# Monetary Policy and Net Domestic Credit: A Time variant study from Nigeria

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***Abstract***
*This study examined the effects of monetary policy on net domestic credit in Nigeria from 1990-2023. Time series data were sourced from Central Bank of Nigeria statistical bulletin. Multiple regression models were specifically estimated to ascertain the relationship between monetary policy and net domestic credit. The study modelled net domestic credit as the function of liquidity ratio; cash reserve ratio, open market operation, monetary policy rate and Treasury bill rate. The study employed the Auto-Regression Distributive Lag (ARDL) methodology in determining existence of the short-run and long-run relationships. The study found that that cash reserve ratio led to a decline in net domestic credit by about 4.9 in the long run. Treasury bill rate, liquidity reserve, cash reserve ratio and open market operation have negative relationship with net domestic credit. Treasury bill rate was found to have a positive effect on net domestic credit. From the ARDL results, the study concluded that there is significant relationship between liquidity ratio and net domestic credit. There is significant relationship between cash reserve ratio and net domestic credit in Nigeria. There is significant relationship between open market operation and net domestic credit. There is no significant relationship between monetary policy rate and net credit domestic credit in Nigeria, there is significant relationship between Treasury bill rate and net domestic credit in Nigeria and no significant relationship between liquidity ratio and net domestic credit. We recommended that commercial bank lending objectives should be optimally implemented within the ambit of the monetary policy measures, monetary policy rate. Monetary policy and monetary policy variables such as open market operation, should answer the objective of bank lending to the real sector of the economy. That the liquidity ratio maintained by the commercial banks be essentially adjusted from time to time by the monetary authorities.*

***Keywords:*** *Monetary Policy, Net Domestic Credit, Monetary Policy Rate, Open Market Operation*

## INTRODUCTION

Monetary policy is a classical instrument of fine-tuning the economy to achieve desired macroeconomic goals. The Central Bank of Nigeria Decree 1969 empowered Central Bank the monetary policy functions. Monetary policy is the deliberate use of monetary instruments (direct and indirect) at the disposal of monetary authorities such as the Central Bank in order to achieve macroeconomic stability (Toby & Peterside, 2014). The application of monetary policy depends on the desired macroeconomic goals; this monetary policy can be expansionary or contractionary. Contractionary monetary policies aimed at moderating the anticipated inflationary pressures, expected to be triggered by the pre-election spending and the high

liquidity injections into the banking system through the purchase of non-performing loans (NPLs) by the Asset Management Corporation of Nigeria (AMCON) while expansionary monetary policies aimed at stimulating the economy.

Bank credit is a financial market activity where banks extend credit to deficit economic units to meet their financing needs (Ezirim, 2005). The monetary transmission mechanism describes how policy induced changes in the nominal money stock or the short-term nominal interest rates impact real variables such as aggregate output and employment (Ireland, 2005). Specific channels of monetary transmission operate through the effects that monetary policy has on interest rates, exchange rates, equity and real estate prices, bank lending and firm balance sheets (Toby & Peterside, 2014; Ngerebo-a, Nwosi & Lucky, 2016). The analysis of the monetary policy transmission proved how monetary policy changes affect the real economy, is one of the most researched areas in macroeconomic literature and a special focus for central bankers. Bank credit constitute the most economic important of bank functions. Bank credit aids in generating employment, maintain a business, take advantage of economies of scale and help to prevent economic disaster (Nwanyanwu, 2011). It helps in reactivating, expanding and modernizing all types of manufacturing enterprises through different structure of credit such as overdraft, short, long-term credit depending on the purpose of the loans.

The objective of stimulating bank credit to the real sector by the monetary authority is to achieve sectoral growth. The real sector is recognized by the monetary authorities as the productive sector of the economy. The importance cannot be over emphasized in the emerging economy like Nigeria. Its output is measure quantitatively as the contribution of the sector to Total Gross Domestic Product (GDP). The sector is important for variety of reasons, it produces and distributes tangible goods required to satisfy aggregate demand and aggregate supply in the economy (Adegbite, 2010). Second performance of the sector can be used to measure the effectiveness of monetary and macroeconomic policies (Adediran and Obasan, 2010). Third a vibrant industrial sector is capable of generating income, create employment absorb idle resources and increase capacity utilization which is prerequisite for economic growth (Mike, 2010). The manufacturing sector act as a catalyst that accelerates the pace of structural transformation and diversification, this enables the country to utilize its factor endowments and to depend less on the foreign supply of finished goods or raw materials (Adediran & Obasam, 2010; Akani & Lucky, 2018). ). The sector also creates investment capital at faster rate than other sector of the economy while promoting wider and more effective linkages among different sectors by facilitating the formation capital (Toby & Thompson, 2013).

Monetary policy is one of the principal economic management tools that governments use to shape economic performance. Measured against fiscal policy, monetary policy is said to be quicker at resolving economic shocks. Monetary policy objectives are concerned with the management of multiple monetary targets among them price stability, promotion of growth, achieving full employment, smoothing the business cycle, preventing financial crises, stabilizing long-term interest rates and the real exchange rate. Experience shows that emphasis is usually placed on maintaining price stability or ensuring low inflation rates.
The effectiveness of monetary policy on credit allocation is still an issue under intense debate particularly related to the efficacy of the transmission. Research carried out on the choice of optimal monetary policy instrument in Nigeria; Kehoe (2007) suggested further research to

accommodate more realistic features in the economy like the exchange rate and foreign trade, the government sector and consumption behavior.

Several research studies have been done in relation to monetary policy and commercial banks credit, Edwin (2010) did a study on challenges faced by the Central Bank of Kenya in effective monetary policy transmission, Gitonga (2010) studied the relationship between interest rate risk management and commercial lending behavior, Kimoro (2017) did a survey of the foreign exchange reserves risk management strategies and commercial banks credit channels and Mbotu (2018) did a study on the impact of monetary policy rate on commercial banks' benchmark lending interest rates.
While there are many studies on the effect of monetary policy on the economy, the effect of monetary policy on sectorial credit allocation is lacking in literature, for instance Tayler and Zilberman (2014) examined the macro prudential roles of bank capital regulation and monetary policy, Kishan and Opiela (2000) used the capital-to-asset ratio as the proxy for a bank's ability to raise uninsured deposits, finding that the loan portfolios of well-capitalized banks are less sensitive to monetary policy shocks than are those of poorly capitalized banks of the same size. The studies failed to explain the relationship between monetary policy and sectorial credit allocation of commercial banks in Nigeria. From the above problems and knowledge gap this study wants to examine the relationship between monetary policy and sectorial credit allocation in Nigeria.

## LITERATURE REVIEW

### Monetary Policy

Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy. It can be described as the art of controlling the direction and movement of credit facilities in pursuance of stable price and economy growth in an economy (Chowdhury, Hoffman & Schabert, 2003). Monetary policy refers to the actions of the Central Bank to regulate the money supply which could be through discretional monetary policy instruments such as the open market operation(OMO), discount rate, reserve requirement, moral suasion, direct control of banking system credit, and direct regulation of interest rate (Loayza & Schmidt-hebbel, 2002; Akani & Lucky, 2020). Monetary policy comprises the formulation and execution of policies by the central bank to achieve the desired objective or set of objectives; the policies and decisions are aimed at guiding bank lending rates to levels where credit demand and money growth are at a level consistent with aggregate supply elasticity (Loayza and Schmidt, 2002). The objectives and goals that the 12 central bank seeks to achieve generally are low inflation (usually targeted), protection of value of currency, full employment and sustainable economic output (economic growth).

