascertaining fiscal dominance in Nigeria were found to be statistically insignificant within the study periods. It is therefore safe to conclude that within the study periods, there is no evidence of fiscal dominance in Nigeria. This finding is consistent with the finding of Afolabi, et al (2018) who using VECM method of analysis found no fiscal dominance in Nigeria. The implication is that the recurring and increasing deficit in Nigeria are usually financed by borrowing (as seen in the rising debt profile of the country) rather than money creation. In other words, fiscal deficit is usually financed by the fiscal authorities using fiscal instruments and not necessarily by the monetary authorities.

Inflation rate happens to be the only variable having significant impact on the growth of monetary base (BMG). This is not unexpected. The result shows that a unit increase in the rate of inflation in Nigeria will reduce the growth of monetary base by 0.84. The results also show high speed of adjustment. The ECM coefficient of -0.87 is statistically significant.

Table 3: Results of ECM Model for Crowding Out

Dependent Variable: Credit to Private Sector DLOG(CPS)		
Variables	**Coefficient**	**Prob. Value**
D(TBR)	-0.003420	0.2790
DLOG(M2)	0.528415	0.0000
D(CPUS)	-0.010515	0.3493
D(FDEF)	-0.004338	0.4645
DLOG(DOD)	0.378613	0.0083
DLOG(GDP)	0.004957	0.6113
ECM(-1)	**-0.263024**	**0.0000**

Using Breusch-Godfrey Serial Correlation LM Test and with Prob Value of Obs*R-squared = 0.1694 the results are found to be free from serial correlation. Also, the Breusch-Pagan-Godfrey test for heteroskedasticity having Prob. value of Obs*R-squared of 0.0740 indicates that the estimation results are without heteroskedasticity at 5% level of significance.

The results show that fiscal deficit does not significantly impact on credit to private sector in Nigeria and within the study period. Though, its negative coefficient is in line with a priori expectation, however it was found to be statistically insignificant to impact CPS. As such, it will not be wrong to conclude that in the case of Nigeria, fiscal deficit crowds out credit to the private sector. On the other hand, domestic debt (DOD) was found to be statistically significant. Specifically, it means that one percent increase in the domestic debt tend to increase credit to private sector by 0.37 percent. The study earlier found that Nigeria's fiscal deficit is largely financed through domestic borrowing and not mainly by creation of monetary base, therefore the positive relationship could be explained by the country's largely reliance on domestic borrowing for its deficit financing.

Furthermore, the study tried to ascertain whether deposit money banks' credit to public sector has crowding out effect on credit to private sector. The result does not indicate that credit to public sector crowds out that of private sector given that its coefficient is not statistically significant. Money supply (M2) is also significant and shows that one percent increase in money supply will lead to as high as 52% increase in credit to private sector.

The results also found a negative relationship between credit to private sector (CPS) and treasury bill rate (TBR) indicating that in the case of Nigeria, deposit money banks might have found treasury bill rates a lucrative portfolio investment, better than lending to private investors. However, the coefficient is statistically insignificant and so it cannot be inferred

that TB sales is a deterministic factor in crowding out private credit in Nigeria. Overall, the study did not find incidence of crowding out in Nigerian economy. In effect, Fayed's (2012) finding that government borrowing crowds out banks credit to private sector (CPS) does not apply to Nigeria, at least not within time covered by this study.

VII. Conclusion and Policy Implications

a. Summary and Conclusion

The study evaluates the transmission mechanism from policy instruments of the Central Bank to selected macroeconomic variables with particular focus on the 2005 banking consolidation. Using quarterly data spanning the periods of 1986Q1 to 2019Q4 in a recursive SVAR model, the study tracked the responses of target outcomes (real output, prices and credit to the private sector) to innovations on monetary policy instruments. The findings of the study show that it is difficult to adjudge a single monetary tool most effective in Nigeria, rather the effectiveness of each monetary policy tool depends on the economic problems it is intended or designed to solve. The results show that where the target of monetary policy is to maximally increase output and/or credit to the private sector, the use of money supply (M2) is advised as both variables respond most substantially to innovations in money supply. However, it is equally the most inflation-inducing. By contrast, while real exchange rate (RER) increases output and credit to the private sector (CPS) by almost as much as money supply does, its effect appears more sustained as well as has least effect on inflation. In other words, money supply maximizes both output and credit to the private sector, both of which are desirables. However, it also maximizes inflation, which is non-desirable. By contrast, RER maximizes both desirables and has the least effect on inflation, implying that it yields the best combination of outcomes. The use of policy interest rate, the MPR, is probably the weakest among the variables.

