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## **Effect of Financial Inclusion on Monetary Policy Fundamentals in Nigeria (1986-2021)**

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### **Abstract**

This study examined the effect of financial inclusion on monetary policy fundamentals in Nigeria. Specifically, this study determined the effect of commercial banks savings deposit, commercial bank loans to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks respectively on liquidity ratio, cash reserve ratio, open market operation, and loan to deposit ratio of rural branches. The study covered a time frame of thirty-six (36) years that is, from 1986 to 2021 based on available data from the Central Bank of Nigeria (CBN) Statistical Bulletin. The study employed an Ex-post facto research design with the aid of the Auto-Regressive Distributed Lag (ARDL) technique to analyse the data and anchored on the Finance-Nexus Growth Theory. The result of Granger Causality test reveals that Commercial Banks Savings Deposit (CBSD) (p-value  $0.05 = 0.05$ ) have significant effect on liquidity ratio. On the other hand, commercial bank loans to small and medium scale enterprises (p-value  $0.1422 > 0.05$ ), currency in circulation (p-value  $0.1015 > 0.05$ ), number of commercial bank branches (p-value  $0.4256 > 0.05$ ), and deposits of rural branches of commercial banks (p-value  $0.9944 > 0.05$ ) have no significant effect on liquidity ratio,

cash reserve ratio, open market operation, and loan to deposit ratio of rural branches accordingly. Similarly, commercial banks savings deposit (p-value  $0.0322 < 0.05$ ) and (p-value  $0.0075 < 0.05$ ) have significant negative relationship with liquidity ratio. Commercial bank loans to small and medium scale enterprises (p-value  $0.0703 > 0.05$ ), currency in circulation (p-value  $0.9168 > 0.05$ ), and deposits of rural branches of commercial banks (p-value  $0.2484 > 0.05$ ) have positive insignificant relationship with cash reserve ratio, open market operation, and loan to deposit ratio of rural branches respectively. The Central Bank of Nigeria (CBN) should encourage Deposit Money Banks (DMBs) to develop innovative pensions/savings products to promote mobilization of short-, medium- and long-term deposits in Nigeria, based on relevant models deployed elsewhere. The CBN through the Micro, Small, and Medium Enterprises (MSME) development fund should support the commercial banks to increase their credit to Small and Medium Scale Enterprises (SMEs). The level of fund extended to SMEs reflects the level of liquidity of the banks which could aid the CBN vary the cash reserve ratio from time to time.

**Keywords:** Financial Inclusion, Monetary Policy Fundamentals

### **1. Introduction**

Integration of financial inclusion by the G20 leaders and indeed globally, is a key guidance for financial sector assessment and a pillar for multi-year global development agenda. The goal of financial inclusion seems to vary from country to country and several commitments and policies have been in difficult form for implementation. While the G20 countries dwell on comprehensive financial sector reform and development agenda, the centre for financial inclusion agency focuses on collaborative effort to enhance its goals. Government of countries around the world have taken the issue of financial inclusion as a priority in policy formulation especially, for developing countries aimed at achieving economic growth and development. Access to financial services by rural population has the tendency of mobilizing funds for investments, production and capital market development. A large number of Nigerian populations are concentrated in the rural areas which are mostly financially excluded. Also, in developing countries, access to formal financial services by the majority of poor population remains limited due to limited available financial institutions such as deposits money banks, banking outlets and other financial service providers (Ajisafe, Anyakudo, Akinkuotu & Okunade, 2018) <sup>[3]</sup>.

Nwanna and Jisike (2021) <sup>[31]</sup> stated that the five-year strategy (2019-2024) plan of the Central Bank of Nigeria is to ensure that 95% financial inclusion rate is achieved by 2024. The introduction of the N50 charge would discourage more people from using mobile banking and thus defeat its purpose. If you want to retain your customers, you cannot afford to add such money. These developments have triggered very aggressive changes in the financial services industry, introducing significant dynamism into the industry's value chain - changing mode of production, delivery and consumption of financial products and services. Nigeria economy from inception till date is faced with critical challenges of imbalances in access to finance for greater productivity (output growth) which have resulted to high rate of unemployment, decline on non-oil export and unstable demand for naira (Exchange rate). Furthermore, the poor participation of Nigerians in the formal financial sector has posed the economy and the regulator (CBN) the problem of achieving stable monetary and price stability thereby limiting savings and investment for banks and other financial institutions. More so, financial excluded group (unbanked) have impacted negatively on the transmission of monetary policy as the rural households and financial illiterate class who have little or considerable portion of money in circulation keep such quantity of money outside the financial system thereby declining the deposit base, capital strength of banks and posing great treat to the monetary policy decisions of the central bank of Nigeria. The financial inclusion strategy document envisages that financial inclusion will help CBN to achieve its core mandate of ensuring price and monetary stability in the economy by increasing the scope of savings, investment and consumption decisions that are made within the formal financial sector (Mbutor & Uba, 2013) <sup>[27]</sup>. It is also hoped that widening financial inclusion will reduce the cost of cash management, and defend the strength of the local currency, while promoting a sound financial system in the economy. Interestingly, only few studies have considered financial inclusion and its relationship with monetary policy effectiveness. For example, Mbutor and Uba (2013) <sup>[27]</sup>, using Nigerian data over the period 1980 and 2012, showed that growing financial inclusion improved the effectiveness of monetary policy. Mehrotra and Yetman (2014) <sup>[28]</sup> examined how financial inclusion influences welfare-maximizing monetary policy. They showed that "optimal monetary policy implies a positive relationship between the share of financially included households and the ratio of output volatility to inflation volatility. Lenka and Bairwa (2016) <sup>[25]</sup>, in a study of SAARC countries, found a significant impact of financial inclusion on monetary policy, meaning that increased financial inclusion can lead to reduced inflation in an economy, thus leading to increased monetary policy effectiveness. Nwanna and Jisike (2021) <sup>[31]</sup> focused on financial inclusion as it relates to economic growth. The mixed results from empirical studies of Mbutor and Uba (2013) <sup>[27]</sup>, Mehrotra and Yetman (2014) <sup>[28]</sup>, Lenka and Bairwa (2016) <sup>[25]</sup>, Nwanna and Jisike (2021) <sup>[31]</sup> among other studies necessitate the need to carry out a study on the effect of financial inclusion on monetary policy fundamentals in Nigeria. Therefore, it is against this backdrop that this study seeks to examine the effect of financial inclusion on monetary policy fundamentals in Nigeria from 1986 to 2021.

## 2. Literature Review

### Clarification of Concepts

It is widely agreed that financial inclusion is multidimensional, encompassing access to, use of and capability in relation to a range of financial services. Central Bank of Nigeria (CBN) summarised that financial inclusion is a state in which all people have access to banking and insurance services as well as financial literacy and capabilities. It has also been defined as "the state of financial system where every member of society has access to appropriate financial products and services for effective and efficient management of their resources; get needed resources to finance their businesses; and financial leverage to take up opportunities that will lead to increase in their income (Chima, 2011) <sup>[13]</sup>. The Centre for Financial Inclusion provides a somewhat all-encompassing definition. The Centre defines financial inclusion as a state in which all who can use them have access to a full suite of quality financial services, provided at affordable prices, in a convenient manner, and with dignity for the clients. It is a state where financial services are delivered by a range of providers, most of them private sector, and reach everyone who can use them, including the poor, disabled, rural, and other excluded populations.

