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Abstract

The Five-year CBN Policy Thrust coupled with the credit crunch which started in March 2019 had prompted the CBN to roll out a slew of policy measures to spur lending to the private sector. The Loan-to-Deposit ratio was raised from 30.0 per cent to 60.0 per cent in May 2019 and further to 65.0 per cent in September 2019. Proponents of the temporary credit initiatives commended the initiatives contending that it will improve lending, possibly reduce the cost of funds, stimulate the economy and reduce unemployment. Critics, however argued that the stringent conditions that accompanied the policy will force banks to ignore managerial efficiency in the administration of credit, which will affect loan quality, hence aggravates delinquent loans. Using exploratory data analysis, this study examines the effectiveness of the policy and found that it has at least succeeded in enhancing credit to the private sector and eased bad loans. The study recommends amongst others, the need for substantial open incentives for not only compliance banks but also those banks that attach high preference to lending to SMEs. It also suggests strengthening evaluation and monitoring of the implementation of the policy from both the supply (banks) and demand side (beneficiaries).

1.0   Introduction

In the Five-year Policy Thrust of Central Bank of Nigeria (i.e. 2019-2024), the CBN Governor, Godwin Emefiele promised to improve access to credit for the Micro, Small & Medium Enterprises (MSMEs) as well as spur consumer spending to stimulate growth and enhance employment, amongst others. This is critical because commercial banks are still vital in the credit supply chain not only in Nigeria but the entire emerging market economies (EMEs). This is very much unlike the developed countries such as the US where other financial institutions are generally believed to have surpassed commercial banks in the supply of credit (Mohanty, Schnabel & Garcia-Luna, 2016).

Following an apparent credit squeeze which started in March 2019, Emefiele modified some long-standing rules that were perceived, rightly or wrongly, as one of the constraints to bank lending. For instance, minimum Loan-to-Deposit Ratio (LDR) was adjusted upward from 30.0 per cent to 60.0 per cent in May 2019 with a deadline of September 2019 after which the shortfall attracts Cash Reserve Ratio (CRR) of 50.0 per cent. This led to a sporadic increase of about 5.33 per cent in gross credit to about N16.4 trillion in September 2019 from N15.6 trillion in May 2019. To sustain this great stride, the minimum Loan to Deposit Ratio (LDR) target was again reviewed upward from 60.0 per cent to 65.0 per cent following a circular by Banking Supervision Department (BSD, 2019). The deadline for satisfying the requirement was then set at end-December 2019. It therefore follows that Deposit Money Banks (DMBs) are by the directives required to lend at least 65.0 per cent of their total deposit liabilities to

credible customers at most by December 31, 2019. The review, according to the circular was scheduled for quarterly and to encourage Small and Medium Enterprises (SMEs), retail and consumer lending, the weights of 150.0 per cent was assigned in computing their LDR.

To encourage banks to meet the requirement, several fascinating measures were put in place. These include: One, any bank that fail to meet the minimum LDR of 65.0 per cent by the specified date shall be subjected to 50.0 per cent additional CRR of the target LDR shortfall. Two, DMBs are strongly directed to further strengthen their risk management practices with reference to their lending behaviors. Three, The CBN pledged continuous review of developments in the market so as to facilitate higher investment in the sectors critical to the development of the economy without losing sight of the need for safety and soundness of the financial system and four, it was agreed at the 345th banker's committee meeting that new credit protection clause should be included in the offer letters of loan beneficiaries allowing banks to service delinquent loans using the beneficiaries deposit balances in other banks across the industry. This was designed to help in checkmating the possibility of jump in non-performing loans (NPLs) that may arise from the implementation of the minimum 65.0 per cent LDR.

While protagonists of the policy initiative were elated contending that it will spur lending particularly to the SMEs and possibly at affordable cost, generates growth and tackle unemployment, opponents were oblivious of the effectiveness of policy.

Opponents argued that if banks were compelled to increase lending, managerial efficiency and quality of lending will be compromised which may result in compounding the already gloomy situation of non-performing loans (NPLs).

This paper attempts to verify the effectiveness of the policy. To achieve this, the paper is divided into four sections including this introduction. Section two briefly explains the theory that supports this policy action of CBN. Section three presents various exhibits that demonstrates the position of the banking sector pre-and-post the policy pronouncement to prove the effectiveness of the policy. The last section concludes with a thought on issues to consider making the policy more effective.

2.0 The Supporting Theory
2.1 Hawtrey's Theory

Hawtrey, R. G. is of the view that monetary system is solely responsible for economic fluctuations. He opines that trade cycle is purely a monetary phenomenon, such that changes in the level of economic activity reflects largely changes in the flow of money. Hence, he submitted that drivers of cyclical fluctuations are embedded in those factors that cause changes in money supply.

A Change in money supply, on the other hand, according to Hawtrey, is a function of credit creation capability of the banking system. Changes in the level of income and spending are in-turn functions of changes in the volume of bank credit. He attributed trade cycle to deviations in effective demand arising from changes in bank credit. Thus, according to him since general demand is a monetary phenomenon, it can be conveniently concluded that trade cycle is also a monetary phenomenon. The extent and duration of the cycle, to him, is determined by the rate of progress of credit development such that the faster the

movements in credit (i.e. accelerated credit movement) the shorter the trade cycle and the reverse is also true.

However, he fairly recognized the influence of non-monetary factors, but submits that they operate only through the medium of credit. Consider for instance, the case of optimism in an industry which is capable of directly affecting activities of the firms, but can only occur through monetary changes, such as increase borrowing. In a nutshell, therefore, Hawtrey's theory implies that if central banks can control credit, then they can manage fluctuations in the level of economic activities.

2.2 Bank Lending and Economic Theory

Although, there are competing theories that attempt to explain the basis for bank credit fluctuations in EMEs, most prominent of these theories focus on demand side elements and the supply side factors. The question here is, does the behavior of Nigerian banks still conform with any of the theory?
Following Mohanty, Schnabel & Garcia-Luna (2016), the demand side elements see changes in bank credit as a function of demand for credit by households' and firms. The proponents of this view recognize credit supply by banks as elastic, hence adjustable to the prevailing demand situation in the market. This was why Ghosh and Ghosh (1999), for instance, attributed the bank lending crisis in Asia after the 1997/98 financial crisis to fall in demand for credit. Similarly, Cotarrelli, Dell'Ariccia & Valdkova-Hollar (2003) argued strongly that the lending boom experienced in Central and Eastern European countries in the mid-2000s was a result of upward shift in the IS curve.

In a nutshell, most business cycle literature seem to support this view as they portray bank credit as highly procyclical, implying that bank lends more during upswing than downturn.
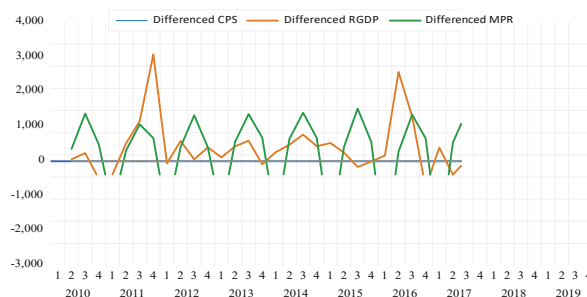
Figure 1: Changes in Bank Credit, Business Cycle and Monetary Conditions, 2010Q1-2019Q2

It is however clear from Figure 1 and Table 1 that the procyclicality of bank credit is gradually waning for Nigeria. For instance, the correlation between CPS and RGDP (demand side elements of bank credit fluctuations) was as high as 90.0 per cent until 2018Q4. The correlation, however, declined to 81.0 per cent when the sample was extended to 2019Q4. Astonishingly too, the relationship turned negative (88.0 per cent) when data between 2018Q1 and 2019Q4 was considered.

The view on supply factors blames variations in credit on banks capacity and willingness to lend. This group contends that shocks that relaxes the capacity of banks to lend, such as increase in capital inflow or expansionary monetary policy induces lending and that the reverse is also true. Figures 1, 2 and 3 and Table 1 presents the relationship between monetary condition and bank lending to the private sector. Cursory examination of the figures and the table reveals a different picture for Nigeria.

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[4] Details in section three.
[5] Difficult to generally affect the industry except it passes monetary sector.
[6] This played out in the effort of the CBN in reversing the recent recession in Nigeria.

Table 1: Correlation among CPS, RGDP and MPR

	2010Q1-2019Q4	2010Q1-2018Q4	2018Q1-2019Q4
	CPS	**CPS**	**CPS**
CPS	1.00	1.00	1.00
RGDP	0.81 [8.540]*	0.90 [11.969]*	-0.88 [-4.516]*
MPR	0.87 [10.798]*	0.80 [7.868]*	0.53 [1.539]

Note: * *significance at 1.0 per cent. CPS = Credit to the Private Sector, RGDP = Real Gross Domestic Product, MPR = Monetary Policy Rate*

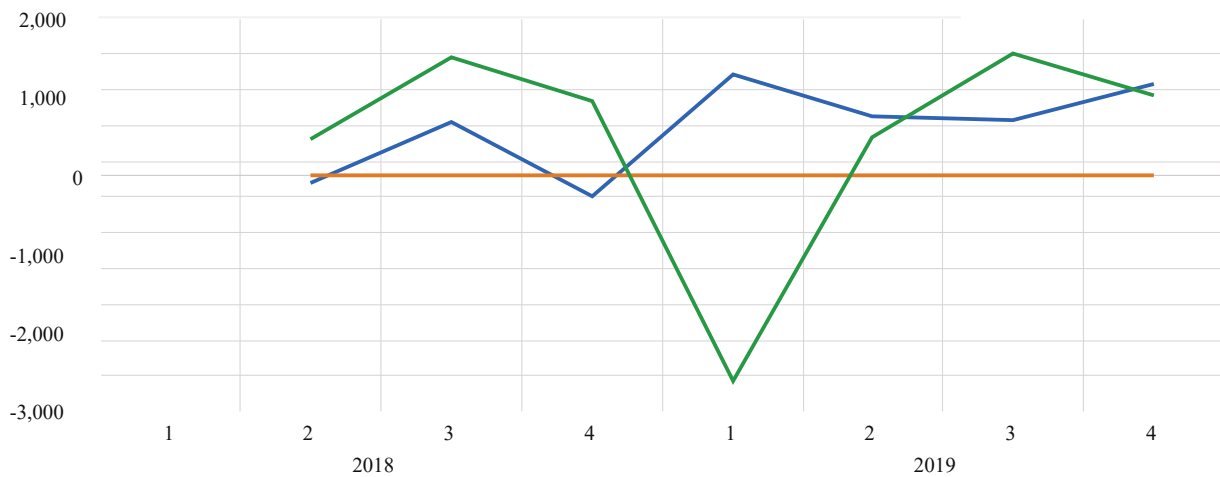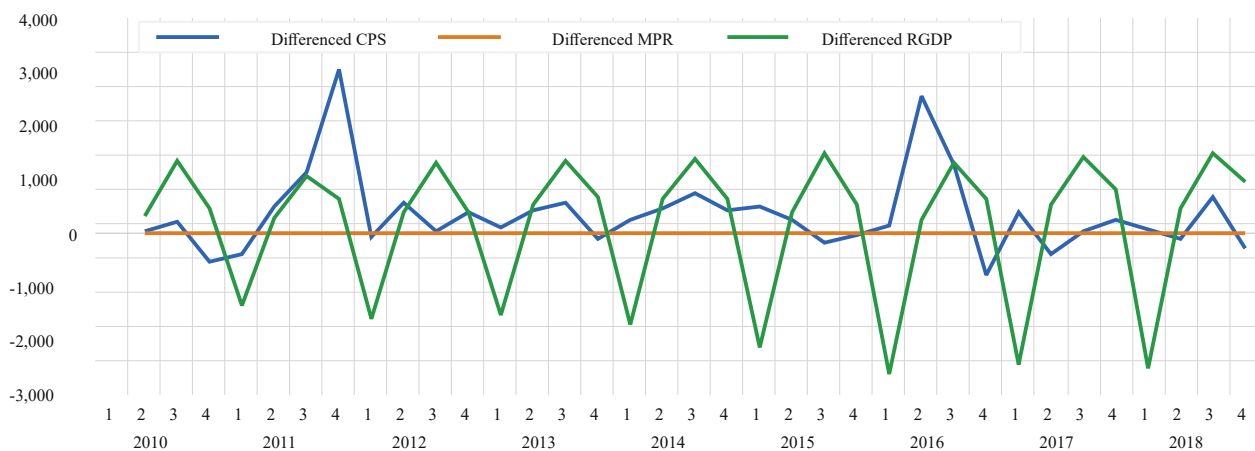**Fig. 2.:** Changes in Bank Lending, Business Cycle and Monetary Conditions, 2018Q1-2019Q4

Fig. 3.: Changes in Bank Lending, Business Cycle and Monetary Conditions, 2010Q1- 2018Q4

3.0   Methodology and Data Issues

The study adopted an exploratory analysis to drive home its point. This approach simply brings data together pre-and-post-the-policy initiative, and calculated some useful statistics describing the distribution of the data including monthly, quarterly and in some cases annual growth rates. The data is then graphically plotted to visualize the trend so as to uncover the relationship amongst the variables, thereby enable us to depict the impact of the policy measures on the objective function. For instance, one of the objectives of the adjustment of LDR was to spur credit to the private sector. To determine if this objective is achieved, the study in some cases plotted data on CPS as well as their growth rates covering the periods prior and post the policy initiative and see if CPS improves after the policy pronouncement.

The data which covered the period February 2017 to November 2019 is sourced from the Database of Statistics Department of Central Bank of Nigeria. The data include different variants of interest rate (i.e. savings rate, prime lending rate, maximum lending rate, treasury bills rate, interbank rate) credit to private sector, net foreign assets, total deposit, cash reserve ratio, loan-to-deposit ratio, total deposit, total loan, nonperforming loans among others.

4.0   Discussion of Result

4.1   Banks, Credit and Interest Rates: What Happened and What Has Changed?

Exhibit One: Falling Credit to the Private Sector

At the end of the eleventh month of 2018, bank credit extension to the private sector(CPS) month-on-month fell by 1.16 per cent. A temporary shock, CBN might assumed or might have assumed. The situation worsened such that the year was closed by a further dip of 2.67 per cent compared to the preceding month of November. This gory picture was far more pathetic when compared to the 3.85 per cent drop in the corresponding period of 2017. A fair signal of recovery was witnessed in the first month of 2019 when CPS slightly rebounded by 0.64 percent vis-à-vis the last month of 2018 and further up by 1.23 per cent in February. March and April of 2019 however revealed a reversal. A 1.33 and 0.46 per cents further squeeze was recorded in March and April 2019 (Figure 4). This saddening episode of credit squeeze probably made the CBN to adjust minimum loan-to-deposit ratio to 60.0 per cent by September 2019.
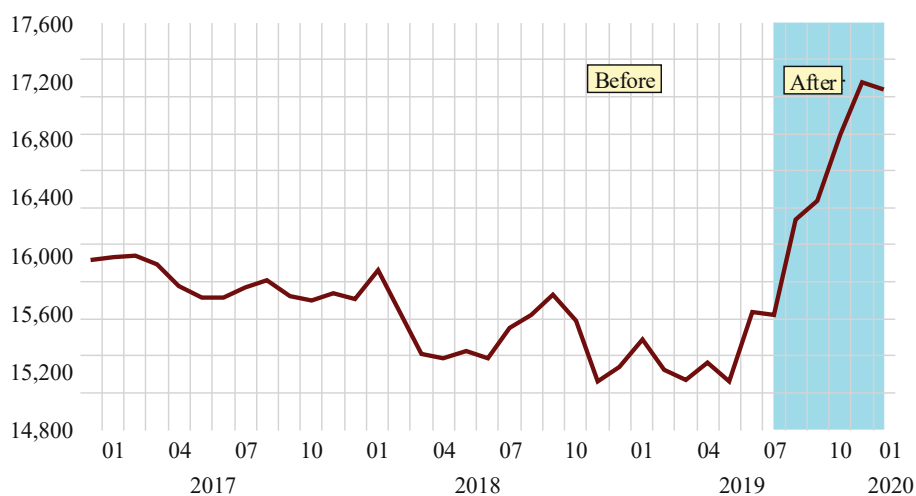
Figure 4:Total Credit to Private Sector, February 2017 to November 2019

This directive led to surge in CPS as the month of September closed with a jump of 4.27 per cent relatively to the preceding month of August and 4.27 when compared with September 2018. October 2019 witnessed a further month-on-month rise in credit by 0.76 and year-on-year growth rate of 4.08 per cent. November recorded an increase of 2.81 per cent relatively to September and 8.27 per cent comparatively to October 2018.

The year closed with a monthly growth rate of 2.09 per cent and the highest annual growth rate of 13.57 per cent. The month-on-month growth rate was however moderated in January 2020 probably due to the adjustment of CRR from 22.5 to 27.5 per cent, but yearly growth rate skyrocketed by 12.57 per cent.

Exhibit Two: *Improved Capacity to Lend*

To what extent improvement in lending to the private sector reflect increase in the capacity to lend.

To get a clear picture of the lending capacity of banks in Nigeria and following Mohanty, Schnabel & Garcia-Luna (2016), a simplified version of DMBs balance sheet is presented as Table 2.

It is pertinent to mention here that banks have principally five broadly categorized sources of financing credit expansion to private sector, namely: deposit liabilities, foreign borrowings, domestic borrowing including non-bank sources, drawing down on reserves, reduction in net-lending to government.

Appendixes 1 to 4 depict the sources of funding for banks during the study period. It is clear from Appendix one that deposit throughout the period was on the part of growth, except for between months 7 and 11 when there was a marginal decline.

Appendix two shows that bank reserves with CBN (including CRR) and credit from CBN rose post-the-policy initiative. While increase in credit from CBN signifies increase in sources of funds to the banks, the former confirms the opposite.

This is attributable largely to the penalty meted out on banks that could not satisfy the minimum LDR requirement. Net Credit to Government (NCG) was on the decline during the policy period while Net Foreign Assets (NFA) which started trending downward since November 2018 had flattened.

In the same vein, loans and advances from other banks in Nigeria shored up all the period-through and loans and advances from other creditors which was almost at the bottom pre-the policy initiative rose slightly and remained so throughout the study period.

While it is very difficult to dissect sources of funds for banks using this approach, because banks asset and liability are not mutually independent, one can conveniently submit that Nigerian banks had enough liquidity to support critical sectors of the economy during the period.

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[7] See Bernanke and Gertler (1995) for more information on 'credit view' which is at the fore front on this argument.

[8] See http://statistics.cbn.gov.ng/cbn-onlinestats/

[9] As depicted by Figure 4.