Monetary policy covers the monetary aspect of the general economic policy which requires a high level of co-ordination between monetary policy and other instruments of economic policy of the country. The effectiveness of monetary policy and its relative importance as a tool of economic stabilization varies from one economy to another, due to differences among economic structures, divergence in degrees of development in money and capital markets resulting in differing degree of economic progress, and differences in prevailing economic conditions (Faure, 2007). To achieve the desired stabilization in an economy, central banks use various monetary policy instruments which may differ from one country to another according

to differences in political systems, economic structures, statutory and institutional procedures, development of money and capital markets and other considerations. Some of the commonly used monetary policies include: changes in the legal reserve ratio, changes in the discount rate or the official key bank rate (Central bank Rate), exchange rates and open market operations. Monetary transmission mechanism is the mechanism through which changes in money supply affects the decisions of firms, households, financial intermediaries, investors and ultimately alters the level of economic activities and prices it can be thought of as encompassing the various ways in which monetary policy shocks propagate through the economy (Kuttner and Mosser, 2002).

**Monetary Policy Rate**

There is general agreement among economists and policymakers that monetary policy works mainly through interest rates. When the central bank policy is tightened through a decrease in reserve provision, for instance, interest rates rise. Interest rate rise means that the banks have to adjust their lending rates upwards. The rise in interest rates leads to a reduction in spending by interest sensitive sectors of the economy, such as housing and consumer purchases of durable goods. Therefore, the cost of credit becomes high and in most cases becomes unaffordable reducing demand for credit. Some economists and policymakers have argued that an additional policy channel works through bank credit (Keeton, 2001; Stiglitz and Weiss, 2001). In this view, monetary policy directly constrains the ability of banks to make new loans, making credit less available to borrowers who depend on bank financing. Thus, in the credit channel, restrictive monetary policy works not only by raising interest rates, but also by directly restricting bank credit.

However, Gambarcorta and Mistrulli (2004) study in Italian banks during the period 1992 to 2001 using short-term 21 interest rates and found that well-capitalized banks can shield their lending from monetary policy shocks as they have easier access to non-deposit fund raising. Interest rate denotes the time value of money as it is the rate at which an amount of money accrues over time. In economic theory, interest is the price paid for inducing those with money to save it rather than spend it, and to invest in long-term assets rather than hold cash. Rates reflect the interaction between the supply of savings and the demand for capital; or between the demand for and the supply of money (O'Hara, 2005).

The Central Bank's principal objective is formulation and implementation of monetary policy directed to achieving and maintaining stability in the general level of prices. The aim is to achieve low inflation and to sustain the value of the currency. In addition, the Central Bank aims to support Government economic policy of economic growth and employment (Monetary policy Statement, 2008). Interest rate is the price a borrower pays for the use of money they borrow from a lender/financial institutions or fee paid on borrowed assets (Crowley, 2007). Interest can be thought of as "rent of money". Interest rates are fundamental to a capitalist society‖ and are normally expressed as a percentage rate over the period of one year.

**Cash Reserve Ratio**

The reserve requirement (or cash reserve ratio) is a central bank regulation that sets the minimum fraction of customer deposits and notes that each commercial bank must hold (rather than lend out) as reserves. These required reserves are normally in the form of cash stored physically in a bank vault (vault cash) or deposits made with a central bank. The required

reserve ratio is sometimes used as a tool in monetary policy, influencing the country's borrowing and interest rates by changing the amount of funds available for banks to make loans with. Western central banks rarely alter the reserve requirements because it would cause immediate liquidity problems for banks with low excess reserves; they generally prefer to use open market operations (buying and selling government-issued bonds) to implement their monetary policy (Chodechai, 2004).

In banking, excess reserves are bank reserves in excess of the reserve requirement set by a central bank. They are reserves of cash more than the required amounts. Holding excess reserves has an opportunity cost if higher risk-adjusted interest can be earned by putting the funds elsewhere; the advantage of holding some funds in excess reserves is that doing so may provide enhanced liquidity and therefore more smooth operation of payment system. The reserve requirement can be used as an instrument of monetary policy, because the higher the reserve requirement is set, the less funds banks will have to loan out, leading to lower money creation and perhaps ultimately to higher purchasing power of the money previously in use. The effect is multiplied, because money obtained as loan proceeds can be re-deposited; a portion of those deposits may again be loaned out, and so on. Usman (2005), commenting on the factors that affect commercial banks 'lending behaviour said that, the sound and viable functioning of commercial banks in Nigeria is adversely affected by the choice of certain policy instruments for the regulation of banking operations. Such instruments include a rigidly administered interest rate structure, directed credit, unremunerated reserve requirements and stabilizing liquidity control measures like the stabilization securities of the past‖.

**Open Market Operations**

An open market operation (also known as OMO) is an activity by a central bank to buy or sell government bonds and bills on the open market. A central bank uses them as the primary means of implementing monetary policy. The usual aim of open market operations is to control the short term interest rate and the supply of base money in an economy, and thus indirectly control the total money supply. This involves meeting the demand of base money at the target interest rate by buying and selling government securities, or other financial instruments. Monetary targets, such as inflation, interest rates, or exchange rates, are used to guide this implementation. Federal Reserve has used OMOs to adjust the supply of reserve balances so as to keep the federal funds rate around the target federal funds rate established Open market operations are the principal instrument in affecting the full range of credit and monetary conditions (O' Hara M, 2005).

As the ultimate source of liquidity to the economy, the System cannot control total bank reserves precisely in the very short run because the monetary system of a modern economy must be able to respond flexibly to wide week-to-week changes in the demand for currency, bank deposits and credit that are imperfectly predictable as to timing and amount. But the System can and does exert a strong influence over the growth path of total bank reserves, deposits and credit by varying over time the division between reserves provided without strings through open market operations and those provided with strings through the discount window. Through open market operations, a central bank influences the money supply in an economy directly. Each time it buys securities, exchanging money for the security, it raises the money supply.

Conversely, selling of securities lowers the money supply. Buying of securities thus amounts to printing new money while lowering supply of the specific security. The main open market operations are: Temporary lending of money for collateral securities ("Reverse Operations" or "repurchase operations", otherwise known as the "repo" market). These operations are carried out on a regular basis, where fixed maturity loans (of one week and one month for the ECB) are auctioned off; Buying or selling securities ("direct operations") on adhoc basis and foreign exchange operations such as forex swaps (Chodechai, 2004). Treasury bills are the least risky and the most marketable of all money market instruments used by the government to raise money by selling bills to the public. T-bills have a maturity period of 91- and 182-day.

**Loanable Funds Theory**

Under the loanable Funds theory of interest, the rate of interest is calculated on the basis of demand and supply of loanable funds present in the capital market (Bibow, 2000). The loanable funds theory of interest advocates that both savings and investments are responsible for the determination of the rates of interest in the long run while short-term interest rates are calculated on the basis of the financial conditions prevailing in an economy. The determination of the interest rates in case of the loanable funds theory of the rate of interest depends on the availability of loan amounts. The availability of such loan amounts is based on factors like the net increase in currency deposits, the amount of savings made, willingness to enhance cash balances and opportunities for the formation of fresh capitals (Bibow, 2000). The nominal rate of interest is determined by the interaction between the demand and supply of loanable funds.

**Keynesian Theory**

The Keynesian theory stated that some microeconomic-level actions if taken collectively by a large proportion of individuals and firms can lead to inefficient aggregate macroeconomic outcomes, where the economy operates below its potential output and growth rate. Most Keynesians advocate an activist stabilization policy to reduce the amplitude of the business 15 cycle, which they rank among the most serious of economic problems. Keynes argued that the solution to the Great Depression was to stimulate the economy ("inducement to invest") through some combination of two approaches: a reduction in interest rates and government investment in infrastructure.

