FINANCIAL INCLUSION, FINANCIAL STABILITY AND EFFICACY OF MONETARY POLICY IN NIGERIA

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ABSTRACT

The importance of inclusive financing to inclusive growth is no more in doubt. Thus, the Central Bank of Nigeria developed a financial inclusion strategy in 2012 to reduce the percentage of adult Nigerians excluded from the formal financial services so as to enable them contribute to the growth and development of the country. This study adopts modified versions of Sarma (2012) and Nicholas and Isabel (2010) methodologies to compute composite indices of financial inclusion and financial system stability, respectively for Nigeria from 2007Q1 to 2016Q4. The study then empirically examines, using autoregressive distributed lag (ARDL) approach, the dynamic linkages among financial inclusion, financial system stability and the efficiency of monetary policy. The results show that Nigeria has made a remarkable progress in the implementation of her financial inclusion initiative and that the financial system was fairly stable during the study period. The empirical result reveals that financial inclusion enhances the effectiveness of monetary policy. The study, therefore, recommends that the CBN should continue to pursue her financial inclusion drive with all vigor so as to expand not only the coverage but also the ease and pace of accessing financial services, as it is capable of enhancing the efficiency of monetary policy.

Key words: *Financial Inclusion, Banking System Stability, FSI, Monetary Policy, Nigeria.*

JEL Classification: *E52, E58, G00, G21*

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1. INTRODUCTION

A strong consensus seems to have emerged on the importance of inclusive financing for inclusive growth at a critical time when financial stability is of great concern to monetary authorities. Thus, different policy initiatives by central banks and governments across the world have been initiated to boost access to finance. The 2011 Maya declaration is the first measurable global set of commitments by emerging markets and developing countries to strengthen effort to unlock the economic and social potentials of about 2.5 billion poorest people of the world through greater financial inclusion. This declaration was endorsed by more than eighty (80) institutions across the globe. The Maya declaration recognises the importance of inclusive financing to not only inclusive growth but also global financial stability, financial deepening and poverty reduction.

The Central Bank of Nigeria (CBN) in 2012, as a sign of her commitment to the Maya Declaration, developed a financial inclusion strategy for Nigeria. The aim of the strategy, amongst others, was to reduce the percentage of adult Nigerians excluded from formal financial services from 46.3 per cent as at 2010 to 20.0 per cent by 2020 with a view to enabling them have access to financial services, engage in economic activities and contribute to growth and development of the country. The number of Nigerians that are included in the formal financial sector shall then increase from 30.0 per cent in 2010 to 70.0 per cent by the year 2020. By this, Nigeria had committed herself to reducing the population of "unbanked" and "under-banked" adults by about 50.0 per cent by the year 2020.

Most public analysts in Nigeria are of the opinion that a remarkable success has been achieved by the Central Bank of Nigeria in her financial inclusion drive (Yaaba, 2017), although no formal measurement framework has been officially adopted, particularly from the perspective of the supply side[2]. This paper is therefore a maiden attempt to measure not only the status of the financial inclusion, but how it, coupled with financial system stability, impact on monetary policy efficiency of the CBN.

To achieve this objective, the paper is structure into five sections including this introduction. Section two reviews both theoretical and empirical literature on the subject matter, as well as presents a stylized fact on the structure, size and strength of the Nigerian financial system. While sections three and four present methodologies and analysis of results, respectively, the last section provides conclusion and policy option.

2 - EFInA has made considerable effort in tracking the demand side.

2. LITERATURE REVIEW

2.1 Theoretical and Empirical Literature

The degree of soundness of the financial system has enormous implication for monetary policy and so do the extent of financial inclusion. Policy analysts such as Gali, Lopez-Salido & Valles, 2004;Di Bartolomeo & Rossi, 2007; Bilbiie, 2008; Khan, 2011; Tombini, 2012; Mbutor & Uba, 2013, Mehrotra & Yetman, 2014; Mehrotra & Nadhanael, 2016 have highlighted the link between financial inclusion/exclusion and (in) efficiency of monetary policy. An inclusive financial system has the capability of influencing firms and households decisions as it provides easy access to finance for investment at affordable rate. Access to finance for investment promotes growth, reduces income inequality and by extension minimizes incidence of poverty (Beck, Demirguc-Kunt & Martinez Peria, 2007).

Some other analysts are however of the view that the theoretical basis for financial inclusion-monetary policy link could be anchored on the popular Limited Asset Market Participation (LAMP). This facilitated the consideration of varying implications of inclusive financing on monetary policy efficiency. While some researchers such as Gali, Lopez-Salido & Valles (2004) modelled the demand of households that are credit constrained and unable to smooth consumption as a function of current income that is hardly affected by interest rate, Bilbiie and Straub (2012) in an Euler equation, modelled changes in the direction of interest rate as an effect of changes in the activities in the asset market. Mbutor and Uba (2013) opined that financial inclusion enhances deposit mobilisation which strengthens the soundness of the banking system and consequently aid the efficiency of monetary policy via effective transmission of monetary policy decisions to other sector of the economy.

Cecchetti and Schenholtz (2015) strongly assert that financial inclusion does not only enhance monetary policy efficiency but also influences the monetary authority's policy choice. According to them, two aspect of policy is necessary to understand the link between monetary and financial inclusion. First, the existence of trade-off not only between the level of growth (or employment) and inflation but also their variability. Shock moves inflation and output away from the target and potential levels, respectively. In other words, an unexpected event can distort inflation and output equilibriums. This distortion could either be positive or negative[3]. The positive effect occurs when agents are optimistic about future. Thus, shock induces movement of consumption, investment, aggregate demand, inflation and output towards the same direction. The negative effect, on the other hand, occurs, for instance, when shock induces inflationary spiral, aggravate cost of production and consequently fall in the level of output.

3 - Positive effect is referred to as demand shock, while negative effect is the supply shock.

According to them, if monetary policy induces an aggregate demand like shock which affects both inflation and output in the same direction, it is easily handle by the policy makers, but when shock induces movement of inflation and output towards different directions, policy makers are faced with a difficult situation – a trade-off between lowering inflation[4] or enhancing output[5]. This is because any attempt at closing one gap, will definitely expands the other, at least in the short-run. Therefore, for central banks, such as CBN, whose primary mandate is to maintain low and stable inflation, emphasis will be placed on minimizing the inflation gap. Since the ability of households to smooth consumption depends, to a large extent, on their access to financial system, it therefore follows that the "unbanked" that faces liquidity constraint can hardly make adjustment.

In a nutshell, therefore, a financially inclusive country can place more emphasis on closing inflation gap, giving that, households have the capability to smooth consumption, arising from easy access to the financial system, while a low financially inclusive country whose households hardly able to smooth consumption will concentrate on closing output gap and make do with high inflation. Thence, the more financially inclusive a country becomes, the more households are able to smooth consumption/spending and the more stable is inflation.

Mehrotra and Nadhanael (2016) consider the traditional interest rate as a very critical link between inclusive financing and monetary policy effectiveness. They opined that since the demand of consumers that are credit constrained is largely a function of current disposable income[6], a low financial inclusive environment may experience a lower and weaker direct impact of movements in interest rate on agents' consumption, investment and savings decisions than a highly financial inclusive environment. Olaniyi (2016) contends that financial inclusion brings different segments of the society into a formal financial sector, thereby increase the reach of monetary policy and hence enhance monetary policy efficiency. He recognizes that financial inclusion increases access to financial services, which in-turn boost aggregate demand and investment which is generally acknowledged to be sensitive to monetary policy through interest rate.

Although, there is paucity of empirical literature on the simultaneous impact of financial inclusion and financial stability on monetary policy, there is however ample work on the impact of each separately on monetary policy. Starting with the study by Mbutor and Uba (2013) that applied vector Autoregression (VAR) on Nigerian data from 1980 to 2012 and found evidence that inclusive financing can serve as a veritable source of monetary policy effectiveness. The financial inclusion variables covered in

4 - Closing inflation gap.
5 - Move output towards the potential.
6 - This further supports the view of Gali, Lopez-Salido & Valles (2004)

the study includes; bank branches, commercial banks loans as a percentage of GDP, total deposit and loan of rural banks branches, average lending rates and foreign exchange rate.