Table 2: Simplified Aggregate Balance Sheet of Deposit Money Banks

Assets	Liabilities
Domestic Debt to the Private Sector (DCPS)	Total Deposits (TD)
Net Foreign Assets (NFA)	
Net Credit to the Public Sector (Including Government Securities) (NCG)	Other Sources of Financing (including Bonds, Credit from other Financial Institutions, Capital Accounts, Other Items Net etc.)
Net Assets held with the CBN (R)	

Source: *Mohanty, Schnabel & Garcia-Luna (2016)*

Exhibit Three: **Soaring Interest Rate**

Figure 5 indicates that Year 2019 started with the industry weighted average prime lending rate (PLR) and maximum lending rate (MLR) as high as 16.01 and 30.48 per cent, respectively. Average saving rate for the industry during the period was 4.07. By the end of April 2019, the PLR and MLR spiked to the period climax at 18.23 and 30.89 per cent. Astonishingly, the average saving rate fell to 3.91 per cent. This implies that while the cost of funds to banks was declining, lending rate was on the rise. This disparity was a clear signal of exploitation by banks which is no doubt unfriendly to growth.
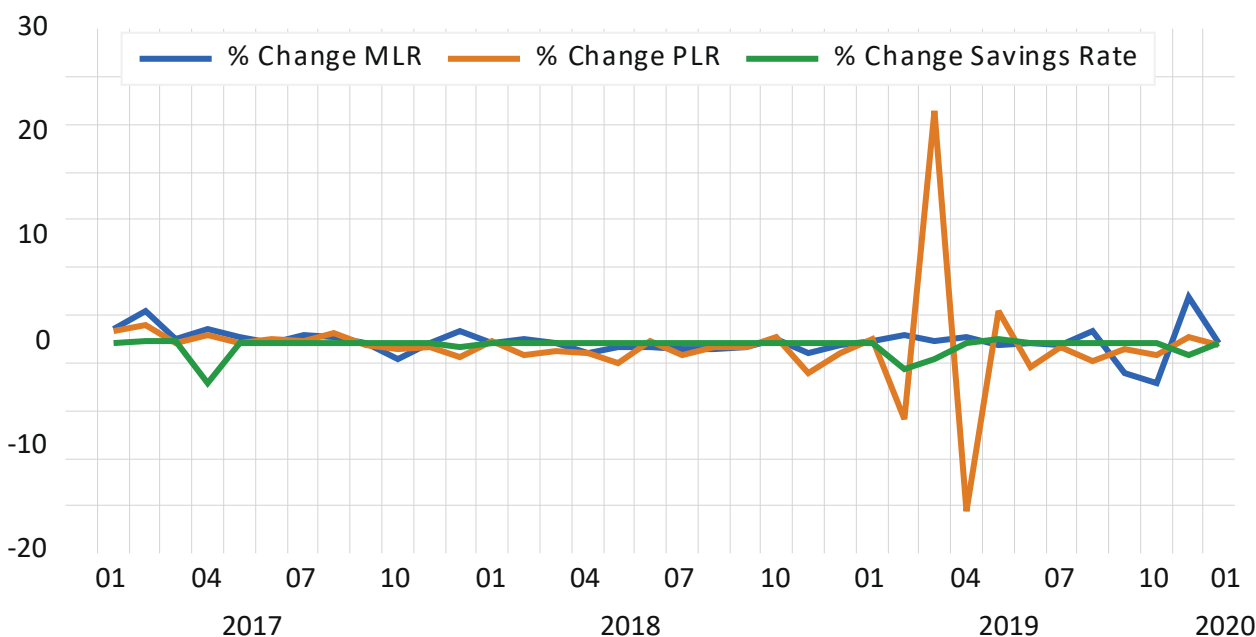
Figure 5: Different Variants of Interest Rates

With the pronouncement of the policy in July 2019, although MLR slightly rose to 31.04 per cent but average industry weighted PLR moderated to 15.40 per cent in August 2019. The downward trend in PLR and MLR, despite increase in CPS continued, reaching the period bottom of 14.91 and 29.40 per cent in November 2019. The turning point was largely the fall out of the adjustment in the CRR in January 2020. This notwithstanding, however, MLR only increased marginally to 30.77 per cent from 30.72 per cent in December 2019.
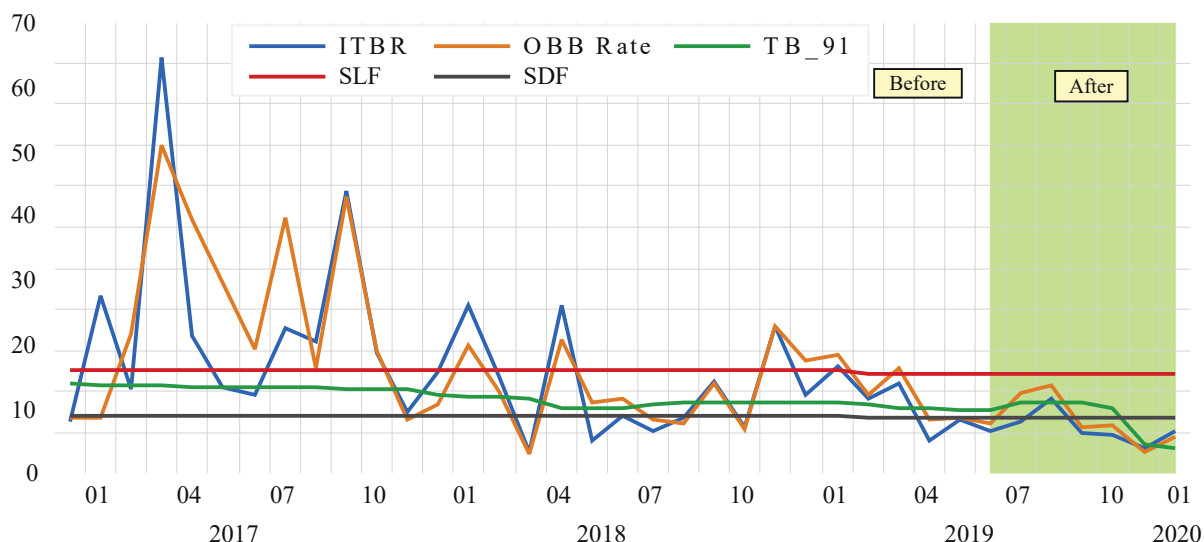
Figure 6: Inter-Bank Rates

The short-term interest rates which are theoretically expected to hover within the MPR corridor were in most cases below the floor (Figure 6).

 Exhibit Four: *Increasing Propensity to Save but Declining Propensity to Lend*

Whereas private sector deposit took the path of expansion recording the lowest annual growth rate of 4.77 per cent in January 2018 pre-credit inducing policy pronouncement, credit to the same sector was continuously on the decline and only peaked at 0.06 per cent in November 2018 at a time when private sector deposit was at its peak of 19.44 per cent.
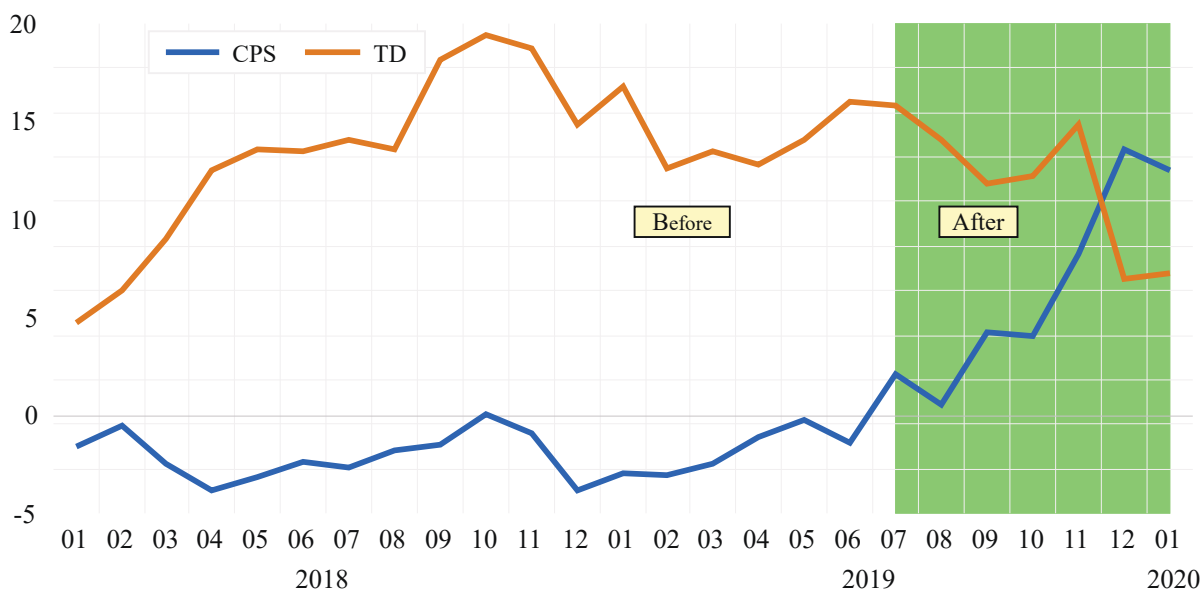
Figure 7: Private Sector Deposit Vs Credit to the Private Sector (Year % Change)

With the pronouncement of the policy in July 2019, private sector credit expanded 3.46 per cent to 2.11 per cent at the end-July 2019 from -1.36 per cent in June. The trend continued until it climaxed at 13.57 per cent at the end of the year. Arising from the adjustment in the CRR to 27.5 per cent in January 2020 however, the private sector credit moderated to 12.57 per cent (Figure 7). The picture is relatively gorier if we compare the gap between private sector deposit and credit as depicted by Figure 8.
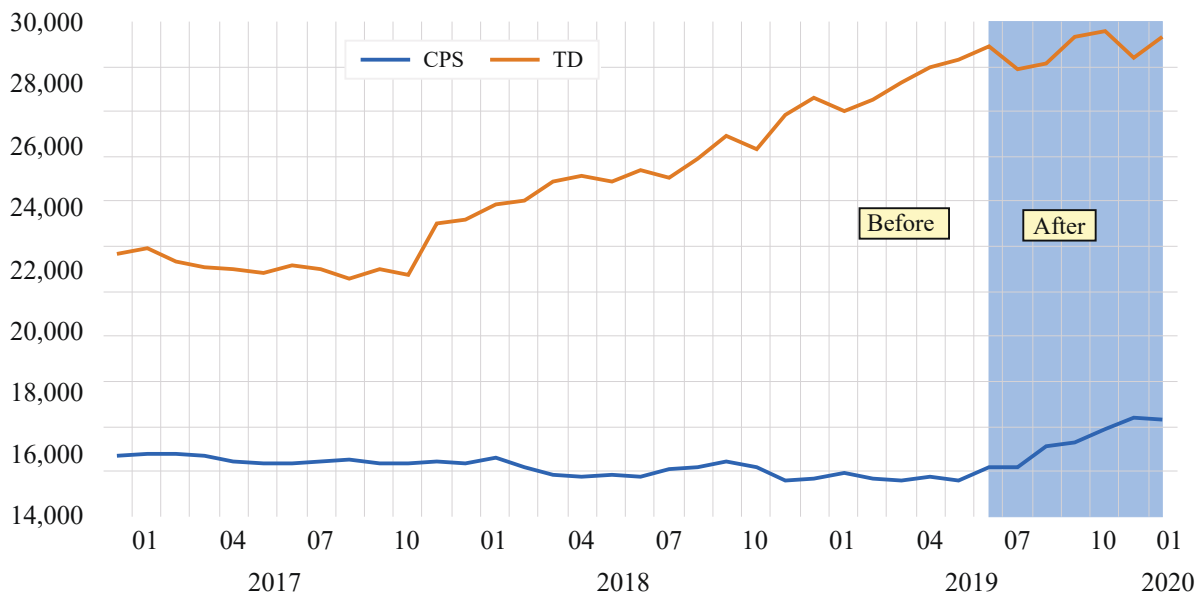
Figure 8: Private Sector Deposit Vs Credit to the Private Sector (Monthly Trend)

Exhibit Five: But the Little Goes Where?

Cursory analysis of Figure 9 indicates that larger percentage of the credit to the private sector goes to the industry sector, followed by services sector, then trade and general commerce. Construction and agricultural sectors occupy positions four and five respectively. This was the trend pre-new LDR policy pronouncement and the trend remain so even post the policy pronouncement.
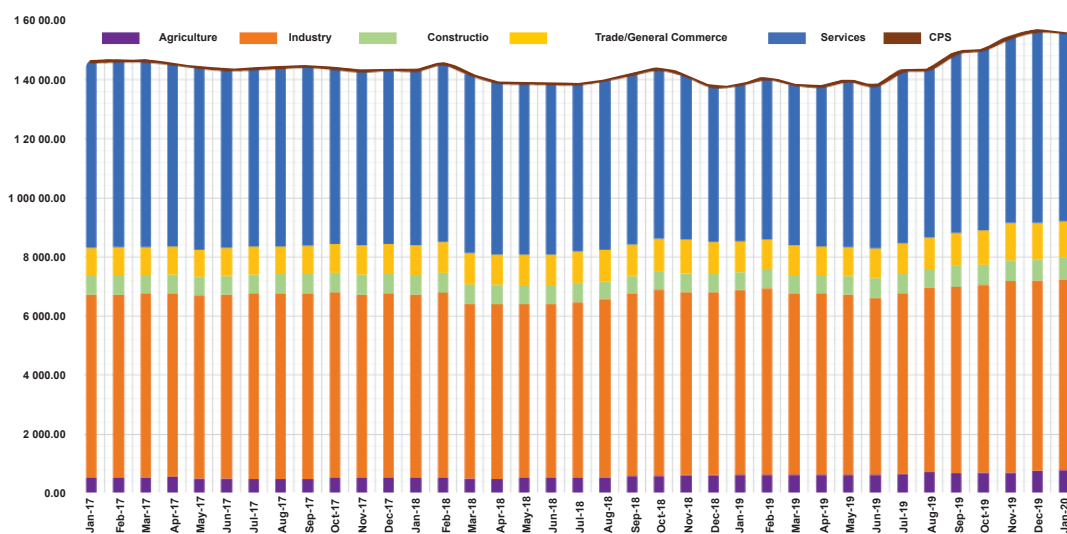
Figure 9: Sectoral Distribution of DMBs Credit

It is pertinent also to investigate which sub-sectors of industry and services benefits more. Figure 9 further reveals that larger percentage of industry sector credit concentrates in the oil and gas sub-sector. The sub-sector attracted not less than 53.0 per cent of the total credit to the industry sector. This is followed by the manufacturing sector which attracts not less than 33.4 per cent since 2017. The power and energy, and mining and quarrying sub-sectors are left struggling for between a meager 4.96 to 7.75 per cent; and 0.10 to 0.51 per cent, respectively.
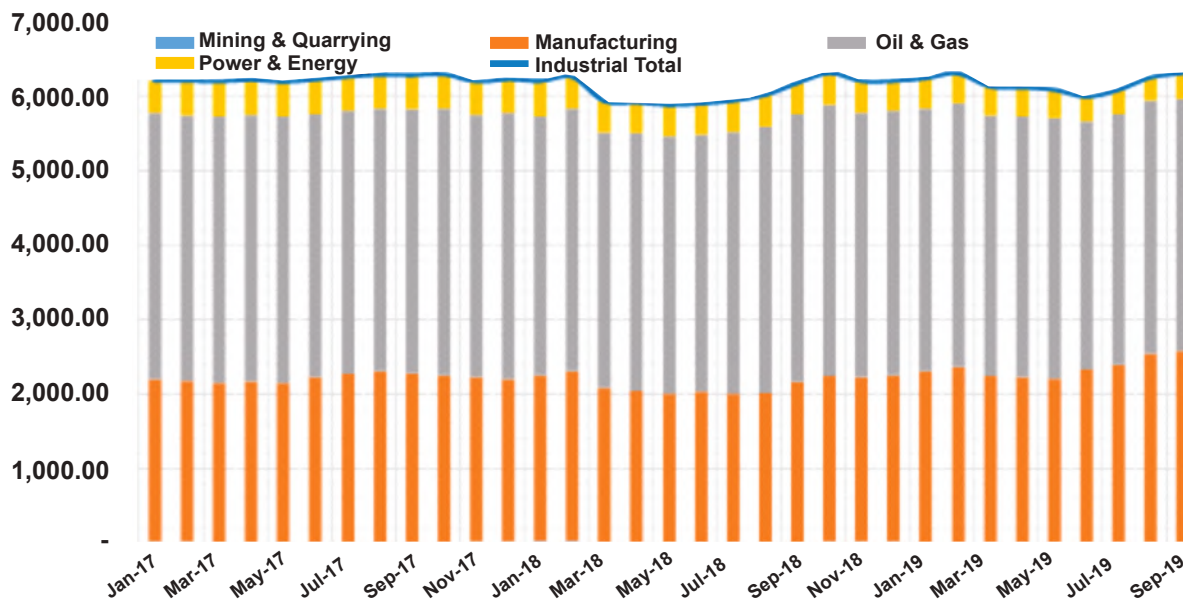
Figure 10: Distribution of DMBs Credit to the Services Sector

Figure 10 which depicts the distribution of credit to the services sector shows that larger share of the facilities was in favour of the general sub-sector which benefited between 16.29 to 22.59 per cent, followed by oil and gas which gulped around 18.09 and 21.83 per cent both pre-and-post credit policy pronouncement. Finance, insurance and capital market, information and communication, real estate, transport and storage, others, power and energy, and energy sub-sectors respectively occupied positions 3, 4, 5, 6, 7, 8 and 9.
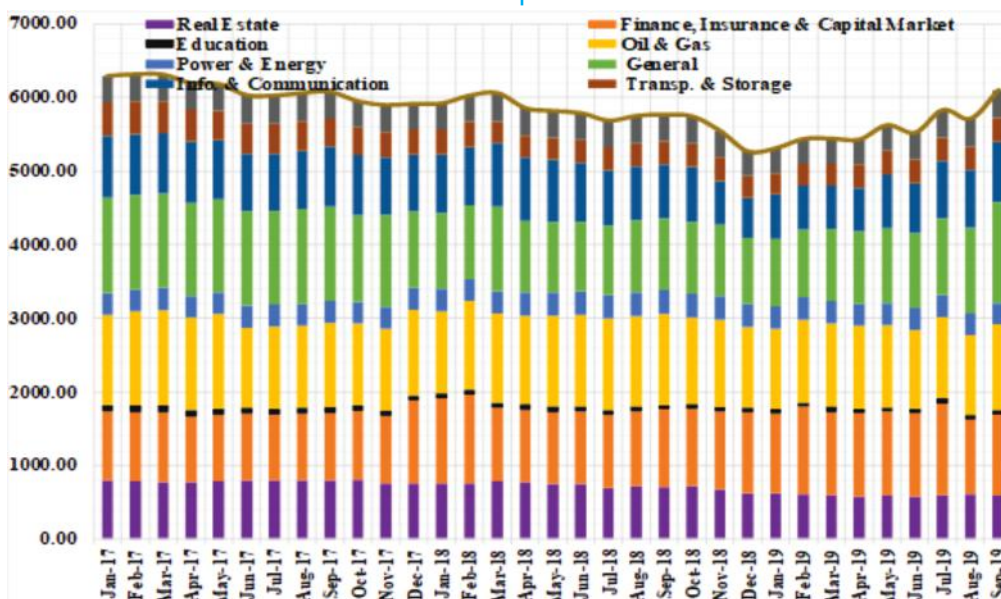
Figure 11: Distribution of DMBs Credit to the Industrial Sector

Exhibit Six: *Non-Performing Loans are on the Decline*

Expansions in credit undoubtedly have implications for economic activity. It spurs growth as it helps in channeling savings into investment, but it is also a matter of concerns for prudential regulation. It can negatively affect the quality of loan, raises systemic risk and weakens the health and soundness of the banking system (Igan & Pinheiro, 2011).
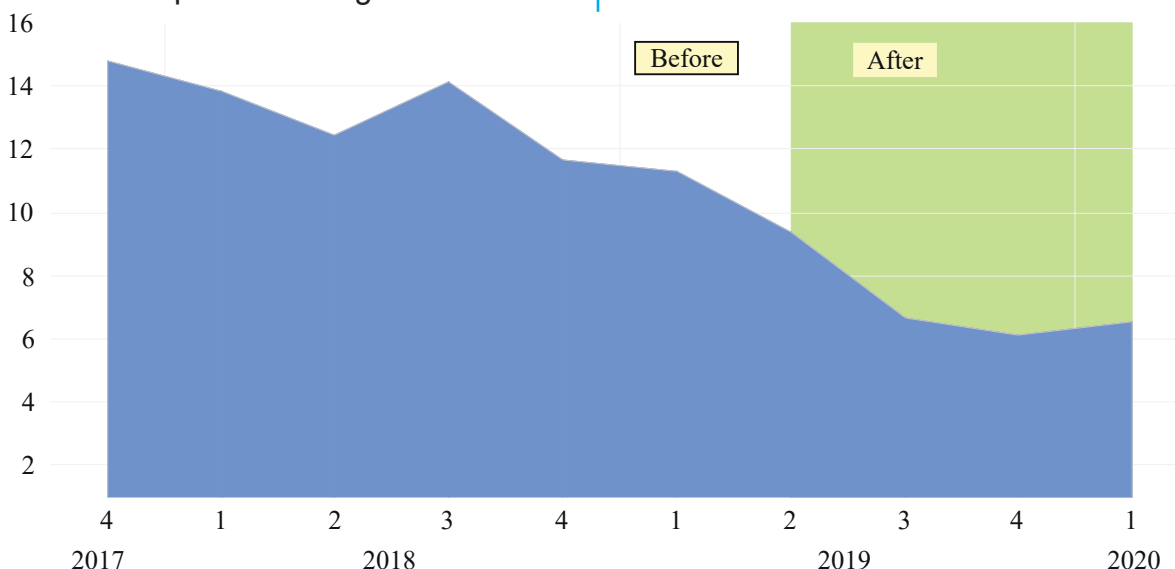
Figure 12: The Ratio of Nonperforming Loans to Total Loans

Astonishingly, however, as the credit expands the ratio of non-performing loans to total loans continuously moderated (Figure 12).From 14.81 per cent in the last quarter of 2017, Nonperforming loans to total loans gradually moderated until it reached 12.45 per cent in the second quarter of 2018. The third quarter of 2018 witnessed a spike to 14.16 per cent and thereafter declined. It opened the year 2019 at 11.30 per cent but impressively closed the year with as low as 6.10 per cent. This was due tovariousother policy measures that accompanied the credit boost strategy.