Investment by government injects income, which results in more spending in the general economy, which in turn stimulates more production and investment involving still more income and spending. The initial stimulation starts a cascade of events, whose total increase in economic activity is a multiple of the original investment. A central conclusion of Keynesian economics is that, in some situations, no strong automatic mechanism moves output and employment towards full employment levels. This conclusion conflicts with economic approaches that assume a strong general tendency towards equilibrium. In the 'neoclassical synthesis', which combines Keynesian macro concepts with a micro foundation, the conditions of general equilibrium allow for price adjustment to eventually achieve this goal. More broadly, Keynes saw his theory as a general theory, in which utilization of resources could be high or low, whereas previous economics focused on the particular case of full utilization. Monetary policy transmission through the interest rate channel is based on the traditional Keynesian interpretation of the role of money for real interest rate movements.

**Monetary Policy and Credit Channel**

Monetary policy models describe an economy in which there is an excess supply; hence, aggregate output is demand-determined in the short to medium run. The agents in this macro model include the (a) households, (b) domestic firms, (c) the government; (d) the rest of the world provides capital, goods and services demanded by the domestic economy and a market for domestic production and (e) the central bank. In the model, the central bank has the task of anchoring the nominal side of the economy. The central bank adopts an inflation targeting framework (IT) and is a flexible inflation targeted and sets a short-term interest rate to achieve an inflation target, and, consequently provides nominal stability. There are lags and delays between a change in interest rate and inflation. Given these lags and price and wage rigidities, the use of a simple interest rate rule is required to anchor inflation in the long run.

Meanwhile, asset markets are imperfect. The nominal exchange rate is allowed to transitorily deviate from purchasing power parity (PPP) so that movements occur in the real exchange rate. In addition, the nominal short-term interest rates play the leading role as the instrument of monetary policy.

The transmission mechanism starts with the domestic interest rate policy. The overnight reverse repurchase rate is prescribed as the nominal interest rate which follows a behavioral equation required to anchor inflation in the long run (Clarida, Gali and Gertler 2000).The overnight RRP adjusts to inflationary pressure measured by the difference between the inflation forecast and the inflation target announced by the Government and the output gap.

This is seen as,

$$r_t^p = \alpha + \beta(\pi_t^*) + \rho(q_t - q_t^*) + \varepsilon, \quad (1)$$

Where $r^p$' is the reverse repurchase rate, α connotes the neutral monetary policy stance, $\rho^f$ is the one-quarter ahead inflation forecast, * is the medium-term inflation target announced by the Government, q is real output, q* is potential real output, and an error term,

The reverse repurchase rate is transmitted to the benchmark interest rate $r^d$ through the natural arbitrage condition. In the model, the benchmark interest rate is the 91-day Treasury bill rate. As seen in equation 2.1, $r^d$ is also affected by other variables, such as the overnight reverse repurchase rate $r^p$, inflation expectations $\rho^e$, foreign interest rate $r^u$, real money supply m and an error term.

$$r_t^d = \alpha + \beta r_t^p + \rho\pi_t^e + \gamma r_t^u - \vartheta m_t + \varepsilon. \quad (2)$$

Treasury bill rate is higher, the higher the overnight reverse repurchase rate, the higher the inflation expectations, the higher the foreign interest rate, and the lower the level of money supply. In this equation, there is a direct channel from the policy rate to the 91-day Treasury bill rate.

Changes in the 91-day Treasury bill rate $r^d$ are then carried over to the changes in the other market interest rates, such as lending rates is the natural arbitrage condition.

$$r_t^l = \alpha + \beta r_t^d + \varepsilon. \quad (3)$$

It is also assumed that the short-run domestic inflation is relatively sticky, indicating that inflation expectations for the short term are similarly sticky. This further implies that by controlling the nominal overnight reverse repurchase rate, the bank rate can also affect the short-term real reverse repurchase rate or the difference between the short-term rate and short-term inflation expectations. Through market expectations of future real rates, longer real rates, the overnight reverse repurchase rate is expected to lower short and longer real interest rates, and consequently affect economic activity.

Changes in the overnight reverse repurchase rate also affect bank credits as seen in equation 2.4 below

$$c_t^p = \alpha + \beta q_t - \delta(r_t^l - \pi_t^e) + \varpi m_t + \gamma k_t - \vartheta n + \varepsilon, \quad (4)$$

where $C^p$ is private credit, q is real output, $r^1$ is bank lending rate,  is inflation expectations, m is money supply, k is the bank regulatory capital to risk-weighted assets (in excess of the required bank rate capital to asset ratio), flies is banks' non-performing loan ratio and an error term.

Meanwhile, k is expected to have a positive coefficient as higher capital buffer (relative to the regulatory capital) to absorb losses helps banks to expand credit. In Bayoumi and Melander (2008), the balance sheets of firms and households are included. In the absence of a longer and consistent series for the Philippines, the model is limited to the consolidated balance sheets of commercial/universal banks, thrift and rural banks. In the case of n, a negative coefficient is expected, as higher shares of non-performing loans to total loans are riskier, hence, banks are expected to be prudent in extending new loans. Meanwhile, the presence of q in model 4 reflects the feedback look from income to bank credit via the financial accelerator effect.

Bank credit together with net other items determine the level of money supply from the asset side. It should be noted that in the model, money supply is an indicator of the quantity of money that the economy requires, without the bank rate setting any target for it. From the liability side, the impact of changes in the real market interest rates $(r_t^d - \pi_t^e)$ affects currency in circulation in the monetary system as in equation 5:

$$c_t^c = \alpha + \beta q_t - \gamma(r_t^d - \pi_t^e) + \varepsilon. \quad (5)$$

Equation 5 is then added to deposit liabilities to arrive at the total money supply level (m) from the liabilities side and feeds back into model 5. To determine the impact of bank credit on spending, real personal consumption C and real investment spending I are re-specified.

Real consumption C in model 6 follows the permanent income and life-cycle hypothesis. In the long run, it is assumed to depend on real disposable income di and real wealth m. The presence of di implies that a proportion of households are "liquidity constrained" while $C^p$ implies that households are "credit constrained" in the short-run (Bayoumi and Melander, 2008; Greenlaw et al., 2008). The remaining households' consumption, however, is determined by their wealth positions. In this model, real wealth m includes real financial aspects (including the market value of domestic equity).

$$c_t = \alpha + \mu di_t + \lambda m_t + \varpi c_t^p - \gamma(r_t^d - \pi_t^e) + \varepsilon. \quad (6)$$

Meanwhile, the inclusion of the long-term real interest rate $r_t^d - \pi_t^e$ in equation 6 captures the direct substitution effect between consumption and savings. In addition, the presence of accounts for the time lag before consumption responds to changes in the real interest rate.

The desired investment spending by domestic firms $I_t$ in equation 2.6 uses the accelerator principle linking the desired fixed capital with output $q_t$, real lending rate $r_t^l - \pi_t^e$ and the exchange rate e (Montiel, 2003)

$$I_T = \alpha + \beta r_t^p + \rho \pi_t^e + \gamma r_t^u - \vartheta m_t + \varepsilon. \quad (7)$$

The impact of bank credit is seen as directly affecting investment in equation 7. In this model, technology is fixed. Moreover, firms hold inventories which represent insurance against demand surprises. However, this is taken as exogenous in the model, implying that firms make their decisions regarding capital, labor and prices first, and then make decisions about the desired level of inventories. The choice of investment demand model stems from the ease of identifying the policy instruments (in this model interest rate and exchange rates) available to monetary authorities to influence the aggregate supply resulting from investment behavior. However, in the empirical estimation, an attempt is made to produce a complete and detailed estimation of investment in terms of capital stock and employment. This is essential in determining the link between investment and production capacity and consequently the output gap

