THE DYNAMICS OF INFLATION ON BANKS' PROFITABILITY IN NIGERIA: AN AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL

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ABSTRACT: This study examined inflation on banks' profitability in Nigeria using annual time series data for the period from 1995-2018. In view of the need to understand inflation on banks profitability, this study sought to establish the relationship between inflation, money supply and loans and advances in Nigeria. The study employed Philip-Perron (PP) test as a pre-test technique, Autoregressive Distribution lag (ARDL) and Wald test. The results of the analysis of data revealed that variables were non stationary at levels while ROA was stationery at 1st difference. ARDL bound test confirmed the existence of long-run cointegrating relationship at the 5 percent level of significance. Based on the analysis of the results, it was discovered that inflation, money supply and loans and advances positively affected the performance of banks. The study recommended that Central bank should consider the policy option that would encourage banks to carry on their investment plans irrespective of inflationary symptoms in the economy. Furthermore, the study recommended that Central bank should use prudential guidelines to effectively manage the exposures of the banking industry to avoid concentration risks in commodity prices. Accordingly, loans and advances was found to be the most significant contributor towards bank profitability. A more thorough analysis of the loans portfolio may be useful for bank management in structuring a sound, stable and profitable asset portfolio

I. INTRODUCTION

Banking sector exists as a stimulant to drive the economy and for efficiency which can be maintained to generate adequate returns. The bank efficiency will enhance public confidence to attract investors. The banking sector profitability is influenced by the rate of money supply, loans and advances, and inflation. The banking sector is an important factor in the intermediation process, thereby providing the required funds for quality service delivery to customers. The intermediation process in the banking sector enhances profitability and economic growth.(Levine., Loayza & Beck. 2000)). A major performance measure in the banking sector is the profitability ratio. Inflation is one of the determinants of bank profitability. It could take the form of, creeping, cost push, demand pull, imported, wage push, mark-up as a condition of unrelenting price. Inflation arises when there is too much money chasing few goods in an economy. This will actually result as aggregate demand exceeds the aggregate supply of goods and services, thereby reducing the purchasing power of the monetary unit (Chioma, Adanma & Clementina, 2014). The rate of inflation is the annual rate of increase of the average price level, and if it crosses the single digit, high rate of inflation can occur when the level of money supply is high. A certain level of inflation is desirable for sustainable growth (Emekekwue, 2008). This may affect banking sector performance and hamper financial decisions. Banks' profitability is largely affected by inflation, and this has become a source of worry for shareholders, investors, lenders and managers while planning their programmes(Limer.,Maijama, & Adamu, 2014). Studies have shown that inflation as a macroeconomic variable affects banks profitability. Commercial banks credit policy is worsened by inflation which in turn affects banks performance due to several withdrawals by depositors from the banking sector. Therefore, this study introduces loans and advances as a determinant of banks performance when there is inflation in the economy.

II. LITERATURE REVIEW

The banking sector creates an enabling environment for economic entities to deposit excess funds. It equally provides loans for deficit economic units and is caused by factors such as rising prices, each unit of currency purchases fewer goods and services. It is a sustain rise in general price level. According to Al-Nasser, Yusoff,

Islam and Al-Nasser (2013),inflation is even more important than low prices and web presence as it provides online customers with more product or service choices at reduced costs. If inflation devalues currency at 4.0 percent, it implies that the dollar declines in value at the annual rate of 4.0 percent in its purchasing power. Inflation is significant in financial institutions as it deals with financial instrument, that is instruments designated in dollar sums. For example, when a bank grants a loan/ advance, it acknowledges ostensible monetary instruments as proof of account holder's commitments to the bank. Banks also issue ostensible money related instruments to creditors when they borrow. Ghazouani (2004) utilized various data from different countries on inflation and banking sector performance indicators. The findings revealed that inflation had a negative effect on banking sector performance. However, he opined that a little rise in inflation does not affect stock performance and financial sector development. Furthermore, high rate of inflation decreases the rate of return on financial asset(Choi, Smith and Boyd, 1996). Money supply and rate of inflation rate are positive related in a long run. Hence, more cash chasing fewer goods in circulation will lead to inflation. The concept of money changes in variations in the money stock, and are vital aggregates that possess far reaching inflations for economic policy formulation. The changes in money have significant effect on the pattern of economic relations which form the basis for articulation of measures necessary for ensuring aggregate economic performance in any organization and economy (Obim, John and Orok, 2018). The modern quality theory of money is associated with Friedman (1963), who opined that inflation is totally a monetary phenomenon, and it occurs due to constant and frequent rise in the quantity of money and not output. He further postulated that if the growth rate of money stock is constant, given the growth rate of output, the persistent rise in price and value of money (inflation) will be kept under control. Although, the opinion of Friedman has been subjected to academic debates, yet it still appears a better way of minimizing the problematic effect of inflation in the economy (Okotori, 2019).