Lenka and Bairwa (2016) used Principal Component Analysis (PCA) to construct financial inclusion index for South Asian Association for Regional Cooperation (SAARC) countries from 2004 to 2013, thereafter adopted a Generalized Least Square (GLS) technique to analyze the impact of the index on monetary policy efficiency. The study found a significant impact of financial inclusion on monetary policy as inclusive financing proved efficient in moderating inflation.

Olaniyi (2016) adopted a panel vector error correction model on annual data of fifteen (15) African countries from 2005 to 2014 and found no link between financial inclusion and efficiency of monetary policy. The results, according to the author, indicate that monetary policy effectiveness was instrumental to financial inclusion and not the other way round.

Mehrotra and Nadhanael (2016) adopted a Generalized Method of Moment (GMM) and Vector Autoregression (VAR) to estimate an output Euler equation for nine countries in Asia using data from 2000Q1 to 2013Q2. They divided the countries into two, using the World Bank's indicator of account ownership of 2011. The first group consists of Hong Kong SAR, Korea, Singapore and Thailand, while the second group includes China, India, Indonesia, Malaysia and the Philippines. The results show that interest rate sensitivity of output is higher in countries with high degree of financial inclusion.

2.2 Stylized Fact on the Structure, Size and Strength of the Nigerian Financial System

The Nigerian financial landscape in 2017 comprises largely of five regulators and a large number of operators. The regulators include, the Central Bank of Nigeria (CBN),Nigerian Deposit Insurance Corporation (NDIC), National Insurance Commission(NAICOM), Pension Commission (PENCOM), Securities and Exchange Commission (SEC), among others. The operators, on other hand, consist of Deposit Money Banks (DMBs), Microfinance Banks (MFBs), Primary Mortgage Institutions (PMIs), Finance Companies, Development Finance Institutions (DFIs), Insurance Companies, Pension Funds Administrators (PFA) and the Nigerian Stock Exchange (NSE).

The Central Bank of Nigeria (CBN) which commenced operation in 1959 is the apex regulatory institution of the financial system. The Bank is statutorily responsible for ensuring price and financial system stability achievable through effective and

efficient regulation and supervision of the financial institutions and conduct of monetary policy. The Nigerian Deposit Insurance Corporation established in 1998 has the mandate of protecting depositor's funds through deposit insurance. It also has the duty of fostering monetary stability and promoting efficient and effective payment system. While NAICOM oversees the activities of insurance companies, the PENCOM regulates the Pension Funds Administrators.

Table 1: Size of the Nigerian Financial System, 2014 – 2016

(₦'Billion, unless specified otherwise)

	2013		2014		2015		2016	
	Assets	% of Total	Assets	% of Total	Assets	% of Total	Assets	% of Total
Deposit Money Banks	**48,803.05**	**90.11**	**54,995.25**	**90.45**	**56,542.29**	**88.10**	**63,813.27**	**88.04**
Commercial	24,334.69		27,413.60		28,173.26		31,682.82	
Merchant	133.58		167.60		195.77		447.63	
Non-Interest	24,334.79		27,414.05		28,173.26		31,682.82	
Specialised & DFIs	**362.81**	**0.67**	**740.74**	**1.22**	**808.00**	**1.26**	**804.30**	**1.11**
Bank of Agriculture	51.84		36.43		29.09		42.84	
Bank of Industry	256.16		645.47		704.74		687.59	
The Infrastructure Bank	4.16		7.54		7.95		7.33	
Nig. Export-Import Bank	50.65		51.29		66.22		66.54	
Other Non-Bank Fin. Inst.	**467.60**	**0.86**	**524.18**	**0.86**	**722.77**	**1.13**	**697.98**	**0.96**
Finance Companies	103.05		119.59		107.36		121.80	
Mortgage Institutions	126.71		182.94		271.53		249.65	
Microfinance Banks	237.84		221.65		343.88		326.54	
Insurance/Pension Funds	**4,526.99**	**8.36**	**4,539.22**	**7.47**	**6,105.79**	**9.51**	**7,164.73**	**9.89**
Insurance	468.90		699.14		802.91		1,005.78	
Pension Funds	4,058.09		3,840.08		5,302.88		6,158.95	
Financial System	**54,160.46**	**100.00**	**60,799.39**	**100.00**	**64,178.85**	**100.00**	**72,480.28**	**100.00**

Source: *Central Bank of Nigeria*

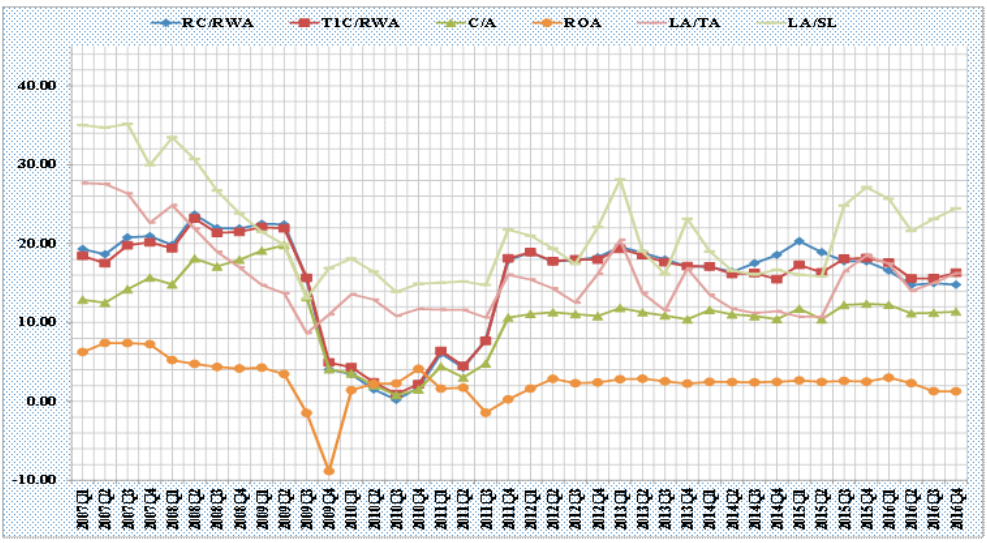
The DMBs which are licensed by the CBN and were operational as at May 2017 are twenty four (24), out of which nineteen (19) are commercial banks, four (4) are merchant banks and one (1) is a non-interest bank[7]. In addition to the existing Nine hundred and seventy nine (979) functional microfinance banks, eighteen (18) new licenses[8] were issued in the first half of 2016. PMIs, on the other hands, numbered up to thirty five (35). Three (3) new licenses were granted by the CBN in the first half of 2016, in addition to the existing sixty four (64) Finance Houses (FHs). In all, there are six (6) prominent DFIs which includes Nigeria Exports-Imports (NEXIM) bank established in 1991, Bank of Industry established in 1964, Bank of Agriculture which was incorporated in 1972 as Agricultural and Rural Development Finance Institution, The Infrastructure Bank established as Urban Development Bank (UDB) in 1992 as well as Nigeria Mortgage Refinance Company which was established in June 2013.

7 - During the first half of 2016 a new license was issued for the establishment of one more commercial bank.
8 - See CBN Financial Stability Report, June 2016.

The asset base of the financial system has over the years been on the increase. From ₦54.2 trillion in 2013, it grew gradually but continuously to ₦72.5 trillion in 2016. The financial system as portrayed by Table 1 is dominated by banking system. As at end-2013, the asset base of the banking system constituted about 90.11 per cent of the total asset of the financial system. This position, however, narrowed in 2016 when it declined to about 88.05 per cent, arising largely from the rapid increase in the total asset of the pension funds over the period. It is nevertheless worth noting that even the assets of other institutions are domiciled in the banking system. With about five thousand, five hundred (5,500) branches and cash centres in operation, the banking system has more than seventy five thousand (75,000) staff serving about one hundred and twenty one million adults (+18 years) in 2016.

In the same vein, deposit mobilisation has improved over the years. It stood at about ₦4.5 trillion at the end of the first quarter of 2007 and grew gradually to about ₦10.6 and ₦15.0 trillion at end of the first quarters of 2010 and 2013, respectively. It was ₦17.2 trillion at the end of first quarter 2016 but closed the year at about ₦18.3 trillion. Despite the huge asset and deposit base, however, the banking system still isn't able to finance large chunk of the country's economic activities.