In sum, changes in interest rates and bank credits lead to changes in the real sector through consumption and investment. All the changes in spending behavior, when added up across the whole economy, generate changes in aggregate spending. Total domestic expenditure plus the balance of trade in goods and services reflects the aggregate demand in the economy, and is equal to gross domestic product (GDP). Gross domestic product (demand) feeds into the gross domestic product (production) side which consists of two sectors: the primary sector (agriculture) and the advanced sector (industry and services). The output of the agriculture sector is exogenous in the model. This leaves us with the industry and services sectors which are assumed to have excess capacity. Hence, supply responds to the level of aggregate demand. Gross domestic product feeds into banks' capital to asset ratio k in equation 8 below.

$$K_t = \alpha + \beta q_t + \varepsilon. \quad .8)$$

From Bayou and Melander (2008) bank lending standards determine changes in banks' capital to asset ratio. A limitation of equation 8 is the absence of bank lending standards. In Bayoumi and Melander (2008), bank lending standards are based on answers from the quarterly Federal Reserve Bank's survey of bank loan officers. In the initial specification, there was an attempt to include the overnight reverse repurchase rate (equation 8) in equation 8 to examine the impact of monetary policy actions on changes in bank capital. This model allows for these two feedback channels through equations 4 and 8.

$$Y_t^g = q_t - q_t^* \quad (9)$$

Potential output and the resulting gap as measure of future inflationary pressures have regained importance under the IT framework. Output gap in this model is estimated based on Dakila (2001) in which it is expressed as the difference between the log of a one quarter moving

average of supply side (industry and services) gross domestic products (depersonalized series) q and potential output $q^*$.

$$P_t^w = \alpha + \delta Y_t^g + \beta p_t^M + \theta m_t + \rho W_t + \varepsilon. \quad (10)$$

The output gap $Y^g$ then feeds into the wholesale price index $P^W$ in equation 10. The whole price index in this model is affected by the average prices of merchandise imports in pesos $P^M$ the excess liquidity as indicated by real money supply m relative to gross domestic product and the average compensation (or wages) for industry and services sectors. This specification makes the pricing decision based on a flexible mark up.Indicators of inflation expectations include the two-year ahead inflation forecast.

$$\pi_t^e = \alpha + \beta \pi_t^* + \rho \pi_t + V \pi_{t-1}. \quad (2.11)$$

The estimation of long-run inflation expectations $\pi_t^e$ in equation 2.11 follows a hybrid structure that contains both forward-looking and backward-looking expectations. The structure includes rational component of inflation, indicated by the medium-term (three to five years) inflation target announced by the Government $\pi_t^*$, and contemporaneous and inertial components indicated by current $\pi_t$, and past inflation rate $\pi_{t-1}$The rational component is based on Demertzis' and Viegi's (2005) worked on inflation targets as focal points for long run inflation expectations. The idea is that in the absence of concrete information of inflation expectations, the only information that agents have is the quantitative inflation target announced by the Government.

**The Monetarist and Transmission of Monetary Policy**

The traditional textbook (Keynesian) channel is known as the interest rate or the intertemporal substitution channel:

$$(M \uparrow \Rightarrow)\ i \downarrow \Rightarrow C \uparrow (1\uparrow) \Rightarrow Y^d \uparrow \Rightarrow y \uparrow \Rightarrow \Pi \uparrow \quad (2.12)$$

Expanding 'money' (M) reduces interest rates (i), reduces the cost of borrowing for firms (and consumers), leads to increased consumption (C) as well as investment (I) and therefore higher demand ($Y^d$), a bigger output gap (y) and finally higher prices and inflation (π)

The monetary transmission mechanism

**The interest rate channel and policy responses**

But Bernanke and Gertler (1989) pointed out that the macroeconomic response to policy-induced interest rate changes was considerably larger than implied by conventional estimates of interest elasticity's of consumption and investment

This suggests that mechanisms other than the interest rate channel may also be at work in the transmission of monetary policy

**The exchange rate channel: net exports**

The exchange-rate channel:

$$i \uparrow \Rightarrow e \downarrow \Rightarrow NX \uparrow \Rightarrow y \uparrow \Rightarrow \Pi \uparrow \quad (2.13)$$

Lower interest rates (i) lead to a depreciation of the exchange rate (e), an increase in competitiveness, an improved trade balance (due to higher net exports, NX) and increased demand, a larger output gap and finally higher inflation

Moreover.

The monetary transmission mechanism

**The exchange rate channel: import prices**

The exchange-rate channel:

$$i \downarrow \Rightarrow e \downarrow \Rightarrow P_m \uparrow \Rightarrow \Pi \uparrow \quad (2.14)$$

Exchange rate (e) depreciation also raises import prices ($P_m$), which are important determinants of firms' costs and the retail price of many goods and services: this directly affects the price level and (temporarily) inflation

An appreciation should reduce inflation (with a longer lag if prices are sticky on the downside)

The monetary transmission mechanism

**The exchange rate channel: net wealth**

The exchange-rate channel:

$$i \downarrow \Rightarrow e \downarrow \Rightarrow NW \updownarrow \Rightarrow y \updownarrow \Rightarrow \Pi \updownarrow \quad (2.15)$$

An exchange rate depreciation increases the relative value of foreign-denominated assets and liabilities and therefore net wealth (NW), affecting demand

The sign of the effect depends on the make-up of balance sheets

The monetary transmission mechanism

**Other asset price effects: investment (Tobin's q)**

The investment channel (Tobin's q):

$$i \downarrow \Rightarrow Pe \uparrow \Rightarrow q \uparrow \Rightarrow 1 \uparrow \Rightarrow y \uparrow \Rightarrow \Pi \uparrow$$

Consider two ways of increasing the size of a firm, buy another firm (and acquire 'old' capital); or invest in new capital

The ratio of the market value of a firm to the replacement cost of its assets is known as Tobin's q. Tobin (1969) argued that a firm should invest in new buildings and equipment if the stock market will value the project at more than its cost (that is, if the project's q is greater than 1).Increased equity prices ($P_e$) mean that new investment projects have become relatively cheaper to finance and therefore more attractive. The monetary transmission mechanism

**Other asset price effects: consumption**

Other asset price effects: consumption

$$i\downarrow \Rightarrow Pe\uparrow \Rightarrow TW\uparrow \Rightarrow C\uparrow \Rightarrow y\uparrow \Rightarrow \Pi\uparrow \quad (16)$$

The permanent income hypothesis postulates that consumers' spending is related to (total) wealth

Increased wealth (as a result of higher equity prices, $P_e$, say) -if it is perceived to be permanent — leads to a (much smaller) increase in (desired) consumption

The monetary transmission mechanism

**Other asset price effects: housing wealth**

Other asset price effects: housing wealth

$$i\downarrow \Rightarrow P_h\uparrow \Rightarrow TW\uparrow ?\Rightarrow C\uparrow \Rightarrow y\uparrow \Rightarrow \Pi\uparrow \quad (17)$$

Increased house prices (rh) are often associated with increased private consumption in the UK/US

Housing wealth represents greater wealth for some (but for the economy as a whole?);

Housing wealth increases available collateral and therefore reduces credit constraints; and

People may be more likely to change house or spend on improvements/consumer durables (in a process called mortgage equity withdrawal) The monetary transmission mechanism

**Bank Lending Channel of Monetary Policy Transmission**

The monetary policy transmission mechanism refers to the routes through which monetary impulses are communicated to the real sector of the economy. Mishkin, (1995), argued that to be successful in conducting monetary policy, the monetary authorities must have an accurate assessment of the timing and effect of their policies on the economy, thus requiring an understanding of the mechanism through which monetary policy affects the economy. The bank lending channel represents the credit view of this mechanism. According to this view, monetary policy works by affecting bank assets (loans) as well as banks' liabilities (deposits). The key point is that monetary policy besides shifting the supply of deposits also shifts the supply of bank loans. For instance, an expansionary monetary policy that increases bank reserves and bank deposits increase the quantity of bank loans available. Where many borrowers are dependent on bank loans to finance their activities, this increase in bank loans will cause a rise in investment (and also consumer) spending, leading ultimately to an increase in aggregate output, (Y). The schematic presentation of the resulting monetary policy effects is given by the following:

M ↑ → Bank deposits ↑ → Bank loans ↑ →I ↑ → Y ↑ (18)

(Note: M= indicates an expansionary monetary policy leading to an increase in bank deposits and bank loans, thereby raising the level of aggregate investment spending, I, and aggregate demand and output, Y, ). In this context, the crucial response of banks to monetary policy is their lending response and not their role as deposit creators. The two key conditions necessary for a lending channel to operate are: (a) banks cannot shield their loan portfolios from changes

in monetary policy; and (b) borrowers cannot fully insulate their real spending from changes in the availability of bank credit. The importance of the credit channel depends on the extent to which banks rely on deposit financing and adjust their loan supply schedules following changes in bank reserves; and also the relative importance of bank loans to borrowers. Consequently, monetary policy will have a greater effect on expenditure by smaller firms that are more dependent on bank loans, than on large firms that can access the credit market directly through stock and bond markets (and not necessarily through the banks).