However, Friedman (1977) pencilled down some propositions regarding the economic implications of inflation. Firstly, he opined that an increase in inflationary trend may compel unusual reaction by monetary authority. This may increase the uncertainty about the future. Secondly, the uncertainty about future inflation impacts negatively on the effectiveness and efficiency of price mechanism in resource allocation. (Umar et al, 2014). From the foregoing, it can be deduced that the higher the inflation, more the reduction of resource allocation efficiency, as risk-averse investors likely reduce their contract durations, in order to minimize the financial losses due to the existence of inflation (Takon, John, Ononiwu & Mgbado, 2020). However, since savings and investment involve contract of such nature, increase in uncertainty of future inflation may simultaneously reduce planned savings and investment. This will generate uncertainty about cost of capital (interest rate), thereby negatively affecting banks profitability. Several studies have been carried out with respect to inflation and banks' profitability, within and outside Nigeria. One of these studies is the work of Okofori (2019) who examined the dynamics of monetary policy and inflation in Nigeria. Using the multiple regression ordinary least square, it was found that broad money supply, exchange rate, monetary policy rate, treasury bill rate, reserve requirement and liquidity ratio had significant impact on the inflation rate in Nigeria. Also, Umar et al,2014) carried out an exposition of the effect of inflation on performance of banks. However, they concluded that inflation acts as a drag on performance of banks, as these financial institutions are forced to move their resources from mere investments and concentrate more on profiting from the resulting currency inflation. In addition, Chioma et al ,2014) carried out a study on impact of inflation and performance of banks. Applying the linear regression technique to panel series of data, the result showed that there was a positive, but insignificant relationship between inflation, banks performance, investment and the investment decision of deposit money banks in Nigeria. Furthermore, Santoni (1986) investigated the effects of inflation on commercial banks. The results showed that real share prices of banks were inversely related to both anticipated and unanticipated inflation. Almost every economic and financial transactions require exchange of money in the future time. Loans and advances are good example of this. However, it is a known fact that inflation decreases the value of money over time, and it is of great necessity for both the lenders (bankers) and the borrowers (potential bank customers) to cultivate the habit of predicting and anticipating inflation over relevant time period (Nzotta,2004) Consequently, these predictions or forecast do go wrong, hence if the actual rate of inflation exceeds the forecasted rate, price of goods and services will automatically rise (Takon, et al, 2020). Moreover, the unanticipated increase in the general price level will definitely lead to decrease in exchange value of economic and financial transactions. Therefore, since most financial institutions, especially banks, are creditors in nominal financial instruments, shareholders loose their wealth when bank capital deteriorates, as a result of inflation (Santoni, 1986).

Banks financial instruments (assets and liabilities) mature at different dates. The nominal costs (interest rates) quoted in different financial markets are established in the process of contracting between the deficit economic units (borrowers) and the surplus economic units (lenders). They express the number of naira a borrower must recompense to the lender in the future in exchange for a specified number of present naira, if both the lenders and the borrowers anticipate that the value of the naira will attenuate or depreciate in terms of the goods it can buy, given the duration of the loan. The nominal cost of capital outlined in the loan contract will also take

account of this. Thus, the resulting interest rate will be simultaneously faulty, in order to indemnify for the anticipated devaluation or depreciation in the value of the naira (Santoni, 1986).

III. METHODOLOGY

Based on the existing theoretical and empirical literature, descriptive and expost facto design were adopted to investigate the dynamics of inflation on banks profitability in Nigeria, Secondary source of data was used and extracted from CBN statistical Bulletin. Relevant information was gathered from published materials, articles, libraries, journals using the desk method. The time series data used was for the period 1990-2018.The study employed ARDL (Autoregressive Distributed Lag), it determines the long-run relationship between series with different order of integration. This study was focused on analysing the dynamics of inflation on banks profitability in Nigeria. Hence, the models specified in this study are:

ROA   = f(INF, MS,LADV)

ROA   = Return on Asset

INF   = Inflation

MS   =   Money supply

LOADV = Loans and advances

IV. DATA ANALYSIS

Philip – Perron unit root test

Table 1 below shows regression result for Philip-Perron unit root test. It was found that only ROA exhibited no unit root process at various critical levels mostly at five percent level of significance and was found to be stationary at levels. In other words, variables such as INF, MS and LADV were non-stationary at their levels, at such, their null hypotheses of the presence of unit root cannot be rejected. However, these variables (INF,MS, LADV) were stationary at their first differences, hence, their null hypotheses can be rejected.