It further x-rayed the responses of the target outcomes in the pre and post banking consolidation periods. Among the findings is the response of prices (CPI) to a standard shock in MPR which was found to be inconsistent with a priori expectation and supports the likely existence of price puzzle in Nigeria. Credit to the private sector also had diverse responses to the different policy instruments pre- and post-consolidation. While money supply (M2) appears to be the most effective monetary policy instrument in stimulating output, it is also the most inflationary. This implies that it may not always be the best instrument to engage when inflation rates are already high. Also, findings show that the 2005 banking consolidation altered the responses of some target variables to innovations in some monetary policy instruments. For instance, after the consolidation exercise real exchange rate depreciation became contractionary as well as being ineffective as an instrument to stimulate deposit money banks' credit to private sector.

Also, the study empirically examined the presence of fiscal dominance and crowding out in Nigeria. The results could not find evidence of fiscal dominance in Nigeria. They rather suggest higher debt financing than resort to ways and means. The study was also not able to find evidence to prove that fiscal deficit crowds out deposit money banks' credit to private

sector in Nigeria. However, the ECM results were not divided into pre- and post-banking consolidation periods as were the analyses from SVAR. It is possible such a move may yield results that are more revealing. The Central Bank of Nigeria often appear reactionary in dealing with major macroeconomic and development indices that rely on monetary instruments. One of the most touted bases for its actions (and reactions) is fiscal dominance. However, evidence from this study does not support explicit existence of fiscal dominance, at least not the sort that emanates from financing of State deficits from ways and means.

b. Policy Implications of the Findings

The literature posits that positive response of prices to a contractionary monetary policy (price puzzle) is associated with a weak interest rate response to inflation and might be due the fact that interest rate innovations partially reflect inflationary pressure that lead to price increases. In effect, changes in the systematic component of monetary policy have not allowed reduction in inflation or output variance without substantial costs (Castelnuovo et.al., 2010; Sims 1992; Krusec, 2010; Sims and Zha, 2006; Hanson, 2004). That this result applies to post-consolidation period in Nigeria challenges the notion in the literature that a more compact, better-structured and robust banking sector is important for transmission of policy instruments into intended outcomes, particularly as they relate to prices.

The literature suggests that one way out is to include measures that forecast future inflation, particularly those arising from commodity prices, into monetary policy formulation. Currently, the Central Bank explicitly incorporates inflation rate into its policy rate, which is why the policy rate has remained in the two-digit range for some decades now. This might have helped in ensuring effectiveness of monetary policy rate in the determination of cost of funds, but it has also helped to widen the difference between lending and deposit rates. But the bigger snag is that the Central Bank, which is the very agency that should work to control inflation in Nigeria, takes inflation rate as given. Under such circumstances, and with a broad money supply policy that focuses on managing transient and seasonal (sometimes imagined) fiscal dominance, inflation rate is unlikely to come down. By implication, transactions interest rate would also remain very high for the foreseeable future. Add to the above the fact that banks in the country usually incorporate specific costs (energy, security, personnel, multiple taxation, etc.), macroeconomic instability costs among others into their onward lending rates. This implies a proper crowding out of the real sector, not necessarily by Government deficit financing, as has been the concern in many quarters, but by interest rate and inflation management regimes that would not allow long term investment.

The way out has to still begin with the Central Bank. While explicit inflation targeting may not be realistic given the level of the country's development and the environment under which the Bank operates, the Bank needs to properly audit the major causes of inflation, particularly headline inflation that may be associated with food and other basics. Thereafter, it ought to design a framework for managing that component of inflation. Of course, this will involve inter-agency collaboration as other arms of Government, particularly fiscal authorities, are enlightened on the implications of their actions and the benefits of a streamlined framework. When inflation rate, which appears to drive a lot of other

destabilizing macroeconomic factors, including interest rate, is brought under control, it will be possible for the Bank to set policy rates that, post incorporation, would allow the banks to have transactions rates that support real sector development.

At the larger macroeconomic level, we keep in mind that RER is not actually an explicit monetary policy tool, but a measure of competitiveness incorporating factors like balance of payments, relative costs of doing business and nominal exchange rates in addition to the ones listed in this study. Factors that affect the real exchange rate have remained relatively at their pre-consolidation levels or worsened. For example, while policy and lending rates are pegged to inflation rate, savings rates are not. This widens the gap between savings and lending rates, discouraging resource mobilization, not necessarily on-lending to the private sector. While lending rates have continued to inch up, incorporating inflation as usual, savings rates have been declining. The country's competitiveness has been on a decline as cost of doing business and arbitrary economic frameworks and institutions multiply. These have affected not only output growth, but the country's external balance and internal incentives structures. In effect, transmission of the disconnect between unbalanced macroeconomic variables and ineffective policy instruments may now have transcended the banking industry and shown up in the broader economy. Post-consolidation, in addition to a counter-intuitive monetary policy rate transmission mechanism (or price puzzle), there is also contractionary real exchange rate depreciation effect.