**The Broad Credit Channel**

The broad credit channel, also referred to as the balance sheet effect or financial accelerator, does not require that a distinction be drawn among the alternative sources of credit. Instead, it is predicated on credit market imperfections associated with asymmetric information and moral hazard problems. Research on the credit channel was motivated, in large part, by the puzzle that monetary policy shocks that had had relatively small effects on long-term real interest rates appeared to have had substantial effects on aggregate demand. This literature attributes the magnification, or propagation, of monetary policy shocks to frictions in the credit markets Because of the information asymmetries between borrowers and lenders, external finance is an imperfect substitute for a firm's internal funds.

The broad credit channel posits that an increase in interest rates associated with a tightening of monetary policy causes deterioration in firm health, in terms of both net income and net worth. A firm's net income is impaired both because its interest costs rise and because its revenues deteriorate as the tighter monetary policy slows the economy. A firm's net worth is adversely impacted as the lower cash flows emanating from the firm's assets are discounted using the higher interest rates associated with the tightening of monetary policy. The deterioration in the firm's net income and the reduction in the collateral value of the firm's assets, in turn, cause an increase in the external finance premium that must be paid by the firm for all sources of external finance. This increase in the cost of external funds for borrowers over and above the risk-free interest rate then results in a reduction in aggregate demand in addition to that due to the increase in the risk-free interest rate associated with the interest rate channel of the transmission of monetary policy.

**The Bank Lending Channel**

With the bank lending, or credit, view, in contrast to the money view, the focus of the transmission mechanism operating through bank balance sheets shifts from bank liabilities to bank assets. When monetary policy tightens, the reduction in available bank reserves forces banks to create fewer reservable deposits, banks must then either replace the lost reservable deposits with non-reservable liabilities, or shrink their assets, such as loans and securities, in order to keep total assets in line with the reduced volume of liabilities. Typically, one would expect to observe some combination of these responses, although Romer and Romer (1990) question the extent to which banks, in an age of managed liabilities, are unable to easily replace reservable deposits.

**Bank Lending and the Transmission of Monetary Policy**

Empirical researchers investigating the bank lending view face several challenges. First, they need to determine whether a change in monetary policy does affect bank lending. Then, if bank lending is affected, the issue becomes the extent to which shifts in bank loan supply do, in fact, affect aggregate demand. The difficulties in establishing the first point are twofold. First, to what extent are banks able to insulate their loan portfolios from monetary policy shocks by

adjusting other components of their balance sheet? The second difficulty concerns identifying a bank-loan supply shock, insofar as a decline in bank loans following a tightening of monetary policy may simply reflect a decline in loan demand rather than a decline in the supply of loans. While the theoretical conditions required for bank loan supply to be affected by changes in monetary policy are clear, it is not straightforward empirically to disentangle shifts in loan supply from shifts in loan demand. At an aggregate level, Bernanke and Blinder (1992), among others, show that bank lending does contract when monetary policy becomes tighter. However, such an observed correlation may reflect a reduction in loan demand as the economy weakens in response to the tighter monetary policy, rather than reflecting a reduction in bank loan supply.

Furthermore, even if one observed an initial increase in bank loans or a notable delay in the decline in bank loans following a tightening of monetary policy, such evidence would not necessarily conflict with an inward shift in bank loan supply in response to a tightening of monetary policy. For example, the initial response of firms to a tightening of monetary policy may be an increase in loan demand resulting from the need to finance the buildup of inventories, as aggregate demand initially declines faster than production. Even though banks may decrease loan supply immediately to borrowers without loan commitments, the total amount of bank loans may temporarily increase, as banks are forced to honor existing loan commitments (Morgan, 1998; Lucky, & Tamunoiduabia, 2022). Thus, the endogeneity issues associated with using aggregate data for total loans make it impossible to obtain a clear answer.

**Empirical Review**

Toby and Zaagha (2020) empirically examined the effect of Central Bank policy rates on private sector funding in Nigeria. The purpose of the study was to examine the extent to which monetary policy affect private sector funding in Nigeria. Time series data were sourced from Central Bank of Nigeria Statistical Bulletin from 1985-2018. The study employed multiple regression models to estimate the relationship that exists between monetary transmission channels and private sector funding in Nigeria. Ordinary Least Square (OLS), Augmented Dickey Fuller Test, Johansen Co-integration test, normalized co-integrating equations, parsimonious vector error correction model and pair-wise causality tests were used to conduct the investigations and analysis. Empirical findings that Central Bank Policy rates has significant relationship with credit to private sector, credit to core private sector and no significant relationship with credit to small and medium scale enterprise sector. The study recommends the need for monetary authorities to stabilize Central bank policy rates and deposit money banks should reduce lending rate to encourage investment borrowings.

Zaagha (2020) examined the effect of money supply on private sector funding in Nigeria. The purpose of the study was to examine the extent to which monetary policy affect private sector funding in Nigeria. Time series data was sourced from Central Bank of Nigeria Statistical Bulletin from 1985-2018. Credit to private sector, credit to core private sector and credit to small and medium scale enterprises sector was used as dependent variables while narrow money supply, broad money supply, large money supply, private sector demand deposit was used as independent variables. Ordinary Least Square (OLS), Augmented Dickey Fuller Test, Johansen Co-integration test, normalized co-integrating equations, parsimonious vector error correction model and pair-wise causality tests were used to conduct the investigations and analysis. The empirical findings revealed that money supply explains 82.1 percent variation on credit to core private sector, 85.2 percent and 23.4 percent of the variation in credit to private

sector and credit to small and medium scale enterprises sector. The study conclude that money supply has significant relationship with credit to private sector, credit to core private sector and credit to small and medium scale enterprises sector. From the findings, the study recommends that Central Bank of Nigeria should induce the variations of the amount of money changes through the nominal interest rates. That the monetary authorities should ensure adequate quantity of money supply that positively affect private sector funding in Nigeria.

Zaagha and Murray (2020) examined the effect of deposit money banks policy on private sector funding in Nigeria. Time series data was sourced from Central Bank of Nigeria Statistical Bulletin from 1985-2018. Credit to private sector, credit to core private sector and credit to small and medium scale enterprises was used as dependent variables while liquidity ratio and loan to deposit ratio was used as independent variables. Ordinary Least Square (OLS), Augmented Dickey Fuller Test, Johansen Co-integration test, normalized co-integrating equations, parsimonious vector error correction model and pair-wise causality tests were used to conduct the investigations and analysis. The empirical findings revealed that deposit money banks policy explains 40.8 percent variation on credit to core private sector, 28.1 percent and 58.9 percent of the variation in credit to core private sector and credit to small and medium scale enterprises sector. The study conclude that deposit money banks policy has no significant relationship with credit to private sector and credit to core private sector but has significant relation with credit to small and medium scale enterprises sector. From the findings, the study recommends compliance to deposit money banks policies; this will enhance effective financial intermediation and increase funding of the private sector. There is also need for the regulatory authorities to harmonize the various deposit money banks policies with the objective of enhancing private sector funding. There is need to decentralize the operation of the deposit money banks in the urban cities. Policies should be formulated to extend the operation of the deposit money banks to the rural communities, this will enable the institutions to mobilize much deposit and increase credit to the private sector.