Monetary Policy can be said to be a deliberate action of the monetary authorities of a country that affects quantity, cost and availability of money supply and credit with the aim to realising targeted economic goals as well as ensuring stability in the balance of payment position (Umeora, 2016) <sup>[48]</sup>. The action is carried out through changing money supply and or interest rates to control the level of money supply in the economy. The Central Bank of Nigeria (CBN) is the organ that has the responsibility for conducting monetary policy in Nigeria. The growing connection between capital markets and monetary policy not only appeals to investors but also to monetary authorities and financial institutions owing to the influence of monetary policy adjustments on the operation of the market which is important in order for investors to assess risk exposures and maximize returns from their investment in securities. (Lu, Zhou & Kou, 2013) <sup>[26]</sup>.

### Anchored Theory

Theories have been documented in literature in an attempt to discuss the relationship between financial inclusion and monetary policy transmission. Some of these theories include finance-growth theory, financial intermediation and financial stability theories. The finance-growth theory is adopted for the theoretical framework in this study because the finance-growth nexus believes that financial development creates a dynamic productive environment for growth through supply leading or demand-following effect. Discussions and debates on the significance of the financial system in achieving economic growth had been on going as early as the 19th century. Economists like David Hume, Henry Thornton and Richard Cantillon contributed on aspects of money circulation in the 1830's and 1840's in Great Britain. However, it was the work of Walter Bagehot, a British economists and ardent follower of Adam Smith that first proffered a novel and comprehensive description of the relationship between the financial system and the economy in his book titled, "Lombard Street: A description of the Money Market" in 1873. In his book, W. Bagehot

explains how capital spill-overs are affected by past events in the British money market as Political economists debated on its most profitable application. This theory also recognizes the lack of access to finance as a critical factor responsible for persistent income inequality as well as sluggish growth. Hence, access to a safe, easy and affordable source of finance is acknowledged as a precondition for quickening growth and reducing income disparities and poverty which create equal opportunities, enables economically and socially excluded people to integrate better into the economy and actively contribute to the development and shield themselves against economic shocks. (Serrao, Sequeira, & Hans, 2012) <sup>[44]</sup>. One of the major challenges facing financial inclusion in Nigeria is the very low financial literacy rate particularly among the rural dwellers making banking and other financial services challenging for the operators. In addition, information and telecommunication knowledge is still low in the country, making access to financial services difficult. Inadequacy and inappropriateness of awareness campaign sometimes inhibit the level understanding of financial transactions and the

ability of the illiterate to take advantage of the possibilities in financial services. Critical to awareness is the difference in the language of the target population and the language of education and therefore reduces the effectiveness of communication. An uninformed population cannot effectively use financial services (Migap, Okwanya, & Ojeka, 2015) <sup>[29]</sup>. The implication of this theory to financial inclusion and monetary policy is that an increase of financial inclusion may reduce the inflation rate in an economy, which causes the stability of the price level. In addition, individual and enterprises in an economy are also found benefited from financial inclusion as the improvement of access to financial services should help both consumers and producers to raise their welfare, productivity as well as reducing non-performing loans.

### Empirical Studies

Owing to the lack of empirical studies in the context of Nigeria, the relevant empirical works are detailed in Table 1 for precise analysis.

**Table 1:** Summary of Empirical Studies Reviewed

S. No	Author and Date	Topic/Scope	Variables Employed	Methodology	Findings
1	Nwanna and Jisike (2021)	The effects of financial inclusion on economic growth in Nigeria from 1992 to 2018	Currency outside banking, nominal GDP, currency in circulation, microfinance banks' deposits, number of commercial bank branches, commercial banks' credit to private sector, loans and deposits of rural branches of commercial banks	Granger Causality test	Currency in circulation has an insignificantly positive relationship as well as a causal effect on economic growth in Nigeria. Likewise, loans extended by rural branches of commercial banks also have a positive and significant relationship and causal effect on economic growth in Nigeria
2	Chima, Babajide, Adegboye, Kehinde and Fasheyitan (2021)	The importance of inclusive access to finance on the growth in terms of the economy in 48 sub-Saharan African (SSA) sovereign states with periodicity from 1995 to 2017	Questionnaire	Survey	This article found that there is a complimentary association between the present degree of inclusiveness of finance and economic advancement in SSA
3	Babajide, Okunlola, Lawal, Akinjare and Lawal-Adedoyin (2021)	The interplay of deposit money banks (DMBs) activities as a link between financial inclusion and economic growth per capita	Per capita growth, deposit mobilisation and credit disbursed in rural areas	Vector Error Correction Mechanism (VECM) and OLS	Deposit mobilisation and credit disbursed in rural areas are statistically significant in explaining per capita growth and thereby fulfilling the primary level of inclusion in rural areas
4	Tonuchi, Nwolisa, Obikaonu and Alase (2021)	The extent monetary policy is effective in achieving financial inclusion in Nigeria	Fin-Tech, inflation rate and lending rate	Fully modified OLS	Accounting for Fin-Tech in the model improves the effectiveness of the monetary policy on financial inclusion in Nigeria, contrary to popular assertion that Fintech impedes monetary policy effectiveness.
5	Bourainy, Salah and Sherif (2021)	The impact of financial inclusion on the inflation rate in 37 developing countries for a period of 10 years from 2009 to 2018	Financial Inclusion Index (FII) using three dimensions; access, usage, and quality of financial services, inflation rate, interest and official reserves	Principal Component Analysis (PCA) & Generalized Method of Moments (GMM)	Level of financial inclusion has an impact on decreasing the inflation rate in developing countries. It was also found that interest and official reserves have a significant positive impact on inflation rate.
6	Lahcen and Gomis-Porqueras (2021)	Impact of financial inclusion on inequality and welfare	Credit market participation, inequality and welfare	Principal Component Analysis (PCA)	They found that consumption inequality results from differences in agents' decision to access financial services
7	Oleschak (2021)	Financial inclusion and of tax	Tax revenue, inflation rate	Panel Data	The data showed a strong and

