

Economic Performance Response, Credit Disbursement and Monetary Policy Shocks in Nigeria

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ABSTRACT

This study investigates the nature and magnitude of the influence of credit disbursed by financial institutions on income per head within the monetary policy environment in Nigeria and especially how the income per head response to the dynamic impact of the credit to the private sector and monetary policy shocks. The correlates were modeled using the non-linear dynamic stochastic general equilibrium (DSGE) framework. We obtained the estimation by conducting dynamic tests on annual time series Nigerian data over the period 1970 to 2018. The results reveal that there exists positive relationship between credit to the private sector and per capita income in Nigeria and that the current income per head of Nigerians exhibit positive influence on future income per head. Also, shocks from inflation have negative impact on credit to the private sector. The impact of monetary policy shocks suggests that shocks from credit to the private sector and interest rate spread influence per capital income positively. The results reported that the shocks from credit to the private sector and interest rate spread induce inflation to increase, while shocks from credit to the private sector exert indirect impact on per capita income. The shocks from interest rate spread assert positive and significant impact on per capita income in Nigeria. The impulse response and variance decomposition of these state variables on the control variables suggest that, any unit change in the shocks from state variables reduces per capital income only for a short time and a unit shock from the state variable induces an increasing short-lived impact on credit to the private sector. Shock from state variable g yields temporal increase the capita per head. We recommend that reducing inflation rate in the monetary policy channel should be the major policy focus of the monetary authorities in Nigeria.

Keywords: Monetary Policy, Monetary Policy Transmission, Interest Rate Channel, Open Market Operation, Credit Channel, Exchange Rate Channel.

Introduction

Monetary policy, is regarded as an indispensable economic management tool, is one of the various economic policies that can be deployed to achieve targeted objectives of the state or a government. Monetary policy refers to the deliberate action of the government designed to affect the size of money supply. It is a policy instrument employed by the central bank to control or regulate the availability, cost, and use of money and credits to achieve optimum levels of output and income growth, employment, price stability, balance of payments equilibrium or any other goal of government economic policy. In essence, monetary policy plays prominent role in addressing economic stability concerns of the economy including poverty reduction. Monetary policy involves measures through which the central bank manages the supply of money, in order to stabilize price and reduce poverty (CBN, 2017). Monetary policy implementation features through financial intermediation of the banking system and financial markets depending on the level of financial development of a country.

The financial sector is the nerve center of the national economy of any given nation state. It is a system that performs the task of coordination between the surplus and deficit economic units and constitutes a potentially vital machinery for income growth (Iganiga, 2010). According to the Central bank of Nigeria (1993), the financial system refers to the set of rules and regulations and the aggregation of financial arrangements, institutions, agents, that interact with each other and the rest of the world to foster economic growth and development of a nation. Bencivenga and Smith (1991), the competence of the financial sector in carrying out its roles, especially that of intermediation involving interaction between the surplus and deficit units of the economy, depends to a large extent on the level of credit disbursement of the formal financial system. Financial intermediation is conceptualized as the ability of financial institutions and markets in an economy to effectively mobilize savings for investment purposes (Nzotta and Okereke, 2009). To achieve this, a large proportion of the population must gain access to credit in the formal financial system. This marks improvement in the access to variety of quantity and quality financial products, and efficient financial allocation services through the monetary policy strategies. The success of the financial system in providing its roles globally has been based on the credit and monetary policy initiatives of financial sector reforms (Iganiga, 2010).

The primary aim of the apex monetary authority in Nigeria is to ensure domestic credit disbursement in a sound financial system, ensure monetary and price stability, promote a sound financial system in Nigeria among others. The central bank of Nigeria (CBN) is authorized by law to control the level of credits within and outside the banking system. Theories and empirical evidence on monetary policy have shown that credit disbursement is directly proportional to increase in the stock of money supply (Fisher 1926; Friedman 1956; Sahadudhhen 2012; Gertler & Karadi 2014; Basher & Elsamadisy, 2014 and Imoughele & Ismaila, 2016). On the other hand, money supply is seen as the summation of currencies in circulation which includes demand deposits, and time deposit, for the case of broad money supply. Thus, an increase in money supply is a positive and direct function of the level of credits in an economy.

There are at least four monetary policy channels that are used to control the level of credits in an economy. These are the interest rate channel, Treasury Bills channel, Open Market Operation channel which is basically influenced by inflation rate and the exchange rates channel. Although these channels are applicable to Nigeria, the interest rate and inflation rate are used to control the level of money supply and by extension credit disbursement. As such, interest rate and inflation rate are cardinal for our purpose.

The level of credits in an economy is controlled by the price of credits (interest rates). The interest rate that is used to control the level of credits in the Nigerian economy is determined by the Monetary Policy Rates (MPR). The monetary policy rates are the rates set by the Monetary Policy Committee (MPC) for Deposit Money Banks (DMBs) and other financial institutions to buy or sell credits. The monetary policy committee in Nigeria is expected to meet six times in a year to fix the MPR with the aim of controlling domestic prices, increase foreign currency supply, ensure economic growth, increase income as well as ensure a sound and stable financial system and also control the stock of money supply and credits. The monetary authority uses the aforementioned monetary policy channels to determine the outcome of macroeconomic variables, especially economic/income growth and domestic price of credit.

The economy will feel the effects of the credit activities and monetary policy shocks more positively when the income level of people are on the increase in the economy. These are expected to grow the output, income and increase capital formation in the economy (CBN, 2012). These will however improve the economic welfare of low-income earners and increase their access to wider range of credits with capacity to raise or stabilize income and build resilience against economic shocks. In addition to income benefits and good access to affordable credit, monetary policy shocks within the credit disbursement environment are, expected to increase income and productivity in the domestic economy through optimal resources allocation/investments (Robinson, 2001).

To perform its income growth function optimally, the economy must learn to react appropriately to the dictates of monetary policy shocks through the financial institutions credit disbursement activities in the financial system. Two monetary policy channels indicators: interest rate and inflation rate are cardinal for our purpose. This is in addition to credit to the private sector as proxy for credit disbursement and per capita income which measures economic performance.

The Problem

Credit disbursement is now a cardinal objective of many apex banks and most financial regulatory bodies in developing and developed economies. This is due to the fact that a well-functioning financial system offers efficient savings, payment system, credit and risk management services to households and firms. Without credit disbursement in the formal financial systems, investors and small-scale business owners must rely on their own limited savings to invest and become entrepreneurs. Also, newly founded small scale businesses will depend on their earnings to initiate growth, and income earning opportunities in the business world. The consequences of these are persistent income inequality, low earning ability of the economic units, low Level of productivity and slow economic growth rate.

Despite the stride of successive governments and its monetary authorities in the pursuit of credit disbursement, the formal credit system seems not to have been able to adequately penetrate the informal financial market in Nigeria. The poor need credit products in different shades. Interestingly the central banks of Nigeria in conjunction with their monetary authorities have formulated and implemented various monetary policies and strategies to financially broaden credit disbursement to include the very poor rural dwellers in the formal financial system for easy access to credit. The extent to which these efforts yield expected result in Nigeria is the subject of this research. In spite of the numerous reforms, financial institutions and markets have not performed to expectations in terms of credit disbursement within the monetary policy environment. Nigeria's major productive sectors have significantly shrunk in size since the 1980s. Poverty level is rising, persistent and harsh, with more than 70% of the population living below the poverty line. The distribution of income is so skewed that the country is considered one of the most unequal societies in the world, with 50% of the population having only 8% of the national income (Soludo et al, 2007).

Previous studies have attempted to demonstrate that monetary policy shocks influence macroeconomic activities as well as credit disbursement in the formal financial system. While they seem to agree on the significant effect of monetary policy shocks and credit disbursement on financial intermediation, there appears to be disagreements with respect to the relative effects on income growth. For instance, Gertler & Karadi (2013) used economic and financial variables to provide proof on the nature of transmission mechanism or shocks in monetary variables and economic variables in United State (US). They employed monthly data sourced from the US Federal Reserve from 1979 to 2012. To show the direction of transmission they used the traditional VAR model analysis with a High Frequency Identification (HFI) of the monetary policy shocks. Their findings revealed that the modest movement in monetary policy produces large movements to economic activities and cost of credits in US. They point to the fact that the large movements in cost of credit is attributable to term premia and spread in cost of credit that are mostly absent from the standard monetary transmission policy model.