 A good case to support this argument, is the initiative of the Bankers Committee that loan defaults can be serviced by deposits of defaulters in other banks.Here, a clause is to be inserted in the loan offer letters of customers that allows the issuing banks, in case of default, to mobilize the defaulters deposit or any other financial assets across the industry to repay the loan.

The introduction of Global Standing Instruction (GSI) seems to have also helped in further pushing down the NPLs.Global Standing Instruction (GSI) was an initiative aimed at curtailing the intrigue of bad debtors who move from one bank to the other. The GSI is linked with the Bank Verification Number (BVN) of depositors. This help to detect serial borrowers with bad repayment history that still make effort to borrow from other financial institutions.Moreso, the Central Bank of Nigeria also barred Deposit Money Banks (DMBs) with delinquent loan facilities over 10.0 per cent from paying dividends to the shareholders.

5.0   Concluding Thought

To spur credit to the real sector of the economy the Central Bank of Nigeria adjusted loan-to-deposit ratio to 65.0 per cent and mandated DMBs to comply. Punitive measures were put in place in case of failure. This exploratory study is an attempt to examine the effectiveness of the policy in encouraging banks to create

more credit. Although, the benefits of the policy have not been fully realized, the study submitted, based on the available data, that the policy indeed contributed largely in luring banks to increase lending but did not substantially bring about reduction in the cost of funds.

There are several theoretical arguments and real-world considerations in support of credit enhancement policies. This include policy-based lending, direct lending, credit support, subsidy and grant amongst other. However due to bitter experiences of some countries around the world and considering the successful experiences of East Asian countries where similar policies proved highly efficient (Vittas & Cho, 1996), there is the strong need to highlight some general recommendations for possible implementation to make the policy more efficient.

First, the central bank should consider this policy from a highly dynamic perspective. The policy should be seen to be temporary and can be halted anytime. This is because the merit may likely diminish over time.

Second, there is the need for enforcement of new collateral strategies/laws. The DMBs are still reluctant to lend to SMEs, not only because they are not established to do so but also because they do not own enough collateral for the facilities. The CBN should seek ways of addressing the over-reliance on immovable collaterals possibly by incentivizing the acceptance of movable collateral (non-fixed collateral) and guarantees when lending to SMEs. They should device ways of working with business groups, professional groups and associations to intensify peer pressure. Vittas & Cho (1996), have sufficiently documented how SME clusters and peer pressure within SMEs network was effective in recouping loans in Japan.

Third, the CBN should, in collaboration with federal government, device ways of assessing credit worthiness of SMEs. This could be done in the form of encouraging the establishment of vibrant independent institutions to rate their credit worthiness. It could be entirely a private sector affair or through public-private partnership.

Fourth, the CBN need to increase investment in financial literacy. Most of the SMEs in Nigeria do not have the technical capacity to draft business plans that is usually required either by the CBN, in case of intervention programmes or by the DMBs for normal loans.It is therefore crucial for the CBN to consider investing in educating SMEs financially, while in the meantime, relax the requirement until when they are technically equipped to satisfy the condition.

Fifth, the process of resolving debt crisis seems too long. The market for NPLs should be made permanent. Furthermore, the newly proposed clause of using deposits/assets of loan defaulters across the industry to settle commitment in other banks should be broadened to cover not only assets in the financial system but all over the economy.

Sixth, the usefulness of evaluation and monitoring has still not been given adequate attention by the CBN. Policy initiative should be preceded by rigorous review and appraisal both by relevant departments of the Bank and possibly independent bodies.

The implementation is then strictly and cautiously monitored not only from the supply side (banks) both also from the demand side (beneficiaries) with proper documentation. The result of the evaluation should be made open to enhance market discipline. Banks that flaunt the rule/directive should be openly sanctioned while those that obey should equally be openly incentivized. The importance of effective evaluation and monitoring cannot be over-emphasized.

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[10]Central Bank of Nigeria, Supervision Circulars & Guidelines,
Ref: BSD/DIR/GEN/LAB/12/054 available at
https://www.cbn.gov.ng/Documents/bsdcirculars.asp?beginrec=1&endrec=20.
[11] This must be done without cost.
[12]This issue will be discussed at length in the next paper which I hope to title:
"Emefiele Might be Right: Evidence from Policy and Targeted Lending".

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Appendix
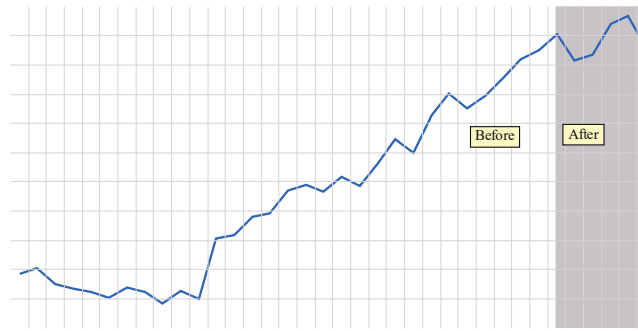
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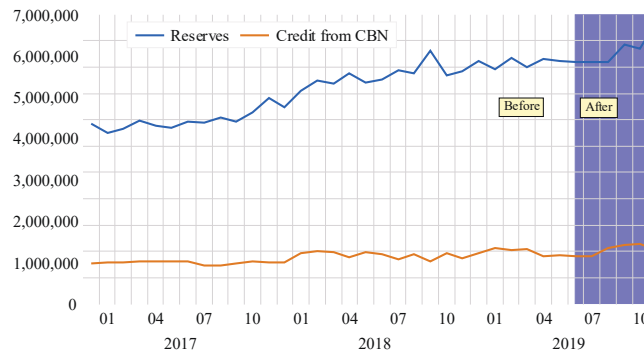
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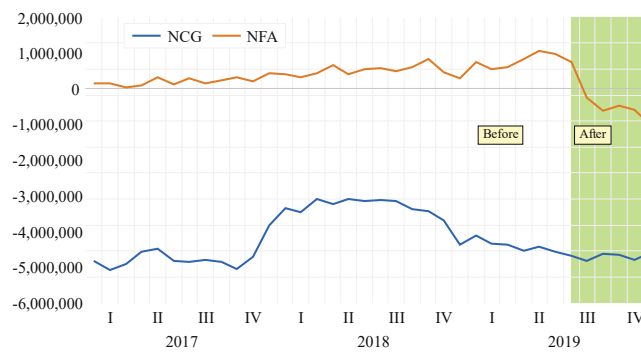
Appendix 3: Trend in DMBs Net Credit to Government (NCG) and Net Foreign Assets (NFA)
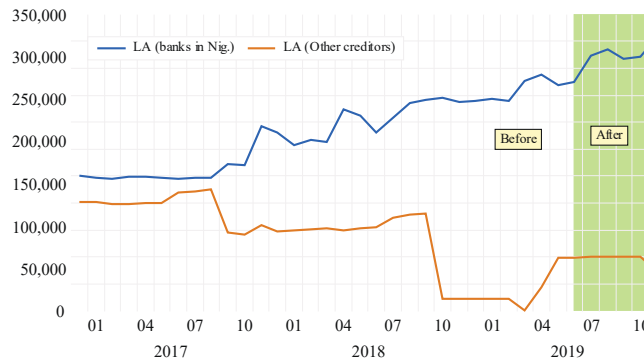
Appendix 4: Trend in DMBs Loans & Advances from Banks in Nigeria & Other Creditors

Basel III in Nigeria: Making it work

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Abstract

Basel III is a framework to preserve the stability of the international banking system. Nigeria adopts Basel capital framework for capital regulation in the banking sector. This article is a policy discussion on how to make Basel III work in Nigeria. The significance of Basel III is discussed, and some ideas to consider when implementing Basel III to make it work in Nigeria, are provided. Under Basel III, the Nigerian banking system should expect better capital quality, higher levels of capital, the imposition of minimum liquidity requirement for banks, reduced systemic risk, and a transitional arrangement for transitioning across Base II and II. This article also emphasizes that (i) there should be enough time for the transition to Basel III in Nigeria, (ii) a combination of micro- and macro-prudential regulations is needed; and (iii) the need to repair the balance sheets of banks, in preparation for Basel III. The study recommends that the Nigerian regulator should enforce strict market discipline and ensure effective supervision under the Basel framework. There should be international cooperation between the domestic bank regulator and bank regulators in other countries. The regulator should have a contingency plan to reassure the public of the safety of their deposits, and there should be emergency liquidity solutions to support the financial system in bad times.

1.0 Introduction

This article presents a discussion on Basel III in Nigeria and how to make it work. In 2010, the Basel committee reached an agreement to strengthen financial regulation by introducing a global liquidity standard, and by increasing the global minimum capital standards for commercial banks which is known as Basel III standards. In addition to capital regulation, Basel III require bank supervisors to consider the role of macroeconomic policies, both monetary and fiscal, in promoting stability in their respective banking systems. Many developed countries particularly European countries have fully implemented Basel III while many African countries, including Nigeria, have not adopted Basel III and are still in the process of implementing Basel II.

Some Central banks feel obliged to adopt and implement Basel III standards, even though Basel III standards may not meet the needs and circumstances of their banking systems (Ozili, 2019a&b).Other African bank supervisors plan to adopt Basel III at a later period because they feel they need enough time to study the monetary policy requirements needed to cater for Basel III. Some argue that Basel III only applies to sophisticated banking systems - such as those in Europe, and that African banking systems are not sophisticated and therefore do not need sophisticated banking regulations like Basel III. On the political level, some bank supervisors have opposed and rejected Basel III recommendations because they want to preserve the country's national identity – they feel that adopting foreign laws or regulations will lead to loss of national identity, Ethiopia is a classic example.

Other African bank supervisors understand the need to strengthen the resilience of their banking systems to adverse shocks, and Nigeria is one of them. Promoting banking stability in Nigeria is important and would require a broad micro- and macro- financial policy framework. Basel III in Nigeria will form a key part of the wider agenda coordinated by the Central bank to build a safer financial system and ensure its resilience to financial crises and economic recessions.

The study makes two contributions to the literature. First, the discussions in this article contribute to the policy debates on the effect of Basel III regulation on the banking system of developing and developed countries (see Blundell-Wignall and Atkinson, 2010; Kalloub et al, 2018;Yan et al, 2012; etc). Secondly, the discussion contributes to the literature that analyse how banking supervision and regulation works in African economies (see Van Vuuren, 2012;Adesina, 2019; Ozili, 2019b).

Extending the debate to Nigeria, it is needful to explore how regulation and supervision can work in Nigeria given the financial market imperfections, weak enforcement, political interference in banking regulation, limited sources of information and shallow capital markets. Thirdly, it contributes to the literature that examine the possible effect of regulation and supervision on bank behavior and risk-taking (see Laeven and Levine, 2009; Buch and DeLong, 2008; Lall, 2009, Ozili, 2019a). This literature argue that strict regulation and supervision can reduce excessive risk-taking in banks and can improve the stability of banks in stressed times, which is what bank regulators want.

The rest of the article is organized as follows. Section 2 discuss the objective, importance and progress of Basel III in Africa. Section III discuss how to make Basel III work in Nigeria. Section 4 discuss the challenges of Basel III adoption and how to minimize them. Section 5 present some recommendations, and Section 6 concludes.

2.0 Basel III: Objective, Importance and Progress in Nigeria

Basel accord is a framework to preserve the stability of the international banking system, and Nigeria adopts Basel capital framework for capital regulation in the banking sector. The purpose of the Basel accords is to design a framework to preserve the stability of the international banking system. Basel 1 was the first set of capital accords issued by the Basel Committee for Banking Supervision (BCBS). Basel 1 was issued in 1988. Basel 1 was designed to enhance understanding of key supervisory issues and improve the quality of banking supervision across countries. In 1997, the BCBS issued the "Core Principles for Effective Banking Supervision", which provided a comprehensive framework for effective banking supervision.

Basel II accord primarily focus on financial soundness. It was designed to enhance capital regulation by introducing risk weights, aligning bank regulation with best practices in risk management, and by providing banks with incentives to enhance risk measurement and management capabilities. Basel II was initially issued in 1999. The BCBS issued a first, second, third and fourth consultative papers for Basel II in 1999, 2001, 2003 and 2004. Basel II accord was amended in 2005 and 2006, and a final version approved in 2008.

The Basel III accord was developed by the BCBS due to the impact of the global financial crisis on banks. Basel III places great importance on liquidity and impact of economic cycles on financial system risks. Basel III builds on the previous accords, Basel I and II, and is part of a continuous process to enhance regulation in the banking industry (see table 1). There are three (3) key principles of Basel III.

The first principle is the 'minimum capital requirements'. The Basel III accord increased the minimum capital requirements for banks from 2% in Basel II to 4.5% of common equity, as a percentage of the bank's risk-weighted assets. There is also an additional 2.5% buffer capital requirement that will bring the common equity to 7%.

The second principle is the 'leverage ratio'. Basel III introduced a non-risk based leverage ratio which require banks to hold at least a 3% leverage ratio. The non-risk based leverage ratio is calculated by dividing Tier 1 capital by the average total consolidated assets of a bank. The third principle is 'liquidity requirements'. Basel III introduced two liquidity ratios - the 'liquidity coverage ratio' and the 'net stable funding ratio' (NSFR). The liquidity coverage ratio requires banks to hold sufficient high-liquid assets that can withstand a 30-day stressed funding scenario as specified by the bank supervisor. On the other hand, the 'net stable funding ratio' require banks to maintain stable funding above the required amount of stable funding for a period of one year of extended stress. The NSFR is designed to address liquidity mismatch in banks.

Basel III is important because it will strengthen regulation, supervision, and risk management within the banking industry. Basel III will prevent banks from taking excessive risks that can hurt the economy. It will improve banks' ability to withstand abnormal shocks. Basel III will also strengthen transparency and disclosure in banks. Under Basel III, the banking industry should expect better capital quality, higher capital levels, minimum liquidity requirement for banks, reduced systemic risk, and differences in Basel III transitional arrangements.

Table 1: Basel Transition				
Pillar 1			Pillar 2	Pillar 3
Capital	Risk coverage	Containing coverage	Risk management and supervision	Market discipline
Summary of specific provisions				Global liquidity standard & supervisory monitoring

3. Basel III in Nigeria: Making It Work
3.1. What Nigerian banks can do themselves

Nigerian banks can do at least six (6) things in preparation to adopt Basel III standards.
Firstly, the senior management of Nigerian banks should show support towards complying with Basel III standards. Top management of banks can show their support, and show their seriousness in complying with Basel III standards by: (i) providing extensive trainings on Basel III standards to their risk management and compliance staff, (ii) promoting a strong risk culture across all levels of the organization, (iii) ensuring there is a two-step authorization process before approving credit lines or trade deals above

a certain threshold in order to reduce the bank's exposure to abnormal credit risk and market risk, (iv) ensuring that members of the Board Risk Committee are competent in risk management and regulation.

Secondly, there should be process ownership for Basel III adoption in banks. Banks in Nigeria should appoint a Chief Risk Officer (CRO) who will be responsible for implementing Basel III standards in the bank. The CRO should become the process owner for Basel III adoption within the bank. The CRO should be competent and should have experience in the financial services, banking or regulatory industry.

Thirdly, Nigerian banks should appoint a Chief Compliance Officer (CCO) who will be responsible to ensure that the bank comply with Basel III regulations and all existing local laws and regulations that affect the bank's activities. The CCO should be the process owner for Basel III compliance within the bank. The CCO should be competent and should have experience in the legal, banking or regulatory industry.

Also, Nigerian banks should increase their holdings of high-quality capital and decrease the amount of low-quality capital and hybrid capital in their capital structure. Hybrid capital are low-quality capital instruments because these instruments have the properties of equity but already have a claim on them, making such instruments unavailable to absorb losses in banks. Common equity has the highest quality of capital, therefore, Nigerian banks may need to go to the capital market to obtain high-quality capital.

Also, banks should recruit competent staff for its risk management function. Careful recruitment of risk management staff should be a top priority because recruiting incompetent risk management staff could lead to human errors, non-compliance issues, process errors, risk modeling mistakes, avoidable losses, and violation of regulations which may attract heavy fines to banks.

Furthermore, banks in Nigeria should reduce their exposure to speculative risks. Nigerian banks should review their overall risk exposures prior to Basel III adoption, and should reduce risk by eliminating risks that do not add value to shareholders' wealth particularly speculative risks in their trading books. This will help to reduce the regulatory capital for market risk.

3.2. The Role of the bank regulator/ supervisor

The bank regulator should oversee the transition period from Basel II to Basel III in Nigeria. The regulator may extend the transition period to 6 months, 2 or 5 years if necessary. The bank regulator may also consider how long it will take to translate Basel III standards into a national macro-prudential policy framework.

Secondly, the bank regulator in Nigeria should decide whether they will modify Basel III standards or adopt off-the-shelf Basel III standards. Basel III standards can be modified in three ways, either (i) adopt off-the-shelf Basel III without any changes; (ii) impose higher requirements above Basel III standards, or (iii) impose lower requirements below Basel III standards.

If the regulator chooses to modify Basel III standards, such modification to Basel III should be done in a way that harness the benefits of global banking standards while at the same time reducing the risks or cost that adopting off-the-shelf Basel III brings (Beck et al, 2019).

Thirdly, the bank regulator supervisor should ensure that bank examiners understand the Basel III requirements so

that they can conduct effective bank examination and supervision of banks under Basel III standards. Bank examiners are responsible for conducting risk-based or compliance-based regulatory audits of the financial statements, processes and governance structure of regulated banks and other financial institutions. These audits or examinations are either risk-based or compliance-based.

Also, the bank regulator should notify bank examiners of any local modification made to Basel III during its implementation. Bank examiners should understand any changes to Basel III, and how such changes will affect the way they conduct regulatory audits for supervisory purposes. If necessary, additional training should be provided to bank examiners to explain the reasons for such modifications and to guide bank examiners on how to conduct regulatory audit under the new changes.

Furthermore, the bank regulator should ensure that there is no ambiguity in Basel III implementation process for the compliance teams of banks. The bank regulator should ensure that the compliance managers (or teams) of banks fully understand the requirements of Basel III. The regulator should hold several meetings with the compliance teams of banks to explain the regulatory and compliance expectations of Basel III.

Such meetings will give the compliance teams the opportunity to ask questions on areas they do not understand regarding Basel III rules. This approach is desirable and cheaper for banks compared to the cost of hiring some consultant to explain the compliance process of Basel III to banks, and paying huge consulting fees for such services.
Finally, the regulator should seek the help of the government if they believe that new laws need to be made to support the Basel III regulatory framework in Nigeria.

3.3. The Role of Government

The government can do three (3) things to support the Basel III adoption process. The government should provide full support to the Central bank throughout the Basel III implementation process. Secondly, the government should understand the purpose of Basel III standards, the benefits and the potential consequences of adopting Basel III standards especially the procyclicality of Basel III capital requirements.

The government can set up a senate committee to oversee the Basel III adoption process. The committee should communicate with the bank regulator, to ensure that the government is well-informed about Basel III objectives and implementation plans, so that any future fall-out from Basel III or other negative externalities to the banking system will be well-anticipated.

Thirdly, the legislative arm of government should be willing to enact new laws or establish new institutions at the request of the regulator if such new laws or institutions are needed to support the banking system in the Basel III era.

And finally, the government should have a crisis resolution plan, contingency liquidity provision or other extraordinary measures to rescue the financial system from unforeseen events especially financial crises.

4.0 Challenges to Basel III adoption and how to minimize them

There are challenges to implementing Basel III in Nigeria.
For instance, domestic banks that have limited cross-border exposure may show little enthusiasm to embrace Basel III standards in their risk culture. To minimize

this problem, the bank regulator can allow domestic banks to gradually adopt Basel III at their own pace within a defined transition period.

But, allowing domestic banks to adopt Basel III in their own convenient time could signal regulatory bias and favoritism towards some domestic banks, it may signal that regulatory complacency towards small domestic banks.

Another challenge to implementing Basel III is that the regulator may become selective in adopting the full aspects of Basel III. They choose some aspects of Basel standards to adopt and choose the aspects to ignore. It is difficult to minimize the selective adoption problem because Nigeria is not a member of the Basel Committee for Banking Supervision (BCBS), and is therefore not under any obligation to adopt off-the-shelf (or full) Basel III standards.