		revenue developing countries		Analysis	robust negative link between financial inclusion and inflation and a positive link between financial inclusion and tax revenue for developing countries
8	Giron, Kazemikhasragh, Cicchiello and Panetti (2021)	The determinants of financial inclusion in the least developed countries in Asia and Africa	Official savings, education and income	Probit econometric technique	The results showed that young people and women are groups excluded from financial inclusion and that education and income are two of the key pillars for increasing financial inclusion
9	Thathsarani, Wei and Samaraweera (2021)	Financial inclusion and human capital development in South Asian countries	Domestic credits to the private sector, HDI, ATMs	Panel Data	Financial inclusion has a long-run impact on human capital development in South Asian countries.
10	Afolabi (2020)	The effect of financial inclusion on inclusive growth in Nigeria 1981 to 2017	Rural loan, number of bank branches, money supply-GDP ratio, private sector credit to GDP ratio and GDP per capita.	Auto-Regressive Distributed Lag (ARDL)	Rural loan, number of bank branches and level of liquidity have a positive and significant effect on inclusive growth in the short and long run, while interest rate impede inclusive growth
11	Okoro, Obiekwe and Okoro (2020)	The impact of financial inclusion on Sub-Saharan economies: Nigeria and Ghana 1985 to 2018	Unemployment rate (UNPR) Commercial banks credit to private sector (BCPS), lending interest rates (LINT), number of rural bank branches (NRBB), Total bank loans to rural dwellers (CBLR), Bank Credit to Agriculture (CBCA) and commercial banks liquidity ratios	Dynamic panel	There exists a significant link between financial inclusion and the sampled economies
12	Usman (2020)	The impact of electronic banking on financial inclusion in Nigeria	Total number of automated teller machines, point of sale devices and internet banking	Linear regression analysis	Internet banking and automated teller machines have insignificant impact on financial inclusion while the point-of-sale devices significantly impact financial inclusion in Nigeria
13	Saraswati, Maski, Kaluge and Sakti (2020)	The effects of financial inclusion and fin-tech on effectiveness of the Indonesian monetary policy	Interest rate, cost of capital, inflation rate		The results demonstrated that financial inclusion level affects inflation rate
14	Aribaba, Adedokun, Oladele, Babatunde, Ahmodu and Olassehinde (2020)	The effect of the financial inclusion scheme on poverty alleviation among the low-income earners in Nigerian (2004 – 2019)	Loan to Depositor Ratio (LDR), Loan to Rural Areas (LRA) Financial Deeping Indicators (FDI) and Social Investment Loan (SIL) to SMEs Poverty Index (PI) and Per Capita Income (PCI)	Ordinary Least Squares (OLS) and Error Correction Model (ECM)	The study shows that financial inclusion schemes play a significant effect on poverty alleviation among the low-income earners in Nigerian. It also reduces poverty level and increases per capita income thereby enhance the standard of living through the new social investment scheme
15	Ratnawati (2020)	The effect of financial inclusion on economic growth, poverty, income inequality, and financial stability in selected countries in Asia	Banking penetration, access to banking services, and use of banking services, Poverty ratio below the national poverty line and the Gini coefficient, Bank Z-Score and bank nonperforming loans	Panel Analysis	The results from the hypothesis test shows that all dimensions of financial stability simultaneously have significant influence on economic growth, poverty, income inequality, and financial stability.
16	Ayegbeni (2020)	The challenges and prospects of agency banking and financial inclusion in Nigeria	Questionnaire	Survey	Making financial services relevant to the unbanked on a daily basis requires agency banking that would allow Nigerians to easily convert cash into electronic value
17	Fowowe (2020)	The effects of financial	Living Standards	Survey	Financial inclusion,

		inclusion on agricultural productivity in Nigeria.	Measurement Study– Integrated Surveys on Agriculture (LSMS-ISA)		irrespective of how it is measured, has exerted positive and statistically significant effects on agricultural productivity in Nigeria
17	Sakanko, David and Onimisi (2020)	The effect of financial inclusion on inclusive growth in Nigeria 2007-2018	Account ownership, access to bank, ATM and credit, loans to SMEs and internet usage, poverty, household expenditure, employment, and per capita income	ARDL bounds testing	The results demonstrated that, while increase in account ownership, and access to bank and ATM raise poverty, and access to credit, loans to SMEs and internet usage reduces employment and per capita income in the long-run
19	Omar and Inaba (2020)	The impact of financial inclusion on reducing poverty and income inequality in 116 developing countries 2004-2016	Per capita income, ratio of internet users, age dependency ratio, inflation, and income inequality	Unbalanced annual panel data	Per capita income, ratio of internet users, age dependency ratio, inflation, and income inequality significantly influence the level of financial inclusion in developing countries
20	Anisiuba, Ezeaku and Emengini (2020)	The effect of financial inclusion on entrepreneurial growth in retail and wholesale sub-sectors in Nigeria	wholesale subsectors contributions to GDP, account ownership, commercial bank branches	Correlation analysis and error correction approach	The results reveal that FI has a significant positive effect on EG particularly in the context of the retail and the wholesale subsectors contributions to gross domestic product
21	Obayori and George-Anokwuru (2020)	Financial inclusion and economic growth in Nigeria 1981-2018.	RGDP, per capita income, access to financial services	ARDL	It was revealed that both in the short-run and long-run, access and effective usage of financial services bring about a significant increase in economic growth
22	Enueshike and Okpebru (2020)	The effects of financial inclusion on economic growth in Nigeria 2000 to 2018	Contribution of financial institutions to gross domestic product (GDP), loan to small and medium enterprises (LSME), rural bank deposit (RBD) and control variable of inflation (INF)	ARDL	Loan to small and medium enterprise (LSME), rural bank deposit (RBD) and inflation (INF) has a significant effect on economic growth in Nigeria
23	Soyemi, Yunusa and Olowofela (2020)	Impact of financial inclusion on sustainable development in Nigeria	Human Development Index, loan to rural areas, number of commercial bank branches and demand deposit from the rural areas	Error Correction Model (ECM) and Fully Modified Ordinary Least Square (FMOLS)	Loan to rural areas, number of commercial bank branches and demand deposit from the rural areas all have positive significant impact on HDI in Nigeria
24	Muriu (2020)	Country institutional characteristics associated with the ownership of deposit accounts	Rule of law, formal finance, ownership of deposit accounts, fair judicial proceedings	Panel data	Financial inclusion is non-negligibly driven by the institutional context
25	Gourene and Mendy (2019)	Causal relationship between financial inclusion and economic growth in the West African Economic and Monetary Union (WAEMU) 2006 to 2015	Financial Inclusion supply rate, Financial Inclusion demand rate, RGDP	Heterogeneity panel causality	Results showed that at scale 1 (2 - 4 years), there is no causality between economic growth and Financial Inclusion indicators
26	Takyi and Leon-Gonzalez (2019)	Effectiveness of monetary policy and its implications for financially included and excluded households in Sub-Saharan African (SSA) economies	Financially excluded households, financially included, inflation rate, RGDP	Bayesian inference method	The estimation results showed that the share of financially excluded households in these economies is relatively small, usually between 35% and 42%.
27	Anthony-Orji, Orji, Ogbuabor and Onoh (2019)	The impact of monetary policy shocks on financial inclusion in Nigeria	Minimum rediscount rate, interest rate, broad money supply and deposit rates of deposit banks	Vector Autoregression Model (VAR).	Minimum rediscount rate, interest rate, broad money supply and deposit rates of deposit banks all have significant impact on financial inclusion in Nigeria, however not at the same time and magnitude