Figure 1: Selected Financial Soundness Indicators for Nigeria, 2007Q1 to 2016Q4



The banking system is fairly stable, as evidenced in Figure 1, which presents some selected financial soundness indicators compiled in line with the IMF-FSIs Guide. Although, regulatory capital to risk weighted assets (CAR) fell below the minimum international standard of 8.0 per cent from 2009Q4 to 2011Q3 due largely to the global

financial crisis that emanated from the mortgage sector of the US in 2007/08, it has largely rebounded. It stood at 14.98 at the end of the fourth quarter of 2016. The CAR was at its lowest of 0.20 per cent during the third quarter of 2010 and peaked at 23.67 per cent at the end of 2008Q2.

In the same vein, return on assets (ROA) which plunged to as low as -8.85 per cent in the fourth quarter of 2009 have also rebounded and close the fourth quarter of 2016 at 1.27 per cent. ROA was at its peak of 7.40 in the second quarter of 2007. The liquid assets to total assets, which fell to as low as 8.64 per cent in the third quarter of 2009 stood at 16.25 per cent at the end of 2016. The non-performing loans in relation to total loan had been on the decline. An indicator which had risen to as high as 38.35 per cent at the peak of the GFC (i.e. 2010Q2) had fallen to as low as 12.82 per cent at the end of the fourth quarter of 2016. The indicator was at the bottom of 2.96 per cent at the end of 2014Q4.

3. EMPIRICAL METHODOLOGY

The standard formulation of the estimated equation is given as:

$$MP_t = FII_t + BSSI_t \qquad (1)$$

Where *MP* represents monetary policy proxy by consumer price index, *FII* is financial inclusion index/ indicators, *BSSI* denotes banking system stability index/indicators and the subscript *t* is the time dimension. Consumer Price Index (*CPI*) is used to proxy monetary policy efficiency, since the CBN is statutorily saddled with the responsibility of ensuring low and stable prices (CBN Act, 2007)[9]. Banking System Stability Index is used as proxy for financial stability, because in Nigeria, the banking system covers more than 80.0 per cent of the financial system (See Table 1); hence stability or fragility in the banking system can be taken to mean same for the financial system.

A bounds test approach to cointegration popularly refers to as Autoregressive Distributed Lag (ARDL) developed by Pesaran *et al.* (2001) is deployed to estimate equation (1). The choice of ARDL is informed by several considerations. First, the model can be estimated irrespective of whether the underlying regressors are stationary at I(1) or I(0) or a mixture of both. In other words, it ignores the order of integration of the variables (Pesaran *et al*. 2001). Secondly, it provides unbiased estimate of the long-run model, as well as valid t-statistics even when some of the regressors are endogenous (Harris & Sollis, 2003). Thirdly, it has good small sample properties.

9 - See also Mbutor & Uba (2013)

In line with Pesaran *et al*. (2001) therefore, the ARDL format of equation (1) is formulated as:

$$\Delta LMP_t = \vartheta + \sum_{i=1}^{\rho} \lambda_i \Delta LMP_{t-i} + \sum_{j=0}^{\rho} \delta_j \Delta LFII_{t-j} + \sum_{k=0}^{\rho} \beta_k \Delta BSSI_{t-k} + \omega_1 LMP_{t-1} + \omega_2 LFII_{t-1} + \omega_3 BSSI_{t-1} + \mu_t \quad (2)$$

Where Δ is a differenced operator, L is logarithm, θ is an intercept term, λ, δ, β are the respective coefficients of the short-run parameters. The ω_j are the coefficients of the long-run parameters, ρ_s are the optimal lag length of the respective variables, t is the time dimension and μ is error term. All other variables are as defined under equation (1).

In line with Granger representation theorem, the error correction representation of equation (2) becomes:

$$\Delta LMP_t = \vartheta + \sum_{i=1}^{\rho} \lambda_i \Delta LMP_{t-i} + \sum_{j=0}^{\rho} \delta_j \Delta LFII_{t-j} + \sum_{k=0}^{\rho} \beta_k \Delta BSSI_{t-k} + \Omega EC_{t-1} + \mu_t \quad (3)$$

Where *EC* is the error term of the ARDL model and other variables are as defined under equations 1 and 2.

Quarterly data from the first quarter of 2007 to the fourth quarter of 2016 is used for the estimation. The choice of the study period is informed by the availability of relevant data on quarterly basis. Three variants of Equations 2 and 3 are estimated, first with the computed indices, *FII* and *BSSI;* second and third with the variables FII and BSSI as vectors. The vector *FII* in the second regression consists of all dimensional indices that sums to the financial inclusion index. The indices include penetration, services and usage indices. On the other hand, the vector *BSSI* covers Banking Soundness Index (BSI), Banking Vulnerability Index (BVI) and Economic Climate Index (ECI). Finally, with *FII* and *BSSI* as another vector of three variables each, where *FII* consists of the ratio of credit to private sector to GDP, number of Automated Teller Machines (ATMs) and number of accounts; and *BSSI* considers regulatory capital to risk weighted assets (CAR), net interest margin (NIM) and non-performing loan to total loans (NPL/TL). The derivation of *FII* and *BSSI* as well as their sub-indices are detailed below.

3.1 Financial Inclusion Index (FII)

In line with Sarma (2012), the study constructed a composite index of financial inclusion from the supply side. The index is calculated as a weighted average of three dimensions of financial inclusion, namely: financial penetration index (FPI), financial services index (FSI) and financial usage index (FUI).

Financial Penetration Index (FPI): This is the availability of financial services to the populace. The size of the population having access to financial services is a good measure of FPI. Available measures of this index include; the number of branches per 1,000 km^2, number of branches per 100,000 adults, the number of automated teller machine (ATM) per 1,000 km^2, number of ATMs per 100,000 adults, number of agents per 1,000 km^2 and number of agents per 100,000 adults. The study adopts the proportion of number of accounts to total adult population in Nigeria. This is given as:

$$FPI_t = \frac{ac_t}{p_t} \qquad (4)$$

Where *FPI* is the financial penetration index, *ac* represents number of accounts (Deposit Money Banks, Microfinance Banks, Primary Mortgage Institutions and Insurance companies), *p* depicts total adult population and *t* is time.

Financial Services Index (FSI): Accessibility is generally agreed to be an important ingredient of an inclusive financial system. Accessibility can also be proxied by number of accounts per 1,000 people and the number of staff per customer. For data reasons, this study adopts the number of branches of the financial institutions in Nigeria/total adult population and the number of ATMs/ total adult population.

$$FSI_t = \delta_1 \frac{fb_t}{p_t} + \delta_2 \frac{atm_t}{p_t} \qquad (5)$$

$$\delta_1 + \delta_2 = 1$$

Where *FSI* is financial services index, $ä_1$ and $ä_2$ are the respective weights of number of financial institutions branches (*fb*) and number of automated teller machines (*atm*), respectively[10], *p* represents adult population and the subscript *t* is the time dimension.

Financial Usage Index (FUI): It is argued that besides access to banking services, usage is highly important[11]. This dimension is measured by number of depositors per

10 -Δ_1 and δ_2 are adopted from Udom et al. (forthcoming).

11 - See Sarma 2012 for detailed explanation.

1,000 adults, number of borrowers per 1,000 adults, average size of total deposits to gross domestic product and average size of total loans to GDP. In this study, this dimension is measured by the volume of credit to private sector, deposits liabilities of the financial system and insurance claims, relative to GDP. This is presented as:

$$FUI_t = \frac{cr_t + is_t + d_t}{y_t} \tag{6}$$

Where *FUI* represents financial usage index, *cr* is credit to private sector, *is* denotes insurance claims, *d* symbolizes deposit liabilities and *y* connotes aggregate output.

The *FPI, FSI* and *FUI* are then combined to form another set of two indices namely; Index 1 and 2, given as:

$$Index\ 1_t = \frac{\sqrt{FPI_t^2 + FSI_t^2 + FUI_t^2}}{\sqrt{\omega_p^2 + \omega_s^2 + \omega_u^2}} \tag{7}$$

$$Index\ 2_t = 1 - \frac{\sqrt{\left(\omega_p - FPI_t\right)^2 + (\omega_s - FSI_t)^2 + (\omega_u - FUI_t)^2}}{\sqrt{\omega_p^2 + \omega_s^2 + \omega_u^2}} \tag{8}$$

Where *FPI, FSI* and *FUI* as presented in equations 7 and 8 are financial penetration index, financial services index and financial usage index, respectively, while ω_p, ω_s and ω_u are the weights of their respective indices. Index 1, according to Sarma (2012) is the normalized Euclidean distance from point *O* which indicates a worst situation in term of financial inclusion, while Index 2 presents the inverse of the normalized Euclidean distance from point *w* which is the ideal point. This according to Sarma (2012) is to ensure that the higher value of index 2 corresponds to the higher value of financial inclusion.