Nto, Mbanasor and Osuala (2012) examined the influence of monetary policy variables on banks' credit supply to SMEs in Nigeria. Time series data were collected on quarterly basis covering a period of 1995-2010 and were analyzed using fully Modified Least Squares (FMOLS). The results indicated that policies on interest rate and liquidity ratio were negatively and positively significant to SMEs. The study recommends that government through CBN should strengthen existing policies on the monetary policy instruments so as to increase and stabilize credit supply to SMEs.

Somoye and Ilo (2019) investigated the impact of macroeconomic instability on the banking sector lending behaviour in Nigeria between 1986 to 2005. Their study revealed the mechanism transmission of monetary policy stocks to banks operation. The result of cointegration and Vector Error correction suggests a long-run relationship between bank lending and macroeconomic instability.

Van den Heuvel (2015) in his study shows that monetary policy affects bank lending through two channels. They argued that by lowering bank reserves, contractionary monetary policy reduces the extent to which banks can accept reservable deposits, if reserve requirements are binding. The decrease in reservable liabilities will, in turn, lead banks to reduce lending, if they cannot easily switch to alternative forms of finance or liquidate assets other than loans. Punita and Somaiya (2014) on the impact of monetary policy on profitability of banks in India between 1995 and 2014 provided some dissenting evidence that lending rate has a positive and significant influence on banks' profitability, which indicates a fall in lending rates will reduce

the profitability of the banks. It was also found out that bank rate, cash reserve ratio and statutory ratio significantly affect profitability of banks negatively. Their findings were the same when lending rate, bank rate, cash reserve ratio and statutory ratio were pooled to explain the relationship between bank profitability and monetary policy instruments in the private sector.

## METHODOLOGY

The study used quasi experimental research design approach for the data analysis. The approach combined theoretical consideration with the empirical observation and extract maximum information from the available data. Therefore, the research design in this study was the quasi-experimental which allowed us to examine the relationship between the dependent and the independent variables. The data in this study was sourced from the publications of Central bank of Nigeria Statistical Bulletin. This constitutes the time series data sourced from the secondary data.

### Model Specification

$$NDC = f(LR, CR, OMO, MPR, TBR) \quad (19)$$

Transforming Equation 1 to above to methodological form

$$NDC = \alpha + \beta_1 LR + \beta_2 CRR + \beta_3 OMO + \beta_4 MPR + \beta_5 TBR + e_i \quad (20)$$

**Where:**

| | | |
|---|---|---|
| NDC | = | Net domestic credit |
| LR | = | Liquidity Ratio |
| CRR | = | Cash Reserve Ratio |
| OMO | = | Open Market Operation |
| TBR | = | Treasury Bill Rate |
| MPR | = | Monetary policy rate |
| $\beta_0$ | = | Intercept |
| $\beta_1 - \beta_6$ | = | Coefficient of the explanatory variable |
| $\mu$ | = | Error term |

### Data Analysis Method

### Auto Regression Distributive Lag (ARDL)

To estimate the specified econometric models, the study will employ the Auto Regression Distributive Lag (ARDL) approach. The ARDL model, developed by Pesaran, Shin, & Smith (2001), is a widely used technique in econometrics for analyzing the long-run and short-run relationships between variables. It has gained popularity in applied research due to its flexibility in accommodating mixed data types and addressing endogeneity concerns. The ARDL model is particularly suitable for analyzing the impact of infrastructure gaps on foreign investment, as it allows for the examination of both the immediate and delayed effects of infrastructural variables on investment. By incorporating lagged values of the dependent and independent variables, the ARDL model captures the dynamic nature of these relationships over time. The ARDL approach is appropriate when the variables in the model are integrated

of different orders, that is, they may be stationary or non-stationary. The key condition for employing the ARDL approach is that at least one variable should be integrated of order one (I (1)), while all other variables can be either stationary (I (0)) or integrated of order one (I (1)). This condition ensures the presence of a long-run equilibrium relationship among the variables.

**Regression Statistics Tests**

The Regression Statistics Tests section examines the statistical properties and goodness-of-fit measures of the estimated regression models. These tests provide important insights into the reliability and robustness of the estimated relationships between the dependent variable and the independent variables. By conducting various statistical tests, we can evaluate the significance of the estimated coefficients; assess the overall fit of the model. These tests provide valuable information about the validity of the model assumptions and the accuracy of the estimated results. The Regression Statistics Tests section plays a crucial role in evaluating the quality of the econometric models and their suitability for addressing the research objectives. It allows us to assess the reliability of the estimated relationships and make informed interpretations about the impact of the independent variables on the dependent variable. In this section, we will present the criteria for the interpretation of important statistical tests such as the t-test, F-test, R-squared and adjusted R-squared.

**T-Statistics Test**

The t-Statistics Test is a statistical test used to assess the significance of individual coefficients in a regression model. It involves calculating the t-statistic for each coefficient, which is the estimated coefficient divided by its standard error:

$t = (\beta - \beta_0) / SE(\beta)$……21

**Where**

**β** represents the estimated coefficient,

**$\beta_0$** is the hypothesized value of the coefficient under the null hypothesis

**SE (β):** is the standard error of the coefficient.

To validate or nullify a hypothesis at a significance level of 0.05 (or 5% probability), we compare the absolute value of the calculated t-statistic with the critical t-value, denoted as t_ critical. The critical t-value is determined based on the degrees of freedom (df), which is typically the sample size minus the number of estimated coefficients in the model.

**Decision Criteria:**

i. If the absolute value of the calculated t-statistic, |t|, is greater than t_critical, we reject the null hypothesis and conclude that the coefficient is statistically different from the hypothesized value at the 0.05 significance level.
ii. Conversely, if |t| calculated is smaller than t-critical, we fail to reject the null hypothesis and conclude that there is insufficient evidence to suggest a significant relationship between the independent variable and the dependent variable.

**F-Statistics Test**

The F-Statistics Test is a statistical test used to assess the overall significance of a regression model. It evaluates whether the regression model as a whole provides a better fit to the data compared to a model with no independent variables. The F-statistic is calculated by dividing the explained sum of squares (ESS) by the residual sum of squares (RSS) and adjusting for the number of independent variables and the sample size:

F = (ESS / k) / (RSS / (n - k - 1))…….22

**Where**

ESS is the sum of squared differences between the predicted values and the mean of the dependent variable,

**k:** is the number of independent variables,

**RSS:** is the sum of squared residuals,

**n:** is the sample size.

To validate or nullify a hypothesis at a significance level of 0.05 (or 5% probability), we compare the calculated F-statistic with the critical F-value, denoted as F-critical. The critical F-value is determined based on the desired significance level and the degrees of freedom associated with the numerator (k) and denominator (n - k - 1).

**Decision Criteria:**

i. If the calculated F-statistic is greater than the critical F-value, we reject the null hypothesis and conclude that the regression model as a whole is statistically significant. This means that the independent variables collectively contribute significantly to explaining the variation in the dependent variable.
ii. On the other hand, if the calculated F-statistic is smaller than the critical F-value, we fail to reject the null hypothesis and conclude that there is insufficient evidence to suggest a significant relationship between the independent variables and the dependent variable.