28	Nwidobie (2019)	Financial inclusion index in Nigeria: An exploratory analysis	composite value of demand, time, saving and foreign deposits of deposit money banks, number of branches (BBR), deposit in rural branches (DRB), loans granted to customers in rural areas (LRA), volume of transactions via ATM (VATM), volume of transactions via mobile bank (VMP), volume of transactions via POS (VPOS), and volume of transactions via webpay (VWBP)	Principal Component Analysis (PCA)	Number of bank branches, deposits in bank branches in rural areas, volume of transactions via POS, volume of transactions via the ATM, loans to account holders in rural areas and volume of transactions via webpay as the determining variables for measuring the level of financial inclusion in Nigeria
29	Oladimeji and Adegbite (2019)	The influence of financial inclusion on economic growth in Nigeria	RGDP, currency in circulation, number of bank branches	Ordinary Least Squares (OLS) and Granger Causality Test	The coefficient of determination indicated that 99.95% of variations in economic growth can be explained by the changes in financial inclusion variables
30	Elsherif (2019)	The relationship between financial inclusion and monetary policy transmission in Egypt of 2000 to 2017	Financial inclusion, money supply and exchange rate shocks	VECM and Granger Causality tests	The study found that financial inclusion, money supply and exchange rate shocks have some role in explaining variations in monetary policy effectiveness
31	Otiwu, Okere, Uzowuru and Ozuzu (2018)	The relationship between financial inclusion and economic growth 1992 to 2013	Total loans and advances of microfinance banks, total deposits, investments and number of microfinance banks, RGDP	Ordinary Least Square	The study reveals that the growth and development of a nation is significantly dependent on the expansion of banking and financial services to the currently financially-excluded class of citizens of the country
32	Ajisafe, Anyakudo, Akinkuotu and Okunade (2018)	Effect of financial inclusion and monetary policy on poverty level in Nigeria 1986-2015	loans and advances to SMEs, poverty level	ARDL	Economic growth fostered what could be referred to as vicious cycle of poverty in Nigeria
33	Ezenwakwelu (2018)	The effect of financial inclusion on economic growth, unemployment and human development in Nigeria 2007 to 2015	RGDP, HDI, level of unemployment,	Ordinary Least Square	Financial inclusion had an insignificant effect on GDP, very significant relationship with unemployment level and significant relationship with human development
34	Anyanwu, Ananwude and Nnoje (2018)	Effectiveness of Nigeria's microfinance model of financial inclusion on women empowerment	Questionnaire	Pearson correlation	Significant relationship between women empowerment and microfinance banks' products: rent savings, child education, new born and daily savings account
35	Wakdok (2018)	The impact of financial inclusion economic growth in Nigeria	RGDP, broad money, credit to private sector, loan deposit of the rural area and liquidity ratio of commercial banks	Error Correction Model	Financial Inclusion has a positive and significant impact on Economic Growth in Nigeria
36	Ibor, Offiong and Mendie (2017)	The impact of financial inclusion on the micro, small and medium enterprises (MSMEs) performance in Nigeria	Questionnaire	Pearson Chi-square technique	The results showed that, whereas financial inclusion positively and significantly impacts the operations and growth of MSMEs, distance to financial services access points and infrastructural deficiency challenged fast and effective access to financial services by MSMEs in Nigeria
37	Abdullahi and Fakunmoju (2017)	The effect of financial inclusion on SMEs contribution to sustainable economic growth in	Questionnaire	Pearson correlation	Financial inclusions have positive effect but do not significantly affect sustainable

		Nigeria 1970 and 2015			economic growth at 5%
38	Okoye, Adetiloye, Erin and Modebe (2017)	The effect of financial inclusion on economic growth and development in Nigeria 1986-2015	Loan to deposit ratio, financial deepening indicators, loan to rural areas, branch network, ratios of private sector credit to GDP, broad money supply to GDP, RGDP, HDI, poverty index	Ordinary Least Squares	The study shows that credit delivery to the private sector has not significantly supported economic growth in Nigeria, while financial inclusion has promoted poverty alleviation in Nigeria through rural credit delivery
39	Hung (2017)	Relationship between financial inclusion and monetary policy in Vietnam 2004 to 2015	Financial inclusion index, inflation and interest rate	Ordinary Least Squares	The results of the study indicated that an increase of financial inclusion index would lower inflation
40	Omojolaibi (2017)	Impact of financial inclusion and governance characteristics on economic progress in Nigeria 1980-2014	Investment in infrastructure, per capita GDP and income inequality	Generalised Method of Moment (GMM)	financial inclusion and governance indices have statistical relevance in determining infrastructural investment in Nigeria
41	Evans (2016)	financial inclusion and monetary policy effectiveness in Africa 2005-2014	Money supply, interest rate, inflation rate	Panel VECM	This study establishes that financial inclusion is not a significant driver of monetary policy effectiveness in Africa. On the contrary, monetary policy effectiveness is the driver of financial inclusion
42	Lenka and Bairwa (2016)	Does financial inclusion affect monetary policy in SAARC Countries?	Financial inclusion index, exchange rate, inflation rate, and interest rate	Generalized Least Square (GLS)	Financial inclusion, exchange rate, and interest rate are negatively associated with inflation in SAARC countries
43	Ene and Inemesit (2015)	Impact of microfinance in promoting financial inclusion in Nigeria 1990 - 2014	Minimum deposit amount, savings account, microfinance minimum deposit amount, interest rate, rural dwellers loans and advances	OLS	The findings showed that minimum deposit amount have a positive and significant relationship with saving
44	Nwanne (2015)	The sustainability of financial inclusion to rural dwellers in Nigeria	Questionnaires	Descriptive study and content analysis	The implication of this study is that economy cannot grow fast without proper implementation of financial inclusion to rural areas in Nigeria
45	Babajide, Adegboye and Omankhanlen (2015)	Impact of financial inclusion on economic growth in Nigeria	Capital per worker, RGDP, inflation rate	OLS	The result shows that financial inclusion is a significant determinant of the total factor of production, as well as capital per worker, which invariably determines the final level of output in the economy
46	Mbutor and Uba (2013)	The impact of financial inclusion on monetary policy in Nigeria 1980 -2012	Banks' average lending rate, foreign exchange rate of the naira number of bank branches, total number of loans and advances of commercial banks as a percentage of GDP, and aggregate of rural bank branches of deposits and loans	OLS	The result of the study supports the notion that growing financial inclusion would improve the effectiveness of monetary policy.

### 3. Methodology

This study used an “*ex-post facto*” research design to carry out research on the effect of financial inclusion on monetary policy fundamentals in Nigeria from 1986 to 2021. The data were diligently sourced from the statistical bulletin of the Central Bank of Nigeria (CBN). The dependent variable were tools of monetary policy in Nigeria, and this were disaggregated into four instruments: Liquidity Ratio (LR), Cash Reserve Ratio (CRR), Open Market Operation (OMO), and Loan to Deposit Ratio of Rural Branches of Commercial

Banks (LDR). The independent variables were five chosen index of financial inclusion as it relates the peculiarity of the Nigerian environment. There are Commercial Banks Savings Deposit (CBSD), Commercial Banks Credit to Small and Medium Scale Enterprises (CBCSME), Currency in Circulation (CIC), Number of Commercial Banks Branches (NCBB), and Deposits of Rural Branches of Commercial Banks (CBDRA).