Another major question this paper seeks to answer is: to what extent does monetary policy shocks and credit channel drive income growth in the economy? If it does, what is the nature of the influence? The worry then is whether monetary policy shocks could influence credit disbursement positively which will in turn drive the growth of income in the economy. This is the major research problem that this paper set out to investigate. It is on the basis of this that we intend to investigate the nature and magnitude of relationship between economic growths, credit to the private sector and monetary policy channel indicators in Nigeria. This study investigates the transmission effects of credit to the private sector and monetary policy channels to gross domestic product in Nigeria within 1980 to 2018. Specifically, we investigate the monetary transmission effects of credit to the core private sector, and monetary policy channels (interest rate, exchange rates, and treasury bills rate) to the economy (gross domestic product).

It is expected that at this stage in the financial sector development of the economy, where there are innovations that enhances credit disbursement and following the efforts of the Central Bank of Nigeria (CBN) and the deposit money banks to strategically include more adult Nigerians in the formal financial system, one will expect that there should be poverty reduction and increase productivity since credit disbursement is expected to increase the income earning capacity of economic agents by providing opportunity for the agents to be economically and productively engaged. Instead, income and productivity are fast dwindling to a vanishing point.

Our logical point of departure is to investigate the relevance or otherwise of the structural relationship between credits to the private sector (CPS) and shocks from monetary policy channels (MPC) on income per head in Nigeria. We theorize this against the backdrop of recent poor performance (poverty level of Nigerians) of the Nigeria economy and elsewhere blamed on failed credit disbursement in a monetary policy environment. The theoretical underpinning that economic performance (increase in the earning capacity of economic units) is driven by credit disbursement is adjudged on the opinion that monetary policy shocks play significant role in this relationship. The connectivity of credit disbursement-economic performance (income growth) relationship with the intervention of monetary authority is the preaching of this paper. However, this paper brings to light the critical behavioral patterns of income in response to stimuli provided by the various monetary policy strategies adopted and credit disbursement activities carried out to increase output in Nigeria. This paper undertakes a new Keynesian DSGE model in examining monetary policy in Nigeria. The DSGE model incorporate back-ward and forward-looking variables and solutions in modeling for monetary policy. The New Keynesian DSGE permits examinations of the effect of frictions in the economy and useful when central banks are forward-looking in setting monetary policy.

Literature Review

The Concept of Monetary Policy

The growth and stabilization policy measure is a package or set of measures introduced to grow the economy and stabilize the financial system of an economy. This policy guidance represents the growth and stability measures of the monetary policy. Monetary policy deals with the money supply in the economy, interest rate, and is often administered by a central bank and have a direct impact on the asset market. Monetary policy is a combination of measures designed to regulate the value, supply and cost of money in an economy, in consonance with the expected level of economic activity (Folawewo and Osinubi, 2006). For many economies, the objectives of monetary policy include price stability, maintenance of balance of payments equilibrium, promotion of employment and output growth, and sustainable development.

These objectives are necessary for the attainment of internal and external balance, and the promotion of long-run economic and income growth. Evidence in the Nigerian economy has shown that since the 1980's some relationship exist between the stock of

money and economic growth or economic activity and over the years, Nigeria has been controlling her economy through variation in her stock of money (Fasanya, Onakoya and Agboluaje, 2013). Consequent upon the effect of the collapse of oil price in 1981 and the Balance of Payment (BOP) deficit experienced during this period, various methods of stabilization ranging from fiscal to monetary policies were used. Interest rates were fixed and these were said to be beneficial to big borrowing farmers (Ojo. 1989). Ikhide and Alawode (1993) while evaluating the effect of Structural Adjustment Programme (SAP) concluded that reducing money stock through increased interest rates would lower gross National product. Thus, the notion that stock of money varies with economic activities applies to the Nigerian economy (Laidler, 1993).

i) Channels of monetary policy transmission mechanism

For any economy to go the right direction on the part of growth, the monetary policy transmission mechanism, the pathway through which monetary policies influence the general economy should be identified (Ifere, et al 2015). Plethora of empirical financial literature identify interest rate, the exchange rate, the price of credit, the asset price and the expectation channels as the major channels through which monetary policy is transmitted to the real economy. Miskin (2006), Abdullahi (2014), CBN (2010), Nwosu and Saibu (2012), Edekwu (2013), Ajayi (2007). In Nigeria, the CBN with a view to make informed and timely policy reviews amidst market dynamics and volatility will need better understanding of the transmission mechanism through which monetary policy affects the economy. It is germane to state unequivocally that the exact nature and impact of the channels vary amongst countries depending on country and region-specific factors.

(ii) The interest rate channel of monetary policy transmission

The interest rate channel is exemplified in the work of Hicks (1937) IS-LM model and referred to as pure Money view Model. The IS-LM models are a macro-economic tool that defines the relationship between interest rates and assets market. Most financial analyst are of the view that monetary demand and supply in an economy is predicated on the level of interest rates. The economic intuition behind the aggregate demand channels of policy influence on real variables is usually described by the traditional Keynesian (IS-LM) framework. The framework focused on the equilibrium position between the demand for and the supply of money to determine the rate of interest which influenced investment spending and consequently output level (Dornbusch et al 2002 cited in Abdullahi (2014) and Nwosa and Saibu (2012).

Fondly referred to as the Keynesian Gross, the IS-LM model define the relationship between real output (GDP) and nominal interest rate. It explains the financial interaction between the economic goods market (IS) and loanable fund market (LM). The model explains changes in national income considering short-run situation when the price level is fixed and also shows what can trigger a response (shift) in aggregate demand curve. While IS (investment savings) curve represent equilibrium in the real sector of the economy, the LM (curve Liquidity Market) represent equilibrium in the money market. The IS-ML models remain a veritable tool in analysing economic fluctuations and enhancing income growth.

(iii) Credit channel of monetary policy

The credit channel of monetary policy transmission mainly operates through two conduits: the balance channel, in which monetary policy affects borrower's net-worth and debt collateral, and the bank lending channel, in which the monetary policy impacts the level of intermediated credit (Bernanke and Gertler (1995)). The banking sector majorly drive the credit channel of monetary policy through financial intermediation process. The traditional credit view emphasizes much on the bank loans (asset side) and how best monetary policy of Central Bank can influence loan supply through its operations. The credit channel involves the degree to which monetary policy can affect the supply of loans (that is, how Open-market Operations (OMO) affect bank loans); and the relative importance of bank loans to borrowers (Disyatat and Vonsinsrikul 2003). Individuals and firms squarely use bank loans to finance investments but, in many instances, are confronted with friction when switching between loans supply from banks and other available forms of non-bank credit as prevailing changes in monetary policy can alter the flow response of credit flows and invariably caused reduction of the bank loan stock. According to Bhattacharya and Marklergee (2011) the monetary policy works not only through its impact on the demand for loanable fund but also through the supply of loans (credits). This implies that the demand and supply chain for loanable fund should be relative.

The credit channel is not actually an alternative but an extension of the traditional IS-LM model and a set of factors that amplify and propagate the conventional interest rate effects (Bernanke and Gertler 1995 and Okaro 2011). Borrowers (households and small firms) that have no close substitute for credit from banks but confronted with asymmetric information that limit their access to other non-bank sources of credit financing. Halila (2013), notes that borrowers' reliance on bank credits enables monetary policy to work, at least in part, through its effects on changes in the level of credit in the banking system. The credit channel focuses on the special role banks play in the financial system arising from the fact that banks ameliorate asymmetric information problems between borrowers and lenders, and also by the fact that large fluctuation in the aggregate economy are often brought about by small shocks under the financial accelerators hypothesis (Bayangos 2010).

vi. Exchange rate channel of monetary policy

A policy induced change in the interest rate at short intervals in an open economy emanates through the exchange rate channel. Fluctuation in exchange rate brings about changes in the price level of goods and services with subsequent implicative effect on spending of individuals and firms. This is spotted particularly in an open economy where a significant proportion of the country's wealth or does business in foreign countries. Okaro (2011) argues that the exchange rate channel is an additional transmission mechanism by referring to the asset theory of the exchange rate. A country exchange rate policy is a fall out of the persistent of changes in demand and supply of money in the domestic and foreign economies. Changes in exchange rate often affect the spending pattern of individual, household and firms, it also has overwhelming impact on the

effectiveness in the utilization of wealth and resources as well as output (performance measures). According to Kalu et al (2015) any changes in the exchange rate impacts on spending pattern of the people, firms and ultimately on goods and services.