Another challenge is political interference in banking regulation and supervision. Politicians can take legislative actions to prevent a Central bank from implementing specific regulations which they feel will put weaker local banks in jeopardy, or for other reasons. To minimize the political interference problem, the Central bank may seek presidential endorsement and support for Basel III adoption in the country, and the Central bank may seek legal support for Basel III implementation.

Another challenge is increased cost of capital. Nigerian banks will be required to hold higher capital buffers and this may reduce the availability of credit to small and medium-sized enterprises. To address this problem, the government while implementing Basel III, can consider providing a generous lending window or credit schemes to small businesses and individual borrowers preferably at single-digit interest rate so that individuals and businesses can have access to affordable credit during the transition period and in the Basel III era.

5.0   Recommendations

1.   Nigerian bank regulator should enforce strict market discipline under Basel II in preparation for Basel III.
2.   Secondly, effective bank supervision is needed to ensure that the activities of banks comply with micro and macro-prudential policies and regulations.
3.   Thirdly, there should be international cooperation and peer engagement between the domestic bank regulator and bank regulators in other countries in areas of common interest for effective adoption of Basel III standards.
4.   The regulator should have a contingency plan to reassure the public of the safety of their deposits in bad times.
5.   The timetable for the introduction of Basel III's new minimum capital and liquidity ratios should be flexible to give banks enough time to transit to Basel III requirements.
6.   The bank regulator should have emergency liquidity solutions to support the financial system during troubled times. When liquidity solutions are available, the bank regulator should carefully review the quality of such emergency funds, and should review the timing of the withdrawal of emergency liquidity facilities in order to create a soft landing for the most affected financial institutions in the event of a crisis.
7.   Finally, the bank regulator in Nigeria may need to carefully review the definition of the assets eligible to meet the liquidity requirements of Basel III.

6.0   Concluding Remarks

It is certain that new banking regulations will increase in the coming years. For this reason, it is important to ensure that banks in Nigeria have sufficient capital above the minimum levels at all times, depending on their risk profile, business models and prevailing economic conditions. The bank

regulator may impose a more stringent capital base for banks, and may speed-up the implementation of Basel standards, and this will be a recurring element in subsequent Basel regulations particularly in Basel 3.5 and Basel 4.

Five points to remember include the following. Basel III regulation will bring more regulations, transparency and more clarity to the banking system in Nigeria. Secondly, Basel III regulation will combine both micro- and the macro-prudential approach to financial system regulation.

Thirdly, Basel III will also introduce a macro-prudential framework which will promote stability in the financial system, reduce procyclicality in the financial system and to deal with systemic risk. Furthermore, the bank regulator may opt for a long transition period because Basel III will be a learning process for some banks.

Finally, the bank regulator can intensify their effort to help their banks recover from the effect of past or current crises, in preparation for Basel III implementation.

The effect of Basel III on the performance of Nigerian banks is unknown. Future research can investigate the effect of Basel III on Nigerian banks. Academics and policy researchers interested in banking research can examine the impact of Basel III on bank performance.

The findings from such analyses can provide feedback to the bank regulator in their assessment of the impact of Basel III standards on bank behavior and bank performance. Secondly, Basel III's stringent capital regime can reduce excessive risk taking in banks and can reduce the level of nonperforming loans in banks.

In line with this argument, future research can investigate whether Nigeria banks have more or fewer nonperforming loans in the Basel III era, compared to the Basel II era.

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Artificial Intelligence in Conventional Banking: Challenges, Opportunities and Risks.

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Abstract

Artificial intelligence (AI) commonly referred to as machine intelligence is the technological simulation of human intelligence into machines. It's the intellectual ability exhibited by machines in contrast to the natural knowledge that is demonstrated by a normal human being like self-driven vehicles, manufacturing robots, disease mapping, smart assistants, AI technology is progressing at a rapid rate. The technology consists of two key fundamental ideas, first being the study of human brains and how brain processes work and secondly helps represent the process through machine learning. The technology has in recent past taken over numerous industries the most recent being the conventional banking industry. This paper focuses on Artificial intelligence in the banking sector, the revolutionary changes it has brought and the impact on human labour.

1.0 Introduction

Technology and innovation are at the bottom heart of the world economy making many nations and cities greener while underpinning the financial, nuclear, health, and mobility sectors. This move has been more successful with the recent technological innovation of artificial intelligence sometimes called machine intelligence, which is a form of computer intelligence, unlike natural intelligence which is commonly displayed by human beings and some animals. Being an interdisciplinary science, it is primarily concerned with building intelligent machines that have the capability of performing many simple and complex tasks that require human intelligence hence creating a paradigm shift in virtually all sectors of the technological industry.

The banking sector is one of the most vital areas in today's economy, with many conventional banks licensed to handle cash, issue credit, and other financial transactions that provide Safe Avenue to store extra cash and resources. Digital disruption has been redefining the banking industry and changing the way businesses operate and function. Every stakeholder in the industry has been accessing options and ways that will create value in the evolving technological world. Workshops, articles, reports, and research continue to proliferate among the considerable hype in the technology behind the finance industry for a good reason for giving customers the most enjoyable experience (Dirican, 2015). This has seen the banking sector witnessed a groundbreaking change in technology with the foremost and vital detail being the customer utility and centricity.

Russell & Norvig (2017) asserts that with the groundbreaking changes in the recent past, most banks have harnessed cognitive technology within artificial intelligence to bring the utility and advantage of digitization as well as helping them meet the competition posed by Fintech players. Winning strategies employed by banks have been undergoing an artificial intelligence transformation in revealing how best to capture its opportunities in a competitive environment. Most of the strategies highlight the urge for a holistic AI strategy that will extend across the banking business line, making proper use of data, professionalism in employees, and

partnership with both external and internal partners.

2.0 Challenges

The impact of artificial intelligence on the global economy and human lives has been rapidly expanding with data indicating that it will add more than $15 trillion to the global economy by 2010. With conventional banking being end users it's estimated to boost revenue and bank productivity by up to 50%. This dream however cannot be achieved with many challenges facing technology like.

Computing power: The machines are power-hungry, a factor keeping most of the users and potential buyers away. With machine learning being the steping stone to the technology, they demand a high and ever-increasing power to perform efficiently. Referring to (Smith, & Nobanee, (2020) most of them require a supercomputing power which is very expensive to achieve and maintain. Bank being a profit-oriented institution might not afford the applications as it will come with an unprecedented amount of data from a rapidly expanding complex algorithm.

Limited knowledge: Within the banking system, there are many places where artificial intelligence can be used to perform better than the traditional systems, however, there is a huge challenge of knowledge concerning artificial intelligence. The banks always have schedules and workshops to learn innovative ways of increasing production, manage products and resources online and react to market changes effectively but are not aware of AI products and their service providers like Amazon and Google cloud.

Human-level interaction: This among the biggest challenges in AI technology and has kept the bots researchers on the edge for banks and other businesses startups. Banks can praise and boast of system 99% accuracy, but human understanding is much better and can perform better in every banking aspect. Unlike AI systems which operate on an input to output mode of operation professional human beings can predict the output at accuracy over 99%, while the AI bot requires well defined and accurate system algorithms with uninterrupted robust power (Wall, 2018). The machines are finely tuned for maximum accuracy but like any other machines, are prone to virus attack, and will have errors far beyond human-level performance.

Biasness: The good and worse natures of AI bots primarily depend on the accuracy and amount of data they are fed with. In real sense data centers and research institutes collect poor and inaccurate data as it holds no significance in its operations. The data is biased and defines the nature and specification of a small sample with a common interest like race, religion, and gender. These problems can only change if AI systems are equipped with an algorithm that tracks the data of the respondents.

Data Quality: AI systems functionality relies heavily on data that are fed as input to get output. Hence the systems require heavy training and data sets. Moro, Cortez, & Rita (2015) says that they learn and operate from the available data sets just like normal human beings but for it to identify patterns and give good results they need very heavy data sets. For its proper functionality, it needs the user to list the type of data available, categorize the data as structured or unstructured, and see if there is any missing information. Good and reliable data is however difficult to maintain

Among the opportunities presented by artificial intelligence in banking industries include:
1.   **Anti-money laundering features:** The technology is being implemented by banks across middle-office functions, has usable features that help in detecting fraudulent activities, irregular payments,

as well as improving the standard process for combating anti-money laundering and helping the customers know their regulatory checks. While the technology hasn't reshaped the customer functions in banking, it has done a huge revolution in the middle office function, being the avenue where risk management is very vital. Most conventional banks have incorporated AI into a legacy and common rule-based antifraud platform in their systems.

2. Customer support in front offices: Like any other financial institution, conventional banks operate as physical spaces, being cited as an industry that is on the threat of being killed by millennials. Research by business insiders indicates that over 50% of that generation does not use brick and mortar in their workstations, in the long run making customer support very poor and low customer expectations. Artificial intelligence has however impacted this landscape with technological bots that have voice assistance capability being the norm at major banks. This impact has seen biometric authorization being experienced, and for few customers who enjoy the occasional bank, visit meets artificial intelligent robotic help.

3. Strengthening competitive advantage: AI has brought about well-enhanced customer experience as it develops a better understanding of customer pattern and their behavior. Referring to Perez, Deligianni, Ravi & Yang (2018) this has revolutionized the banking sector while enabling most of them to customize their products and services through adding personalized and intuitive features that deliver meaningful interaction with customers as well as building a strong relationship with the customers. They help predict customer patterns and future outcomes by analyzing customer behavior and trends making them have a better competitive advantage to other institutions that have not adopted the technology.

4. Effective in decision making: Artificial intelligence applications are inbuilt with cognitive systems that can think and act like human beings while providing an optimal solution based on the customer's available date in real-time. These systems are tailor-made to keep a repository of expert information in a database commonly known as a knowledge database. The bankers will then use these cognitive systems in strategic analysis and decision making.

5. Help banks choose customer credit and loan wisely: Banks still rely on factors like customer credit score, the flow of income, credit history, and level of transactions while deciding on credit worthiness. This field where artificial intelligence helps with an analysis that goes beyond the customer data. The loan decision systems will use machine learning technology in observing patterns and behaviors that help the bank determine whether the customer is creditworthy or not. When implemented to full use the application will make a decision that is accurate, reliable, and dependable. Major capital markets authority professionals believe that loan decision tools will replace human beings since their decisions are more accurate and not biased Moro, Cortez & Rita (2015).

6. Better regulatory compliance tools: The banking sector is one of the most regulated globally in that they need to have excellent risk profiles to prevent major financial problems, give the best customer support as well as identification of customer patterns and behaviors. Banks, therefore, rely on the AI sophisticated tools that identify and prevent the huge risk of financial crimes like fraud and money laundering. The growth of artificial intelligence tools has revolutionized this industry while providing safer and more reliable customer experiences. The pieces of AI software mostly rely on cognitive fraud analytics that helps in identifying customer's

transactions, the flow of income, track transactions and identify suspicious activities as well as assessing data of different compliance systems and rules Perez Deligianni Ravi & Yang, (2018). The tools have not been fully utilized and have not reached their full potential but have helped conventional banks in regulatory compliance and reducing the risk posed by fraudsters.

3.0 Risks associated with artificial intelligence in banking

Many researchers and users of artificial intelligence bots roll their eyes when they see articles written by scientist Stephen Hawking with headlines' ' Stephen Hawking warns the world that the rise of robots may be disastrous to mankind". According to (Russell, &Norvig (2017), the technology has been hailed as revolutionary and changing the world although it comes with many risks associated. Once intelligent computers can reprogram themselves and successfully improve on their complex functions, a move that will lead to an intelligence explosion, this will bring another angle of machines outwitting humans in a scramble for limited resources and self-preservation. Artificial intelligence is therefore a threat since its growing more sophisticated and future pitfalls are growing louder. Among the risk, they pose in the banking industry include:

Job automation/impact on the labor market: Job automation where thousands of educated professionals will lose their jobs to machines is the most immediate concern. (Smith, &Nobanee, H. (2020) argues that it's a matter of time when the bots will replace certain jobs to a huge degree; mostly in banking particularly but not exclusively the employees who do predictable and repetitive jobs disruption could be underway. According to the wall street journal, over 20 million jobs globally in the banking industry are at a high exposure to automation in jobs ranging from marketing, sales, cashiers, market

analysis, and hospitality as the tasks will be done using bots. This puts banking employees at high risks as AI jobs are smarter and becoming more dexterous in the long run displacing the workforce.

Lack of transparency: Most AI systems are built with neural networks serving as operating systems being complex interconnected nodes. The systems are therefore less capable of indicating their real motive in decision making as they only display the input and output part. When making a lending decision it's very important to trace the specific data, and why specific decisions resulted in that data, and the underlying reasoning that resulted in a specific decision. Most users are still in darkness on whose data was used to train and program the models.

Biased algorithm: The AI machines pose a great question in regard to the legal aspect of the bots that are becoming increasingly smart. It's still unclear how to judge them the way we would judge human beings. When we feed data sets that have biased data the system will confirm our biases as it's a case of garbage in garbage out. Banks are still not well equipped with expertise at their disposal to filter any biased data with some vulnerable groups being disadvantaged by the systems. This has seen many convicts being sentenced to years in prison by a technically incorrect system as most banks rely too much on information from output smart systems without the knowledge of how the algorithm achieved data results (Smith, A., &Nobanee, 2020).

Misalignment between banks' goals and machines: The part that banks value in artificially intelligent machines is efficiency and effectiveness in performing tasks. This bank management, however, has set goals and if they are not aligned with the machine goals this could be extremely dangerous. With many errors in banking systems, they might not be able to issue anyone credit based on AI data as

some of the information from the credit reference bureau could be not up to date or missing through an error of omission from the previous lender.

Discrimination: Machines are built to collect, track, and analyze much of the information about a customer. The bank's insurance department might reject a customer insurance cover based on data of a person caught on camera talking on the phone. The bank human resource department might reject or withhold an applicant's job offer based on social credit score.

Privacy, less personal security, and the rise of deep fakes: While the loss of jobs and displacement of the workforce is the most pressing issue associated with AI it's just one of the many risks. Malicious use of artificial intelligence is a huge threat to digital and national security mostly through criminal training machines used in hacking and interfering with physical security. It's now very possible to track every human online as well as when they are performing their business transactions. When someone is in a position to watch you and make decisions based on the bots Intel it's considered an invasion of privacy as it can turn to social oppression.

Social inequality: With the rise of machine intelligence, the world faces bias and widening social-economic inequality that will be sparked by human job loss to AI driven jobs. Like the education workforce has been a key driver in social mobility, however, Bots takeover will create a huge gap with those left in the cold less likely to seek retraining other skills, compared to people in higher positions. Various forms of Bots bias will be detrimental going beyond gender as AI is created by humans and humans have from the past been seen to be inherently biased. Most AI developers come from racial demographics and have grown in the social-economic background most of which don't consider disabilities; hence it's

a huge challenge when it comes to the user application.

4.0 The most common artificial intelligence tools used

Alphasense: This is a powered search engine tool used by banks and other financial industries. The tool in banking platforms utilizes natural language in processing and analysis of keywords within the database, filings, news, and research transcript to discover changes and trends in financial markets serving clients like host banks and investment companies. It has impacted the conventional banks and a variety of professionals like bank brokers as the search engine gives data to earning call transcripts, sec global filings, and crucial information of private and publicly traded companies.

Ayasdi: This is a cloud-based application that uses machine intelligence solutions for banking enterprises in solving complex financial challenges. For banks and companies in the fintech industry, the application is deployed for functions of understanding and managing risks, the anticipation of customer needs, and combating money laundering processes. This has helped banks with money laundering detection solutions, as the sheer committee for investigations has been straining the industry.

Kensho: This is an application that provides machine learning as well as data analytics to banks and leading financial institutions like JPMorgan's. The application will offer a financial solution by use of cloud computing and processing natural language helping the company system to provide solutions to complex financial questions in understandable language (Kaya, Schildbach, & Schneider, 2019) The application was used by traders in predicting a drop in the British pound following Brexit according to the 2017 Forbes money magazine.

Underwrite: This is an AI tool that's used to analyze thousands of data points in banks from the credit reference bureau, for customers and small-scale trader's loan applicants. The application acquires data from CRB and applies machine learning to identify loan patterns and make an informed decision of good and bad applicants with users of the tool claiming it can reduce the level of defaults by 30-50%. Since its market entry in 2015, most of its users have reduced loans default rate by 17% to 5% according to a survey from companies' websites.

Data robots: These are AI tools that provide machine learning software for bank IT specialists, business analysts, and software engineers. Data robots have helped conventional banks and other financial institutions in the building of accurate predictive models that enhance informed and better decision-making surrounding issues like fraudulent credit cards, managing digital assets, block chain management, and lending activities.

Banks and institutions using data robots have been more accurate in underwriting decisions through the prediction of customers with history and the likelihood of default.

Affectiva: This is one of the most common artificial intelligence software and the world's most famous robot. The robot is a humanoid style with an inbuilt tablet strapped on its chest injected with sophisticated abilities to function, read emotions, and elaborate cognitive states (Dirican, 2015). Following its recent upgrade, the bot was introduced to banks floors where it handles duties like cashier; teaches customers on account opening, relay credit card details, and more.

Socure: Commonly known as "know your customer" it's a very friendly term across business and banking boards as it's aligned under federal law. The bot was introduced under the patriot act of 2001 as it comprises of the host customer identity verification checks, which fetch data and information in every aspect from terrorism, to drug trafficking activities. The Bot verification system uses machine learning and AI to analyze individual online, offline, and social data in meeting the strict membership conditions. The bot runs predictive data science on an individual like emails, IP addresses, phone numbers, and other proxies to investigate the applicant's information.

5.0   Conclusion.

The quality of AI technology in banking has improved considerably in a few areas over the past few years with all merits and merits it entails with the prediction of being the most disruptive technology in the coming decades. Work and performance have been made easier, systems gaining a better understanding of business dynamics, opening a world full of opportunities.

The challenges seem depressing and devastating to human capital but through a collective effort by developers, the business community and world leader's changes to the challenges can be effective.

6.0   Recommendation

Artificial intelligence is among the emerging technologies that has its advantages and disadvantages to its application in the banking industry. With more inventions coming into the business world developers and humans need to take care of the negative side of technology while using the positive side to create a better and prosperous business world.

The key to this emerging technology is to make sure they serve humans better, not to get out of hand and destroy our civilization. There need to be public bodies with all stakeholders to have an insight into the good and bad side of AI and then oversight to see that every concerned person is developing and using AI Safely.

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Role of Financial Regulators and Supervisors in Promoting Women's Financial Inclusion: Evidence from the Central Bank of Nigeria

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Abstract

Women's financial inclusion has become increasingly important across the globe as surveys have revealed that women are disproportionately excluded from the financial system. They lack access to basic financial services more than their male counterparts. Evidence abound that promoting women's financial inclusion provides huge benefits not only to the women but also their families and the economy in general. Given the potential of women's financial inclusion to reduce income inequality and enhance inclusive growth, most financial regulators and supervisors are now focusing more on increasing participation of women in financial system to close the gender gap. It is against this backdrop that this paper examines the role of financial regulators and supervisors in promoting women's financial inclusion with focus on the efforts of the Central Bank of Nigeria. It also highlights the constraints to women's financial inclusion and measures to be taken by financial regulators and supervisors to address these issues including low level of financial literacy, inadequate access to credit, lack of collateral and cultural/social practices.

1.0 Introduction

Globally, the role of financial regulators and supervisors, which primarily is to ensure monetary and price stability has evolved to include the promotion of financial stability with a focus on financial inclusion. They also ensure consumer protection and quick arbitration when necessary in the financial system. Financial inclusion gained importance in the early 2000s and financial regulators and supervisors are now more than ever paying greater attention to this as it has the potential to reduce income inequality and enhance inclusive growth, which consequently leads to financial and economic stability resulting in sustainable development of a country.

Despite these benefits of financial inclusion, evidence abounds that a proportion of the population, especially women still lack access to basic financial services. There has been disproportionate access to financial services for women, which has exacerbated the poverty level in many households. Women, who account for 40 percent of the world's workforce, encounter barriers to financial services which constrain their participation in economic activities thereby reducing their chances of improving the quality of life of their households. Women's financial inclusion occurs when they have effective

access to a range of financial products and services that help them to meet their multiple businesses and household needs and that are responsive to the socio-economic and cultural factors that cause financial exclusion in women and men to have different characteristics (DFID, 2013).

The 2011 Global Findex report shows that in developing economies, only 37 percent of women have access to basic financial services, that is, account in a formal financial institution while 46 percent of men do. The lower access to financial services by women has been attributed to several factors, such as lack of financial literacy, lack of assets for collateral and cultural biases against women, among others. Despite the progress in enhancing financial inclusion, women are still disproportionately excluded as close to one billion are excluded from the financial system. In developing countries, women remain 9 percentage points less likely to have access to financial services than men (Demirguc-Kunt, Klapper, Singer, Ansar and Hess, 2017).