This study adapted and modify the model of Nwanne and Jisike (2021) <sup>[31]</sup> whose study focused on financial inclusion

and economic growth in Nigeria. The original model of Nwanna and Jisike (2021)<sup>[31]</sup> is stated as:

$$NGDP = f(CBB, CIC, COB, CPS, RBD, RBL, MFBD) \quad (1)$$

Where:

NGDP = Nominal gross domestic product  
 CBB = Number of Commercial banks' branches  
 CIC = Currency in circulation  
 COB = Currency outside banks  
 CPS = Credit to private sector  
 RBD = Rural banks' depositors  
 RBL = Rural banks' loans  
 MFBD = Microfinance banks deposits

Owing to the fact that this study has four dependent variables to measure monetary policy, the model of Nwanna and Jisike (2021)<sup>[31]</sup> will be functionally modified as follows:

$$LR = f(CBSD, CBCSME, CIC, NCBB, DRBCB) \quad (2)$$

$$CRR = f(CBSD, CBCSME, CIC, NCBB, DRBCB) \quad (3)$$

$$OMO = f(CBSD, CBCSME, CIC, NCBB, DRBCB) \quad (4)$$

$$LDR = f(CBSD, CBCSME, CIC, NCBB, DRBCB) \quad (5)$$

Econometrically transforming Equ. 2-5 will result in the following:

$$\log LR = \beta_0 + \beta_1 \log CBSD_t + \beta_2 \log CBCSME_t + \beta_3 \log CIC_t + \beta_4 \log NCBB_t + \beta_5 \log DRBCB_t + \varepsilon_t \quad (6)$$

$$\log CRR = \beta_0 + \beta_1 \log CBSD_t + \beta_2 \log CBCSME_t + \beta_3 \log CIC_t + \beta_4 \log NCBB_t + \beta_5 \log DRBCB_t + \varepsilon_t \quad (7)$$

$$\log OMO = \beta_0 + \beta_1 \log CBSD_t + \beta_2 \log CBCSME_t + \beta_3 \log CIC_t + \beta_4 \log NCBB_t + \beta_5 \log DRBCB_t + \varepsilon_t \quad (8)$$

$$\log LDR = \beta_0 + \beta_1 \log CBSD_t + \beta_2 \log CBCSME_t + \beta_3 \log CIC_t + \beta_4 \log NCBB_t + \beta_5 \log DRBCB_t + \varepsilon_t \quad (9)$$

Where:

LR = Liquidity ratio  
 CRR = Cash reserve ratio  
 OMO = Open market operation  
 LDR = Loan to deposit ratio of rural bank branches  
 CBSD = Commercial banks savings deposit  
 CBCSME = Commercial banks credit to small and medium scale enterprises  
 CIC = Currency in circulation  
 NCBB = Number of commercial banks branches  
 DRBCB = Deposits of rural branches of commercial banks  
 $\beta_0$  = a constant term  
 $\beta_1 - \beta_5$  = is the coefficient of the independent variables in the equations  
 $\varepsilon$  = the error term  
 $t$  = the time trend

The a priori expectation is that  $\beta_1 - \beta_5$  is Equ. 6 – 9 should not greater than zero (0). This is on the assumption that

financial inclusion should be effective and efficient in helping the Central Bank of Nigeria (CBN) in utilizing their different tools of monetary policy.

#### 4. Analysis and Discussion of Findings Descriptive Statistics of the Data

The descriptive statistics give an insight to the mean, median, maximum, standard deviation, skewness, kurtosis, Jarque-Bera, p-value and number of observations of the data. The data descriptive statistics are shown in Table 2. Liquidity ratio, cash reserve ratio, open market operation, loan to deposit ratio of rural branches of commercial banks, commercial bank savings deposit, commercial banks loan to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks have the mean of 48.69333, 9.698611, 1740.371, 116814.2, 1309.606, 38.52500, 926.6467, 3679.278 and 58.81861 respectively. The median for the variables are 46.6500, 8.15000, 1418.86, 57.83500, 335.840, 36.6050, 524.025, 3239.00, and 12.9250 accordingly for liquidity ratio, cash reserve ratio, open market operation, loan to deposit ratio of rural branches of commercial banks, commercial bank savings deposit, commercial banks credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks. The maximum and minimum value for liquidity ratio are 104.2000 and 29.10000; 24.00000 and 1.000000 for cash reserve ratio, 4555.500 and 65.90000 for open market operation, 3699600 and 28.04000 for loan to deposit ratio of rural branches of commercial banks, 5887.650 and 4.270000 for commercial bank savings deposit, 123.9300 and 10.75000 for commercial banks credit to small and medium scale enterprises, 3325.150 and 5.700000 for currency in circulation, 6916.000 and 1367.000 for number of commercial bank branches and 427.4500 and 0.020000 for deposits of rural branches of commercial banks.

The standard deviation were observed to be 13.83336, 7.454476, 1641.780, 615694.8, 1742.587, 28.06980, 957.6947, 1663.832 and 114.7894 sequentially for liquidity ratio, cash reserve ratio, open market operation, loan to deposit ratio of rural branches of commercial banks, commercial bank savings deposit, commercial banks credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks. All the variables were positively skewed to normality. From the Kurtosis coefficients, the variables were largely not leptokurtic in nature.

The Jarque-Bera statistic p-values for all the variables disclose the non-normality of cash reserve ratio, open market operation, currency in circulation, and number of commercial bank branches at a significant level of 5%. Consequently, this study applied another econometric test of normality – Shapiro-Wilk which according to Thode (2002) as cited by Yap and Sim (2011), is the best choice and recommended by researchers as the best choice for testing the normality of data. Owing to the weakness in Jarque-Bera power to identifying the normality CRR, OMO, CIC, and NCBB, the Shapiro-Wilk normality test was presented in Table 3. The result of the Shapiro-Wilk normality test (at 5% significance level) entails that the data were normally distributed and inference from model estimations are reliable in statistical term of reference.



**Table 2:** Descriptive Statistics of Data

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P-value	Obs
LR	48.69333	46.6500	104.2000	29.10000	13.83336	1.781662	8.296543	61.12598	0.00000	36
CRR	9.698611	8.15000	24.00000	1.000000	7.454476	0.759798	2.300361	4.197997	0.12258	36
OMO	1740.371	1418.86	4555.500	65.90000	1641.780	0.307322	1.484447	4.012029	0.13452	36
LDR	116814.2	57.8350	3699600	28.04000	615694.8	5.703695	33.69793	1608.737	0.00000	36
CBSD	1309.606	335.840	5887.650	4.270000	1742.587	1.291442	3.499351	10.38096	0.00000	36
CBCSME	38.52500	36.6050	123.9300	10.75000	28.06980	1.237854	4.199591	9.460186	0.00883	30
CIC	926.6467	524.025	3325.150	5.700000	957.6947	0.825026	2.538184	4.403917	0.11059	36
NCBB	3679.278	3239.00	6916.000	1367.000	1663.832	0.241294	1.495003	3.746862	0.15360	36
DRBCB	58.81861	12.9250	427.4500	0.020000	114.7894	2.204841	6.406399	46.57328	0.00000	36

Source: Output data from E-views 10.0

**Table 3:** Shapiro-Wilk Test of Normality

Variables	Shapiro-Wilk Test Statistic	P-value
CRR	0.859784	0.00032
OMO	0.557131	0.00000
CIC	0.863600	0.00040
NCBB	0.870357	0.00058

Source: Output Data from Gretl

**ARDL Short Run Relationship  
Liquidity Ratio and Financial Inclusion Variables**

The result in Table 4 shows commercial bank savings deposits and number of commercial bank branches have a significant negative relationship with liquidity ratio, while commercial bank credit to small and medium scale enterprises, currency in circulation, and deposits of rural branches of commercial banks have an insignificant positive relationship with liquidity ratio. A unit increase in commercial bank savings deposits and number of commercial bank branches lead to a significant 2.72% and 1.97% depreciation in liquidity ratio, whereas a unit rise in commercial bank credit to small and medium scale enterprises, currency in circulation, and deposits of rural branches of commercial banks increases liquidity ratio insignificantly by 4.0%, 5.42%, and 7.67% respectively. When commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks are held constant, liquidity ratio would amount to a factor of 76.07.