The *FII* is then derived as the arithmetic mean of Indices 1 and 2:

$$FII_t = \frac{1}{2}(Index\ 1_t + Index\ 2_t) \tag{9}$$

Following Sarma (2012), the following rule can be applied to the resultant *FII* to determine a country's level of inclusive financing.

$0.5 < FII < 1 = High\ FII$
$0.3 < FII < 0.5 = Medium\ FII$
$0 < FII < 0.3 = Low\ FII$

It is important to note that the weights (δ_1 and δ_2 in equation 5, and ω_s in equation 7 and 8) are adopted from Udom *et al.,* (forthcoming)[12].

3.2 Banking System Stability Index (BSSI)

The study updated the BSSI computed by Sere-Ejembi et al. (2014) which was derived using Nicholas and Isabel (2010) methodology. The indicators used for the computation are compiled in line with the IMF-FSIs[13] framework. Table 2 details the indicators that were used for the compilation of the BSSI. The indicators were grouped into three, Banking Soundness Index (BSI), Banking Vulnerability Index (BVI) and Economic Climate Index (ECI).)[14].

Table 2: Indicators of Banking System Stability for Nigeria

Category	Indicator	Notation
1. Banking Soundness Index		
Capital Adequacy	Capital Adequacy Ratio	CAR
	Ratio of Non-Performing Loans net of Provisions to Capital	NPLP/C
Asset Quality	Ratio of Non-Performing Loans to Total Loans	NPL/TL
Liquidity	Ratio Liquid Assets to Total Assets	LA/TA
	Loans to Deposits Ratio	TL/D
Profitability	Return on Assets	ROA
	Interest Margin to Gross Income Ratio	NIM
	Non-Interest Expense to Gross Income	NIE/GI
2. Banking Vulnerability Index		
External Sector	Current Account Balance to GDP Ratio	CAB/GDP
	Ratio of Money Supply to Foreign Reserves	M2/FR
	Ratio of External Assets to Total Assets of DMBs	EA/TA
	Ratio of Foreign Currency Assets to Foreign Currency Liabilities of DMBs	FCA/FCL
Financial Sector	DMBs Domestic Credit to GDP	DC/GDP
Real Sector	Inflation	IF
	GDP Growth Rate	GDPR
3. Economic Climate Index		
	GDP Growth Rate of the US	GDPUS
	GDP Growth Rate of the UK	GDPUK
	GDP Growth Rate of China	GDPCH

12 - Udom, et al. (forthcoming) derived the weights through survey. They administered questionnaire to selected staff of the CBN and DMBs in Nigeria. The responses are then consolidated to derive the weights.
13 - IMF framework is commonly used in the literature for early warning signals (EWS).
14 - See appendix for detail.

The sub-indices for both FII and BSSI were then standardized using statistical normalization technique, given as:

$$Z_t = \left(\frac{X_t - \mu}{\sigma}\right) \qquad (10)$$

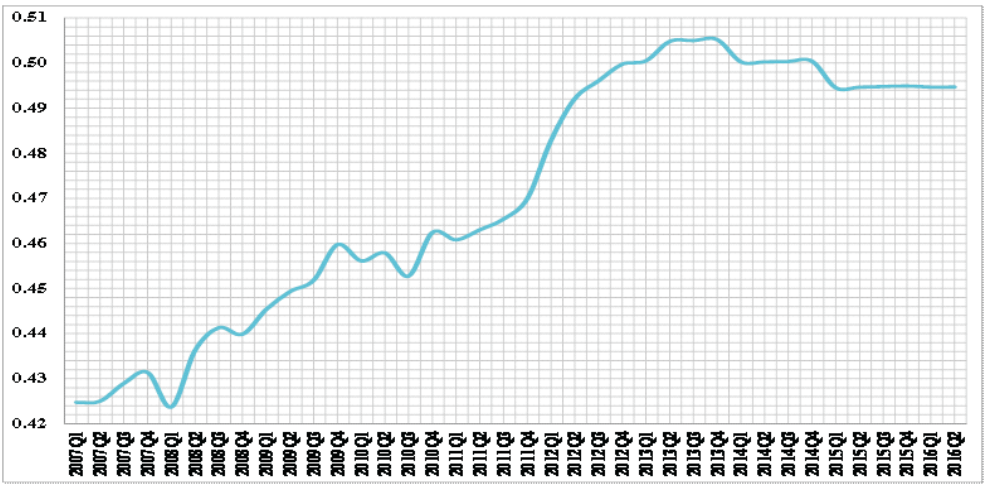
Where X_t represents the value of the index X during period t; μ is the mean and σ is the standard deviation.

4. ANALYSIS OF RESULTS

4.1 Financial Inclusion and Stability Indices

Visual inspection of Figure 2 reveals that Nigeria is making gradual progress in her quest for inclusive financing. From 0.42 points in the first quarter of 2007, the index grew gradually until it reaches an all-time high of 0.51 in the fourth quarter of 2013 and thereafter fell to 0.50 in the succeeding quarter. The index remains stable until the fourth quarter of 2014 when it again dropped to 0.49 and persisted until it marginally declined to 0.42 in 2016Q3 and thereafter rise marginally in the fourth quarter of 2016 to 0.50. Following Sarma (2012), therefore, Nigeria is still a medium financial inclusion country striving to achieve high financial inclusion status.

Figure 2: Financial Inclusion Index for Nigeria, 2007Q1 to 2016Q4



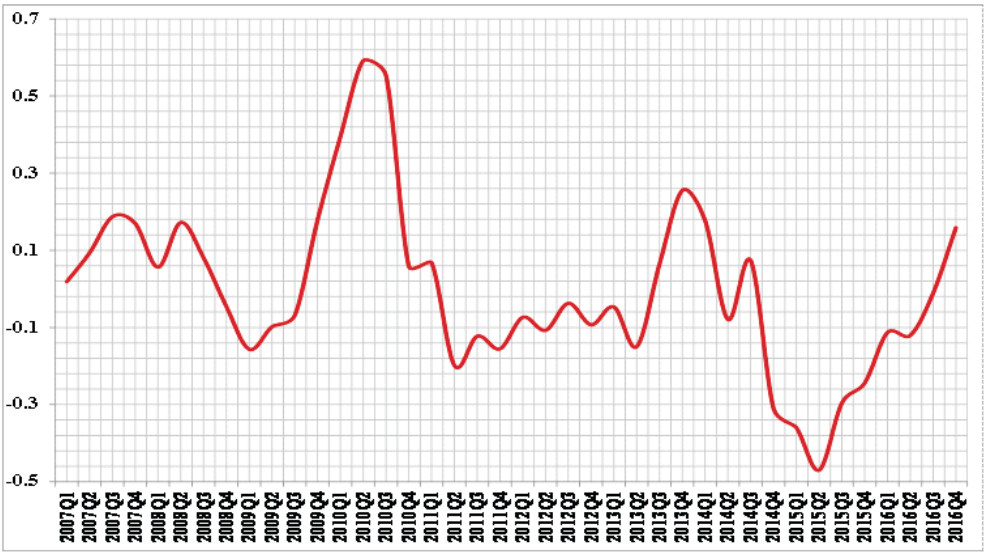
Further investigation reveals that the major drivers of FII are the services and penetration dimensions without remarkable improvement in the usage dimension[15].

15 - Figures that depict this fact are not presented in the paper for space consideration.

This shows that the Nigerian financial system is stepping up the provision of financial services and penetrating the teeming adult population, without commensurately enhancing the usage of those services. In other words, while the financial system, particularly banks, opens more bank accounts for customers, their efforts in deposit mobilisation and credit creation is still below optimum.