In Nigeria, the disproportionate exclusion of women from the financial system is also evident. A survey carried out by Enhancing Financial Innovation and Access (EFInA) in 2008, showed that 45.5 million or 52.5 percent of the adult population of 86.6 million were financially excluded with 47.5 percent having access to financial services, through formal and informal means.

The survey further showed that 82 percent of adult females were never banked compared to 67 percent of adult males that were never banked. Since then, efforts have been made to enhance access to financial services for the financially excluded with the Central Bank of Nigeria (CBN) being at the forefront of financial inclusion drive. In 2018, the proportion of women that were financially excluded reduced to 40.9 percent (EFInA, 2018).

The objective of this paper is to discuss the role of regulators and supervisors in promoting women's financial inclusion with a focus on the CBN's efforts in this regard. The paper is divided into six sections. Following the introduction is Section 2 which discusses conceptual issues and the gender gap -why women's financial inclusion matters. Section 3 presents the constraints to women's financial inclusion. Section 4 evaluates the role of regulators and supervisors in addressing the constraints. Section 5 highlights the efforts of the CBN in promoting women's financial inclusion and section 6 concludes the paper.

2.0   Related Literature
2.1   Conceptual Issues

Financial inclusion is a multidimensional concept with no universally accepted definition as various authors, international organisations and central banks have attempted to define the concept. The definitions provided are not exhaustive but serve as the basis to understand the multi dimensionality of financial inclusion.

According to Plymouth City Council Financial Inclusion Strategy (2009), financial inclusion describes a process where all members of the economy do not have difficulty in opening bank accounts, can afford to access credit, and can conveniently, easily and consistently use financial system products and facilities without difficulty. It is the process which ensures that a person's incoming money is maximised; out-going is controlled and can exercise informed choices through access to basic financial services.

The Consultative Group to Assist the Poor (2011) defines it as "a state in which all working-age adults, including those currently excluded by the financial system, have effective access to the following financial services provided by formal institutions: credit, savings (defined broadly to include current accounts), payments and insurance".

Atkinson and Messy (2013) define the concept as the process of promoting affordable, timely and adequate access to a wide range of regulated financial products and services and broadening their use by all segments of society through the implementation of tailored existing and innovative approaches including financial awareness and education with a view to promote financial well-being as well as economic and social inclusion.

According to Bank Indonesia (2014), it is the right of every individual to have access to a full range of quality financial services in a timely, convenient, informed manner and at an affordable cost in full respect of his/her personal dignity. Financial services are provided to all segments of the society, with particular attention to low-income poor, productive poor, migrant workers and people living in remote areas.

Similarly, the Central Bank of Paraguay (2014) refers to financial inclusion as the access to and usage of a range of quality, timely, convenient and informed financial services at affordable prices. These services are under appropriate regulation that guarantee consumer protection and promote financial education to improve financial capabilities and rational decision-making by all segments of the population.

Finnegan (2015) describes the concept as where effort is made to ensure that all households and businesses, regardless of levels of income are able to effectively access and use appropriate financial services they need to improve their lives.

In the State Bank of Pakistan's (2015) perspective, financial inclusion is defined as when individuals and firms can access and use a range of quality payments, savings, credit and insurance services which meet their needs with dignity and fairness.

Yoshino and Morgan (2016) extend the definition of financial inclusion to include small and medium-sized enterprises (SMEs), referring to it as the degree of access of households and firms, especially poorer households and SMEs, to financial services.

As cited in Oleka and Onyia (2017), Oyewo and Oyewole (2014), define the concept as a process or situation which allows the unbanked; especially the dwellers in rural and semi-urban areas, easy access to loans and deposit mobilization by formal financial institutions, or availability of and usage of formal financial services by rural dwellers.

The Bank of Tanzania (2017) defines it as the regular use of financial services by individuals and businesses through financial infrastructures to save, manage cash flows, invest in productive capacities and mitigate shocks, which are delivered by formal providers through a range of appropriate solutions with dignity and fairness.

According to the World Bank (2018), financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way.

The Center for Financial Inclusion (2018) defines financial inclusion as a state in which all people 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.

Financial services are delivered by a range of providers, most of them private, and reach everyone who can use them, including disabled, poor, rural, and other excluded populations.

The CBN (2018) posits that financial inclusion is achieved when adult Nigerians have easy access to a broad range of

formal financial services that meet their needs at affordable costs.

In spite of the various definitions of the concept, a common theme present in all is the "access to financial services". Although "access" is necessary, it is not sufficient as the use, affordability and quality of the financial services are important, which some of the definitions also emphasized.

2.2   Gender Gap – Why Women's Financial Inclusion Matter

The gender gap in financial inclusion has underscored the need for financial regulators and supervisors to place more emphasis on women's financial inclusion. The basic indicator, which is account ownership shows that globally in 2011, 47 percent of women had an account, against 54 percent of men that had an account. In 2014, account ownership for women increased to 58 percent while men had 65 percent, reflecting a persistent gender gap of 7 percentage points. In developing countries, the gender gap remains at 9 percentage points despite the progress in the rate of financial inclusion (Demirguc-Kunt, Klapper, Singer and Oudheusden, 2014).

It was also found in 2014 that women are 20 per cent less likely than men to have an account at a formal financial institution and 17% less likely to have borrowed formally in the previous year in developing economies. Even where women can access credit, they often lack access to other financial services, such as savings, digital payment methods, and insurance (World Bank, 2014).This further underscore the gender gap in financial inclusion.

Nevertheless, there has been an increasing commitment to accelerate women's financial inclusion. In 2016, the Alliance for Financial Inclusion (AFI), a global forum of financial inclusion policymakers from developing countries, committed to closing the gender gap in financial inclusion with the adoption of the Denarau Action Plan – the AFI Network Commitment to Gender and Women's Financial Inclusion. The action plan sets out a series of actions, which AFI members have committed to take to address the gender gap in financial inclusion. These include: collecting, analysing and using sex-disaggregated data to promote financial inclusion; promoting gender diversity within member's institutions and strategies; and setting specific financial inclusion targets for women's financial inclusion within both the framework of the Maya Declaration and their national financial inclusion strategies, with progress to be monitored and reported regularly (Miles, 2017). The Denarau Action Plan is a 10-point plan geared towards accelerating women's financial inclusion and targets to halve the financial inclusion gender gap across AFI member jurisdictions by 2021. As a member of the AFI, the CBN is committed to closing the gender gap in financial inclusion.

A study carried out by the International Monetary Fund in 2018 reveals that women are underrepresented at all stages of the global financial system, that is, being classed as depositors, borrowers, representation on boards of banks and regulators. The study thus concluded that better inclusion of women as users, providers, and regulators of financial services would be beneficial beyond addressing the gender gap.

Trivelli, Pels, Villanueva, Marincioni, Sachetti, Robino, Walbeyand Martinez(2018) opine that closing the gender gap in financial inclusion could have positive effects in smoothing consumption, lowering financial risks and costs, providing security, increasing saving and investment rates, and facilitating new business opportunities. Women can contribute to growth not only by building businesses but also by better managing their financial resources. Also, narrowing the gender gaps would foster

greater stability and resilience in the banking system, enhance economic growth, and contribute to more effective monetary and fiscal policy(Sahay and Čihák, 2018).

The financial inclusion of women does not only give them access to financial services but increase their empowerment, opportunities to earn income and reduce poverty levels. Burjorjee, Deshpande and Weidemann (2002) assert that women's use of financial services can increase their income and economic security, enhance their independence, reduce the vulnerability of their families, and stimulate local economies.

Finnegan (2015) notes that increased access to finance contribute to women's economic well being as well as to their economic empowerment. Women's access to individual private savings accounts not only fosters economic resilience by increasing women's savings, but also enables women to make financial choices, buy more durable goods, and increased women's bargaining power in the household. It also results in better outcomes for their children, household nutrition, and the wider community (Hendriks, 2019).

A study in Kenya shows that access to mobile money services delivered huge benefits, especially to women-headed households, which increased their savings by more than a fifth. It also allowed 185,000 women to leave farming and develop businesses or retail activities, which helped to reduce extreme poverty among women-headed households by 22 percent. Similarly, in Nepal, female-headed households were found to spend more on nutrition and education after opening a savings account (Demirguc-Kunt et al, 2017).

The need to bridge the gender gap cannot be over emphasised as women's financial inclusion portends benefits to not only women but their families and the economy

in general. Thus, women's financial inclusion is an underused source of growth that should be harnessed to achieve sustainable and inclusive development (Taylor and Boubakri, 2013).

3.0 Constraints to Women's Financial Inclusion

Despite the efforts of regulatory and supervisory authorities to enhance women's financial inclusion, evidence shows that women have been disproportionately excluded due to several constraints that hinder their access to basic financial services. Some of these are:

Low Level of Financial Literacy
According to the 2018 Toronto Centre Global Leadership report, the low level of financial literacy is considered to be the most serious constraint to women's financial inclusion. It explained that many women demonstrate less financial knowledge than men and are also less confident in their financial knowledge and skills.
The low financial literacy level of women has also proven to limit them in gaining access to and benefitting from financial services. An OECD survey conducted in 2013, which was also corroborated by research evidenceof Lusardi and Mitchell (2014) revealed that in many countries, women demonstrate less financial knowledge than men and are also less confident in their financial knowledge and skills. Furthermore, women observed to have the lowest financial knowledge were found to be less-well educated and within the low-income bracket.

A study carried out in Pakistan revealed that not all bank accounts opened by women were operated by these women. The study observed that while an account could be opened in the name of a woman, the decision-making around the use of the funds in the account often lies with a male relative (World Bank, 2014).

Inadequate Access to Credit

Women do not readily have access to credit when compared to men due to various cultural practices and type of business, which is mostly micro and small enterprises. Statistics in developing economies in 2014 shows that women are17 per cent less likely than men to have formally accessed any form of credit at a formal financial institution and20 per cent less likely than to have an account. This is an indication of the inadequate level of financial empowerment women are faced with. Beyond access to credit, women often lack access to other financial services, such as savings, digital payment methods and insurance.

A plethora of literature has shown that financial institutions are less likely to provide financing to female-owned enterprises. If given, it is likely to be at a rate relatively higher than male-owned enterprises. This illustrates the difficulty that many women encounter in accessing financial products and services.

Lack of Collateral Assets

Closely linked to inadequate access to credit is the lack of collateral assets. Women do not readily own immoveable collateral assets such as land titles due to existing land and cultural practices that discriminate against them. This has limited most women from accessing credit from financial institutions as they are unable and find it difficult to provide collateral for loans.

Lack of Gender Desegregated Data

Financial Institutions do not understand the female market due to the lack of gender -disaggregated data, which impedes designing financial products targeted at women. It is critical to gather and analyse data on women's access to and use of financial services, to understand the existing gaps in women's financial inclusion and how to close them. This was evidenced by a study carried out by AFI, which established that financial institutions lack credible and objective gender- disaggregated data and its absence has made it difficult for financial institutions to demonstrate the business case for serving low-income women or have a clear understanding of the female market. Consequently, financial institutions are yet to develop products for low-income segments due to a lack of information about women's financial needs and financial behavior. Also, for credit reporting, credit bureaus do not collect/represent gender-disaggregated data, which will provide financial institutions with information on the performance of loans extended to women.

Deterioration of public confidence and Instability in the Financial System

Public confidence and stability are vital elements of a well-functioning financial system. In the absence of these elements, the economy's ability to mobilize savings for economic use is in jeopardy. The deterioration of public confidence can be a barrier to women's financial inclusion. Stability is critical because it gives financial market participants the assurance to trade in financial markets and use the services of financial institutions. Women in most cases, especially those in the rural areas are skeptical about having accounts or accessing credit from financial institutions, which is occasioned by lack confidence alongside the low level of financial literacy and inaccessibility of the financial institutions in some areas.

Cultural and Social Norms/Practices

Some cultural practices are responsible for the low financial inclusion of women. There are places where women are not allowed to own assets in their names or inherit assets. Lack of independence is also a factor as some women are financially dependent on their spouses, thus limiting access to financial services. Also, women in remote areas also encounter mobility constraints that make it difficult to engage services of financial institutions.

4.0 Role of Financial Supervisors and Regulators

To address the under representation of women in the use of financial services, financial regulators and supervisors should institute specific gender policies targeted at women in the following areas:

Financial Literacy Programmes

Financial education and financial literacy programmes for women are critical investments in women's financial inclusion. People find it difficult to use what they are not knowledgeable about; this also applies to women and their usage of financial services. Financial supervisors should aim at increasing overall levels of financial literacy starting from a young age by encouraging and sponsoring financial literary programmes, for example, spearheading national strategies on financial education. Financial supervisors and regulators should drive financial literacy programmes targeted at women.

Credit Reporting System and Collateral Registry

Financial supervisors and regulators can promote the establishment and use of credit reporting systems that capture relevant, accurate, and sufficient data for improved services. This should include gender-disaggregated data that can help provide information on the creditworthiness of women borrowers. An article published by Press Herald (2016) revealed that although men have more credit cards than women, the latter were identified as having better credit scores.

Similarly, an important step in resolving the collateral constraints encountered by women in their quest to finance is the establishment of a collateral registry, where it does not exist and increased use of the collateral register in countries where they exist. This will help to capture immovable assets owned by women that can be used as collateral to access credit in financial institutions, thus solving the collateral assets constraint.

Gender-sensitive Regulations

Financial regulators and supervisors need to develop a regulatory and supervisory framework to ensure the provision of financial services to promote women's financial inclusion. As cited in AFI (2016), "the provision of financial services should be tailored to all niche groups, including women, within the financial sector. In this case, appropriate policy, legal and regulatory and supervisory frameworks should be developed and employed to encourage innovation in the provision for financial services, particularly for women and in closing the gender gaps." Beyond regulations, financial inclusion strategies should be developed and where they are in existence, more emphasis should be placed on gender-sensitive policies to increase women's financial inclusion.

Digital Financial Services

Financial regulators and supervisors have a crucial role to play in digital financial services by providing appropriate regulatory frameworks. Digital financial services provide alternative channels, such as mobile banking, e-money, internet banking and agent banking for financial services. Payments, credit, savings, remittances and insurance are financial services that can be accessed and delivered through digital channels, which are capable of increasing women's financial inclusion. In areas where financial services are not easily accessible, the use of digital financial services create opportunities for women to have access to financial services thereby eliminating mobility constraint and unavailability of financial institutions' branches. This further entails that digital financial infrastructure required to effectively drive women's financial inclusion should be designed and implemented. This will grant women better access to the use of financial services.

Gender-Disaggregated Data

Financial regulators and supervisors can collect gender-disaggregated data, which will provide information on the extent of

women's financial inclusion and serve as a basis for instituting appropriate policies to enhance their access to financial services. This involves requesting financial institutions including credit reporting institutions to submit gender-disaggregated data, which will also enable the institutions to target the women's market adequately.

Research has shown that more granular data would motivate better participation by highlighting the commercial viability of the women's market, their financial needs, the type of protection that can be offered to them as consumers and an understanding of their financial behaviour. Financial regulators and supervisors should, therefore, require a targeted strategy such as the creation of gender desk, to resolve this existing gender-information skewness. The gender desk would be created both by regulators - central banks and operators - financial institutions to understand the issues hindering women from accessing financial services and how best to meet their financial needs.

Consumer Protection

Consumer protection is critical to promoting women's financial inclusion. It provides information on the rights and responsibilities of women as consumers of financial services. Consumer protection can help to address women's lack of confidence in the financial system. It can also help to address data protection and privacy issues, which are becoming increasingly important because of the offering of digital financial services. Where regulations abound to effectively protect women, financial institutions will no doubt treat them fairly and observe good market conduct. Financial regulators and supervisors should, therefore, ensure that financial institutions adhere to market conduct rules and have in place effective redress mechanisms.

Gender Diversity

Financial regulators and supervisors should support and promote women's participation in governance/leadership positions in the financial system. They should ensure that their board and the board/top management positions in financial institutions have women represented as this can also facilitate financial inclusion. Deliberate efforts should be made to promote women's representation in the financial system as this provides better opportunities to women, which can have a positive impact on women's financial inclusion.

5.0   Promotion of Financial Inclusion by the CBN

The Central Bank of Nigeria (CBN) is responsible for promoting a sound financial system in Nigeria with regulatory and supervisory oversight on banks and other financial institutions. Over the years, the CBN has instituted various reform programmes and policy measures aimed at ensuring the soundness, safety and stability of the banking system. Some of these include the adoption of a new banking to ensure that banks focus on their core banking activities; creation of the Asset Management Corporation of Nigeria to manage and dispose eligible bank assets; implementation of risk based supervision to effectively supervise the financial institutions; focus on consumer protection to ensure that customers of financial institutions are fairly treated; adoption of Basel II and III as well as IFRS to align the operations of financial institutions to international standards; introduction of macroprudential supervision to contain the build-up of systemic risks; promotion of sound corporate governance and risk management practices in the industry; provision of intervention funds to enhance credit to sectors in the economy; institution of various regulations to improve lending and credit culture in Nigeria; and focus on financial inclusion to ensure access to basic financial services.

Given the positive effects of increased access to basic financial services, building

inclusive financial system has become an imperative objective for policymakers around the world. In 2010, the G20 produced a set of recommendations known as "The Principles for Innovative Financial Inclusion". The following year, AFI, a global network of concerned policymakers and supervisors, issued the "Maya Declaration", the first set of global and measurable commitments to financial inclusion. The declaration was endorsed by over 80 countries, including Nigeria. Efforts are being made to promote financial inclusion in Nigeria with the CBN at the forefront.

Consequently, in collaboration with stakeholders, the CBN launched the National Financial Inclusion Strategy (NFIS) in 2012,which was aimed at ensuring that over 80 percent of the bankable adults in the country have access to financial services. Several initiatives were enunciated, which were fundamental to ensuring that the proportion of the financially excluded reduced from 45.4 million or 52.5 percent in 2008 to 36.6 million or 36.8 percent in 2018 with 63.2 percent having access to financial services. The proportion of women that were financially excluded reduced from 82 percent to 40.9 per cent (EFInA, 2018).

The reduction in the number of financially excluded persons, including women was occasioned by the policy measures put in place by the CBN, which include among others, the three-tiered Know-Your-Customer, agent banking, mobile banking/mobile payments, microfinance policy, non-interest banking, cashless policy, consumer protection and national financial literacy strategy.

Other specific measures put in place by the CBN to promote women's financial inclusion include improving access to credit through the Micro, Small and Medium Enterprises Development. This was introduced in 2013 to enhance the access of micro, small and medium

enterprises to low- interest rate funds. The fund has a seed capital of N220 billion of which 60 per cent of the fund is allocated to female owned enterprises. Evidence shows that this drive increased access to financial services by women and reduced gender disparity by at least 15% annually.

Also, to address the under-representation of women in the banking system, the CBN directed financial institutions to increase the representation of women on their boards and top management in 2012. In this regard, the financial institutions were to achieve a target of 30 percent of women members on the board directors and 40 percent of top management staff. This has resulted in an increased representation of women in financial institutions with efforts still on-going to ensure full compliance by financial institutions.

As part of efforts to accelerate financial inclusion in Nigeria, the NFIS was revised in 2019. The strategy revealed that the demographic groups mostly excluded in the financial system were women, youth, persons in rural areas and those from the North West and North East. Also, micro, small and medium enterprises (MSMEs) were excluded from financial services. The demographic groups and MSMEs were identified as the focus of intervention with the following considered priorities for enhancing financial inclusion in Nigeria:

a.   Creating an enabling environment for the expansion of Digital Financial Services;

b.   Enabling the rapid growth of agent networks with nationwide reach;

c.   Harmonising Know-Your-Customer requirements for opening and operating accounts/mobile wallets on all financial services platforms;

d.   Creating an enabling environment to serve the most excluded; and

e.   Improving the adoption of cashless payment channels, particularly in government-to-person and person-to-government payments.

The CBN established the National Financial Inclusion Special Intervention Working Group with the focus on women, youth and people with disabilities. Under this group, a sub-committee was created to address the issues that hamper women's access to financial services and the way forward.

The sub-committee came up with recommendations to enhance women's financial inclusion, which led to the assessment of women's financial inclusion and the development of a framework on Access of Women to Financial Services. The framework when concluded will provide a sustainable implementation plan and set the target to ensure access of women to financial services in Nigeria.