Exchange rate differential grossly determine the relative prices of goods and services amongst economies. A country that has a strong exchange rate policy framework will deepens trade liberalization and balance of payment amongst countries. Abdullahi (2014) states that the strength of the exchange ratio channel, however, depends on the responsiveness of the exchange rate to monetary policy shocks and the openness of the economy. The Mundell-Fleming model outlined the link between monetary policy and exchange rate via a positive relationship between the exchange rate and interest rate parity (Hillian 2013). The model further argues that the interest rate differential between any two countries represents the expected change in their bilateral exchange rates, and drives international capital flows. The exchange rate channel of monetary policy transmission mechanism features prominently in a small but open economy with strong domestic monetary policy that keep pace of changing events in the global economy.

Instruments of Monetary Policy

The Monetary Policy is a financial process whereby the monetary regulatory authority (central bank) design measures to regulate the money supply in an economy. The central bank employs various instruments of monetary policy or monetary variables at its disposal to control the availability of credits and liquidity management (money supply) in a manner that stimulate and enhance the economic growth. The instruments of monetary policy are also referred to as “weapons of monetary policy” and are categorized either as quantitative or qualitative instruments. The instruments of monetary policy employ by the monetary regulatory authority depend on the level of development of the economy, especially its financial sector.

Open Market Operations

Open market operations (OMO) is a monetary policy instrument used to manage the level of liquidity in an economy. It is a monetary control measure use by the central bank to reduce money supply from the financial system. It involves the buying and selling of government securities by the central bank in the open market in a bid to either expand or contract the amount of money in the financial and banking systems. Nnanna (2001) notes that OMO entails the sale or purchase of eligible bills or securities in the open market by the Central Bank of Nigeria for the purpose of influencing deposit money banks’ reserves balances, the level of base money and consequently the overall level of monetary and financial conditions. The Central Bank either buys or sells (the Treasury) securities to the banking and non-banking public in the open market. If the Central Bank sells securities, it reduces the supply of reserves and when it buys securities it increases the supply of reserves to the Deposit Money Banks, thus affecting the supply of money.

In Nigeria, the open market operations (OMO) is the most flexible and most common dynamic tool deploy by the central bank to implement and regulate monetary policy paradigm. This is pertinent because the central bank of Nigeria uses this technique

to adjust and manipulate the monetary policy rate (MPR), the rate at which banks borrow reserves from one another. Buying and selling of government securities (bonds and treasury bills) allow the central bank to control the supply of reserve balances held by banks and helps to determine the increase or decrease of short-term interest rates based on the monetary policy measures of either implementing an expansionary monetary policy or a contractionary monetary policy. Essentially, OMO constitutes a major instrument of monetary policy under the market-based system of monetary management and it is used by the monetary authorities to regulate the cost and availability of credit in the banking system and thus influence the level of money supply (Godwin, et al. 2018).

Bank Rate or Discount Rate

A bank rate or discount rate simply is the interest rate at which a country's central bank lends money to domestic deposit money banks in the form of short-term loans. Central banks are saddled with management of the bank rate as a way of regulating economic activity. Will (2019), notes that lower bank rates can help to expand the economy by lowering the cost of funds for borrowers, and higher bank rates is applied when inflation is higher than desired. The bank rate is pertinent because deposit money banks use it as a yardstick to determine the rate at which they disburse credits (loans) to their prime borrowers. Bank rate is the interest rate that the central bank charges a deposit money bank when they borrow funds particularly when the bank is temporarily short of funds. It is the interest rate that the monetary authority use in disbursing short term credits to member banks. In practice, deposit money banks are required to maintain a certain portion or percent of their deposits as reserve. Consequently, if for any reason the banks don't have enough cash that meet the regulated reserve requirements, they borrow from another bank at the overnight rate or from the central bank.

Cash Reserve Requirement

This is the proportion of a required reserved liabilities that deposit money banks must hold, rather than lending it out as credit or invest. It is basically a requirement determined by the country's central bank to regulate monetary policy conduct in an economy. Reserve Requirement may be used as a control incentive for the Deposit Money Banks to hold a portion (or a combination) of their reserves as vault cash and or deposits with it. The premise is that maintaining such fraction of the banks' reserve will limits the volume of loans Deposit Money Banks can disburse to the domestic economy and thus limit the supply of money. Generally, it is a norm that banks maintain a stable relationship between their reserve holdings and the amount of credit they extend to the public. Reserve requirement is the fraction of the total deposit liabilities which commercial banks are required to maintain in form of cash reserve with the central bank interest Rate of Nigeria (Nasko, 2016).

Exchange Rate

Exchange rates measures the relative currency strength of one currency to another. It is a monetary instrument use to define and control the rate at which a country's

currency is exchange for another. As an open economy that interact with other economies, the balance of payments can be in deficit or in surplus with growing impact the monetary base and the supply money. By selling or buying foreign exchange. The Central Bank make sure that the exchange rate is at levels that do not affect domestic money supply (credit) in undesired direction. The real exchange rate when misaligned affects the current account balance because of its impact on external competitiveness. Central bank can regulate the exchange rates between domestic and foreign currencies through the monetary policy drive.

Direct Credit Control

The Central Bank can direct Deposit Money Banks on the maximum percentage or amount of loans (credit ceilings) to different economic sectors or activities, interest rate caps, liquid asset ratio and issue credit guarantee to preferred loans. In this way, the available savings is allocated and investment directed in particular directions. The Central Bank uses direct credit measures to control the volume, terms and conditions of domestic bank credit disbursement, including periodic credit disbursement through loans, advances or investments. Meanwhile, the apex bank has not utilized such controls in its quest for the implementation of monetary policy.

Empirical Review

Abubakar (2015) study the transmission Mechanism of Monetary policy in Nigeria using the Vector Autoregressive (VAR) model; the study uses monthly time series data covering the period of 2000 M1 to 2014 M12 and find that there is a long run relationship among monetary policy variables and real economy variables and that monetary policy is relatively effective in Nigeria. The study further reveals interest rate and assets price channels are very weak in Nigeria, that banking lending channel is not operative in the country and that credit and exchange rate channels are the most effective channel through which monetary policy can be transmitted. It was recommended that CBN should re-modify its monetary policy to ensure steady and inflation free economic growth in Nigeria.

Atabaev, and Ganiyev, (2013) examines the effects of monetary transmission on real output and price level in Kyrgyzstan. The study analyzed the relationship between money supply, real output, price level, interest rate, credit and real exchange rate using Vector Auto-regression Approach (VAR) on monthly data for 2003-2011. Finding shows that the interest rate channel is weak, credit channels affect real output and exchange rate channel affect prices. Thus, the exchange rate channels remain the most effective channels of monetary transmission in Kyrgyzstan. The study recommends that government real output and the exchange rate channel in achieving price stability in Kyrgyzstan response to a monetary tightening. The study reveals that banks play an important role in the transmission of monetary policy stocks to the real sector.

Kapur, M. (2018), empirically the role of monetary policy in containing demand and inflationary pressure. It reveals monetary policy effects on output and inflation consistency with cross-country and Indian experience. The study was conducted against

the backdrop of the move to an inflation targeting monetary policy framework that begins in 2014 with consumer price index (CPI) inflation as the nominal anchor amidst the dynamics of monetary transmission. It uses a broader disaggregate model that incorporates the external sector, fiscal policy, banking sector and financial market variables to capture the interaction among key macroeconomic policies and aggregates rather than the typical three equation New Keynesian model. The empirical analysis confirms the role of monetary policy in containing demand and inflationary pressures it opines that the ongoing structural reforms, deregulation and opening up of the Indian economy, as well as ongoing initiatives in the monetary policy operating of monetary transmission, the transmission dynamics can be expected to evolve overtime.

In Vanuatu, Hililan (2013) empirically examine monetary policy transmission using three different econometric and dynamic models base on the period 1984-2008 or which data was available. The study uses the expanded SVAR VECM which uses Johansen's maximum – likelihood proceeded to test for long-run cointegration relation and the new Keynesian dynamic stochastic equilibrium model and introduce frictions in assessing monetary policy in Vanuatu. It compares SVAR model backward – looking feedback rule and the DSGE model that incorporates forward –looking variables and solutions to account for expectation. Finding revealed that the traditional interest rate channel to price and output is weak and credit channel of monetary policy through bank loans is found to be weak in transmitting stock to disaggregated components of GDP but relatively important in transmitting stocks to nominal exchange rates. The credit channel is driven by demand for loans rather than their supply.