TABLE 1: Philip-Perron unit root test

Variables	At level	At 1st Difference	Order of integration
ROA	-3.043952	-	1(0)
INF	-1.609323	- 4.603592	1(1)
MS	-2.284411	- 4.193078	1(1)
LADV	-1.129039	- 3.9053954	1(1)

Source: Eviews 10.0 statistical software

ARDL F-bound testing approach

The F-test is conducted to check the joint significance of the coefficients specified in the model. From table 2, ARDL F-bound test tabulated lower and upper bound is selected based on five percent significance level. However, this study is based on the conventional five per cent significance level, hence, the result in the Table 2 revealed that inflation variables (INF, MS, LADV) are jointly co-integrated with ROA, hence, long-run relationship exists. The calculated F-statistic of 34.46 at five percent significance level was found to be greater than corresponding ARDL lower (2.79) and upper (3.67) critical bound values. The value revealed that there is an evidence of long-run co-integration between inflation variables (INF, MS, LADV) and the profitability of banks

TABLE 2: ARDL F-bounds test

F-Bounds Test		Null Hypothesis; No levels of relationship		
Test statistic	Value	Signif	1(0)	1(1)
Asymptotic: n = 1000				
F-statistic	34.46507	10%	2.08	3
K	3	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual sample size	20	Finite sample: n = 30		
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419

Source: E-views 10.0 statistical software

ARDL long run form estimates

Based on the ARDL bound test result, it is concluded that there is a long run relationship among the variables in the model. Given that, there is a need to estimate the long run coefficients. The ARDL long run form indicates that the independent variables (IN,MS,LADV) have a joint significant negative effect on the performance of the banks in the long run showing that an increase in these variables will have a significant negative effect with changes on the performance of the banks in the long run (ceteris paribus).The performance of the banks will decrease by 0.809 percent as a result of increase in inflation variables (INF, MS, LADV) in the long run (ceteris paribus). However, in the long run, INF,MS, LADV will have a significant positive on the performance of the banks, all things being equal. The relationship between inflation variables and the performance of the banks was found to be positive and significant in the long run.

TABLE 3: ARDL Long run form

Variable	Coefficient	Std Error	t-statistic	Prob
Dependent variable: D(LROA)				
Selected model: ARDL (1,4,4,4)				
LINF	0.320403	0.064545	4.964004	0.0157
LMS	0.226475	0.048168	4.701822	0.0182
LLADV	1.099019	0.198329	5.541386	0.0116
C	-0.809181	1.164568	-0.694834	0.5371
EC=LROA-(0.3204*LINF+0.2265*LMS+1.0990*LLADV-0.8092)				

Source: E-views 10.0 statistical software

ARDL short run estimates

The ARDL short-run intercept of -0.5136 shows that the performance of banks indicates that 0.5136 percent decrease when explanatory are held constant. The analysis displays that the R^2(R-squared) which measures the overall goodness of fit of the entire ARDL model. This is represented with the R^2 value of 0.999(99 per cent). This shows that the explanatory variables (INF,MS, LADV) accounted for about 99.9 percent variation in the independent variable (ROA).

In the same vein, F-statistics (4644.95) of overall model is statistically significant. The overall significance of the ARDL short-run model implies the joint significance of all explanatory variables in explaining the short-run changes on the performance of banks. Further examination of changes in the previous lagged period, two previous lagged period and the previous three lagged periods of INF had a positive effect on the performance of the banks. The implication is that, a percentage increase in INF increases the performance of the banks accordingly in the short run(ceteris paribus). On the other hand, the current period of INF and the previous four lagged periods were found to have a negative impact on the performance of the banks.

The ARDL result further revealed that changes in current period of MS had a positive effect on the performance of banks. This implies that, a percentage rise in MS will increase the performance of banks accordingly in the short run. On the other hand, changes in the previous lagged period, had a positive effect on the performance of banks. This implies that, a percentage increase in MS will increase the performance of the banks accordingly in the short run. Also, changes in the two previous lagged periods and the previous three lagged periods and the previous three lagged periods of MS had a negative effect on the performance of the banks. The implication is that, a percentage increase in MS will decrease the performance of the banks accordingly in the short run. Furthermore, changes in the previous four lagged periods of MS had a positive effect on banks performance. Implication is that, a percentage rise in MS increases ROA accordingly in the short run. Lastly, this result revealed that changes in current period of LADV has a negative effect on the performance of banks in the short-run. The implication shows that, a percentage increase in LADV will increase the performance of banks in the short run. Also, changes of past lagged period and two previous lagged periods of LADV positively affected banks performance. This depicts that, a percentage increase in LADV increases the banks performance accordingly in the short run. A change in three previous lagged period of LADV showed a negative effect on the performance of banks. The implication is that, a percentage increase in LADV decreases the performance accordingly. In addition, a change in four lagged period of LADV showed positive effect on the performance of banks. This implies that, a percentage increase in LADV will increase the performance of the banks short run.