The banking system stability index, on the other hand, indicates that, although the Nigerian banking system has witnessed lot of turbulence during the study period but overall it is fairly stable. It is however important to note that BSSI is more volatile when compare to FII. The BSSI is able to track the beginning of the impact of global financial crisis (GFC) on the Nigerian economy which was mostly agreed by analysts to commence in the first quarter of 2009 (see Yaaba, 2013; Abubakar and Yaaba, 2013; Yaaba & Adamu, 2013; Sere-Ejembi et al. 2014).

Figure 3: Banking System Stability for Nigeria, 2007Q1 to



Although, the instability during the GFC is glaringly noticed in the index, the crisis that erupted in the banking system towards the end of 2014 up to early 2015 is far more noticeable as the index was at its bottom low of -0.47 in the second quarter of 2015. The index peaked during the second quarter of 2010. The stability witnessed during this period can largely be attributed to the intervention by the Central Bank of Nigeria. The CBN stationed resident examiners in the Deposit Money Banks (DMBs), injected liquidity in the form of Tier 2 capital into troubled banks towards the end of 2009, embarked on downward review of MPR and provided guarantees for interbank transactions (see Sere-Ejembi et al., 2014 for detail).

4.2 INFERENTIAL RESULTS

4.2.1 Descriptive Statistics

Table 3 presents a descriptive statistics of the variables used for the estimation. The table reveals a total of 40 observations per variable. Most of the variables are negatively skewed except *BSSI*, *BSI, BVI, NPL/TL* and *ATM*. Financial inclusion and banking system stability indices exhibited different characteristics as they returned standard deviations of 0.06 and 0.22, respectively. While the maximum observation for *LFII* is -0.68 that of *BSSI* is 0.59. The Jarque Bera results for the variables fall between 1.49 for *BVI* and 58.64 for *NIM* with Kurtosis of between 1.63 for *LFII* and 7.38 for *NIM* hence conclusion can be conveniently drawn that the data is not normally distributed.

Table 3: Summary Statistics

Variable	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Prob.	Obs.
LCPI	4.83	4.86	5.36	4.31	0.31	-0.11	1.92	2.02	0.36	40
LFII	-0.76	-0.76	-0.68	-0.86	0.06	-0.32	1.63	3.82	0.15	40
BSSI	0.00	-0.04	0.59	-0.47	0.22	0.58	3.80	3.34	0.19	40
LFSI	-11.16	-11.17	-11.04	-11.41	0.08	-0.51	3.22	1.84	0.40	40
LFPI	-1.36	-1.23	-1.08	-2.37	0.34	-1.67	5.12	26.07	0.00	40
FUI	-6.13	-6.00	-5.68	-6.81	0.31	-0.45	1.89	3.40	0.18	40
BSI	0.00	-0.09	0.86	-0.52	0.34	0.55	2.89	2.02	0.36	40
BVI	0.00	-0.02	0.80	-0.49	0.32	0.47	2.86	1.49	0.48	40
ECI	0.00	0.19	0.93	-1.70	0.63	-0.91	3.41	5.76	0.06	40
CAR	15.65	17.84	23.67	0.20	6.51	-1.22	3.21	10.03	0.01	40
NIM	4.04	4.11	4.21	3.44	0.17	-2.00	7.38	58.64	0.00	40
NPL_TL	10.84	7.43	38.35	2.96	10.14	1.85	5.28	31.50	0.00	40
CR	16.26	16.50	16.68	14.93	0.47	-1.25	3.82	11.51	0.00	40
ATM	6.61	6.44	9.76	4.14	1.72	0.26	1.80	2.87	0.24	40
AC	17.59	17.70	17.95	16.46	0.38	-1.25	3.99	11.99	0.00	40

4.2.2 Correlation Matrix

The correlation among the variables used for the estimation is also explored as a pre-estimation diagnosis. Table 4 which report the result indicates the presence of high positive correlation of about 80.0 per cent between *LCPI* and *LFII* but a negative correlation of 38.0 per cent between *LCPI* and *BSSI*. All sub components of *FII* are negatively correlated with *LCPI* except *LFPI*. In the same vein, the sub-indices of *BSSI* return negative coefficients with *LCPI* except BVI. For instance, *LFSI* and *FUI* yield -9.0 and -48.0 per cents negative coefficients in relation to *LCPI,* while *BSI*, *BVI* and *ECI* are -57.0, 29.0 and -21.0 per cents correlated with *LCPI*. While the indicators

of FII (CR, ATM and AC) yield positive coefficients at not less than 90.0 per cent each, that of BSSI is mixed.

Ordinarily, high correlation among the variables can serve as signals for the presence of serial correlation, but not all the variables entered the regression at the same time. For instance, the first scenario considers only *LCPI*, *FII* and *BSSI* while the second scenario considers *LCPI* and the respective components of *FII* (*FSI*, *FPI* and *FUI*) and *BSSI* (*BSI*, *BVI* and *ECI*). The last scenario regressed *LCPI* on *CAR*, *NIM*, *NPL/TL*, *CR*, *ATM* and *AC*.

Table 4: Correlation Matrix

	LCPI	*LFII*	*BSSI*	*LFSI*	*LFPI*	*FUI*	*BSI*	*BVI*	*ECI*	*CAR*	*NIM*	*NPL_TL*	*CR*	*ATM*	*AC*
LCPI	1.00														
LFII	0.80	1.00													
BSSI	-0.38	-0.34	1.00												
LFSI	-0.09	0.03	0.22	1.00											
LFPI	0.84	0.84	-0.28	0.32	1.00										
FUI	-0.48	-0.14	0.18	0.66	-0.07	1.00									
BSI	-0.57	-0.62	0.75	0.06	-0.54	0.17	1.00								
BVI	0.29	0.37	0.44	0.43	0.48	0.11	-0.17	1.00							
ECI	-0.21	-0.09	0.50	-0.14	-0.27	-0.05	0.08	0.21	1.00						
CAR	-0.04	0.03	-0.47	-0.56	-0.14	-0.10	-0.20	-0.39	-0.32	1.00					
NIM	0.20	0.24	-0.05	-0.04	0.20	0.07	-0.05	0.08	-0.15	0.08	1.00				
NPL_TL	-0.27	-0.35	0.65	0.50	-0.15	0.22	0.66	0.14	0.13	-0.79	-0.16	1.00			
CR	0.90	0.86	-0.34	0.25	0.95	-0.13	-0.58	0.42	-0.27	-0.08	0.19	-0.21	1.00		
ATM	0.99	0.76	-0.42	-0.23	0.77	-0.58	-0.55	0.20	-0.23	0.05	0.17	-0.33	0.84	1.00	
AC	0.92	0.86	-0.33	0.23	0.95	-0.16	-0.57	0.43	-0.25	-0.10	0.22	-0.21	0.99	0.86	1.00

4.2.3 Unit Root Test

Cursory look at Table 5 suggests that the data contain a mixture of both I(0) and I(1) series. While *LCPI*, *LFII*, *BSSI, FUI, CAR, NIM, NPL/TL, CR, ATM* and *AC* are reported as differenced stationary, following both Augmented Dickey-Fuller based on Akaike Information and Schwarz Bayesian Criteria and Phillip Perron (PP), *BSI* and *BVI* are returned level stationary in line with all techniques. *LFPI* is level stationery following PP technique and first differenced stationery under ADF based on both AIC and SBC. PP returns ECI as an I(1) series while ADF based on both AIC and SBC consider *ECI* as I(0).This further justifies the use of bound test which has the capability to accommodate either I(0), I(1) or a mixture of both.