In addition, the study finds that foreign stocks play more important role other than domestic stocks in the transmission of stocks to domestic –deposit interest rates but are not important in explaining movements in domestic – lending interest rates. The money channel to domestic prices is strong and persistent and that the primary source of stocks to prices is from reserve money. It revealed that the money channel is important in transmitting stocks to nominal variables, notably bank credit and monomial interest rate and recommends the use of reserve money as a variable representing stock to monetary policy, the exchange rate channel is strong, fast persistent and important in transmitting stocks to overall real output and to gross investment.

Nigeria Specific Studies

Onyeagba, Echekeba and Adigwe (2015) investigate the impact of monetary policy on the Nigerian economy using the ordinary least square method (OLS) to analyzed data between 1980 and 2010. The result of the analysis shows that monetary policy represented in money supply exerts a positive impact on Gross Domestic Product (GDP) growth but negative impact on the rate of inflation. The study recommends that monetary policy should facilitate a favorable investment climate through appropriate interest rates, exchange rates and liquidity management mechanism and the money market should provide more financial instrument that satisfy the requirement of the ever-green sophistication of operators.

Yaaba, et al (2018) assesses the prevalence of the channels of monetary policy transmission mechanism in Nigeria to determine the position of asset prices channel with emphasis on equity channel of Monetary Policy Transmission Mechanism (MPTM). The study covers all four prominent channels of MPTM in Nigeria – interest rate, exchange rate, credit and equity channels. It employs a multi-model approach including Johansen and Auto-regressive Distributed Lag (ARDL) techniques to analyze the data set over the period of 1985 Q6 to 2017 Q4. The data was used from two perspectives: raw and normalized data such that four set of regressions were carried out and the best model determined based on the one that yield the lowest information criteria. The study suggests close monitoring of the market by the Central Bank of Nigeria (CBN) so as to be able to take proactive policy disruptions in the markets is likely to affect the general price level which is the primary mandate of the CBN.

Kalu, Ogbonna and Paul (2015) highlights monetary policy transmission mechanism in Nigeria treading on empirical studies and happening in the country that retarded the efficiency of the Central Bank of Nigeria (CBN) over the years in pursuit of effective transmission mechanism. The empirical reviews from studies show that interest rate, credit channels, and exchange rate are among the channels of monetary policy transmission to the economy. Major problems that pose serious debility to effective transmission in Nigeria were also highlighted. The study makes some suggestions for improvement, among which include: the Central Bank must persevere legally, morally and otherwise to make the economy a cashless one. The low patronage of banking services by many Nigerians is a stumbling block in effective control of money supply which has contributed to incessant inflation in the country; any form of disguise or indirect interference by the government has to be put to an end; and the instruments of monetary policy such as interest rate and exchange rate that are known to be effective in some sectors should be properly managed and monitored.

Ishioro (2013), empirically investigate the channels of monetary transmission mechanism in Nigeria using annual time series data from 1970 to 2011. The Granger causality test was adopted in estimation of the relationship between the various channels and selected macro-economic aggregates. The major focus of the Central Bank of Nigeria (CBN) has been the formulation and implementation of monetary policies on how to achieve the macro-economic goals of low inflation, interest rate and exchange rate regulation, and sustained economic growth. However, the real sector of Nigerian economic growth, low inflation and stable interest and exchange rates. This has resulted in erratically stable economy; monetary vulnerable macro-economic aggregates. Findings show that three channels of monetary transmission are functional in Nigeria- The interest rate, exchange rate and credit channels. The study recommends that the exchange rate and interest rate channels should form a fundamental basis for inflation targeting in Nigeria.

Abdullahi (2014) empirically examine the importance of interest rate channel of monetary policy transmission mechanism on monetary policy target, effectiveness of credit channel of transmission mechanism in achieving the desired combination of

monetary policy goals and the effectiveness of exchange rate channel on the monetary policy target. The study employs Vector Auto regressive Model (VAR) to analyzed time series from 1980-2010. 2+ values of Real Gross Domestic Product (RGDP) as the exogenous variables while Monetary Aggregate (M2), Monetary Policy Rate S(MPR), consumer price Index (CPI), core credit to the sector (CCPS) and Norminal Exchange Rate (NER) were used as exogenous variables for the three hypotheses. Findings from the study revealed that interest rate channel of monetary policy transmission mechanism were the most effective channel of monetary policy transmission in Nigeria within the period. The credit channel is not an effective monetary policy transmissions mechanism in Nigeria and that the exchange rate channel is weak in explaining monetary policy transmission mechanism in Nigeria. The study recommends amongst others that the role of deposit money banks as agents of financial intermediation in the Nigerian economy should not be neglected. The CBN should make loans transactions of deposit money banks more amendable to monetary policy actions or seek a more effective channel of transmitting monetary actions to the economy. Such measures will include sufficient control over the reserves of deposit monetary banks and the timely application of reserve requirements in money policy control.

Empirical evidence on the effectiveness, dominant and exact channel through which monetary policy impact the Nigerian economy is at best mixed. Ifere and Obafemi (2015) empirically investigate this mixed by using FAVAR model estimated with 53 variables spanning the quality period of 1970:01 to 2013:04. Findings shows that interest rates and credit channels are the dominant and strongest channel of transmission of monetary policy stocks in Nigeria, then followed by exchange rate and money channel. The study revealed that stock channel has no significant impact in transmission process. The study recommends that the Central Bank of Nigeria (CBN) should improve on the use of interest rate and credit channels as monetary policy variables through a policy approach of stimulating and emphasizing judicious management has the capacity to stimulate growth in distinct sectors of the economy.

Edekwu, 2013 did an analysis of the monetary policy transmission mechanism and the real economy in Nigeria for the period 1981-2008 using Vector Auto-regression (VAR) with dynamic Logarithmic form and Ordinary Least Squares (OLS) methods. It examines the process by which interest rate policy of the CBN actually affects the structure of interest rates, credit, aggregate demand, and output production and hence, changes in inflation rate. Findings reveal that the credit channel in the financial market for credit supply and accessibility to the private sector provide the effect of a linchpin in the process by which monetary policy transmits to the real economy. Notably, the exchange rate and interest rate channel show weak effect in monetary policy transmission to the real economy. The study recommends radical reformation and strengthening of the credit supply and access to credit to the real productive sectors of the economy in Nigeria with appropriate regulatory framework. Adequate measures should be geared towards main framing the Monetary Policy Rate (MPR) as a veritable tool to effect changes in the interest rate structure, credit and exchange rate in the Nigeria economy.

Nasko, 2016 investigate the impact of Monetary Policy on economic growth in Nigeria using a multiple regression analysis on time series data covering the period 1990-2010. It uses interest rate, money supply, financial deepening and Gross Domestic Product to measure monetary policy impact on the economy. The study found marginal impact on growth due to change in monetary policy which includes price stability, maintenance of balance of payment equilibrium, full employment and economic growth. The variables were also found to have marginal impact on the economic growth of Nigeria recommends that the government should initiate effective monetary policy framework through money supply, interest rate and financial deepening to adequately stabilize prices, reduce poverty and inequality for a holistic macroeconomic growth.

Ebira and Ogunyinka (2018) empirically investigates if the bank lending channel of monetary policy transmission exists in Nigeria using the Vector Error Correction Model (VECM) to analyzed quarterly time series data covering the period of 2002:1 to 2017:1. Result shows the existence of three co-integrating relationship among the variables, identified as loan, demand and supply by testing for exclusion and exogeneity restrictions on the co-integrating relationships. The study also reveals that loan supply was significant and positively associated with borrowing rate but negatively significant with lending equation which supports the existence of a lending channel for monetary transmission process. It recommends that the CBN should adequately control the credit rates when formulating and implementing its monetary transmission policies.

Donatus and Mordecai, (2016) empirically examined the impact of domestic debt on economic growth of Nigeria for the period 1985-2014 using annual time series data on variables as gross domestic product, treasury bonds, development stocks, federal government of Nigeria bonds and interest rate, sourced from the Central Bank of Nigeria Statistical Bulletin, 2014. The study employed the Augmented Dickey Fuller Unit Root test and the Vector Autoregression method of analysis. The findings of the multivariate Vector Autoregression model revealed that domestic debt plays an important role in the growth process of Nigerian economy judging from the high R^2 (0.983616) and the statistically significant F-value (102.0618) of the gross domestic product regression. The variance decomposition analysis revealed that federal government of Nigeria bonds exert more pressure on the growth rate of gross domestic product in Nigeria. This was followed by shocks received from treasury bonds, while development stocks and interest rate contributed the least to shocks in gross domestic product. The findings of the impulse response function in support of the variance decomposition analysis showed that economic growth responded positively to shocks in federal government of Nigeria bonds and negatively to shocks in treasury bonds throughout the ten-year period. Meanwhile, the response of gross domestic product to shocks in development stocks and interest rate was unstable. The study therefore recommended that government should resort to acquiring funds majorly through federal government of Nigeria bonds since the federal government of Nigeria bonds have a highly significant positive impact on economic growth.