The result in Table 4 shows the adjusted R-square value to be 0.618315, an insinuation that 61.83% changes in liquidity ratio was as a result of joint variation in financial inclusion variables: commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks. The F-statistic which determines if the changes in the dependent variable is significant or not, showcases that the aforementioned magnitude of changes in liquidity ratio was significantly (less than 0.05) explained by financial inclusion variables. The traditional Durbin Watson test of autocorrelation shows a value of 2.1, which implies that there is no autocorrelation in the model.

**Table 4:** ARDL Regression for LR → CBSD + CBCSME + CIC + NCBB + DRBCB

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LR(-1)	-0.031688	0.287132	-0.110359	0.9134
CBSD	-0.027208	0.011663	-2.332812	0.0322
CBSD(-1)	-0.002513	0.016928	-0.148462	0.8837
CBCSME	0.040049	0.153067	0.261645	0.7967
CBCSME(-1)	0.001820	0.145036	0.012552	0.9901

CIC	0.027230	0.030047	0.906237	0.3775
CIC(-1)	0.054214	0.045033	1.203869	0.2451
NCBB	-0.019755	0.006515	-3.032418	0.0075
NCBB(-1)	0.002410	0.006208	0.388303	0.7026
CBDRA	0.076713	0.083142	0.922673	0.3691
CBDRA(-1)	0.029799	0.090860	0.327970	0.7469
C	76.06846	26.69678	2.849349	0.0111
R-squared	0.768263	Mean dependent var	50.78483	
Adjusted R-squared	0.618315	S.D. dependent var	14.42432	
S.E. of regression	8.911446	Akaike info criterion	7.506054	
Sum squared resid	1350.036	Schwarz criterion	8.071831	
Log likelihood	-96.83778	Hannan-Quinn criter.	7.683248	
F-statistic	5.123533	Durbin-Watson stat	2.192800	
Prob (F-statistic)	0.001412			

Source: E-views 10.0 version data output

**Cash Reserve Ratio and Financial Inclusion Variables**

As can be seen in Table 5, commercial bank savings deposits and commercial bank credit to small and medium scale enterprises have insignificant positive relationship with cash reserve ratio. On the other hand, currency in circulation (insignificant), number of commercial bank branches (significant) and deposits of rural branches of commercial banks (insignificant) negative relationship with cash reserve ratio. A percentage increase in commercial bank savings deposits and commercial bank credit to small and medium scale enterprises lead to 0.46% and 7.02% appreciation in cash reserve ratio respectively. Conversely, a unit rise in currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks result in 0.4 (insignificant), 0.3 (significant), and 1.57 (insignificant) decline in cash reserve ratio. Holding commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks constant would result in 5.49 factor swelling in cash reserve ratio. From the adjusted R-square, 91.72% variation in cash reserve ratio was attributed to financial inclusion variables. There is no need to worry about the significant of this variation as the p-value (0.00) and the F-statistic (29.19) vehemently showed that financial inclusion variables were significant in explaining the changes in cash reserve ratio. The Durbin Watson is 2.5 shows that there is no element of autocorrelation in the model.

**Open Market Operation and Financial Inclusion Variables**

The result in Table 6 shows that commercial bank savings deposits and number of commercial bank branches have negative insignificant relationship with open market operation, while commercial bank credit to small and

medium scale enterprises, currency in circulation, and deposits of rural branches of commercial banks have insignificant positive relationship with open market operation. A unit increase in commercial bank savings deposits and number of commercial bank branches result in 13.50% and 20.23% depreciation in open market operation respectively. On the other hand, a percentage appreciation in commercial bank credit to small and medium scale enterprises, currency in circulation, and deposits of rural branches of commercial banks would envisage an increase by factors of 4.41, 0.26, and 0.20 in open market operation respectively. When commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks are held constant, open market operation would be valued at -1269.877.

**Table 5:** ARDL Regression for  $CRR \rightarrow CBSD + CBCSME + CIC + NCBB + DRBCB$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR(-1)	0.370253	0.158729	2.332614	0.0322
CBSD	0.004610	0.002756	1.672555	0.1127
CBSD(-1)	0.006869	0.003622	1.896452	0.0750
CBCSME	0.070238	0.036375	1.930951	0.0703
CBCSME(-1)	0.048015	0.036664	1.309590	0.2078
CIC	-0.004461	0.007104	-0.627959	0.5384
CIC(-1)	-0.004629	0.008883	-0.521163	0.6090
NCBB	-0.003443	0.001611	-2.136459	0.0475
NCBB(-1)	0.002131	0.001299	1.640640	0.1192
CBDRA	-0.015711	0.019621	-0.800741	0.4343
CBDRA(-1)	-0.053272	0.021203	-2.512486	0.0224
C	5.492055	4.334550	1.267042	0.2222
R-squared	0.949734	Mean dependent var	11.40862	
Adjusted R-squared	0.917208	S.D. dependent var	7.326080	
S.E. of regression	2.107973	Akaike info criterion	4.622835	
Sum squared resid	75.54038	Schwarz criterion	5.188612	
Log likelihood	-55.03111	Hannan-Quinn criter.	4.800029	
F-statistic	29.19982	Durbin-Watson stat	2.504219	
Prob (F-statistic)	0.000000			

Source: E-views 10.0 version data output

**Table 6:** ARDL Regression for  $OMO \rightarrow CBSD + CBCSME + CIC + NCBB + DRBCB$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OMO(-1)	0.525036	0.196987	2.665337	0.0163
CBSD	-0.135024	0.094539	-0.135765	0.8936
CBSD(-1)	1.615177	1.216274	1.327971	0.2017
CBCSME	4.418862	12.98431	0.340323	0.7378
CBCSME(-1)	19.25961	12.70536	1.515865	0.1479
CIC	0.269930	2.545152	0.106057	0.9168
CIC(-1)	-1.800634	3.224586	-0.558408	0.5838
NCBB	0.202351	0.555548	0.364236	0.7202
NCBB(-1)	0.213891	0.494643	0.432415	0.6709
CBDRA	-6.887511	7.013947	-0.981974	0.3399
CBDRA(-1)	-4.267606	7.546642	-0.565497	0.5791
C	-1269.877	1293.142	-0.982010	0.3399
R-squared	0.863834	Mean dependent var	2134.363	
Adjusted R-squared	0.775727	S.D. dependent var	1594.463	
S.E. of regression	755.0970	Akaike info criterion	16.38507	
Sum squared resid	9692916.	Schwarz criterion	16.95085	
Log likelihood	-225.5836	Hannan-Quinn criter.	16.56227	
F-statistic	9.804362	Durbin-Watson stat	2.122561	
Prob (F-statistic)	0.000024			

Source: E-views 10.0 version data output

The result in Table 6 shows the adjusted R-square value to be 0.775727, an insinuation that 77.57% changes in open market operation was as a result of joint variation in financial inclusion variables. The F-statistic which determines if the changes in the dependent variable is significant or not, showcases that the aforementioned magnitude of changes in open market operation was significantly (less than 0.05) explained by financial inclusion variables. The traditional Durbin Watson test of autocorrelation shows a value of 2.1, which implies that there is no autocorrelation in the model.