6.0. Conclusion

It has been acknowledged globally that women are more financially excluded than their male counterparts. The lack of access to basic financial services by women has hampered their contribution to economic activities. Studies have shown that the financial inclusion of women does not only reduce poverty and improve their standard of living but also contribute to greater societal wealth and sustainable economic growth and development. To ensure women's financial inclusion, financial regulators and supervisors have important roles to play in addressing the constraints to women's access to financial services.

In Nigeria, women have been recognised as one of the demographic groups that are financially excluded and the CBN is at the forefront to ensure that their access to financial services is accelerated through various policy measures and the development of a gender-sensitive framework.

In order to ensure the effectiveness of policy measures to enhance women's financial inclusion, it is imperative that deliberate efforts be made. In this regard, the under-listed measures are recommended:

a. Promote women's financial literacy to help them understand and engage better with financial institutions in view of the increasing use of digital financial services.

b. Establish frameworks to enable community-based financial institutions to play more effective role in serving the unserved and underserved area in order to enhance women's access to finance and support the generation of gender-disaggregated data by financial and credit reporting institutions.

c. Address cultural and social barriers affecting women's access to finance through appropriate legal reforms.

d. Intensify collaboration with stakeholders and women-led associations to identify specific factors militating women's financial inclusion in the unserved and underserved areas and develop appropriate financial products and services to meet their needs.

It is expected that the implementation of these measures will help to promote women's financial inclusion in Nigeria and other world economies.

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Exploring the Concept of Multi Functional Platform on Income Generation Opportunities of Rural Women: Lessons for Nigeria

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Abstract

This article explores how the Multifunctional Platform (MFP) will impact on the income opportunities of rural women in Nigeria, by reviewing the benefits, challenges, and lessons learned from other West African countries where the programme has been initiated. The reviews indicated numerous benefits like increased income generation opportunities for rural women and poverty reduction considering the inherent features of MFP viz affordability, efficiency, flexibility, freedom from obsolesce, and technical capability. The article also discusses the challenges embedded in the MFP programmes and suggested strategies through which they can be addressed. From all indications, the benefits of the MFP programme outweighs the challenges embedded in the programme, the article, therefore, presents the various lessons that can be learned and recommended adaptation of the programme in Nigeria.

Keywords: Multi functional Platform, Community Based Ownership, Rural Women, Income generation opportunities.

1.0. Introduction

Income generation as an option for poverty alleviation, human capital development, empowerment, growth, and development of an economy, appears to have been building up momentum before the present millennium (Obadan, 1996; Ajaahaiye & Olomola, 1999; Ogwumike & Aromolaran, 2000; Brew-Hammond & Crole-Rees, 2004;Boccanfuso *et al.,* 2008).Development experts, project managers, professionals, policymakers, and scholars have all concurred that a rise in the per capita incoming an economy would translate to not just economic development, but sustainability of such an economy as well (Thorn, 1968; Sadequl, 1996;Noorderhaven *et al.,* 2004). Although these views are universal, they do not seem to hold in African countries. Consequently, African countries rank lowest amongst nations. They are generally characterized with low Gross Domestic Products (GDP), low per capita income, high rate of poverty, low life expectancy rate, a high proportion of workers in agriculture, and poor physical quality of life (Hicks & Streeten, 1979; Oladeji & Abiola, 1998; Oluwa, 2012).

Several efforts have however been adopted by various bodies; international, national, governmental, and non-governmental, towards ensuring that the above-mentioned challenges are reduced or eradicated. The rationale behind such steps is simple; increasing the per capita income within the continent and improving the development and sustainability of the economy. A much bigger reason behind

such concerns is the fact that an improved understanding of the factors influencing the generation of income amongst the poor nations can significantly contribute to the design of better policies and programmes. Access to energy services stands out as a viable means of income generation, economic development, and sustenance (Brew-Hammond & Crole-Rees, 2004). But there are currently over two billion people out of over three billion people who live in rural areas in developing countries, that do not have access to modern energy carriers like electricity and/or liquid or gaseous fuels (Brew-Hammond & Crole-Rees, 2004).

Energy services are essential in the development and survival of human beings. These services serve various important social and economic purposes that promotethe growth and development of the economy. There appears to be a concurrence amongst scholars (Thomas Homer-Dixon 2006; Commission on Sustainable Development, 2007), that access to energy can change the way poor people, particularly women, organize their time and lives.

Reliable and affordable energy services help to combat the social and economic threats that hinder them from achieving security, both at the individual and communal levels. Government policies as well can serve as incentives to investors to build delivery systems that make such services more widely available. In other words, access to energy services can increase income generation opportunities and reduce poverty amongst the rural poor, most of which are women (Oladeji & Abiola, 1998).

Albeit this knowledge and revelations about the benefits of energy services, the subject appears to require more attention in Africa. The problem is particularly acute in sub-Saharan Africa because the per capita commercial energy in 30 out of 49 countries in this region has remained static since the 1980s (Carol-Rees2004).

There is currently significantly less than 10 percent of sub-Saharan Africa's rural population that has access to modern energy carriers. Carol-Rees (2004) and Nygaard (2010) indicated that: limited access to modern energy carriers and their services has a disproportionate effect on the poor, especially poor women in rural areas.

Women expend a large amount of time and physical effort, using manual labour to carry heavy loads over increasingly long distances, at untold health risksto themselves andtheir children as well. There are very few options to choose from in terms of means of livelihood, e.g. farming and trading are the basic sources of income generation that are open to women in rural areas.

The male folks are however not so constrained. Arisi-Nwugballa, (2015) indicated that in a typical African setting, division of labour within the community often borders along the lines of gender; some jobs that involve the use of strength are traditionally reserved for men, whereas jobs that are considered menial are reserved for women. Also, this creates a disparity in their earnings because of the perceptions that the jobs of men are more difficult than those of their women counterparts.

Recent events are however producing some exceptions to the opinions of inequality; women are gradually becoming breadwinners of their family (Orisadare, 2019); women are currently holding leadership positions, and they are steadily competing in areas that were predominantly dominated by men. In Nigeria, different programmes that are geared towards empowering rural women have been rolled out; from creating access to micro credits for rural women; making provision for women to be part of governance (35% women affirmation); to ensuring free education for the girl child in the rural areas (Ejumudo, 2013, Ayevbuomwan *et al.,* 2016; Okeke, 2018).

The interest in women's development has become glaring, with phrases such as: *"Empower a woman and you feed a nation…,"* there is no doubt that Nigerians have come to recognize the importance of women in growing her economy. One such way through which women can be empowered is through the Multifunctional Platform (MFP). A MFP according to Nygaard, (2010) comprises of both technical and organizational solutions that are geared towards increasing the access to energy. It has become a well-established programme amongst countries within West Africa as a simple means of access to modern energy in rural areas.

The MFP has captured a lot of interests in different areas; the Economic Community of West Africa States (ECOWAS) encapsulated this concept in its white paper on energy in 2006, the Poverty Reduction Strategy Papers (PRSPs) mentioned the MFP concept in both of its reports for Mali in 2002 and Burkina Faso in 2004 (MEF, 2002; MED, 2004). The concept has also been mentioned as an issue of policy, where different presidents or policymakers have advised that the programme be adopted in every village (Nygaard, 2010).

Energy services have also been tipped to make great contributions towards achieving the Millennium Development Goals (MDGs), and the MFP proved to be an approach for creating opportunities for economic growth and empowerment for the poor (Burn & Coche, 2003; Denton, 2004; Brew-Hammond & Crole-Rees, 2004; Gaye, 2007).The MFP is usually a community-based programme whereby women own i.e. Community Based Ownership (CBO) and operate the platform. It can be owned and operated as an individual programme though; this is not the goal of the programme. The goal of the programme is to empower women groups in rural areas, such that they will see to the day to day running of the programme in their community.

The benefits of such CBO are enormous. The issue, however, is that such CBO operating an MFP have not been sighted in Nigeria, notwithstanding the presence of traces of individually owned MFP within the rural areas in Nigeria. Given the accrued benefits from CBO's MFP and their observed absence in Nigeria, this article, therefore, tries to provide answers to the following questions: what is MFP's impact on income generation of rural women in Nigeria? What lessons can Nigeria learn from other West African countries where these MFP are operating?

This article explores the impact of MFP on the income generation opportunities of women in rural areas in Nigeria and the lessons that Nigeria can learn from other West African countries where these programmes are in existence. These aims were achieved through a review of the relevant works of literature from other West African countries where these MFP have been operated as a CBO. Other sections of this article include a conceptual review of the various concepts of the article; a contextual review; empirical review; issues/gaps and outcomes and a conclusion and recommendations sections.

2.0.   Literature Review
2.1.   Conceptual Review

The first pilot MFP programme was launched in Mali in 1994 (Brew-Hammond & Crole-Rees, 2004; Nygaard 2010). The goal of the programme then was to proffer a solution that would help increase access to energy (Boccanfuso *et al.,* 2008). Since then, the programme has witnessed progression to other West African countries; there is currently a widespread of the programme in full scale operating within West Africa and beyond. The MFP is a programme that is supported by various multilateral, bilateral and private sector donors, with the aims of ensuring that both ownership and operations of the platforms

are by women organizations and that biofuels are utilized in powering these engines. These aims are geared towards increasing income generation opportunities for women because the majority of the services of the platform serve women more, therefore it will benefit them if they can own, operate, make repairs and provide materials needed to run the platform by themselves, as it would employ them.

MFP as a concept has been defined differently according to context, but the purpose of its original establishment, which is toassist in providing energy as well as empowering women is not lost. Accordingly, the concept has been defined as a specific technical solution in terms of a multipurpose machine (Quinn 2004; Goertz 2006; Ellen*et al.,* 2008), hence the name: "multifunctional platform." The technical element in the MFP represents

Figure 1: *Pictorial Representation of a Multifunctional Platform*
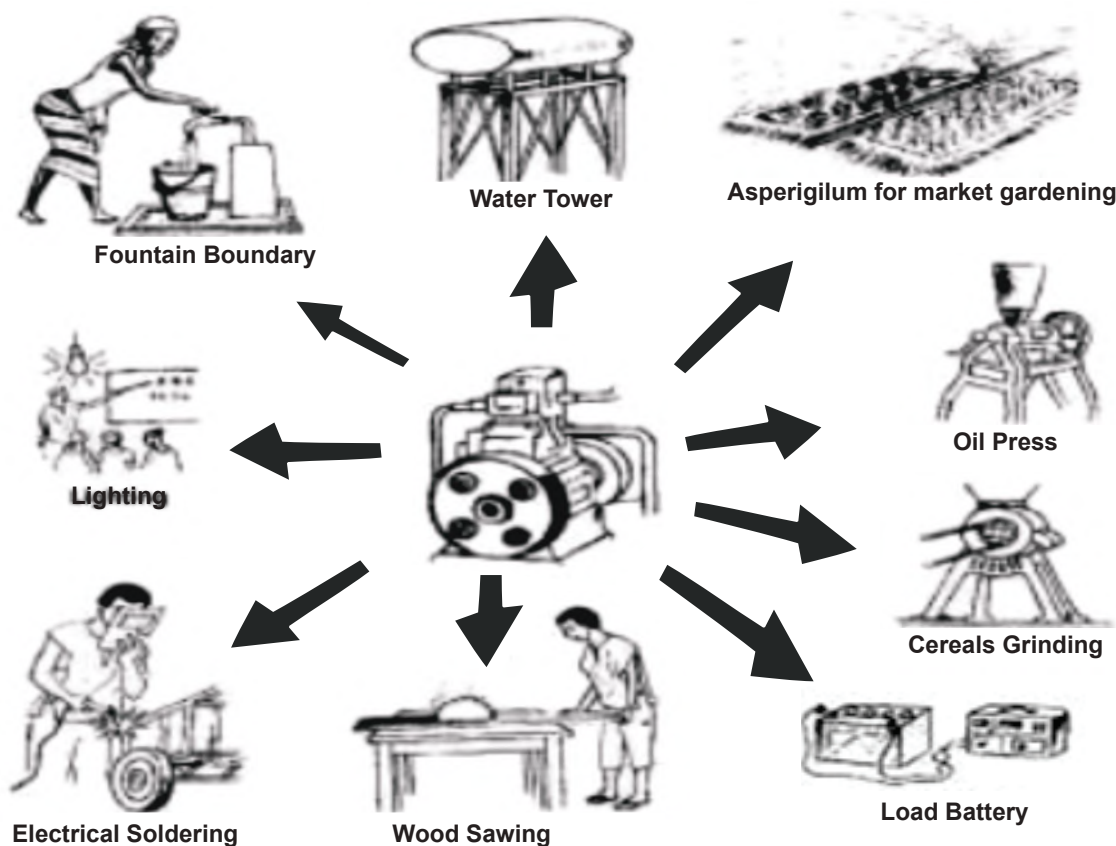
Source: Brew-Hammond, A. and Crole-rees, A. (2004) Reducing rural poverty through increased access to energy services: A review of the multifunctional platform project in Mali, United Nations Development Programme.

The simplest of this platform would be a traditional grain mill as we know it in our villages since the 1970s; an extended version would be the inclusion of other machinery such as de-huskers and oil-presses to this traditional grain mill.

In extension towards a more advanced version, additions such as an electric generator for battery-charging or to produce electricity used for lighting, pumping water or electric equipment such as welders, drills and saws are made to this traditional grain mill (Burn & Coche, 2001).

The MFP concept is made up of three important organizational elements,which were the major reasons behind the agenda of the programme, they are;

I.   Ownership, operation, and maintenance of MFP should be by a CBO. This highlights decentralization whereby the members of such CBOs are the only ones that are concerned with the operation of the programme. From the top to the very least member, authorities and responsibilities flow through and to every member of the organization. With this approach in mind, it is assumed that every member can make a decision, and has a potential of impacting to the society through the platform.

ii.   Only women should be members of such CBOs. This element addresses the issue of the empowerment of women. It is common knowledge that men would often dominate in such CBOs; therefore making the programme compulsorily a women affair, places it in the good sight of the donors and ensures that it would benefit women strictly by increasing their income. More so, since the platform would be such that its ownership, operation, and maintenance would rest on the CBOs, it would afford the women enough opportunities to acquire leadership and technical skills.

iii.   It is more preferable if the engine would be powered by biofuel, which also should be produced by women. This element tries to expand the responsibilities and income generation opportunities of the women by insisting that the engine should run on biofuels that are produced by women as well. The import of this is that apart from the income that women stand to generate from being members of the CBOs, they could still generate extra income by producing and selling biofuels to the CBOs. The benefits here are two folds; first off, women have the opportunities of generating extra income from both the production of "Jatropha curcas" and the extraction of the biofuel from it as well. Secondly, the fact that they can produce renewable fuel is an environmentally friendly innovation.

"Jatropha Curcas" is a multiple purpose plant that has its origin in Latin America, and that is now widespread throughout the arid and semi-arid tropical regions of the world (Henning, 2002). Jatropha has been recognized by a whole lot of people as a plant that has the potential of creating development in the rural area (Eckart & Henshaw, 2012).

Jatropha has many uses and the possible combination of these uses is what makes it potentially very valuable (Heller, 1996). One of the more intriguing uses of Jatropha is the provision of energy source in areas that otherwise lack energy. Jatropha's oil candrive diesel engine, the reason why the initiators of the MFP insisted that one of the criteria for the installation of the platform is that the biofuel extracted from jatropha must be utilized.

2.1.1   Impact and Benefits of Multifunctional Platform

The multifunctional platform embraces many impacts and benefits for both the community and the individuals therein, women in particular (Burn & Coche, 2001; Brew-Hammond & Crole-Rees, 2004; Goertz, 2006; Ellen*et al.,* 2008). These impacts and benefits amongst other things include the sustainability of the programme and the sustainability of the rural livelihood. The impact and benefits that accrue from the sustainability of the platform include:

• **Affordability:** The MFP is such that it is very affordable for end-users. It affords them the capacity to acquire the platform on the one hand, and pay for the ongoing services on the other hand. Installing a basic MFP which comprises of an engine, rice de-huller, stone mill, battery charger, and housing, including the feasibility study and training for the women, had an average cost in Mali of 2,800,000 FCFA (Brew-Hammond & Crole-Rees, 2004).

Brew-Hammond and Crole-Rees, (2004), suggests that the strategy of giving women's association a condition of the project ownership was better than looking for a single individual within a community that can afford to pay for the platform. Of course, the pull of resources together by different women would make it easier to raise such funds. Also, the project provides grants of about US$ 1,500 for the basic module and installation, which represents around 40 to 60 percent of the total basic equipment cost provided that the ownership condition has been fulfilled (Brew-Hammond & Crole-Rees, 2004.

- **Efficiency:** Compared to the conventional means of energy supply with regards to the price, the MFP is cheaper. When analyzing the efficiency of a given technology as a means of supplying mechanical and electrical energy, a comparison of the price of such technology with the price of the conventional one will be made (Villavicencio, 2002). The MFP in all its ramifications appears to be cheaper than the conventional means of rural energy generation and supply. The prices of milling and de-hulling are comparable to those at traditional mills. By implication, the MFP is an efficient technology, and if handled properly, would be a source of income generation for women groups.

- **Freedom from risk of obsolescence:** The MFP is designed in such a manner that there is hardly any risk of it becoming obsolete. A typical example is the small water-cooled, Indian made Lister diesel engine that was developed many decades ago, which appears durable to the extent that no further developments are likely to occur in the engine's efficiency in the nearest future. Compared to the air-cooled diesel engine however, the MFP does not require special skill and facilities for repairs (Jonsson et al., 1994). By implication, the possibility that the MFP would become obsolete is low. Since there

are no risks of the MFP becoming completely obsolete, it can serve as a source of income generation for women, because they can do their repairs, and could easily maximize the complete benefits that are accrued to a program long after program is over.

- **Flexibility:** The MFP is a very flexible platform as it allows for increased usage. First, the platform allows several pieces of equipment to be combined according to the needs of various population groups. This benefit is enormous because the MFP can be redirected to provide other services that will be sources of income when the original reason for the establishment may have failed. Also, the number of operating hours is flexible.

The need for the MFP services is usually in some cases according to region, time of day, and season. For example, water pumping and cereal grinding are primarily needed early in the morning and late afternoon, therefore the flexibleness of the platform makes it possible that income could be generated at every time of the day from different services.

The energies generated from the MFP can also be used in a variety of additional ways by adding more functions to the platform. Some of these additional possibilities are already available as prototypes or concepts in one or two villages. For instance, electricity from the battery could be used to run video systems. The addition of an electric generator makes it possible to provide irrigation, sawing, and refrigeration services.

- **Technological capability:** Technological capability involves the availability of human and organizational resources to install, operate, and manage the multifunctional platform. A benefit in the technological capability line is that the installation, repairs, and management of

this platform would become the responsibility of these women and organizations. The strategy of the project is to train existing repairers and/or mechanics to install and repair the multifunctional platform. This has the two-fold benefit of providing cost savings for the project and, more importantly, enabling mechanics to be more fully occupied, to diversify their income sources, and to enhance the quality of their services.

• A key strategy of the project is to assign ownership and management to women's groups. This does not involve merely assessing existing management resources and choosing the best available, but rather "creating" the needed capacities. The training includes basic accounting, functional reading and writing in their local language, and filling out the monitoring tools, the "management sheets."

2.2   Contextual Review

There appears to be no known case of the CBO's MFP programme as sponsored by any international or national organization in Nigeria as there are in other West African countries. There is however a lot of individually owned MFP platforms operating in different forms in different villages, towns, and cities in Nigeria, engaging in different services as they suit their communities (Orisadare, 2019).

The majority of the privately owned multifunctional platforms within Nigeria are small engines that are used for domestic purposes like grinding of beans for (*akara* and moi-*moi);* Corn for (agidi, pam, flour, etc.); wheat, and soup ingredients. In an extended form, such privately-owned platforms include cassava grinding engines that also perform other functions such as palm oil extraction, kennel crushing, rice milling, melon breaking, and a host of other

services that keep women busy. These platforms serve as sources of income generation for the owners. Most men often in the bid to ensure that they provide a means of income for their wives would set up such kind of platforms.

2.3.   Empirical Review

Brew-Hammond and Crole-Rees, (2004) presented a report of a review on the multifunctional platform project in Mali and documentation of the way modern energy services affected people's lives in terms of income, education, and rural women's status and health.

The study also presented evidence and analytical insights of the key factors that affect the access to energy services and development outcomes relationship by analyzing data and documents from a field study that was conducted between mid-2001 and early 2002 in Mali.

The study found out amongst other things, that the benefits of MFP which include affordability, efficiency, and freedom of risks of obsolesce, flexibility, and technology capacity presents opportunities for income generation for the rural women in Mali.