Methodology

The phenomenon behind this study is based on the conception or the thinking that economic performance is initiated and sustained by financial rewards such as interest income, access to credit facility or credit disbursement. These rewards and credit disbursement are influenced by monetary policy measures institutionalized by the central bank. They have the potentials to vitalize the credit disbursement system and the economy considerably to an extent that a positive influence could be directed from this monetary policy channels or shocks to credit disbursement that can drive economic performance. To symbolize this concept, algorithm of process is design. In the first stage, credit variable is measured in term of credit to the private sector while monetary policy channels are captured using interest rate and inflation rate. All these and the measure of economic performance, which is Per Capita Income, are filtered from unit roots, and ensured that they trend stationary.

Next stage involves establishing a non-linear dynamic stochastic general equilibrium (DSGE) framework that relates these variables in non-linear forms, which in turn conform to economic theories. In stage three, we linearize the non-linear relationships and introduce a first order autoregressive state variable equation, to explain the dynamic evolution of exogenous shocks, in which case the number of control variables are equal to that of exogenous or state variables. This is done so that the problem of stochastic singularity can be overcome. Thus, the linearized equations can be estimated. The fourth stage, we present the linearized equations in general forms to draw out their peculiar features. Lastly, we introduce the Kalma filter for the series of the variables, and to analyze the maximum likelihood estimation that provides the efficient estimators of the linearized equations. This design is consummated by computing impulse response functions, variance decomposition, forecast and analyzing the optimum impact of monetary policy on both credit disbursement and output in Nigeria.

The population of this study is based on macroeconomic and financial environments, in which different arrays of variables and data evolved in systematic ways. In the macroeconomic environment, variables of different household are aggregated to form measurable financial macroeconomic variables that span over infinite time dimension, while financial variables are aggregated from the financial institutions or firms. Specifically, the Nigerian macro-financial environment is explored for this study.

This study adopts the convenient sampling technique to select three categories of variables based on the availability of data. The first category that is selected is referred to as credit variable, while the second category is economic performance variable and the third are monetary policy variables. However, an economic performance variable, one credit disbursement variable and two variables (Interest rate & Inflation rate) capturing the monetary policy environment are selected for this study over a period of 1970 to 2018 on a yearly basis. The study utilized secondary data because the variables under investigation are quantitative in nature. These variables are credit to the private sector as credit variable, per capita income as economic performance variable and two variables-Interest rate and Inflation rate capturing the monetary policy environment. The data on

these variables are sourced from the various volumes of CBN statistical bulletin and World Bank bulletin for the period 1970 to 2018. The choice of this period and variables is necessitated by the inherent paucity of published data and infrequency of data spanning in Nigeria.

Operationally, Per Capita Income (PCI) is conceptualized as the total income in an economy over a defined period of time, say one year, divided by the population of the country. The Per capita income measures the market value of all income earned by an economic unit in an economy within one year and it is a major indicator of the performance of an economy (CBN, 2017). Credit to the private sector is simply the sum of credit disbursed to the private sector (which is the production nucleus of any economy) of the economy by the banks. Bank credit is defined as the credit extended by the banking institutions to the private sector of an economy such as firms and households excluding credit extended to the government and public institutions. Credit to the private sector of the Nigerian economy is hereby captured as a measure through which monetary policy shocks will affect the output performance in Nigeria. Inflation Rate is the persistent rise in the price of goods and services in an economy. Monetary authorities rely on the economic importance of inflation to control liquidity in the economy as a tight monetary policy will require selling treasury bills, while a loose policy entail buying it. This study adopts the inflation rate as a veritable tool employ by the monetary authority to regulate the level of money supply and by extension credit or currency in circulation in an economy. Interest Rate is operationally defined as the proportion of an amount that is given as credit which a lender charges as interest to the borrower expressed in percentage. Interest rate is the cost of borrowing money expressed as a percentage of the amount that is loaned. It is the proportion of a loaned amount that the lender charges as interest to the borrower and may also be the rate that is paid for holding a financial asset as investment or depositing money in a bank (CBN, 2017).

The Model

The study introduces dynamic stochastic general equilibrium (DSGE) model based on the concept that, credit is driven by interest rate and inflation rate in such a manner that they either increase or decrease. However, this increase or decrease can significantly influence money supply and economic performance. Thus, in line with Canova (2007), DeJong and Dave (2011), Ljungqvist and Sargent (2012), a nonlinear dynamic stochastic general equilibrium (DSGE) model which is linked to this concept can be specified below. The optimization of financial institution behavior produces a relationship that links current value of economic performance to its future value, future value of credit and nominal monetary policy rate which is the basis for interest rate and inflation rate. This expression can be functionally illustrated as.

$$\frac{1}{y_t} = \psi E_t \left(\frac{1}{y_{t+1}} \frac{mpr_t}{fin_{t+1}} \right) \dots\dots\dots 1$$

Where y_t is current economic performance, y_{t+1} is future economic performance, fin_{t+1} is the future financial sector credit, mpr_t is the nominal monetary policy rate, and ψ is the coefficient that explains the willingness of a consumer to delay consumption. Firm-

financial institution optimization yields equation that relates the deviation of current financial interest rate to its steady state and the expected deviation of financial interest rate to its steady state at future time and the ratio of economic performance to its natural level. This is given as.

$$\eta(fin_t - fin) = 1 - \alpha + \alpha \left(\frac{y_t}{w_t} \right)^{\delta-1} + \psi \eta E_t(fin_{t+1} - fin) \dots\dots\dots 2$$

Where $(fin_t - fin)$ and $E_t(fin_{t+1} - fin)$ are the deviation of current financial interest rate to its steady state and the expected deviation of financial interest rate to its steady state at future time respectively, w_t is the natural level of economic performance, while η, α and δ are the coefficients that connect the firm pricing decision. Based on the existence of equation 2, we can affirm that financial institutions are motivated by deviation of financial interest rate from its steady state. CBN policy optimization-The CBN adjust monetary policy rate in response to the deviation in financial indices and some other variables. We define this expression as.

$$\frac{fin_t}{fin} = \left(\frac{mpr_t}{mpr} \right)^{\frac{1}{\psi}} \exp^{\varepsilon_t} \dots\dots\dots 3$$

Note that mpr is the steady state value of monetary policy rate and ε_t is the state variable that captures all other variables that explain the proportion of variations in financial indicators that is not explained by monetary policy.

Equations 1 to 2 are nonlinear specifications; they can be linearized as follows.

$$y_t = E_t(y_{t+1}) - mpr_t + E_t(fin_{t+1}) \dots\dots\dots 4$$

$$fin_t = \psi E_t(fin_{t+1}) + h(y_t - w_t) \dots\dots\dots 5$$

$$fin_t = \frac{1}{\psi} mpr_t + \varepsilon_t \dots\dots\dots 6$$

From the performance equation, we have constrained the coefficient of monetary policy rate to -1, this is akin to economic theory-income decreases with increase in monetary policy rate. A new coefficient h is identified in equation 5, this coefficient is a complicated function of the underlying coefficients in equation 2, which cannot be identified separately. According to Woodford (2003), the income gap $(y_t - w_t)$ can be re-represented by pfg , which in the context of this study, it is referred to as performance gap. That is.

$$pfg = y_t - w_t \dots\dots\dots 7$$

This leads to.

$$s_t = E_t(w_{t+1}) - w_t \dots\dots\dots 8$$

In the light of this, equations 4 and 5 can be restated as.

$$pfg_t = E_t(pfg_{t+1}) - (mpr_t - E_t(fin_{t+1} - s_t)) \dots\dots\dots 9$$

$$fin_t = \psi E_t(fin_{t+1}) + h(pfg_t) + \varepsilon_t \dots\dots\dots 10$$

Where s_t and ε_t are exogenous state variables that cannot be observed, while pg_t and fin_t are endogenous control variables that can be observed. Therefore, equations 6, 9 and 10 are structural equations that show how the observed variables evolved as a function of the unobserved. In addition, the number of state variables are equal to number of control variables, meaning the problem of stochastic singularity cannot arise; hence, these structural equations are estimable. To measure the impact of shocks let us express the state variables in the form of first order autoregressive equations.

$$s_{t+1} = as_t + v_{1t+1} \dots\dots\dots 11$$

$$\varepsilon_{t+1} = b\varepsilon_t + v_{2t+1} \dots\dots\dots 12$$

Where v_{1t+1} and v_{2t+1} are shocks and they are the shocks to the state variables (s_{t+1} and ε_{t+1}).