**Loan to Deposit Ratio of Rural Branches of Commercial Banks and Financial Inclusion Variables**

As can be seen in Table 7, commercial bank savings deposits, number of commercial bank branches, and deposits of rural branches of commercial banks have insignificant negative relationship with loan to deposit ratio of rural branches of commercial banks, while commercial bank credit to small and medium scale enterprises, currency in circulation have insignificant positive relationship with loan to deposit ratio of rural branches of commercial banks. A percentage increase in commercial bank savings deposits, number of commercial bank branches, and deposits of rural branches of commercial banks lead to 16.76 and 165.22 factor depreciation in loan to deposit ratio of rural branches of commercial banks. On the contrary, a unit increase in commercial bank credit to small and medium scale enterprises and currency in circulation enhances 3,303 (insignificant) and 20.90 (insignificant) factor increase in loan to deposit ratio of rural branches of commercial banks. Holding commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks constant would result in 5,570 factor depreciation in loan to deposit ratio of rural branches of commercial banks.

**Table 7:** ARDL Regression for  $LDR \rightarrow CBSD + CBCSME + CIC + NCBB + DRBCB$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LDR(-1)	-0.249398	0.273885	-0.910594	0.3752
CBSD	-16.76409	1018.366	-0.016462	0.9871
CBSD(-1)	773.6845	1251.490	0.618211	0.5446
CBCSME	3303.426	13328.19	0.247853	0.8072
CBCSME(-1)	4422.242	12642.89	0.349781	0.7308
CIC	20.90126	2778.356	0.007523	0.9941
CIC(-1)	-116.2373	3386.140	-0.034327	0.9730
NCBB	-165.2212	516.6598	-0.319787	0.7530
NCBB(-1)	61.09191	478.9945	0.127542	0.9000
CBDRA	-9582.802	8017.068	-1.195300	0.2484
CBDRA(-1)	821.3584	7488.793	0.109678	0.9139
C	-5570.707	1331413.	-0.004184	0.9967
R-squared	0.222462	Mean dependent var	144998.7	
Adjusted R-squared	-0.280651	S.D. dependent var	685287.4	
S.E. of regression	775511.2	Akaike info criterion	30.25394	
Sum squared resid	1.02E+13	Schwarz criterion	30.81971	
Log likelihood	-426.6821	Hannan-Quinn criter.	30.43113	
F-statistic	0.442172	Durbin-Watson stat	2.147117	
Prob (F-statistic)	0.914229			

Source: E-views 10.0 version data output

From the adjusted R-square, -28.06% variation in deposit ratio of rural branches of commercial banks was attributed

to financial inclusion variables. This is an indication that financial inclusion variables have not positively explained any change in loan to deposit ratio of rural branches of commercial banks. There is the need to worry about the insignificant of this variation as the p-value (0.94) and the F-statistic (0.44) vehemently showed that financial inclusion variables were insignificant in explaining the changes in loan to deposit ratio of rural branches of commercial banks. The Durbin Watson of 2.14 shows that there is no element of autocorrelation in the model.

**Granger Causality Effect Estimation**

To determine the effect of financial inclusion variables: commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks (in line with the specific objectives and models estimated), the granger causality analysis was performed. The regression output in Tables 8 – 11 reveal the following:

1. Commercial bank savings deposits and deposits of rural branches of commercial banks have significant effect on liquidity ratio due to the fact that causality runs from commercial bank savings deposits and deposits of rural branches of commercial banks to liquidity ratio at a significant level of 5%. On the contrary, liquidity ratio exerts significant effect on commercial bank savings

- deposits and currency in circulation at a 5% significant level.
2. Commercial bank savings deposits and number of commercial bank branches have significant effect on cash reserve ratio owing to the inflow of causality from commercial bank savings deposits and number of commercial bank branches to cash reserve ratio at a significant level of 5%. Conversely, cash reserve ratio significantly affect deposits of rural branches of commercial banks at a significant level of 5%
3. Commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks have no significant effect on open market operation. There is no unidirectional or bidirectional causal relationship between financial inclusion variables and open market operation at a significant level of 5%.
4. Commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks have no significant effect on loan to deposit ratio of rural branches of commercial banks owing to the non-flow of causality from financial inclusion variables to loan to deposit ratio of rural branches of commercial banks at a significant level of 5%.

**Table 8:** LR → CBSD + CBCSME + CIC + NCBB + DRBCB

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
CBSD does not Granger Cause LR LR does not Granger Cause CBSD	35	4.14501 5.74850	0.0500 0.0225	Causality Causality
CBCSME does not Granger Cause LR LR does not Granger Cause CBCSME	29	0.01242 0.90296	0.9121 0.3507	No Causality No Causality
CIC does not Granger Cause LR LR does not Granger Cause CIC	35	2.31221 6.52860	0.1382 0.0156	No Causality Causality
NCBB does not Granger Cause LR LR does not Granger Cause NCBB	35	0.65122 0.68229	0.4256 0.4149	No Causality No Causality
CBDRA does not Granger Cause LR LR does not Granger Cause CBDRA	35	8.64181 3.99630	0.0061 0.0542	Causality No Causality

Source: E-views 10.0 version data output

**Table 9:** CRR → CBSD + CBCSME + CIC + NCBB + DRBCB

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
CBSD does not Granger Cause CRR CRR does not Granger Cause CBSD	35	4.16202 0.12728	0.0497 0.7236	Causality No Causality
CBCSME does not Granger Cause CRR CRR does not Granger Cause CBCSME	29	2.29056 2.43960	0.1422 0.1304	No Causality No Causality
CIC does not Granger Cause CRR CRR does not Granger Cause CIC	35	3.86233 0.00314	0.0581 0.9556	No Causality No Causality
NCBB does not Granger Cause CRR CRR does not Granger Cause NCBB	35	4.34483 0.00158	0.0452 0.9686	Causality No Causality
CBDRA does not Granger Cause CRR CRR does not Granger Cause CBDRA	35	0.41151 9.03757	0.5258 0.0051	No Causality Causality

Source: E-views 10.0 version data output

**Table 10:** OMO → CBSD + CBCSME + CIC + NCBB + DRBCB

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
CBSD does not Granger Cause OMO OMO does not Granger Cause CBSD	35	2.10985 0.00748	0.1561 0.9316	No Causality No Causality
CBCSME does not Granger Cause OMO OMO does not Granger Cause CBCSME	29	0.06087 2.32392	0.8071 0.1395	No Causality No Causality
CIC does not Granger Cause OMO OMO does not Granger Cause CIC	35	2.84318 0.40366	0.1015 0.5297	No Causality No Causality
NCBB does not Granger Cause OMO	35	2.09235	0.1578	No Causality

OMO does not Granger Cause NCBB		1.87487	0.1805	No Causality
CBDRA does not Granger Cause OMO	35	0.80683	0.3758 0.5908	No Causality
OMO does not Granger Cause CBDRA		0.29506		No Causality

Source: E-views 10.0 version data output

**Table 11:** LDR → CBSD + CBCSME + CIC + NCBB + DRBCB

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
CBSD does not Granger Cause LDR	35	0.34277	0.5623	No Causality
LDR does not Granger Cause CBSD		0.03652	0.8497	No Causality
CBCSME does not Granger Cause LDR	29	0.86988	0.3596	No Causality
LDR does not Granger Cause CBCSME		0.21741	0.6449	No Causality
CIC does not Granger Cause LDR	35	0.89915	0.3501	No Causality
LDR does not Granger Cause CIC		3.92881	0.0561	No Causality
NCBB does not Granger Cause LDR	35	1.97421	0.1696	No Causality
LDR does not Granger Cause NCBB		0.57327	0.4545	No Causality
CBDRA does not Granger Cause LDR	35	0.28276	0.5986 0.9944	No Causality
LDR does not Granger Cause CBDRA		5.0E-05		No Causality

Source: E-views 10.0 version data output

**Discussion of Findings**

This study examined the effect of financial inclusion on monetary policy fundamentals in Nigeria with the aim of evaluating the effect of commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks on liquidity ratio, cash reserve ratio, open market operation, and loan to deposit ratio of rural branches of commercial banks from 1986 to 2021. Firstly, the study found a long run relationship only between financial inclusion variables (commercial bank savings deposits, commercial bank credit to small and medium scale enterprises, currency in circulation, number of commercial bank branches, and deposits of rural branches of commercial banks) and liquidity ratio. There was evidence of a long run relationship between financial inclusion variables, cash reserve ratio, open market operation, and loan to deposit ratio of rural branches of commercial banks.