Table 5: Unit Root Tests

Regressor	Augmented Dickey Fuller				Phillips-Perron	
	AIC		SBC			
	t- Statistics	*Remark*	*t- Statistics*	*Remark*	*t- Statistics*	*Remark*
LCPI	-5.388774	I(1)	-5.388774	I(1)	-5.596424*	I(1)
LFII	-3.208642***	I(1)	-3.208642***	I(1)	-15.37929*	I(1)
BSSI	-6.378092*	I(1)	-6.378092*	I(1)	-6.378376*	I(1)
LFSI	-7.089188*	I(1)	-7.089188*	I(1)	--8.685142*	I(1)
LFPI	-4.624111*	I(1)	-7.612156*	I(1)	-8.474102*	I(0)
FUI	-3.33311**	I(1)	-3.33311***	I(1)	-10.18649*	I(1)
BSI	-6.136781*	I(0)	-6.136781*	I(0)	-6.155085*	I(0)
BVI	-2.738337***	I(0)	-2.738337***	I(0)	-2.691324***	I(0)
ECI	-4.179400*	I(0)	-3.757442*	I(0)	-3.341459**	I(1)
CAR	-4.378873*	I(1)	-4.378873*	I(1)	-4.331400*	I(1)
NIM	-7.409228*	I(1)	-7.409228*	I(1)	-31.59326*	I(1)
NPL_TL	-3.835833*	I(1)	-3.835833*	I(1)	-3.830944*	I(1)
CR	-2.734882*	I(1)	-2.734882*	I(1)	-2.489689**	I(1)
ATM	-6.758138*	I(1)	-6.758138*	I(1)	-29.96073*	I(1)
AC	-1.936422***	I(1)	--5.286642*	I(1)	-3.3924*	I(1)

*Note: *, ** and *** denote 1.0, 5.0 and 10.0 per cent respectively.*

4.2.4 Cointegration Test

An eclectic approach was adopted at implementing equation (2)[16]. In other words, equation (2) was implemented using three scenarios. First, the monetary policy proxy (*LCPI*) which serves as an objective function was considered with the computed indices – i.e. *FII* and *BSSI*; second *LCPI* was again regressed against the sub-components of *FII* and *BSSI*, such that in the second scenario, *FII* becomes a vector of the three variables (*LFSI*, *LFPI*, *FUI*) and *BSSI* another vector of three variables (*BSI*, *BVI*, *ECI*). The third scenario considered the objective function with selected indicators of both financial inclusion and soundness. The entire ARDL process was followed to implement each scenario such that overall three (3) set of regressions were carried out. The Cointegration results as shown by Wald test are reported as Table 6.

To start with, all scenarios yield F-statistics of 11.48, 17.29 and 8.77, respectively. At these levels, the F-statistics were higher than the I(1) bounds (upper critical values) of 5.00 and 3.99 at 1.0 per cent level of significance for *k* equals 2 and 6 respectively, as tabulated in Pesaran *et al*., (2001). This provides strong evidence in support of cointegration among the *LCPI* and its determinants in all cases.

16 - Similarly, equation (3) is implemented three times as equation (2) to derive the respective short-run dynamics.

Table 6: Bounds Tests(Footnotes)

Dependent Variable: *LCPI*

Scenario One			Scenario Two			Scenario Three		
Test Stats	**Value**	**k**	**Test Stats**	**Value**	**k**	**Test Stats**	**Value**	**k**
F-stats	11.48	2	F-stats	17.29	6	F-stats	8.77	6
Critical Value Bounds			**Critical Value Bounds**			**Critical Value Bounds**		
Sig.	I(0) Bound	I(1) Bound	Sig.	I(0) Bound	I(1) Bound	Sig.	I(0) Bound	I(1) Bound
10%	2.63	3.35	10%	1.99	2.94	10%	1.99	2.94
5%	3.10	3.87	5%	2.27	3.28	5%	2.27	3.28
2.50%	3.55	4.38	2.50%	2.55	3.61	2.50%	2.55	3.61
1%	4.13	5.00	1%	2.88	3.99	1%	2.88	3.99

4.2.5 Long-Run Coefficients

Table 7 presents the long-run coefficients derived from the ARDL models. The adjusted-R^2reported for all scenarios are 99.0 per cent, implying that the models are well fitted. The Durbin-Watson Statistics are 2.03, 2.70 and 2.21 indicating that there is no evidence of serial correlation.

A critical look at the table starting with scenario one reveals that, while *FII* yields a negative coefficient; *BSSI* returns a positive coefficient. This implies that while *FII* enhances the efficiency of monetary policy, *BSSI* does not. Two critical explanations are handily available for this development. One, inflation, which is the objective function, plays a critical role in the construction of the *BSSI.* It is one of the indicators of *BSI* which is a sub-component of *BSSI* (see Table 2). Two, Broad money supply forms part of the indicators for calculating the *BSSI* and in Nigeria, inflation is still believed to be largely a monetary phenomenon, hence the continuous use of monetary targeting as a framework of monetary policy. Arising from the presence of these two variables in the *BSSI,* therefore, conventional wisdom dictates that the relationship between *BSSI* and *CPI* can hardly be the other way round. Interestingly, however, the coefficient, although positive but statistically insignificant.

For scenario two, the indicators of *BSSI* all return positive coefficients and not statistically significant except *BSI* which is significant at 5.0 per cent. The positive and statistically significant coefficient of *BSI* is an indication that banking services index fuels inflation. An increase in the sub-index leads to an increase in inflation, implying that *BSI* does not enhance monetary policy efficiency. This is however not surprising giving the constituents of the index as explained earlier.

FSI and *FUI* – indicators of *FII* – return negative coefficients with *FSI* statistically insignificant. *FPI*, although positive but statistically significant. The statistically significant negative coefficient of *FUI* shows that inflation moderates as the index

grows. This is theoretically coherent. It further buttressed the argument that financial inclusion should not only be about penetration of financial services but the services should be easily accessible to the people at affordable rate (See Sarma, 2012; Yaaba, 2017). Availability of bank branches, ATMs, amongst others, should not only be the concern of financial inclusion, but the populace should be enticed through friendly policies to access the services. Indeed, financial usage index is paramount, as it is not only access to services that matters but also the usage of the services, hence the importance of this dimension to enhancing the efficiency of monetary policy.

In the case of scenario three, *CAR*, *NIM* and *NPL/TL* (indicators of *BSSI*) return positive coefficients, with *NIM* and *NPL/TL* statistically significant at 1.0 and 10.0 per cent, respectively. On the other hand, two of the *FII* indicators (i.e. *ATM* and *AC*) are negatively sign but only *AC* is statistically significant at 10.0 per cent, while *CR* is positively sign and not significant. This implies that mounting non-performing loans has the tendency of worsening inflation. Probability of default increases, when loan goes to non-productive sectors of the economy. Increase in liquidity, in turn increase the purchasing power of the masses, hence inflation. The positive and significant coefficient of *NIM* also implies that it fuels inflation. *NIM* increases as interest rate increases and increase in interest rate implies increase in the cost of capital which in turn translates to high prices. Therefore, as *NIM* increases, inflation is definitely expected to deteriorate. This further buttress the need for monetary authorities to strive to achieve low and stable interest rate if curbing inflation is at the core of the policy trust. A situation whereby lending rate rises to as high as 25.0 to 30.0 per cent does not augur well for the economy. It must however be noted that there is a trade-off here. High interest rate could be supportive of stable and sound banking system as it could lead to increase income, but it is detrimental to the attainment of low and stable prices which is the major trust of monetary policy of the CBN. Moreso, high interest rate in an environment like Nigeria where there is excessive quest for imports could also lead to default. Domestically produced goods are less competitive arising from the availability of relatively cheaper imported substitutes.

Table 7: Long-Run Coefficients

Dependent Variable: ***LCPI***

Scenario One: ARDL (4, 0, 2)				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
C	4.737	0.149	31.796	0.000
LFII	-0.407	0.103	-3.943	0.001
BSSI	0.383	0.232	1.653	0.110
$R^2 = 0.99$; Adj. R2 = 0.99; DW Stats = 2.038017				
AIC = -6.296226; SBC = -5.900346; HQC = -6.158053				

Scenario Two: ARDL (4, 3, 3, 4, 4, 4, 4)				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
C	4.600	0.057	81.236	0.000
LFSI	-0.233	0.244	-0.956	0.410
LFPI	0.473	0.035	13.546	0.001
FUI	-0.141	0.014	-9.901	0.002
BSI	0.405	0.076	5.359	0.013
BVI	0.081	0.041	1.957	0.145
ECI	0.002	0.012	0.135	0.901
$R^2 = 0.99$; *Adj. R2 = 0.99; DW - Stats = 2.707788*				
AIC = -8.954522; SBC = -7.502963; HQC = -8.447889				
Scenario Three: ARDL (4, 4, 4, 4, 3, 4, 3)				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
c	-3.694	0.852	-4.334	0.023
car	0.110	0.132	0.834	0.465
nim	0.125	0.009	13.782	0.001
npl/tl	0.335	0.137	2.455	0.091
cr	0.080	0.053	1.528	0.224
atm	-0.003	0.002	-1.650	0.198
ac	-0.006	0.002	-2.751	0.071
$R^2 = 0.99$; *Adj. R2 = 0.99; DW - Stats = 2.214036*				
AIC = -9.00669; SBC = -7.555131; HQC = -8.500057				

Inflation moderates as the number of accounts rises, implying that as the usage of the financial services expands, the CBN ability to curtail inflation improves. The CBN monetary policy will gain a wider reach, as more people participates actively in the financial system. Those that ordinarily would not have been affected by the monetary policy decisions of the CBN are now feeling the impact; hence monetary policy decision to curtail inflation covers a relatively larger segment of the society.