In general, the linearized DSGE model can be stated in structural and reduced forms as.

$$M_0 z_t = M_1 F z_t + M_2 z_t + M_3 x_t \dots\dots\dots 13$$

$$N_0 F x_t = N_1 F z_t + N_2 z_t + N_3 x_t + B F u_t \dots\dots\dots 14$$

Where z_t , x_t and u_t are vectors of control variables, state variables and shocks respectively, while F is the forward shift, M_0 and N_0 are diagonal matrix, M_1 , M_3 , M_2 , N_1 , N_2 and N_3 are matrix of parameters. B is a selection matrix that determines which state variable that responds to shocks. The analogous state space representations of equations 13 and 14 are.

$$z_t = A x_t \dots\dots\dots 15$$

$$F x_t = B x_t + G F w_t \dots\dots\dots 16$$

Where A is a policy matrix, B is a state transition matrix and G is a diagonal that measures the standard deviation of the shocks.

Estimation Technique

The study employs the maximum likelihood method. Given the normality assumption underlying the distribution of w_t in equation 3.16, one can use the Kalman-filter to derive likelihood function analytically. It is important to note that as presented in equations 15 and 16, we ignore the possible measurement errors in the data. However, the technological innovations (w_t) are Gaussian. That is, $w_t \sim iidN(0, h)$, $h = E(w_i w_i')$, $E(w_i w_j') = 0$. The application of Kalman-filter for calculating the likelihood involves 1) linear projection of the data, 2) initialization and 3) recursion.

Linear Projection:

$$\bar{x}_{t|t-j} = E(\bar{x}_t | z_{t-j}, z_{t-j-1}, \dots, z_1); t = 1, \dots, T; j = 1, \dots, T \dots\dots\dots 17$$

$$\Sigma_{t|t-j} = E(x_t - \bar{x}_{t|t-j})(x_t - \bar{x}_{t|t-j})' \dots\dots\dots 18$$

$$\bar{z}_{t|t-j} = E(\bar{z}_t | z_{t-j}, z_{t-j-1}, \dots, z_1) \dots\dots\dots 19$$

$$v_t = z_t - \bar{z}_{t|t-j} = A'(x_t - \bar{x}_{t|t-j}) \dots\dots\dots 20$$

$$E(v_t v_t') = A'(\Sigma_{t|t-j})A \dots\dots\dots 21$$

Initialization

$$E(x_t x_t') = E[(Bx_{t-1} + Gw_t)(Bx_{t-1} + Gw_t)'] \dots\dots\dots 22$$

$$E(x_t x_t') = B(x_{t-1} x_{t-1}') + G(w_t w_t') \dots\dots\dots 23$$

$$\Sigma = B(\Sigma)B' + GVG' \dots\dots\dots 24$$

Vectorization

$$vec\Sigma = vecGVG' \dots\dots\dots 25$$

$$vec\Sigma - (B \otimes B)vec\Sigma = vecGVG' \dots\dots\dots 26$$

$$(1 - B \otimes B)vec\Sigma = vecGVG' \dots\dots\dots 27$$

$$vec\Sigma = (1 - B \otimes B)^{-1}vecGVG'$$

3.28

Where $\otimes$ is the kronecker product, note that vec is used to slack the $M \times N$ matrix to $MN \times 1$ vector. As indicated by Beccarini and Mutschler (2012), we initialize the Kalman-filter using the unconditional expectation of x_t .

$$\bar{x}_1 = BE(x_0) + GE(w_1) ; \bar{x}_1 = 0; E(w_1) = 0 \dots\dots\dots 29$$

$$vec\Sigma_{1|0} = E[(x_1 - \bar{x}_1)(x_1 - \bar{x}_1)'] \dots\dots\dots 30$$

$$E[(x_1 - \bar{x}_1)(x_1 - \bar{x}_1)'] = (1 - B \otimes B)^{-1}vecGVG' \dots\dots\dots 31$$

$$vec\Sigma_{1|0} = (1 - B \otimes B)^{-1}vecGVG' \quad 3.32$$

Recursion

$$v_t = z_t - \bar{z}_t = z_t - A'\bar{x}_t \dots\dots\dots 33$$

$$E(v_t v_t') = A'\Sigma A \dots\dots\dots 34$$

$$A'\Sigma A = \Omega_t \dots\dots\dots 35$$

Based on this filtering data generating process (DGP), We write the likelihood function as.

$$like(z|v) = \prod \left(\frac{1}{\sqrt{2nT\pi\Omega_t}} \right) \exp \left(-\frac{v_t' v_t}{2\Omega_t} \right) \dots\dots\dots 36$$

$$Inlike(z|v) = -0.5nT \ln 2\pi - 0.5 \sum_{t=1}^T \ln \Omega_t - 0.5 \sum_{t=1}^T v_t' \Omega_t^{-1} v_t \dots\dots\dots 37$$

We maximize equation 37 to obtain the parameters of the DSGE specified for this study with aid of STATA 15. The results will be discussed in chapter four.

Data Presentation, Results and Discussion

Primarily, this study is conducted to examine the theoretical and structural relationship between economic performance (per capita income) and financial institutions' credit to the private sector in the Nigeria economy. The theoretical underbidding that economic performance (per capita income) is driven positively by financial institution credit disbursement is adjudged on the pedestal that monetary policy shocks played significant roles on this relationship. Thus, the connectivity of economic performance-financial institution credit disbursement relationship with the intervention of monetary authority is the preaching of this paper. Hence, we attempt to describe the features of the data employed in this study using line graphs and some selected descriptive statistics, estimate and interpret the structural relationship between economic performance and financial institution credit to the private sector; and finally conduct post estimation test to examine the impact of monetary policy shocks on both economic performance and financial institution credit to the private sector indicators. The pattern of their descriptive statistics is shown below.

Statistical Description of Included Variables

Appropriate statistics are employed to describe the features of the variables fitted in the DSGE models developed for the country. The summary of these statistics is given in table 1.

Table 1: Descriptive Statistic Results

Statistic	Ngpki
Mean	0.049408
Std.Dev	0.271653
Skewness	1.476106
Kurtosis	7.7425
Statistic	Ngcph
Mean	9682403
Std.Dev	5.97E+07
Skewness	5.918364
Kurtosis	36.02703
Statistic	Ngintsp
Mean	0.061979
Std.Dev	0.028467
Skewness	-0.46549
Kurtosis	2.367444
Statistic	Ngctp
Mean	0.149945
Std.Dev	0.059358
Skewness	2.546196
Kurtosis	9.866371
Statistic	Nginf
Mean	0.191698
Std.Dev	0.173093
Skewness	1.749335
Kurtosis	4.841658

Note that ngkpi is described as Nigerian per capital income, ngctp represent Nigerian credit to private sector, ngintsp is Nigerian interest rate spread, while, nginf represent Nigerian inflation rate. All the variables have been logarithmic transformed.

The average value of the logarithmic transformed per capital income is positive in the country (NGN=5%). The standard deviation of per capital income appears very high in Nigeria just about 27% standard deviation, meaning that per capital income is more volatile (unpredictable) in Nigeria as a country. Per capital income is highly skewed in the country too, but it is leptokurtic in Nigeria. Therefore, there is evidence that in the nearest future Nigerian per capital income would exhibit significant outliers. The skewness coefficients of interest rate spread for Nigeria is -0.47. Hence, interest rate spread is negatively skewed in Nigeria. The average value of interest rate spread in Nigeria has a very wide average interest rate spread that cannot support meaningful investment. Another unique feature about the interest rate spread in the country is that it exhibits leptokurtic nature and less volatile. The mean value of credit to the private sector in Nigeria is just 14%. This is just enough to inform us that in Nigeria there is existence of exclusion of the private sector from credit disbursement by the financial institutions. The series of credit to the private sector is approximately asymmetric in Nigeria. It is highly less volatile in Nigeria. We equally find that credit to the private sector follows a leptokurtic nature or pattern in Nigeria. The mean value of inflation is 19% in Nigeria. This connotes that Nigeria is more inflationary effect. Inflation is highly skewed and leptokurtic in the country, but it appears it is very volatile in Nigeria.

Unit Root Test

The unit test based on ADF method is conducted to confirm the order of integration of the concerned variables, and most importantly this test precedes the estimation of DSGE model because it is required that the variables quoted in DSGE model must be free from unit root. Table 2 summarizes the ADF unit test results.