**Coefficient of Determination**

The coefficient of determination, denoted as R-squared (R^2), is a statistical measure that represents the proportion of the variance in the dependent variable that is explained by the independent variables in a regression model. It provides an assessment of the goodness of fit of the model. R-squared ranges from 0 to 1, where 0 indicates that the independent variables do not explain any of the variation in the dependent variable, and 1 indicates that the independent variables explain all of the variation in the dependent variable. Mathematically, R-squared is calculated as:

R^2 = 1 - (SSR / SST)……23

Where

**SSR (Sum of Squared Residual):** is the sum of the squared differences between the observed values and the predicted values from the regression model

**SST (Total Sum of Squares)**: is the sum of the squared differences between the observed values and the mean of the dependent variable. R-squared measures the proportion of the total variation in the dependent variable that is accounted for by the independent variables. A higher R-squared value indicates a better fit of the regression model to the data, suggesting that a larger percentage of the variation in the dependent variable is explained by the independent variables.

**Data Properties Tests**

**Augmented Dickey-Fuller (ADF) Test**

The ADF test is a commonly used test to assess the presence of a unit root in a time series. A unit root indicates that the series is non-stationary and exhibits a random walk pattern. The null hypothesis of the ADF test is that the series has a unit root, while the alternative hypothesis is that the series is stationary. The ADF test is conducted by regressing the differenced series on its lagged values. The general mathematical form of the ADF test equation is as follows:

$$\Delta y_t = \alpha + \beta y_{t-1} + \gamma_1 \Delta y_{t-1} + \gamma_2 \Delta y_{t-2} + \ldots + \gamma_p \Delta y_{t-p} + \varepsilon_t \ldots\ldots\ldots\ldots 24$$

**Where**

**Δ:** denotes the first difference operator,
**y_t:** represents the time series variable
**ε_t:** is the error term.
The coefficient β is estimated and tested to determine if it is significantly different from zero.

To interpret the results of the ADF test, the calculated test statistic (ADF statistic) is compared to critical values. These critical values depend on the sample size, level of significance, and the specific version of the test used (e.g., ADF-GLS, ADF-Fisher, etc.). The criteria for decision in the ADF test are as follows:

If the calculated test statistic is less negative than the critical value, we fail to reject the null hypothesis of a unit root, indicating non-stationarity.

i. If the calculated test statistic is more negative than the critical value, we reject the null hypothesis and conclude that the series is stationary.
ii. Hypothesis and conclude that the series is stationary.

**ARDL Bounds Cointegration Test**

ARDL (Autoregressive Distributed Lag) Bounds Cointegration is a method used to test for the existence of a long-run relationship or cointegration between variables in a time series setting. The ARDL bounds test allows for the analysis of cointegration even when the variables may be integrated at different orders (i.e., some variables may be stationary, while others may be integrated of order 1 or higher). The ARDL bounds co-integration model can be represented as:

$$Y_t = \alpha + \beta_1 X_t + \beta_2 Z_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 25$$

**Where**

**$Y_t$:** represents the dependent variable,
**$X_t$:**
**$Z_t$:** are the independent variables,
α: is the intercept,
**β_1 and β_2:** are the coefficients,
**$\varepsilon_t$:** is the error term.
To conduct the ARDL bounds test, the following steps are typically followed:

Determine the lag length: Choose an appropriate lag length for the model, usually based on information criteria such as the Akaike Information Criterion (AIC) or the Schwarz Information Criterion (SIC).

i. Estimate the ARDL model: Use ordinary least squares (OLS) regression to estimate the coefficients of the ARDL model.
ii. Conduct the bounds test: Calculate the F-statistic for the joint significance of the lagged variables in the model. Compare the calculated F-statistic with the critical values from the bound tables provided by Pesaran, Shin, and Smith (2001) or Narayan (2005).
iii. At a significance level of 0.05, the decision criteria for the ARDL bounds co-integration test are as follows:
iv. If the calculated F-statistic is greater than the upper critical value, the null hypothesis of no co-integration is rejected, indicating the presence of a long-run relationship between the variables.
v. If the calculated F-statistic is lower than the lower critical value, the null hypothesis of no co-integration cannot be rejected, suggesting the absence of a long-run relationship.
vi. If the calculated F-statistic falls between the upper and lower critical values, no conclusive decision can be made, and further investigation is needed.

The critical values for the ARDL bounds test are available in the works of Pesaran, Shin, and Smith (2001) and Narayan (2005) and depend on factors such as the lag length, sample size, and the type of test (e.g., level or first-difference).

## ANALYSIS AND DISCUSSION OF FINDINGS

**Table 1:** Unit root test Using Augmented Dickey- Fuller Unit Root Test.

| | | | | | | |
|---|---|---|---|---|---|---|
| NDC | -1.710413 | -3.661661 | -2.960411 | -2.619160 | 0.2294 | 1(0) |
| LR | -9.907440 | -3.661661 | -2.960411 | -2.619160 | 0.0000 | 1(1) |
| CRR | -6.594827 | -3.653730 | -2.957110 | -2.617434 | 0.0000 | 1(1) |
| OMO | -7.981873 | -3.646342 | -2.954021 | -2.615817 | 0.0000 | 1(1) |
| TBR | -5.711991 | -3.653730 | -2.957110 | -2.617434 | 0.0000 | 1(1) |
| MPR | -5.923445 | -3.646342 | -2.954021 | -2.615817 | 0.0000 | 1(1) |

Source: E-view. 12.0, 2024

ADF unit root test was conducted to check whether a time series variable is stationary or contains a unit root. Table 1 displays the unit root results of the sample data. The ADF unit root test confirms that the variables are not –stationary level except net domestic credit while other variables in the model are stationary at first difference. Therefore it implies the three variables need to be differentiated to be stationary. Stationary implies the variable has a constant mean and variance over time. ARDL was the preferred estimation method since it is

applicable in a mixed order of integration. From the result, the study proceeded to test for cointegration using the ARDL bounds test

**Table 2:** Bound Test

| F-Bounds Test | | Null Hypothesis: No levels relationship | | |
|---|---|---|---|---|
| Test Statistic | Value | Signif. | I(0) | I(1) |
| | | | Asymptotic: n=1000 | |
| F-statistic | 7.337353 | 10% | 2.2 | 3.09 |
| K | 4 | 5% | 2.56 | 3.49 |
| | | 2.5% | 2.88 | 3.87 |
| | | 1% | 3.29 | 4.37 |
| Actual Sample Size | 39 | | Finite Sample: n=40 | |
| | | 10% | 2.427 | 3.395 |
| | | 5% | 2.893 | 4 |
| | | 1% | 3.967 | 5.455 |

Source: E-view. 12.0, 2024

ARDL bounds test was used to explore the cointegration or long-run relationship between the study variables. Table 2 displays the bound cointegration test results. Based on the results of the bounds cointegration test long-run relationship exists between the variables at a 5 percent level of significance. The findings are confirmed by calculated Fstatistics (7.3) which is greater than the upper bound critical value (2.2) obtained from Narayan's (2011) critical values table for ARDL cointegration. Based on the findings, there is a need to evaluate the long-run and short-run relationship between the study variables.