In a nutshell, therefore, the results reveal that financial inclusion enhances monetary policy efficiency in Nigeria during the study period. In the case of banking system stability, however, the results can be attributed to the constituents of the index which includes the objective function itself and other indicators that are theoretically known to be instrumental to inflationary spiral.

4.2.6 Short-Run Dynamics

Tables 8a, b and c, report error correction versions of the long-run equations as presented in equation 3. Careful examinations of the tables[17] reveal that the coefficients of the *ECs* are negative and statistically significant, indicating the possibility of restoration of equilibrium in case of distortions in the economy. The statistically significant negative coefficient of *ECs* further strengthens the cointegration identified among the variables in the long-run (Bahmani-Oskooe and Bohl, 2000).

Table 8a: Short-Run Dynamics

Scenario One				
Dependent Variable: ***LCPI*** - ARDL (4, 0, 2)				
Variable	***Coeff.***	***Std. Error***	***t-Stats***	***Prob.***
ΔLCPI(-1)	-0.011	0.117	-0.093	0.926
ΔLCPI(-2)	1.783	0.256	6.963	0.000
ΔLCPI(-3)	-0.172	0.111	-1.554	0.132
ΔLFII	0.109	0.038	2.864	0.008
ΔBSSI	0.038	0.011	3.567	0.001
ΔBSSI(-1)	-0.018	0.011	-1.607	0.120
ECM(-1)	-0.068	0.009	-7.362	0.000
$R^2 = 0.99$; Adj. R2 = 0.99; DW Statistics = 2.038017				
AIC = -6.296226; SBC = -5.900346; HQC = -6.158053				

The error correction coefficient of scenario one as reported in Table 8a shows that up to 6.8 per cent of errors can be corrected on quarterly basis. This is however a slow adjustment process, as it will take the economy about 14.7 quarters[18] to revert to the status quo in case of distortions. In the same vein, the *ECs* of scenario two and three reported in Tables 8b and 8c (in the appendix) also indicate that about 81.7 and 17.1 per cents of errors can be corrected on quarterly basis, respectively.

17 - See Tables 8b and c in the appendix.
18 - About three years and seven months.

Table 9: Diagnostic Tests

Scenario One			
Dependent Variables: ***LCPI***			
Breusch-Godfrey Serial Correlation Test			
F-statistic	0.666	Prob. F(2,28)	0.522
Obs*R-squared	1.681	Prob. Chi-Square(2)	0.432
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.869	Prob. F(6,30)	0.529
Obs*R-squared	5.478	Prob. Chi-Square(6)	0.484
Scaled explained SS	6.652	Prob. Chi-Square(6)	0.354
Scenario Two			
Dependent Variables: ***LCPI***			
Breusch-Godfrey Serial Correlation Test			
F-statistic	0.869	Prob. F(6,30)	0.529
Obs*R-squared	5.478	Prob. Chi-Square(6)	0.484
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.340	Prob. F(32,3)	0.952
Obs*R-squared	28.210	Prob. Chi-Square(32)	0.659
Scaled explained SS	0.320	Prob. Chi-Square(32)	1.000
Scenario Three			
Dependent Variables: ***LCPI***			
Breusch-Godfrey Serial Correlation Test			
F-statistic	0.058	Prob. F(2,1)	0.946
Obs*R-squared	3.763	Prob. Chi-Square(2)	0.152
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.169	Prob. F(32,3)	0.998
Obs*R-squared	23.160	Prob. Chi-Square(32)	0.873
Scaled explained SS	0.687	Prob. Chi-Square(32)	1.000

4.2.7 Diagnostic Tests

Breusch-Godfrey Serial Correlation and Autoregressive Conditional Heteroskedasticity (ARCH) Tests were carried out to avoid drawing conclusion from spurious regression arising from sub-optimal estimates of model parameters. The

results for all scenarios are reported as Table 9. The probability values of both tests for all scenarios reveal that the models were both serial correlation and heteroskedasticity free.

The cumulative sums (CUSUM) of recursive residual and cumulative sum of squares (CUSUMSQ) of recursive residual tests were also applied to further ensure that the estimated models and parameters are stable. The results as presented in Figures 4 to 9 indicate that the equations and estimated parameters were stable considering that the sum of recursive errors lies within the 5.0 per cent two critical lines in all cases throughout the study period.

Figure 4: CUSUM for Scenario One

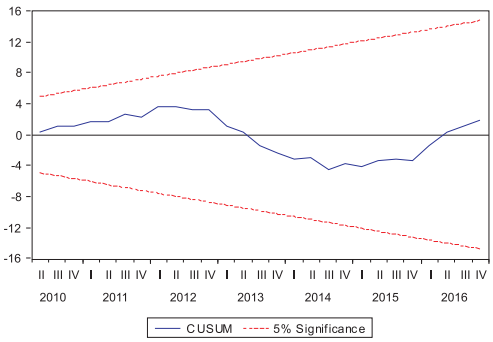


Figure 5: CUSUMSQ for Scenario One

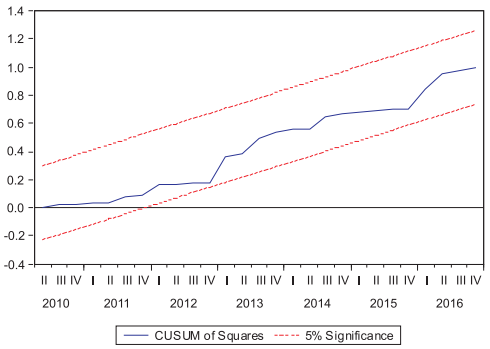


Figure 6: CUSUM for Scenario Two

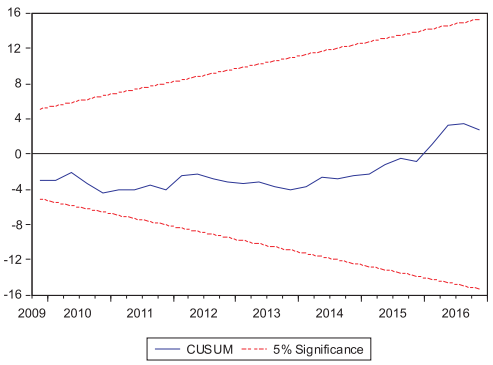


Figure 7: CUSUMSQ for Scenario Two

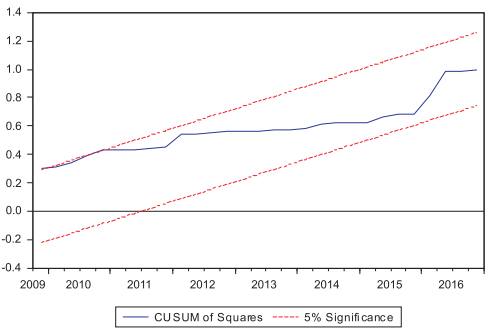


Figure 8: CUSUM for Scenario Three

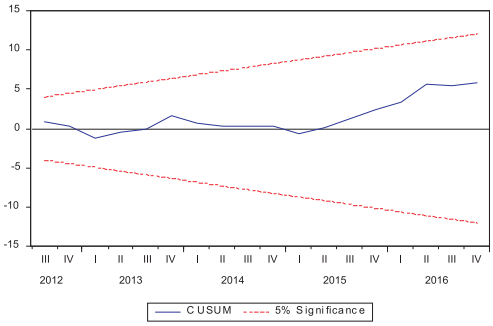
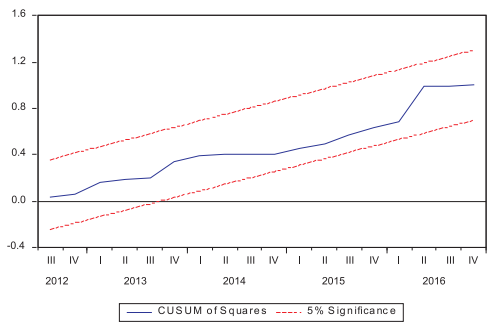


Figure 9: CUSUMSQ for Scenario Three



5. CONCLUSION AND POLICY OPTIONS

Limited access to financial services is generally agreed to have drastic implications not only for inclusive growth and inequality, but also for the efficiency of monetary policy. Starting from the launch of a financial inclusion strategy in 2012, Nigeria, as her commitment to the Maya Declaration, has taken various coordinated steps at enhancing financial inclusion. Although, there are a lot of hindrances but observers and analysts have generally expressed their opinion that the country had achieved a remarkable success. This study attempts to empirically examine the links among financial inclusion, financial system stability and monetary policy, for a central bank whose statutory responsibility is to curtail inflationary spiral. The study adopted Sarma (2012), and Nicholas and Isabel (2010) to construct indices of financial inclusion and financial system stability, and thereafter deployed ARDL technique to determine the link among the variables.