Albeit the recorded challenges which the programme, the study made various recommendations through which such challenges can be tackled. Obeng, (2006), did a comparative analysis of solar service centers and MFP as well as lessons for Ghana, titled "energy services for the rural poor." The study indicated that centers and multifunctional platforms are innovative concepts for providing energy services in poor rural communities.

Therefore it compared the services of these energies with conventional energies and discovered that they contributed to reducing the energy-poverty in rural Ghana and Burkina Faso. It indicated that MFP was the only viable option for lighting,

refrigeration, water pumping powering of equipment, etc. Eckart and Henshaw, (2012), assessed the impact of Jatropha curcus and multifunctional platforms for the development of rural sub-Saharan Africa. They argued for the great need of providing energy that would spark up development and help to alleviate poverty in rural Africa.

They considered Jatropha a potential means of providing these energies since neat Jatropha can serve as a fuel for the type of simple diesel engines used in MFPs. The Jatropha plant can also serve many other purposes that would increase the value it can bring to a village. The study indicated that both Jatropha and the MFP programmes can serve as income generation opportunities for rural women in sub-Saharan Africa.

Extracting and selling of the biofuels from Jatropha can be a major source of income generation, as the installation and operating the MFP programme can be as well. Nygaard, (2010), explored the multifunctional platform concepts in West Africa by accessing the institutional options for rural energy access.

The study showed as well, that the multipurpose nature of the platform has made the concept a nexus of potential achievements that are highly valued in the dominant discourse of development, and that the benefits like poverty alleviation, gender equity, local democracy, decentralization, and environment preservation, accruing from the platform, have helped in attracting donors outside the energy sector. Sovacool*et al.,* (2013) examined the energy-enterprise-gender nexus by providing the lessons garnered from the MFP in Mali.

The study showed that the platform increased Mali'svillages' incomes from 1999 to 2004. Since this period, over 500 MFP have been distributed throughout Mali, and more women have been empowered, education opportunities have been improved, food security and community cohesion have been enhanced.

3.0. Challenges of the MFP

Despite the benefits of the MFP in rural development and income generation to rural women, the MFP still has a lot of challenges that are hindering its complete adoption of the process as a whole. Accordingly, Sovacool *et al.,* (2013), highlighted five challenges that face the platform and distort the accruing benefits to the CBOs. These challenges have been recorded in virtually all of the West African countries where the MFP program has been adopted (Brew-Hammond & Crole-Rees, 2004; Nygaard, 2010; Eckart & Henshaw, 2012).

And from all indications, they are the major reasons behind the cessation of the programmes in some of these countries as well. These challenges include idleness and maintenance, policy coordination, poverty and financing, dependence on imported fuels and technology, and patriarchy.

Idleness and maintenance

Concerning idleness and maintenance, the MFP engines are more complicated and difficult to operate than ordinary diesel generators, solar home systems, or micro-hydro dams. From basic observations, the majority of the parts within the MFP are usually not functional, this can lead to consistent crack and break of the engine. It is also observed that the majority of the diesel engines were not properly maintained and clean (Goertz, 2006).

Mostly maintenance is done after the engine must have broken down. In some cases, the costs of repairs are usually higher than the income. Such technical problems resulted in poor functioning systems and consequently eroded some of the gains the original MFP project made when it finished in 2004 (Sovacool *et al.,* 2013).

Other issues here are the lack of mechanics, dishonesty, or overcharging on the part of the mechanics, and turnovers in village leadership that left those without formal training in charge of the platform. Further more, the fact that the platform is flexible could be a cog in the wheel of progress in such a community. This is basically because a simple break down of the platform could result in out rightly denying the community other energy services (Nygaard, 2010).

To address these challenges, rural women ought to be given the basic training on the repairs and maintenance of the MFP; basic supplies of spare parts ought to be done as the lack of spare parts can cause a complete halt of the entire programme.

Honesty has to be a key ingredient for those that are in charge of the programmes, only leaders that have been tested and trusted to have integrity should be chosen to manage these programmes. Accountability must be paramount if this programme is to succeed; these rural women must undergo basic bookkeeping. Finally, alternative MFP must be provided to attend to other activities in cases of breakdowns, so that other activities within the community do not suffer as well.

Policy coordination

As a major challenge, integrating the MFP program into other areas and sectors like the industrial and commercial sectors has proven difficult to planners and the government. Furthermore, the country's national statistics do not take into account the time and other gendered dimensions of rural poverty.

Also, the majority of the villages where the MFP are situated are dispersed, remote and isolated, besieged with lack of access roads, inadequate physical infrastructure, and lack of access to basic services such as water, health, education, electricity, and telecommunications, an indication that government has a long way to go before it can deploy a platform in every village (Gaye, 2007).

To address this challenge, the stakeholders ought to develop strategies via which the MFP can be integrated into the industrial and commercial sectors of the economy. Such steps would ensure that the benefits of the program are enjoyed by not just the rural areas, but by all and sundry within the economy. More so, by integrating the program into other sectors, creativity and innovations can be instigated making room for a much better technology to be provided.

This will further motivate investors to invest in the program. There is also a need to provide necessary basic infrastructures like access road, water, health, education, and telecommunication services, as this would go a long way in ensuring that the poorest of the poor amongst rural women are accessed and that these platforms are deployed easily in every village.

Poverty and financing

One major problem that has plagued villages in West African countries is poverty. This has made it very difficult for the platform to generate incomes (Brew-Hammond & Crole-Rees, 2004; Nygaard, 2010; Sovacool *et al.,* 2013). Accordingly, Porcaro and Takada, (2005) indicated that the majority of the local markets are limited in scope with regards to growth in their revenue basically because the customers therein are "extremely poor."

Majorly, villages in West African countries that have adopted the platform have had to pool their assets and finance, up to 60% by themselves to be able to acquire the platform, meaning that the platform is not for any community that cannot raise such kind of money. Furthermore, financing in the rural areas in Nigeria is highly limited, therefore only those villages that are wealthier end up acquiring and enjoying the platform.

To tackle such a challenge, various means of financing ought to be devised. One such means could be grants; the federal, state,

and local government levels should provide grants for CBOs of rural women. This way, they will be able to acquire the platform without taxing themselves off their merger resources. The government can also provide these rural community-based women organizations with loans that are repayable over some time. Such gestures provide them with financing, and also confers on them responsibility since they have to repay the loan, thus making them accountable and judicious. With government financing, it will also be easier to eliminate all forms of male dominance in the platform as it gives women total control since their male counterparts did not contribute to the funding.

Dependence

The fact that the platform is purely a foreign product makes it an object of dependency. Sovacool *et al.,* (2013) indicated that both the diesel generator and the diesel fuel that runs most MFPs must be imported. Even though one of the major criteria for the MFP to be installed is the use of biofuels harvested from jatropha, still technical support is required from abroad to be able to extract and filter this oil (Bouffaron *et al.,* 2012). Even the spare parts for the engines still have to come from abroad as well. This challenge could reduce the enthusiasm of acquiring and using the MFP because some of the rural areas without the requisite knowledge of how to go about importing will relent.

For this platform to work, effort should be made to ensure that over-dependence on foreign products is reduced or out rightly eliminated. First off, since one of the major objectives for creating the MFP program was to ensure the production and use of biofuels produced from Jatropha, then the first step would be for the government at all levels to enhance and ensure the growth and production of the plant, such that rural women could generate income from simply cultivating Jatropha.

By so doing, there would be an excess of the product such that it would become costlier to import diesel fuel than to extract the fuel of Jatropha. Also, the governments need to make policies as well as provide adequate facilities and infrastructure that would enable young inventors to be able to fabricate such engines and their spare parts so that these rural women can have easy access to these parts as at when due.

Patriarchy

The typical African society is patriarchal, one that is based on an orientation that women are not supposed to be competing with their male counterparts with regards to income generation. Most tasks have been conceived to be mainly masculine tasks; therefore it is usually hard to conceive an idea where women would be operating such machines. It, therefore, ends up that the male folks would dominate the platform even though it was developed to empower women. MFP is also an increase in workload for the women because they still have their primary role to play in their various families.

To be successful, the adaptation of the MFP should be designed in such a manner that the controls of men are eliminated from the program. Women that would be dedicated to the operations of the platforms should be delegated and trained from the group. The idea that women need not indulge in masculine jobs should be quashed through proper orientation concerning equality in gender.

The dedicated women should also be enlightened on the need to outsource some of their basic family chores, this would go a long way in providing them time to concentrate on managing the platform to ensure accountability and increase their income. On the other hand, it will help in generating income for the outsourced party too.

3.1 Lessons for Nigeria
Liberating Poor Women's Energy and Time

Shreds of evidence from other West African countries where the MFP programmes have been adopted have shown that it helps in saving up energy and time for rural women. This is possible because the platform does most of the chores like pumping of water and grinding of grains which occupy the energy and time of these rural women, in faster and cheaper ways.

More, by providing a modern source of energy for food preparation and the extraction, transportation, and distribution of foodstuffs as well as traditional biomass fuels, the MFP helps rural women of Africa to progress up the energy ladder for motive power.

The savings in human energy and time also enable rural women to turn their attention to more gainful activities for themselves and their families. Evidence of such achievements abound in other West African countries like Burkina Faso, Ghana, Mali, and Senegal; therefore, replicating these achievements in Nigeria can help change the socio-economic landscape of rural settings quite significantly.

This would be particularly beneficial in two lights: first, the barriers associated with high rates of illiteracy in rural areas, and even higher rates among rural women and girls, can be overcome with the wide-scale implementation of the MFP concept.

Second, the MFP includes the provision of potable water supply networks in the package of services provided; therefore it can increase access by the poor to potable water and thus improve health in many villages in Nigeria.

Expanding Opportunities for Growth

The development of enterprises has been shown as an essential element of transformation and poverty reduction in rural areas. In various African countries where the MFP programmes operate, it has been shown that access to affordable energy services to rural women directly contributes to productive and income-generating activities.

Enterprise development is therefore of critical importance to a successful implementation of the MFP concept, as shown in Mali, where several enterprises have emerged around the MFP. Petty trading has both increased and diversified. Welding (of metal chairs, donkey carts, farming implements, etc.,) is a new business in many places that have acquired MFP.

Entrepreneurs purchasing electricity from the platforms provide battery charging services for home (lighting/ entertainment) and other applications. The lessons for Nigeria, therefore, suggest that the adoption of an MFP would lead to the development of more enterprises. It will also assist in the development of cottage industries where vegetable oils like Jatropha are produced, thereby increasing the use of renewable energy (in this case, using biofuels to replace diesel).

This could also serve an income-generating purpose and allow more money to stay in rural communities.
Electricity generation by the MFP could also assist in opening possibilities for rural telephony. Most villages in Nigeria do not have electricity to power and use telephone services, therefore the introduction of the programme could go a long way in rural telecentres – a potentially important step towards the eventual introduction of the Internet and other information technology services.

Strengthening Pro-Poor Local and National Policy Frameworks
The MFP is geared towards bringing micro and macro-level actors together to influence policy frameworks that would reduce poverty. Micro-level actors in this

sense include the CBO of the MFP by women in the rural regions who, based on their activities could foster a co-operative spirit among the key actors, which in turn should lead to better decision making concerning development activity.

The macro-level actors include international and national, governmental, and non-governmental bodies whose goals are to assist in developing these rural regions. The platform brings together key policymakers and implementers of poverty reduction. Nigeria could draw on the experiences of this MFP initiative therefore, to design policies that are far-reaching in reducing the scourges of poverty in rural areas.

4.0.   Conclusion

In conclusion, the MFP project indicates that modern access to energy services can make a significant contribution to improving the income generation opportunities of women within rural areas. Although the platform with regards to CBO by rural women has not been adopted in the Nigerian setting, i.e. there are no general projects that have been sponsored in Nigeria as they are in other West African countries like Mali, Ghana, Burkina Faso, and Senegal, there are indications that the platform exists as private businesses. The platform serves as a means of empowerment and a means of income generation for these women. A lot of benefits that accrue to women groups from the MFP include affordability,

efficiency, freedom from been obsolete, technical capacity, and flexibility. Issues like:idleness and maintenance, policy coordination, poverty and financing, dependence, and patriarchy have been identified as challenges that hinder the complete adoption, development, and sustainability of the platform in sub-Saharan Africa. Notwithstanding, strategies for facing these challenges have been suggested.

5.0Recommendation

Based on the information gathered from the literature on the MFP, this article, therefore, recommends that the government needs to harmonize its development and poverty eradication plans to coincide with the promotion of MFPs, as this has proven in other areas to be a source of income generation for women. The government has to systematically target thousands of villages that still lack access to a platform, and consider giving support to other stakeholders besides women's groups. There is also a need to learn how the platform has benefited other West African countries in areas of liberating poor women (by putting them in firm control of their energy and time), expanding growth opportunities and strengthening pro-poor local and national policy frameworks.These will have far-reaching effects in not just introducing the programme, but in assisting in the development and sustainability of the programme in Nigeria.

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Relationship between Stock Prices and Economic Growth in Nigeria: A Causal Investigation

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Abstract

The study examined the causal relationship between stock prices and economic growth in Nigeria from 1986 to 2018. Adopting the OLS, ARDL and Granger Pairwise Causality techniques, the results revealed that stock prices had positive and significant relationship with economic growth in the long run. However, there was no causal relationship between stock prices and economic growth. It is recommended that information asymmetries in the market should be bridged using better technological user interface in addition to Capital Market Intranet (CAPNET) to strengthen the informative capacity of stock prices while the attention of the investing public can be diverted to the stock market to boost market capitalization.

1. Introduction

The financial system of every nation plays a foremost role in advancing its economy. Such a system is an interplay of financial institutions, markets and regulators. Meanwhile, the stock market is a major pillar within the sphere of the financial system. It is known for intermediation of large funds and provision of platforms for investment within and beyond the domestic economy. However, as important as the market is, it thrives on information which is mostly encapsulated in stock prices announced in the market from time to time.

For quite some time now, it has been debated in the literature whether financial development drives or causes economic development or *vice versa*. This debate birthed few theories and a lot of other empirical investigations such as the demand-following hypothesis, supply-leading hypothesis as well as the theory of financial intermediation advanced by scholars such as Levine and Zervos (1996) as well as Schumpeter (1912).

Also, most empirical contributions which maintained an holistic approach to the subject matter as they focused on the activities within the market such as the number of deals or market capitalization and to a large extent excluded one of the most important drivers of the market, that is, stock price. Thus, there exists paucity of empirical contribution especially in Nigeria which has concentrated on the causal relationship between stock prices and economic development. In theory, Schumpeter (1912) who postulated the supply-leading hypothesis assumed that the stock market and the financial system

determined economic development while the demand-following hypothesis as advanced by McKinnon (1973) averred that economic development caused financial development. Considering these arguments, it is imperative to undertake an investigation into the causal relationship between the phenomena. Meanwhile, this study differs from existing studies in that, in examining this causal relationship, it lays more emphasis on the stock price which is the core of the financial system as it drives participation in the market and the system. More also, the Auto Regressive Distributed Lag (ARDL) modelling technique together with its bounds test, was used in the study because of mixed integration order in the test for presence of unit roots or stationarity of data as against the widely used Johansen Co-Integration test.

This study contributes to literature in three ways. Firstly, it contributes to the ongoing debate as regards causal relationship which exists between the financial system and economic growth with focus on the Nigerian economy. Secondly, the study brings to limelight the driving ability of stock prices within the financial system amid a whole lot of other elements within the system. Lastly, it would attempt to provide insights and recommendations for investors and policy makers which will then form an impetus and reliable basis for decision-making to promote the financial system.

The rest of the study is reported in Section 2 which captures literature review on the subject matter; Section 3 which highlights the data and research methods adopted; Section 4 presents the results and discussions while Section 5 concludes and presents some recommendations.

2.0   Literature Review

Share price is generally considered the present value of all the future returns on a share. Simply put, it encapsulates the future returns that may emanate from an investment holding in stock as specified in present terms. The stock price is quintessential in the economy due to its powerful information content with which it wields tremendous power in driving the market. It affects the economy basically through the 'confidence channel' (ECB, 2017). Thus, an increase in this major indicator stimulates the confidence of investing entities within the economy and reduces economic uncertainties about the future economic state of the nation because stock prices ordinarily possess information about future economic growth (Bondt, 2009). This is further exemplified with the fall of stock prices which preceded the global financial crisis in 2008.

Ordinarily, the stock market thrives on information and investors assess information about the market mostly through stock prices and their movements. Meanwhile, the information content of the stock prices has been considered a direct function of the nature of market efficiency, namely strong, semi-strong or weak form efficiency (Fama, 1970).

Fama (1970) explicated the weak form efficient market to possess stock prices that can only reflect past or historical information about the market while the semi-strong form efficient market has stock prices which can only reflect past and readily available public information about the market.

The strong form efficiency possesses stock prices which can reflect all past, public and insider (privileged) information about the market. Therefore, the use of stock prices transcends development indicators for investors but also a major touchstone of market efficiency.

Literature abounds with studies of the relationship between stock market and economic development although few gave credence to stock prices. Nowbutsing

(2009) used Error Correction Modeling to test for the relationship between stock market development and economic growth.The study showed that the stock market is essential to boosting economic growth in Mauritius especially through the channels of market capitalization and bulk of shares traded in the market. Therefore, it concluded that favourable stock prices which will increase shares traded will stimulate economic growth.

Ugbogbo and Aisien (2019) examined the subject matter for Nigeria, employing the Error Correction Mechanism and found that the growth of the stock market stimulated economic growth, especially through the investment mechanism. Similarly, Owusu (2016) investigated the link between sustainable growth and the stock market in Nigeria usingthe Auto Regressive Distributed Lag (ARDL) modelling technique.It found that the stock market irrespective of the activities within it, hadno linkage with economic growth. That is, there was possibility of economic growth which was actually independent of the stock market. This was supported with empirical evidence from Onuora (2019).

Also, Onuora (2019) used the Ordinary Least Squares regression technique to examine the relationship between the capital market revenue and economic growth in Nigeria. Revenue generated had no significant contribution to economic growth. In a separate study, Abina and Lemea (2019),using the Error Correction Mechanism and the Granger Causality test, found that the capital market improved economic development while economic growth caused stock market development. This therefore implied that the changes in the behavioral patterns of the economy would lead to a change in the behavior of the stock market and not the other way round. Moreover, Azubike (2017) employed the Error Correction Mechanism to find that the stock market and the bulk of the activities within it exerted a positive and significant effect on economic growth implying that growth in

the market would lead to an increase in economic growth although causal relations were not considered.

Contrary to the findings of Abina and Lemea (2019), Acha and Akpan (2019) adopted the Granger Causality technique within the Vector Auto Regressive framework. The study showed that the stock market caused economic growth and that the stock market exerted positive and significant effect on it as well. This denoted that movements or trends within the market would causesome chain form of reaction within the economy and not the other way round. Bondt (2009) used the Vector Error Correction Mechanism and found that the stock market had no significant contribution to economic growth in Nigeria contrary to the theory of financial intermediation as advanced by Schumpeter (1912).Thus far, there exists a plethora of studies on the subject matter especially in relation to the country. However, the debate continues as regards the question of causality between the phenomena.

Therefore, this study, using the Granger Causality and the Auto Regressive Distributed Lag modelling techniques, contributes to existing literature by focusing on stock price as a major driving force in the stock market in Nigeria and its relationship with economic growth.

3. Data and Methods
3.1 Sources of Data

The annual data spanning 1986 to 2018, employed in this study were sourced from the CBN Statistical Bulletin. The period is considered instructive as 1986 heralded the Structural Adjustment Programme reforms within the financial system.

3.2 Model Development

The model adapted for this study was that of Owusu (2016) which was modified to

accommodate more variables in conformity with the objectives of the study. The model for the study is stated as:

GDP= f (SP, GEXP, MCAP, NUTRAN, CPS, STR, μ)..................... (3.1)

The model can be rewritten in econometric form as stated as:

$GDP = B_0 + B_1SP + B_2GEXP + B_3MCAP + B_4NUTRAN + B_5CPS + B_6STR + μ$..... (3.2)

Where:
GDP   =Gross Domestic Product
SP   =Stock Price
GEXP   =Government Expenditure
MCAP   =Market Capitalization
NUTRAN =Number of Transactions
CPS   =Credit to Private Sector
STR   =Stock Turnover Ratio
μ   =Error term
B_0 =Constant parameter
$B_1 - B_6$ =Coefficients of regression

GDP which is the explained variable is expected to have a positive relationship with all the explanatory variables in the study.