**Table 3: Estimated ARDL Long Run**

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| NDC (-1) | 0.474185 | 0.143905 | 3.295136 | 0.0025 |
| LR | -3.093049 | 165.9451 | -1.863899 | 0.0021 |
| CRR | -4.918698 | 15.85553 | -2.534572 | 0.0167 |
| OMO | -4.567901 | 150.6025 | -3.033085 | 0.0050 |
| TBR (-1) | 1.271011 | 1114.174 | 1.140765 | 0.2630 |
| MPR (-1) | -1.166396 | 669.6357 | -1.741836 | 0.0918 |
| C | -6.040663 | 2756.839 | -2.191156 | 0.0363 |
| R-squared | 0.863115 | Mean dependent var | | 2695.641 |
| Adjusted R-squared | 0.826612 | S.D. dependent var | | 2529.271 |
| S.E. of regression | 1.053186 | Akaike info criterion | | 16.95620 |
| Sum squared resid | 3.3276021 | Schwarz criterion | | 17.34010 |
| Log likelihood | -3.216459 | Hannan-Quinn criter. | | 17.09394 |
| F-statistic | 23.64517 | Durbin-Watson stat | | 2.457544 |
| Prob. (F-statistic) | 0.000000 | | | |

Source: E-view. 12.0, 2024

The results, presented in Table 3 show that cash reserve ratio led to a decline in net domestic credit by about 4.9 in the long run. The sign obtained although significant confirm our expectations as increase in cash reserve reduces bank lending ability in the economy. The long-run result contradicts the shot-run result, which reported a positive relationship between reserve

requirement and net domestic credit in Nigeria. Treasury bill rate, liquidity reserve, cash reserve ratio and open market operation have negative relationship with net domestic credit. Treasury bill rate was found to have a positive effect on net domestic credit. The negative effect of liquidity reserve and interest rate confirm the expectation of the results as increase in the variables contract bank lending ability. It also confirms the trade-off relationship between earning assets and liquidity reserve in the commercial banks as illustrated by Nwankwo (1998). The positive effect of the variables confirm the findings of Gambacorta and Iannoti (2005) who studied the velocity and asymmetry in response of bank interest rates (lending, deposit, and inter-bank) to monetary policy shocks (changes) from 1985-2002 using an Asymmetric Vector Correction Model (AVECM) that allows for different behaviours in both the short-run and long-run. The findings of Van den Heuvel (2005) who argued that by lowering bank reserves, contractionary monetary policy reduces the extent to which banks can accept reservable deposits, if reserve requirements are binding, the decrease in reservable liabilities will, in turn, lead banks to reduce lending, if they cannot easily switch to alternative forms of finance or liquidate assets other than loans, Amidu and Wolfe (2008) who examined the constrained implication of monetary policy on bank lending in Ghana between 1998 and 2004 and Mohammed and Simon (2008) Somoye and Ilo (2009) investigated the impact of macroeconomic instability on the banking sector lending behavior in Nigeria between 1986 to 2005.

The negative effect of monetary policy rate on net domestic credit is contrary to the expectation of the results and the theory of expansionary monetary policy, increase in money supply is expected to enhance bank lending to the various sectors of the economy. The negative effect can be traced to noncompliance to monetary policy directives, overregulation, unattractiveness of the sectors to bank lending and increase in liquidity reserve or monetary policy shocks such as the withdrawal of all public funds from the banking sector with the advent of the Treasury single account. The study found that 82.6 percent variation in net domestic credit was explained by variation in monetary policy variables within the specified periods of the study.

Table 4: ARDL Error Correction Regression

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(NDC (-1)) | -0.019201 | 0.127529 | -0.150563 | 0.8830 |
| D(NDC (-2)) | 0.240391 | 0.130702 | 1.839234 | 0.0930 |
| D(NDC (-3)) | 0.579890 | 0.127704 | 4.540876 | 0.0008 |
| D(LR) | 3.329919 | 1.413474 | 2.355841 | 0.0381 |
| D(LR (-1)) | -7.029254 | 1.703311 | -4.126818 | 0.0017 |
| D(LR (-2)) | -7.766876 | 1.583740 | -4.904135 | 0.0005 |
| D(LR (-3)) | -4.943572 | 1.260800 | -3.920979 | 0.0024 |
| D(CRR) | 7.692394 | 4.463472 | 0.172341 | 0.8663 |
| D(CRR (-1)) | -2.816166 | 7.639796 | -3.686180 | 0.0036 |
| D(CRR (-2)) | -2.153547 | 6.394249 | -3.367943 | 0.0063 |
| D(CRR (-3)) | -7.602856 | 4.632003 | -1.641375 | 0.1290 |
| D(OMO) | -7.203996 | 5.527610 | -1.303275 | 0.2191 |
| D(OMO (-1)) | 1.589347 | 6.003283 | 2.647463 | 0.0227 |
| D(OMO (-2)) | 1.406404 | 4.962630 | 2.833990 | 0.0163 |
| D(TBR) | -0.128753 | 0.065369 | -1.969617 | 0.0746 |
| D(TBR (-1)) | 0.307695 | 0.071310 | 4.314887 | 0.0012 |
| CointEq(-1)* | -0.487907 | 0.087282 | -5.589986 | 0.0002 |

Source: E-view. 12.0, 2024

The exercise of the ARDL conducted with the comprehensive model was repeated by regressing net domestic credit with monetary policy variables. This was informed by the fact that table 2 showed a high correlation coefficient among the variables, which may have influenced the statistical significance of the regressors in the comprehensive model. Table 4 above presents the results of the bivariate error correction regression between monetary policy and net domestic credit. The corresponding sign of Error Correction Term (ECT) is negative but not significant. This means that there is a long run causality running from independent variables to the dependent variable. The negative sign of (ECT) indicates a move back towards equilibrium following a shock to the system in the previous year. However, the ECM coefficient indicates that the models can adjust at the speed of 48.7 percent annually. The coefficient of the variables defines the effect of the independent variables on the dependent variables at various lags.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

This study investigated the relationship between monetary policy and net domestic credit in Nigeria. From the findings that, the study accept the alternate hypothesis, the study concludes that there is significant relationship between liquidity ratio and net domestic credit. There is significant relationship between cash reserve ratio and net domestic credit in Nigeria. There is significant relationship between open market operation and net domestic credit. There is no significant relationship between monetary policy rate and net credit domestic credit in Nigeria, there is significant relationship between Treasury bill rate and net domestic credit in Nigeria and no significant relationship between liquidity ratio and net domestic credit

### Recommendations

From the findings of the study, we draw the following recommendations:

i. Monetary policy should be formulated to avoid negative outcome as a result of monetary policy measures and mismatch of bank lending with monetary policy, bank lending objectives should be formulated, harmonized and carefully aligned with monetary policy
ii. Commercial bank lending objectives should be optimally implemented within the objective of the monetary policy measures, monetary policy rate. Monetary policy and monetary policy variables such as interest rate, should directed to stimulate bank lending to the real sector.
iii. That the liquidity ratio maintained by the commercial banks be essentially adjusted from time to time by the monetary authorities. This can be achieved as commercial banks' liquidity ratio is increased or raised from the present 30% to the neighborhood 6 7 of 40% to enable them respond to their primary obligations (that is, servicing their demand and time deposit liabilities).
iv. As monetary policy rate has effective influence on the cost and availability of credit, it should be taken as a significant instrument of monetary policy in the Nigerian financial market. His is because all interest rate structure is dependent on the discount rates as managed by the Central bank of Nigeria.

v. An increase in the Cash reserve ratio will decrease the money multiplier which resultantly affects credit supply. Conversely, a decrease will have a reverse effect on the multiplier thereby increasing creation of credit. A low reserve ratio would enable commercial banks' capacity to create more credit. So, this investigation suggests that the reserve ratio be reduced from the present 6% to about 3.5 %. This would not place the agricultural sector (though classified as a residual sector by the commercial banks) at a disadvantaged position credit supply-wise. The suggestion is based on the premise that a high cash reserve ratio imply that banks will hold a larger proportion of loanable funds in cash assets (which are not tradeable) and therefore, reducing banks' ability to extend loans and credit.

vi. The Central Bank should intensify its efforts on the instruments of monetary and Credit policy as a means of channeling credit to the real sectors of the economy. The suggestion is made because of the encouraging compliance of the commercial banks' to guidelines of the monetary and credit policies as issued by the monetary authorities.

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