The results confirm that Nigeria has made a remarkable progress in the implementation of her financial inclusion initiative and had joined the list of medium financial inclusive nations striving to attain high financial inclusive status. The study also finds that the financial system is fairly stable, despite the turbulence experienced in the banking system during the study period. Overall, the empirical results support that financial inclusion has the capability of enhancing the effectiveness of monetary policy, particularly if effort is geared not only towards penetration but also usage. The study, therefore, recommends that the CBN should continue to pursue her financial inclusion drive with all vigor so as to expand not only the coverage but also the ease and pace of accessing financial services, as it is capable of enhancing the efficiency of monetary policy.

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Appendix 1: Short-Run Dynamics for Scenarios Two and Three

Table 8b: Short-Run Dynamics

Scenario Two				
Dependent Variable: ***LCPI*** - ARDL (4, 3, 3, 4, 4, 4, 4)				
Variable	***Coeff.***	***Std. Error***	***t-Stats***	***Prob.***
ΔLCPI(-1)	-0.570	0.070	-8.137	0.004
ΔLCPI(-2)	-0.523	0.055	-9.452	0.003
ΔLCPI(-3)	-0.348	0.043	-8.159	0.004
ΔLFSI	1.325	0.072	18.508	0.000
ΔLFSI(-1)	2.671	0.144	18.540	0.000
ΔLFSI(-2)	0.879	0.113	7.750	0.005
ΔLFPI	0.111	0.016	6.705	0.007
ΔLFPI(-1)	0.234	0.025	9.210	0.003
ΔLFPI(-2)	0.185	0.023	7.956	0.004
ΔFUI	-0.037	0.008	-4.804	0.017
ΔFUI(-1)	-0.146	0.012	-11.784	0.001
ΔFUI(-2)	-0.106	0.008	-13.813	0.001
ΔFUI(-3)	-0.182	0.010	-18.374	0.000
ΔBSI	-0.036	0.005	-8.063	0.004
ΔBSI(-1)	0.022	0.004	6.250	0.008
ΔBSI(-2)	0.004	0.003	1.207	0.314
ΔBSI(-3)	-0.010	0.003	-3.705	0.034
ΔBVI	0.020	0.003	7.032	0.006
ΔBVI(-1)	-0.065	0.004	-16.660	0.001
ΔBVI(-2)	-0.071	0.004	-19.629	0.000
ΔBVI(-3)	-0.044	0.004	-11.016	0.002
ΔECI	-0.023	0.002	-12.462	0.001
ΔECI(-1)	-0.003	0.002	-1.221	0.309
ΔECI(-2)	0.014	0.002	6.075	0.009
ΔECI(-3)	0.038	0.002	17.071	0.000
ECM(-1)	-0.817	0.038	-21.472	0.000
$R^2 = 0.99$; *Adj. R2 = 0.99;* *DW - Stats = 2.707788*				
AIC = -8.954522; *SBC = -7.502963;* *HQC = -8.447889*				

Table 8c: Short-Run Dynamics

Scenario Three				
Dependent Variable: **LCPI - ARDL (4, 4, 4, 4, 3, 4, 3)**				
Variable	***Coeff.***	***Std. Error***	***t-Stats***	***Prob.***
ΔLCPI(-1)	-0.491	0.093	-5.291	0.013
ΔLCPI(-2)	-1.569	0.098	-16.074	0.001
ΔLCPI(-3)	0.524	0.078	6.711	0.007
ΔCAR	-0.006	0.001	-7.967	0.004
ΔCAR(-1)	-0.001	0.000	-2.235	0.111
ΔCAR(-2)	-0.005	0.000	-11.547	0.001
ΔCAR(-3)	-0.003	0.000	-8.740	0.003
ΔNIM	0.007	0.004	1.999	0.140
ΔNIM(-1)	0.100	0.007	14.423	0.001
ΔNIM(-2)	0.096	0.008	12.755	0.001
ΔNIM(-3)	0.039	0.005	7.641	0.005
ΔNPL_TL	0.003	0.000	17.273	0.000
ΔNPL_TL(-1)	-0.003	0.000	-9.287	0.003
ΔNPL_TL(-2)	0.001	0.000	2.936	0.061
ΔNPL_TL(-3)	-0.005	0.000	-13.746	0.001
ΔCR	-0.084	0.027	-3.150	0.051
ΔCR(-1)	0.157	0.032	4.889	0.016
ΔCR(-2)	0.306	0.036	8.491	0.003
ΔATM	0.309	0.060	5.138	0.014
ΔATM(-1)	0.511	0.075	6.859	0.006
ΔATM(-2)	0.353	0.050	7.054	0.006
ΔATM(-3)	0.787	0.068	11.541	0.001
ΔAC	-0.450	0.051	-8.856	0.003
ΔAC(-1)	-0.227	0.032	-7.048	0.006
ECM(-1)	-0.171	0.026	-6.569	0.007
$R^2 = 0.99$; Adj. R2 = 0.99; DW - Stats = 2.214036				
AIC = -9.00669; SBC = -7.555131; HQC = -8.500057				

Appendix 2: Derivation of Banking System Stability Index (as obtained in Sere-Ejembi et al. (2014)

Questionnaires were administered on both the regulators and operators of banking services in Nigeria. The questionnaires sought their view on the level of importance of each of the indicators used for the computation of BSSI. The indicators are then grouped into three, namely; banking stability index, banking vulnerability index and economic climate index. The sub-indices were thereafter standardised and BSSI is then computed as weighted averages of the sub-indices.

The computation takes the form of:

$$BSSI_t = \omega_1 BSI_t + \omega_2 BVI_t + \omega_2 ECI_t \qquad (1)$$
$$\omega_1 + \omega_2 + \omega_3 = 1$$

The weight ω_i reflects the relative importance of the sub-index in the computation of BSSI as reflected in the responses of both the regulators and operators of the banking system selected through a combination of stratified and purposive sampling. A total of sixteen (16) representatives of DMBs eventually participated in the survey in addition to the Deputy Governors and Directors of relevant department in the CBN.
The weighting takes the form of:

$$BSSI_{t,ww} = \omega_s \sum_{i=1}^{8} \theta_{si} Z_{ts} + \omega_v \sum_{i=1}^{7} \theta_{vi} Z_{tv} + \omega_c \sum_{i=1}^{3} \theta_{ci} Z_{tc} \qquad (2)$$
$$\omega_s + \omega_v + \omega_c = 1$$

Where Z_{ti} are the normalized values of the indicators of banking system stability, *s, v* and *c* relates to the BSI, BVI and ECI, respectively.

The weights of the individual statistically normalized indicator in each sub-index are computed as:

$$\theta_{ri} = \frac{u_i}{\sum_{i=1}^{U} u_i} \; where \; r = [s, v, c] \qquad (3)$$

Where u_i are responses in favour of "high" and *U* isthe number of indicators in each sub-index.

BSSI is then derived as:

$$BSI_t = \sum_{i=1}^{8} \theta_{si} Z_{ts} \quad (4)$$

$$BVI_t = \sum_{i=1}^{7} \theta_{vi} Z_{tv} \quad (5)$$

$$ECI_t = \sum_{i=1}^{3} \theta_{ci} Z_{tc} \quad (6)$$