Table 2: ADF Unit Test Results

Variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
ngintsp	-3.235	-4.279	-3.556	-3.214
nginf	-5.233	-4.288	-3.560	-3.216
ngpki	-3.429	-4.279	-3.556	-3.214
ngctp	-3.425	-4.279	-3.556	-3.214

Note that comparison is based on absolute values

The absolute ADF statistic for per capital income is 3.43 for Nigeria. At 10% critical value, the null hypothesis of unit root is rejected, implying that the variable (per capital income) is stationary in the country. Interest rate spread displays ADF statistic that is larger than the critical value at 10%. Likewise, inflation and credit to the private sector exhibit asymptotic ADF statistic. Therefore, in nutshell, there is no unit root characterizing the variables of interest.

DSGE Estimated Results for Nigeria

The uniqueness of this study is to examine if the link between economic performance (per capita income) and financial institutions' credit to the private sector follows the conventional theoretical framework using the largest economy of the African world, the most emerging economy, Nigeria as a sample. The reason for this is to check if the signs of the parameter of the concerned variables are the same in line with economic theories in Nigeria. Some previous study results have clarified that the parameter of credit to the private sector is not the same in other countries. This uncertainty in parameter estimate is robustly checked using Nigeria (one of the biggest economies in Africa) as case study. Thus, the results of the DSGE on Nigeria economy are reported in table 4.

Table 4: Estimated DSGE Results for Nigeria

Coef-notation	Coef.	Std. Err.	z	P-value
rhoul	.0500421	.1191956	0.42	0.675
rhog	.654039	.1174193	5.57	0.000
rho_e	.9778405	.0393095	24.88	0.000
rho_w	.9608487	.0338814	28.36	0.000
1/beta	.1397151	.3259193	0.43	0.668
beta	7.15742	16.69641	0.43	0.668
kappa	15.70436	34.79144	0.45	0.652
psi	194.731	447.0203	0.44	0.663
coppa	-4.847625	17.8594	-0.27	0.786
alpha	-.0337285	.0333859	-1.01	0.312

Note that the DSGE model estimated is defined as: $(ngpki = (1/\beta) * E(F.ngpki) + \{\kappa\} * ngcph + \{\psi\} * ngctps)$; $(ngcph = E(F.ngcph) - (nginf - E(F.ngpki) - g), \text{unobserved})$; $(nginf = \{\beta\} * ngpki + \{\text{coppa}\} * ngintsp + u)$; $(ngctp = \{\alpha\} * nginf + ngctps)$; $(ngctp = ngctps)$; $(ngintsp = ngintsp)$; $(F.u = \{\text{rhoul}\} * u, \text{state})$; $(F.g = \{\text{rhog}\} * g, \text{state})$. Where $1/\beta$, κ and ψ are the coefficient notation for one period ahead Nigeria per capital income ($ngpki$), κ is the coefficient notation for Nigeria capitalization per head ($ngcph$), ψ is the coefficient notation for Nigeria credit to private sector ($ngctp$), coppa is coefficient notation for Nigeria interest rate spread ($ngintsp$), α is the coefficient notation for Nigeria inflation ($nginf$), β is the notation for Nigeria current period per capital income ($ngpki$). The observed control variables are per capital income, credit to the private sector, interest rate spread and inflation, The most plausible unobserved control variable is capita per head, u , g , $ctps$ and $intsp$ are the unobserved state variables, rhoul , rhog , rho_e and rho_w are the coefficient notations for the current period state variables u , g , $ctps$ and $intsp$ respectively, u is the variation in inflation that is not captured by per capital income, g is the movement in capita per head that is not captured by one period ahead per capital income, inflation and one period ahead capita per head, $ctps$ is the movement in credit to the private sector that is not captured by inflation.

The structural parameters kappa and psi for the Nigerian fitted DSGE model have the right theoretical sign. We notice that it is 15.70 for kappa and 194.73 for psi. Though these parameters may be quite smaller in other countries. Therefore, there is evidence of positive relationship between financial institutions' credit to the private sector and economic performance- per capita income in Nigeria. A wide spread of credits through different channels such as micro finance banks, insurance companies, cooperative society and deposit money banks could transform the Nigerian economy from the lowest ebb to a performing economy where the per capita income will be substantially high like that of US. The parameter $1/\beta$ is positive for the country Nigeria, 13 percent in Nigeria. This implies that Nigerian current economic performance has positive association with future economic performance. Any increase or decrease in current income performance would be reflected in the future income performance.

The value of alpha is negative in Nigeria. This reveals that the inflation in Nigeria is capable to erode the value of credit to the private sector. Meaning that creditors pay heavenly today for what was borrowed yesterday in Nigeria due to negative impact of inflation on credit to the private sector. The reverse may be the case in other economies where the presence of inflation does not reduce the value of credit but rather it boosts credit through the multiplier effect of stable prices on investments, which the borrowed funds are utilized. Amazingly, the parameter beta is positive for Nigeria. Hence, we affirm that in Nigeria, any increase in per capital income leads to a rise in domestic prices. The only difference is that the rise in Nigeria is astronomical and dwindles sharply over time. Unfortunately, the interest rate spread that can be used to curtail prices is ridiculously wide in Nigeria. The unidentified state variables follow significant dynamic process in Nigeria. The impact of the shocks from these state variables on the concerned control variables are capture by policy matrix, and the results are presented in table 5.

Table 5: Impact of Nigerian Monetary Policy Shocks on Control Variables

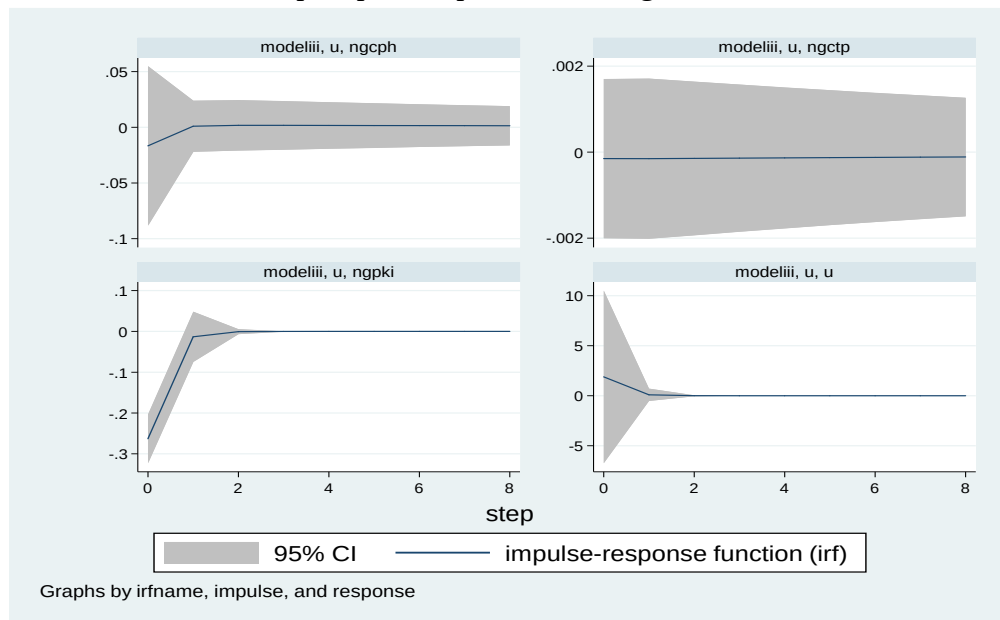
	Coef.	Std. Err.	z	P-value
ngpki				
u	-.1393865	.3230377	-0.43	0.666
g	.2764521	.8847321	0.31	0.755
ngctps	.0839103	.2248782	0.37	0.709
ngintps	.8744924	.7792753	1.12	0.262
ngcph				
u	-.0088135	.03189	-0.28	0.782
g	.0160436	.0673899	0.24	0.812
ngctps	-12.39518	9.895293	-1.25	0.210
ngintps	.048244	.1065113	0.45	0.651
nginf				
u	.0023525	.018221	0.13	0.897
g	1.978684	2.294673	0.86	0.389
ngctps	.6005816	.3644178	1.65	0.099
ngintps	1.411484	.8204789	1.72	0.085
ngctp				
u	-.0000793	.0006467	-0.12	0.902

g	-.0667381	.1340261	-0.50	0.619
ngctps	.9797433	.0265249	36.94	0.000
ngintsp	-.0476073	.055621	-0.86	0.392
ngintsp				
u	2.43e-17	1.92e-11	0.00	1.000
g	-3.33e-16	1.56e-10	-0.00	1.000
ngctps	-1.14e-18	1.64e-12	-0.00	1.000
ngintsp	1	1.33e-10	7.5e+09	0.000

Note that the results are listed equation by equation. The first block is monetary equation for per capital income, the second is monetary policy equation for capitalization per head, third is monetary policy equation for inflation, fourth is monetary policy equation for credit to the private sector, and the last is monetary policy equation for interest rate spread.