There are few studies on financial inclusion and monetary policy fundamentals, especially in the context of emerging economies like Nigeria. On the nature of short-run relationship, first, on financial inclusion variables and liquidity ratio, this study found that commercial bank savings deposits and number of commercial bank branches have a significant negative relationship with liquidity ratio, while commercial bank credit to small and medium scale enterprises, currency in circulation, and deposits of rural branches of commercial banks have an insignificant positive relationship with liquidity ratio. Secondly, on financial inclusion variables and cash reserve ratio, commercial bank savings deposits and commercial bank credit to small and medium scale enterprises have insignificant positive relationship with cash reserve ratio. On the other hand, currency in circulation (insignificant), number of commercial bank branches (significant) and deposits of rural branches of commercial banks (insignificant) negative relationship with cash reserve ratio. Thirdly, on financial inclusion variables and open market operation, commercial bank savings deposits and number of commercial bank branches have negative insignificant relationship with open market operation, while commercial bank credit to small and medium scale enterprises, currency in circulation, and deposits of rural branches of commercial banks have insignificant positive relationship with open market operation. Finally, on financial inclusion variables and loan

to deposit ratio of rural branches of commercial banks, commercial bank savings deposits, number of commercial bank branches, and deposits of rural branches of commercial banks have insignificant negative relationship with loan to deposit ratio of rural branches of commercial banks, while commercial bank credit to small and medium scale enterprises, currency in circulation have insignificant positive relationship with loan to deposit ratio of rural branches of commercial banks.

On the effect of financial inclusion on monetary policy fundamentals, this study reveals that commercial bank savings deposits and deposits of rural branches of commercial banks have significant effect on liquidity ratio. This supports the earlier findings of Saraswati, Maski, Kaluge and Sakti (2020) that financial inclusion level affects inflation rate as a proxy of effectiveness of the Indonesian monetary policy, both in the short run and long run. The effect of shocks in financial inclusion on inflation is not permanent. Meanwhile, fin-tech only affects inflation rate in the short run. Shocks in fin-tech affect the volatility of inflation rate is permanent both through the substitution effect and the cost of capital effect. On the contrary, liquidity ratio has significant effect on commercial bank savings deposits and currency in circulation. This lays credence to Tonuchi, Nwolisa, Obikaonu and Alase (2021) whom established that measures of monetary policy effectiveness, such as inflation rate and lending rate all had a significant effect on financial inclusion in the country. It was also discovered that accounting for Fin-Tech in the model improves the effectiveness of the monetary policy on financial inclusion in Nigeria, contrary to popular assertion that Fintech impedes monetary policy effectiveness. Similarly, it is reflected on Takyi and Leon-Gonzalez (2019)<sup>[46]</sup> that a positive monetary policy shock does perform its intended role of significantly reducing inflation and output, despite a sizeable fraction of the population is financially excluded. In addition, it encompasses the result of Anthony-Orji, Orji, Ogbuabor and Onoh (2019)<sup>[5]</sup> that shocks to minimum rediscount rate, interest rate, broad money supply and deposit rates of deposit banks all have significant impact on financial inclusion in Nigeria, however not at the same time and magnitude.

Nevertheless, it was found that cash reserve ratio is significantly affected by commercial bank savings deposits and number of commercial bank branches. This emulates the findings of Agoba, Sare and Bugri-Anarfo (2017), Yetman

(2017)<sup>[52]</sup> and Elsherif (2019)<sup>[14]</sup> which discloses that financial inclusion, money supply and exchange rate shocks have some role in explaining variations in monetary policy effectiveness, but in the long-run, while there is a bidirectional causality from monetary policy to financial inclusion, this holds for all specifications tried. It also agrees with Hung (2017)<sup>[22]</sup> who indicated that an increase of financial inclusion index would lower inflation, which is used as a proxy for the effectiveness of monetary policy. In addition, the lending interest rate of banks is in negative relation with the inflation in Vietnam. Furthermore, it aligns with Evans (2016)<sup>[17]</sup> that at various degrees, financial inclusion, money supply and interest rate shocks have some role in explaining variations in monetary policy effectiveness, but in the long-run in Africa. Finally, in the context of Nigeria, it agrees with the study of Mbutur and Uba (2013)<sup>[27]</sup> on the notion that growing financial inclusion would improve the effectiveness of monetary policy.

### 5. Conclusion and Policy Implications

This study examined the effect of financial inclusion on monetary policy fundamentals in Nigeria. The study identified that commercial bank savings deposits, deposits of rural branches of commercial banks, and number of commercial banks branches have significant effect on liquidity ratio and cash reserve ratio. Conversely, liquidity ratio significantly affect commercial bank savings deposits and currency in circulation; cash reserve ratio significantly affect deposits of rural branches of commercial banks; and loan to deposits ratio of rural branches of commercial banks significantly affect deposits of rural branches of commercial banks. This study therefore, concludes that growing financial inclusion would improve the effectiveness of monetary policy fundamentals in Nigeria.

The Central Bank of Nigeria (CBN) should encourage Deposit Money Banks (DMBs) to develop innovative pensions/savings products to promote mobilization of short-, medium- and long-term deposits in Nigeria, based on relevant models deployed elsewhere. This magnitude of deposits attracted would determine the decision of the apex bank on either increasing or decreasing the liquidity ratio for economic development. The CBN through the Micro, Small, and Medium Enterprises (MSME) development fund should support the commercial banks to increase their credit to Small and Medium Scale Enterprises (SMEs). The level of fund extended to SMEs reflects the level of liquidity of the banks which could aid the CBN vary the cash reserve ratio from time to time. Although, Open Market Operation (OMO) is designed to be a short-term market instrument, the CBN should consider using it a medium-term market instrument to control the supply of money/currency in circulation in the economy to maintain a stable inflationary level. This is the cornerstone of monetary policy and underlines every action the apex bank. The CBN is advised issue licenses to deserving Payment Service Banks (PSB) to promote Digital Finance System (DFS). The DMBs have been the primary players in expanding digital finance system. While these banks have significant scale, they have not been successful in innovating new models for large scale, low-cost digital payment outside of their core markets where they have branches. The CBN should consider expanding the geographical locations of agent banking, especially in rural areas. This would in no small measure help in mobilizing deposits from these areas which are

considered to be highly financial excluded.

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