Attempting to solve the problem with innovations in money supply (alone) will likely not yield desired results. Specifically, while money supply supports output recovery and increase in credit to the private sector, it is also inflationary as shown in virtually all the panels pre- and post-consolidation. In fact, of the instruments outlined in this paper, it consistently yields the sharpest rise in prices. While at face value, the post-consolidation moderation of money supply induced price rise may appear good, it is equally a sign of a deeper issue – the classic case of non-responsiveness of big banks. Using money supply will mean resorting to the conventional lending channel of monetary policy management. This raises two issues. The first is the impact of the banking structure on the effectiveness of monetary tools. Termos (2005) found that large, more liquid, and well capitalized banks are more impervious to changes in monetary policy than other banks. His position is that as the banking industry gets more concentrated (through mergers and acquisitions as happened in the 2005 consolidation), the effect of monetary policy transmission becomes more mitigated. The second issue is that in standard textbook economics with price stickiness where banks are rational agents struggling to balance their portfolios between bonds and loans which are imperfect substitutes, monetary policy affects output only if movements in the nominal interest rate are translated into the real interest rate (Kashyap and Stein, 1994; Bernanke and Blinder, 1992). These two conditions make it possible for larger capacity banks to be less responsive with loan advances based on adjustments either in interest rate on in the supply of money because they have alternatives. Currently, average yield on Federal Government of Nigeria benchmark 3-year bond is about 16 percent. Besides being higher, it is a lot more secure than lending to the private sector. Even though the Central Bank has mandated banks to give a particular proportion of their funds out as loans and has rolled out a number of programmes

to support real sector development, the fact remains that the Nigerian financial landscape is an incentive-based system where options taken by economic agents are largely determined by known or anticipated returns.

Post consolidation, RER depreciation is contractionary, depresses credit to the private sector and leads to moderate rise in prices (Panels 9a and 9b). This is akin to having stagflation which presents complications for macroeconomic management. If banks are becoming impervious to monetary policy changes while real exchange rate depreciation also has tendency to reduce gross output, it means that solution to the challenge lies elsewhere outside monetary policy. Now, this does not mean that monetary policy cannot have any effects; of course as has been seen, money supply remains one important instrument that yields potent results in the right direction. It simply implies that we can no longer rely on the application of money supply or any other monetary policy instrument alone. Clearly, while banks in the country currently have large amount of resources that increase their stability and profitability, the environment has also become such as to make the broader macroeconomic environment critical, apparently more critical than minor tweaking of monetary policy instruments. It appears that changes in CBN instruments are overwhelmed by changes in the macro environment. For example, nominal interest rate changes that are not sufficient to affect real interest rate, and by extension the incentive structure, would have no lasting effects. The banks may either not respond much or their response would be such as not to be able to change any of the fundamentals like output, credit to the private sector or any of the target variables.

A critical handle for real exchange rate is the nominal exchange rate. However, the impact of a nominal exchange rate devaluation is assumed to be proportionately less relative to a real exchange rate devaluation (Edwards 1988). By implication, depreciation of the nominal exchange rate alone also may not yield the kind of results one would expect from a textbook 'normal' economy. Worse still, the Nigerian currency has depreciated from approximately NGN150 to a dollar in 2005 to approximately NGN450 to a dollar in 2020. Nigeria's borrowing has also increased in recent years. None of these has led to the sort of quantum leap in output growth as would have been projected by textbook economics. These are indications that the promise of economic revival, particularly dealing with the financial and real sectors, does not simply lie in small movements in either monetary or exchange rate policies. There has to be a more in-depth review of the nature of denomination of the country's liabilities, the nature of its openness and the structure of its firm balance sheet ahead of defining policies that could change incentives. Serena and Sousa (2017) conducted an in-depth analysis of the relevance of even firm level assessment of the balance sheet impact of exchange rate depreciations. Similar studies are needed in Nigeria.

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Appendix 1: **Unit Root Results**

Variable	**Augmented Dickey Fuller (ADF)**		**Remarks**
	Level I~(0)	**First Difference I~(1)**	
MPR	-2.755983	-10.89171**	Differenced in Model
M2	6.020229	-3.950353**	Differenced in Model
RER	-2.494132	-9.700992**	Differenced in Model
CP1	3.195887	-6.322351**	Differenced in Model
GDP	-2.025208	-11.62607**	Differenced in Model
BMG	-2.708539	-17.00111**	Differenced in Model
CPS	3.095726	-8.025045**	Differenced in Model
CPUS	1.256905	-11.13585**	Differenced in Model
DOD	1.950107	-3.819139**	Differenced in Model
FDEF	6.926378	-4.874725**	Differenced in Model
INF	-2.695071	-15.55897**	Differenced in Model
TBR	-2.777584	-10.18823**	Differenced in Model

Source: computed by the author.
******indicates significance at 5% level.
Critical values: (levels), 5% = -2.882910; (first difference), 5% = -2.883073