The output in the first block establishes that a shock to u reduces per capital income; while a shock to g , $ngctps$ and $ngintsp$ s influence per capital income positively in Nigeria. Again, in the second block, we find that shocks to g and $ngintsp$ s are impetus for per capital income maximization in Nigeria; but to the contrary income performance retards by the shock to u and $ngintsp$ s. Surprisingly, we could see that the shocks to u , g , $ngctps$ and $ngintsp$ s induce inflation to increase. This could account for the reason why Nigerian economy is spirally inflationary. In the fourth block, we establish that shocks to u , $ngctps$ and $ngintsp$ s exert indirect impact on per capita income performance. In different manners as shown the last block, the shocks to these variables do not significantly influence or impart interest rate spread in Nigeria. Nevertheless, this is with exception to the shock to $ngintsp$ s, which asserts positive and significant impact on per capita income in Nigerian. We now demonstrate the impact and duration of these on the control variables in figures 1 and 2.

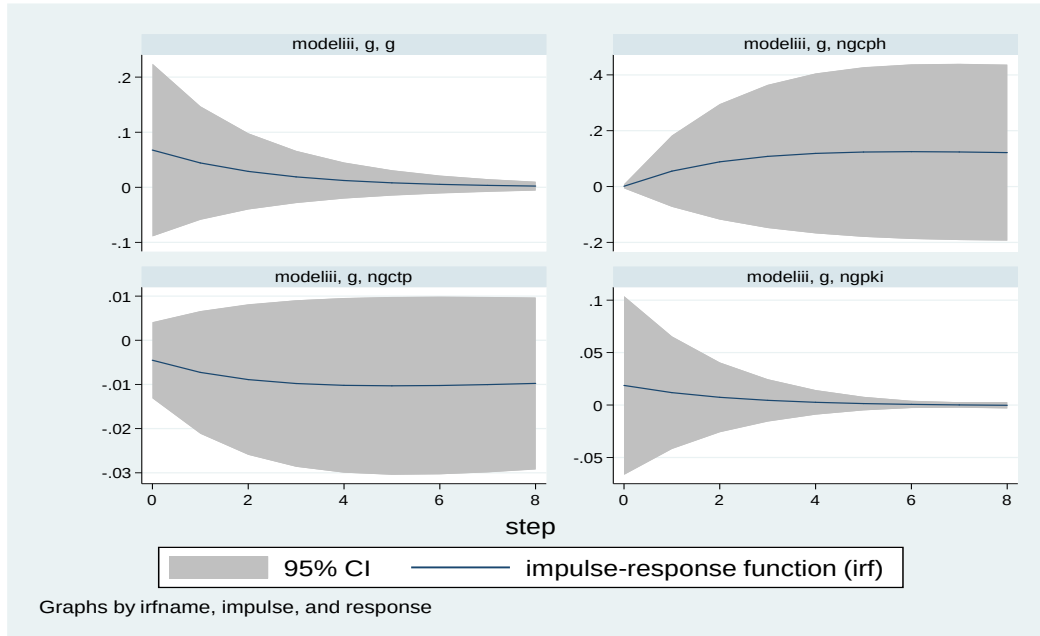
Figure 1: Shock to u to $uscpt$, $uspki$, $uscph$ and u in Nigeria



Note that u is a state variable that represents movement in inflation for reason other than the feedback between inflation and per capital income

In the top left and down left graphs of figure 1, we can see that a unit shock to state u yield a temporal decreasing impact on per capital income. Meaning any unit change in shock to u reduces per capital income only for a short time. Finally, in the top right graph, a unit shock to u induces an increasing impact on credit to the private sector. This impact is however, short lived, because it does not persist for a long time.

Figure 2: Shock to g to $uscpt$, $uspki$, $uscph$ and g in Nigeria



Note that g is a state variable that represents movement in capitalization per head for reason other than the feedback between one period ahead capitalization per head, inflation and per capital income

The down left graph shows that a unit shock to state g causes permanent decline to credit to the private sector in Nigeria. Differently, in the down left graph, a unit shock to g induces temporal decline to economic performance. Finally, in the top right graph, a shock to g yields temporal increase to capita per head. Thus, the state variable g is very central in Nigerian economy, since it yields significant impact on factors that matter in the economy.

Concluding Remarks

The preaching of this paper is to examine the theoretical and structural relationship between per capita income and financial institutions' credit to the private sector in the Nigeria economy. The underpinning theoretical idea is that per capita income is driven positively by financial institutions' credit disbursement which is based on the pedestal that monetary policy shocks played significant roles on this relationship. We employ the non-linear dynamic stochastic general equilibrium (DSGE) framework

that relates these variables in non-linear forms, which in turn conform to economic theories. We linearize the non-linear relationships and introduce a first order autoregressive state variable equation, to explain the dynamic evolution of exogenous shocks, in which case the number of control variables are equal to that of exogenous or state variables. The linearized equations are estimated. This design is consummated by computing impulse response functions, variance decomposition, forecast and analyzing the optimum impact of monetary policy on both credit disbursement and per capita income in Nigeria.

The findings reveal that there exists positive relationship between credit to the private sector and per capita income in Nigeria. Credits through micro finance banks, insurance companies, cooperative society and deposit money banks channel help to transform the earning capacity of Nigerian from the lowest ebb to a situation where the per capita income will be substantially high. The results reveal that the current income per head of Nigerians exhibit positive association with future income per head. Any increase or decrease in current income per head would be reflected in the future income per head of the economy. The results also reveal that inflation in Nigeria is capable of eroding the value of credit to the private sector. Implying that creditors pay heavily today for what was borrowed yesterday in Nigeria due to negative impact of inflation on credit to the private sector. The reverse may be the case in other economies where the presence of inflation does not reduce the value of credit but rather boosts the value of credit through the multiplier effect of stable prices on investments. The parameter beta is positive for Nigeria, affirming that in Nigeria, any increase in per capital income leads to a rise in domestic prices (inflation).

Unfortunately, the interest rate spread that can be used to curtail prices is ridiculously wide in Nigeria. The unidentified state variables follow significant dynamic process in Nigeria and the impact of the shocks from these state variables on the concerned control variables are capture by policy matrix by the monetary authorities. The impact of monetary policy shock output establish that the shock reduces per capital income; while the shock from credit to the private sector and interest rate spread influence per capital income positively in Nigeria. Again, the shocks from interest rate spread are impetus for per capital income maximization in Nigeria; however, to the opposite, per capita income is retards by the shock to the interest rate spread. We observed that the shocks from credit to the private sector and interest rate spread induce inflation to increase. This could account for the reason why Nigerian economy is spirally inflationary. We also establish that shocks from credit to the private sector and interest rate spread exert indirect impact on per capita income.

From the results of this investigation, we hereby conclude that empirically:

1. Credits to the private sector help to transform the earning capacity of Nigerians from the lowest ebb to a situation where the per capita income will be substantially high.
2. Any increase or decrease in current income per head would be reflected in the future income per head of the economy.
3. The inflation rate in Nigeria is capable of eroding the value of credit to the private sector, such that, creditors pay heavily today for what was borrowed yesterday in Nigeria due to negative inflationary effect on credit to the private sector.

4. In Nigeria, any increase in per capital income could lead to a rise in domestic prices (inflation).
5. The impact of monetary policy shock establish that the shock reduces per capital income; while the shocks from credit to the private sector and interest rate spread influence per capital income positively in Nigeria. The shocks from interest rate spread help for per capital income maximization in Nigeria. The shocks from credit to the private sector and interest rate spread induce inflation to increase. Shocks from credit to the private sector and interest rate spread exert indirect impact on per capita income.

We observed that the rise in price in Nigeria is astronomical and that inflation in Nigeria is capable of eroding the value of credit to the private sector through reduction in the value of currency. This imply that creditors pay heavily today for what was borrowed yesterday in Nigeria due to the negative impact of inflation on credit to the private sector. On the basis of this, we recommend that reducing inflation rate in the monetary policy channel should be the major policy focus of the monetary authorities in Nigeria

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