3.3 Methods
3.3.1 Unit Root Test

Following from the treatise by Dickey and Fuller (1981), there is the likelihood of realizing a spurious regression if the series generating the results are non-stationary. The unit root test is an approach in co-integration analysis used for determining the stationarity properties of the time series. This determination was performed employing the Augmented Dickey Fuller (ADF) and Kwiatkowski-Philips-Schmidt-Shin (KPSS) Unit Root Test.

3.3.2 Co-Integration Test

Co-integration means that if two or more series are associated together to form an equilibrium relationship in the long run, even though the series may be non-stationary, they will move closely together over time and their differences will become stationary. Conventionally, the Juselius-Johansen (JJ) likelihood method of co-integration test as discovered by Johansen and Juselius (1990) would have been adopted to determine the long run relationship between the variables. However, the ARDL technique is accompanied with its own co-integration feature known as the Bounds Test and this approach to co-integration will be adopted in this study.

3.3.3 Auto Regressive Distributed Lag (ARDL) Modelling Technique

The Auto Regressive Distributed Lag (ARDL) bounds testing methodology as developed by Pesaran and Shin (1999) has been favoured above the co-integration analysis established by Engle and Granger (1987) and Johansen and Juselius (1990) due to the low power problems associated with the co-integration analysis. However, the ARDL model can be established following the ECM model earlier stated in the study as the ECM model adopted prevents spurious results because it explains the previous disequilibrium in current period.

3.3.4 Granger Pairwise Causality Technique

Granger pairwise causality test was adopted to determine the causal relationship among the variables considered in the study. The test was carried out with an optimal lag of 2 based on the result of the optimal lag length selection criteria. The methodology, as developed by Granger (1969) shows whether a change in a variable will cause a change in another variable. Causality can be unidirectional, bidirectional or no relation at all based on the probability value of the F-statistics. Hence, the Granger equations for the research model were expressed below as:

$$GDP_t = \sum_{i=1}^{n} \beta_i\, SP_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.3}$$

$$SP_t = \sum_{i=1}^{n} \beta_i\, SP_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.4}$$

$$GDP_t = \sum_{i=1}^{n} \beta_i\, GEXP_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.5}$$

$$GEXP_t = \sum_{i=1}^{n} \beta_i\, GEXP_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.6}$$

$$GDP_t = \sum_{i=1}^{n} \beta_i\, MCAP_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.7}$$

$$MCAP_t = \sum_{i=1}^{n} \beta_i\, MCAP_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.8}$$

$$GDP_t = \sum_{i=1}^{n} \beta_i\, NUTRAN_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.9}$$

$$NUTRAN_t = \sum_{i=1}^{n} \beta_i\, NUTRAN_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots \tag{3.10}$$
$$+$$

$$GDP_t = \sum_{i=1}^{n} \beta_i\, CPS_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.11}$$

$$CPS_t = \sum_{i=1}^{n} \beta_i\, CPS_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.12}$$

$$GDP_t = \sum_{i=1}^{n} \beta_i\, STR_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.13}$$

$$STR_t = \sum_{i=1}^{n} \beta_i\, STR_{t-1} + \sum_{j=1}^{n} \alpha_j\, GDP_{t-j} + u_t \quad \ldots\ldots\ldots\ldots \tag{3.14}$$

4. Empirical Results
4.1 Trend Analysis

The trend analysis presents a graphical illustration of the behavior of the variables in a visual context for easy analysis of the patterns of movements over time.
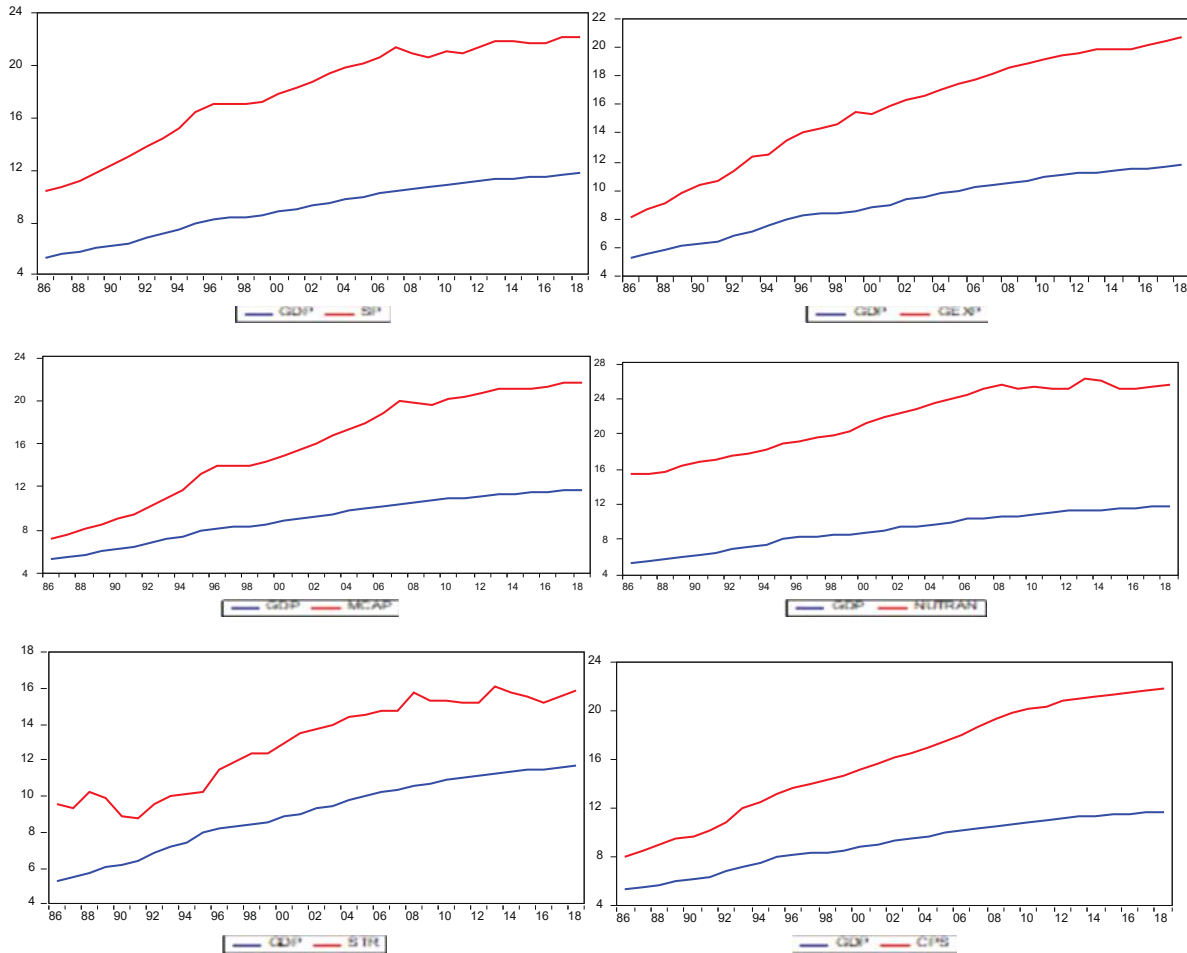
Figure 1: Trend Analysis of all variables
Source: The authors' (2020)

The above figure shows that stock prices and other stock market variables especially stock turnover ratio, were more volatile than economic growth as they rose and fell sharply in contrast to the steady and relatively stable rising movements of GDP.

4.2 Descriptive Statistics

Table 1 shows the descriptive statistics for the variables. It indicates that the highest of the means was that of the number of transactions while stock turnover ratio had the lowest. The standard deviations ranged from about 0.74 for stock turnover ratio to 2.41 for credit to private sector and were not significant from the mean.

Table 1: Descriptive Statistics

	GDP	SP	GEXP	MCAP	NUTRAN	CPS	STR
Mean	9.0546	8.8518	6.5918	6.6446	12.5627	6.8091	3.9170
Median	9.3400	9.4000	6.9300	6.6400	13.0200	6.8400	4.0700
Maximum	11.7600	10.9700	8.9600	9.9900	15.0800	10.0200	5.1700
Minimum	5.3100	5.1000	2.7900	1.9200	9.9300	2.7200	2.3200
Std. Dev.	2.0474	1.7798	1.8761	2.7679	1.7351	2.4119	0.7387
Skewness	-0.3652	-0.8727	-0.5762	-0.3172	-0.1491	-0.1455	-0.8128
Kurtosis	1.8456	2.4442	2.0887	1.6897	1.4329	1.6970	2.7362
Jarque-Bera	2.5659	4.6139	2.9679	2.9141	3.4993	2.4510	3.7295
Probability	0.2772	0.0996	0.2267	0.2329	0.1738	0.2936	0.1549
Sum	298.8000	292.1100	217.5300	219.2700	414.5700	224.7000	129.2600
Sum Sq. Dev.	134.1384	101.3687	112.6277	245.1540	96.3369	186.1477	17.4621
Observations	33	33	33	33	33	33	33

Source: Authors' Computation (2020)

Furthermore, the Jarque-Bera, Skewness and Kurtosis showed that data was normally distributed because the probability value of the Jarque-Bera was higher than 0.05 while values of Skewness were within the range of -1 to +1 and values of kurtosis were within the range of -3 to +3. However, the data was negatively skewed (left-skewed), that is, values of the distribution were concentrated on the right tail side of the distribution graph as the left tail of the distribution graph was longer. This negative skewness implied that the mean values of the distribution were lower than the median distribution.

4.2 Unit Root Test (Test for Stationarity and Order of Integration)

The test for unit root or stationarity in the data was done using the Augmented Dickey Fuller (ADF) and Kwiatkowski-Philips-Schmidt-Shin (KPSS) Unit Root Test as shown in the table 2:

Table 2: **Test for Stationarity of Data (ADF and KPSS Unit Root Tests)**

Variables	URT @ Level		URT @ First Difference		ADF's Order of Integration	URT @ Level		KPSS's Order of Integration
	ADF T-Stat	5% Critical Value	ADF T-Stat	5% Critical Value		KPSS T-Stat	5% Critical Value	
GDP	-3.6863	-2.9571	-	-	I(0)	0.6540	0.4630	I(0)
SP	-2.6974	-2.9571	-4.1019	-2.9604	I(1)	0.6853	0.4630	I(0)
GEXP	-3.0363	-2.9763	-	-	I(0)	0.6471	0.4630	I(0)
MCAP	-1.6089	-2.9571	-4.3069	-2.9602	I(1)	0.6448	0.4630	I(0)
NUTRAN	-1.1421	-2.9571	-4.8160	-2.9604	I(1)	0.5786	0.4630	I(0)
CPS	-1.3427	-2.9604	-3.9875	-2.9604	I(1)	0.6547	0.4630	I(0)
STR	-3.5373	-2.9763	-	-	I(0)	0.4916	0.4630	I(0)

Source: Authors' Computation (2020)

The table revealed that some variables had unit root at level and first difference according to the ADF test while the KPSS test revealed that all variables are stationary at level.

4.3 Optimal Lag Length Criteria

Table 3 provides the criteria for the choice of the optimal number of lags for the ARDL models.

Table 3: Optimal Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-93.83955	NA	1.58e-06	6.505778	6.829581	6.611329
1	133.5655	337.4397*	1.72e-11	-5.004224	-2.413796*	-4.159809*
2	190.8644	59.14732	1.72e-11*	-5.539641*	-0.682588	-3.956363

Note: * denotes the suitable lag length according to each criterion
Source: Author's Computation (2020)

The table indicated that the optimal lag to be adopted for the ARDL analysis was 2, as based on the Akaike Information Criterion.

4.4 Auto Regressive Distributed Lag (ARDL) Bounds Test

The bounds test was adopted due to the mixed order of integration of the variables. The result is shown in table 4.

Table 4: ARDL Bounds Test

F-Statistics	Lower Bound (5%)	Upper Bound (5%)
4.50	2.45	3.61

Source: Authors' Computation (2020)

From Table 4, there exists a stable long run equilibrium relationship (co-integration) among variables as the F-Statistics was greater than the upper bound at 5% critical value, leading to the alternative hypothesis being accepted.

4.5 Short-Run and Long-Run Estimates (OLS and ARDL Results)

The short-run and long-run results from the OLS and ARDL estimations are presented in Table 5.

Table 5: OLS (Short Run) and ARDL (Long Run) Relationship Results Dependent Variable: GDP

Variable	Coefficient	T-Statistics	Probability
Panel (a)OLS Short-Run Relationship			
SP	0.1363	0.08195	0.1082
GEXP	0.2340	0.1005	0.0279
MCAP	0.2037	0.1004	0.0529
NUTRAN	-0.0795	0.0422	0.0706
CPS	0.3906	0.1089	0.0014
STR	0.01596	0.0370	0.6702
C	3.2285	0.4939	0.0000
R-Squared	0.9982		
F-Statistics	2368.994		0.0000
Panel (b)		**ARDL Long-Run Relationship**	
SP	0.3845	2.1264	0.0455
GEXP	0.0222	0.1176	0.9075
MCAP	-0.2210	-0.7224	0.4780
NUTRAN	0.0295	0.3652	0.7186
CPS	0.7611	2.5749	0.0177
STR	-0.0330	-0.5172	0.6104
C	1.7851	1.6887	0.1061

Source: Authors' Computation (2020)

Stock prices had no significant effect on economic growth in the short run although such effect is positive, as shown in Panel (a). Other independent variables such as government expenditure, market capitalization and credit to private sector exerted positive and significant effect on economic growth in the short run.

On the other hand, Panel (b) indicated that stock price and credit to private sector had significant and positive effect on economic growth in the long-run while other variables exerted no such effect. This implied that an increase in stock prices would lead to an increase in economic growth by 38.44%.

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4.6 Diagnostic Tests

The diagnostic tests for reliability of the analyses (Table 6) include the LM serial correlation test for the presence of autocorrelation, the heteroskedasticity test for variance of errors across observation due to bulk or paucity of estimated standard error, the normality test for normal distribution of the data, the Ramsey Reset for functionality and the CUSUM test was used to test for stability of the data (Asteriou& Hall, 2011; Hendry, 1995; Hair, 2010; Pesaran & Pesaran, 1997).

Table 6: Post Estimation Diagnostic Tests

Serial Correlation Test		Heteroskedasticity Test		Ramsey Reset Test		Normality Test	
Statistics	Prob.	Statistics	Prob.	Statistics	Prob.	JB Stat	Prob.
2.3895	0.1187	0.8182	0.6155	0.7559	0.3949	0.8921	0.6402

CUSUM TEST
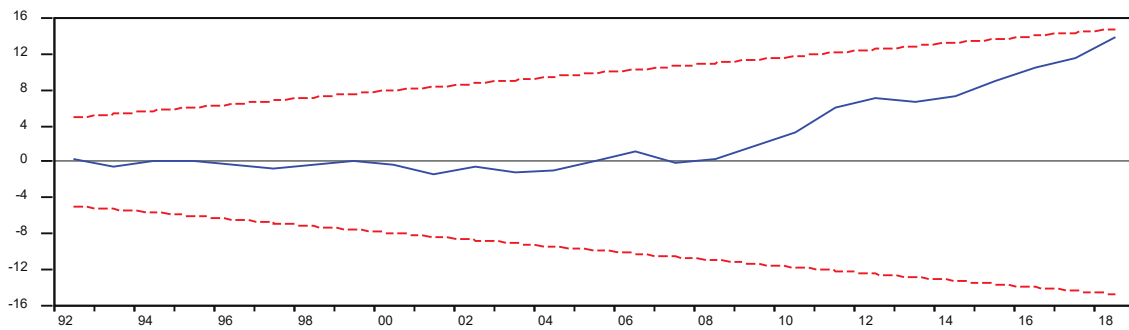
Source: Authors' Computation (2020)

The tests indicate the absence of autocorrelation, heteroskedasticity, non-functionality and abnormal distribution as the probability values of their respective F-Statistics and the Jarque-Bera were higher than 5% significant level. We therefore, rejected the respective null hypotheses.

4.7 Granger Pairwise Causality Result

Pairwise causality was employed to examine the causal relationship between stock prices and economic growth. The result is presented in Table 7.

Table 7: Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Prob.
SP does not Granger Cause GDP	31	0.36773	0.6958
GDP does not Granger Cause SP		2.46207	0.1049
GEXP does not Granger Cause GDP	31	2.00926	0.1544
GDP does not Granger Cause GEXP		1.64787	0.2119
MCAP does not Granger Cause GDP	31	0.65674	0.5269
GDP does not Granger Cause MCAP		7.65265	0.0024
NUTRAN does not Granger Cause GDP	31	0.24870	0.7816
GDP does not Granger Cause NUTRAN		0.75202	0.4814
CPS does not Granger Cause GDP	31	0.19429	0.8246
GDP does not Granger Cause CPS		4.26842	0.0249
STR does not Granger Cause GDP	31	0.25843	0.7742
GDP does not Granger Cause STR		1.27174	0.2972

Source: Authors' Computation (2020)

From the table, stock prices have no causal relationship with economic growth. This implies that the stock price and economic growth are independent of each other as a change in the behavior of one may not necessarily cause a change in the behavior of the other. This is in line with the findings of Obinna (2019) and contrary to Acha and Akpan (2019). Nonetheless, a unidirectional causality was found to run from economic growth (GDP) to each of market capitalization and credit to private sector as the null hypothesis was rejected in both cases.

5.0 Conclusion and Recommendations

The study focused on the relationship between stock prices and economic growth. The short-run result revealed that stock prices, although positive, exerted no significant effect on economic growth,which implied that the positive effect of upward movements in stock prices was not substantially felt in the economy in the short periods succeeding such movements. This is majorly due to the nature of the stock market which is more of investment in nature (that is, medium or long term) compared with the money market, where savings is more prominent (short term in nature) and the saving public gets their returns or access to funds on short term basis.Accordingly, the effect of stock prices diffuses into the economic system in the long run. Hence, the need to proceed to the long run analysis which necessitated the test for stationarity of data.

The test for stationarity of data showed that all variables were stationary at level although some had unit root at level and others at first difference. The ARDL bounds test which eventually established the presence of a long run equilibrium relationship (co-integration) between stock prices and economic growth. The ARDL long run results suggested that both stock prices and credit to private sector exerted positive and significant effect on economic growth. This implied that an increase in stock prices and credit to the private sector would substantially spur economic growth in the long run. Pragmatically, as activities in the stock market move hand in hand with credit extended to the private sector. This is so because some portion of such credit end up in the stock market for investment purposes by private entities, which will then boost the value of stocks and, consequently, their prices.

Furthermore, the causality test found that there existed no causal relationship between stock prices and economic growth. This implied that stock prices and economic growth are independent of each other as a change in the behavior of either of the variables would translate to no change in the other. Meanwhile, economic growth was found to determine or cause a change in the credit allocated to the private sector as well as the size of the market as denoted by market capitalization.

The absence of causal handshake between stock prices and economic growth despite the existence of same between stock market size (market capitalization) and economic growth questions the efficiency of the information content of stock price as a signaling element in the Nigerian stock market. That is, the market may be suffering from weak form inefficiency because size as a market index was discovered to cause economic growth than price which should actually possess the driving or causal force. Hence, there is a need for capital market regulators to adjust or refocus their lens to address the efficiency of the market and reduce information asymmetries. In line with the above, more technological communication interface should be market participants can be developed.

Also, the causal independence between the stock price and economic growth is a pointer to the fact that the Nigerian stock market has not been efficiently integrated

into the economy. This is because such independence between stock price and economic growth means that economic activity has not yet translated into improvements in the value of the market, and vice versa.

Therefore, despite that stock price was a weak determinant of economic growth, the fact that growth itself was also not strong enough to determine stock market value (stock price) implies that the gap between the stock market and the mainstream economy has not been sufficiently bridged.

Hence, deliberate efforts should be made to bring the capital market to the doorstep of the common man in line with the National Financial Inclusion Strategy, drawing lessons in this regard from measures adopted by the Central Bank of Nigeria in respect of money market institutions.

Economic growth was found to cause market size and credit to private sector, suggesting that the economic cycle will either stifle or boost credit to private sector and the stock market size. Meanwhile, it is known that credit to private sector is eventually rechanneled to the market to boost its size, although in Nigeria, it has not yet translated to improvement in market value (stock price).

Thus,premised on the reduction of the treasury bill rate, which is gradually far below inflation rate and inching towards zero percent, it is recommended that the attention of the investing public may be diverted to the capital market.Furthermore, a stronger user interface is recommended in addition to CAPNET to reduce information asymmetries.

Consequently, the need to strengthen stock market efficiency to ensure that stock prices readily reflect optimum information in the market cannot be over-emphasized.

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