TABLE 4: Selected Model: ARDL(1, 4, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LROA(-1)	0.365272	0.217948	1.675962	0.1923
LINF	0.045197	0.053273	0.848420	0.4585
LINF(-1)	0.038016	0.034836	1.091278	0.3550
LINF(-2)	0.020197	0.032770	0.616332	0.5813

LINF(-3)	0.213423	0.027704	7.703593	0.0045
LINF(-4)	-0.113464	0.033096	-3.428372	0.0416
LMS	0.073423	0.018643	3.938299	0.0292
LMS(-1)	0.045302	0.019417	2.333094	0.1019
LMS(-2)	-0.032147	0.022561	-1.424911	0.2494
LMS(-3)	-0.004837	0.017798	-0.271744	0.8034
LMS(-4)	0.062008	0.015355	4.038177	0.0273
LLADV	-0.320177	0.085535	-3.743237	0.0333
LLADV(-1)	0.513602	0.146545	3.504740	0.0393
LLADV(-2)	0.232432	0.184986	1.256484	0.2979
LLADV(-3)	-0.310443	0.172361	-1.801123	0.1695
LLADV(-4)	0.582165	0.148921	3.909208	0.0297
C	-0.513610	0.900571	-0.570316	0.6084
R-squared	0.999960	Mean dependent var		10.29213
Adjusted R-squared	0.999744	S.D. dependent var		1.051380
S.E. of regression	0.016810	Akaike info criterion		-5.530764
Sum squared resid	0.000848	Schwarz criterion		-4.684391
Log likelihood	72.30764	Hannan-Quinn criter.		-5.365543
F-statistic	4644.956	Durbin-Watson stat		3.273414
Prob(F-statistic)	0.000005			
*Note: p-values and any subsequent tests do not account for model selection.				

ARDL error correction regression (ECT)

The ECT coefficient shows how quickly variables converge to equilibrium in the short run, and it should have a statistically significant coefficient with a negative sign. The result for the variables shows that the expected negative sign of error correction term (ECT) was found to be highly significant. The highly significant ECT further confirms the existence of a stable and significant long run relationship. This confirms the existence of the long run significant relationship between inflation and the performance of the banks with their various lags. The coefficient of ECT (-0.1472) as shown in Table 5 revealed that deviation away from the long run ROA is deemed corrected by 14.72 per cent by the following year all things being equal.

TABLE 5: ARDL error correction regression result

ECM Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
	0.162993	0.164361	0.991675	0.3395
D(LROA(-1)	0.937949	0.146022	6.423334	0.0000
D(LINF)	-0.037603	0.016975	-2.215222	0.0452
D(LINF(-1))	-0.054634	0.015740	-3.471115	0.0041
D(LMS)	0.064673	0.170539	0.379227	0.7106
D(LADV(-1))	-1.078326	0.147709	-7.300336	0.0000
CointEq(-1)*	-0.147282	0.006972	-21.12333	0.0000

Source: E-views 10.0 statistical software

V. DISCUSSION OF FINDINGS

The study empirically examined inflation on banks profitability in Nigeria. In order to achieve the stated objectives and test hypotheses of the study, empirical tests were employed in this study. All the explanatory variables were not stationary at levels applying the Philip-Perron unit root test. However, only Return on Asset was stationary at 1st difference. The ARDL bound test displayed a unique cointegration and long run relationship between variables used in this model. The result of the ARDL F-bound test shows that inflation (money supply, loans and advances) are jointly cointegrated with the dependent variable (Return on Asset), hence, long-run relationship existed evidenced by the calculated F-statistic of 34.46. The value is higher than the upper critical bound value which is 3.67. The value revealed that there is long-run cointegration between inflation variables and profitability. Analysis of the ARDL short-run ECT estimates depicts that changes in inflation has a negative effect on profitability in Nigeria. There is goodness of fit in R^2(adjusted) where the independent variables are accounted for 99 percent variation on the independent variable. The outcome also revealed that changes in the previous lagged period, two lagged periods and three lagged periods of inflation had

a positive influence on banks' performance. Furthermore, these results denote that current period in money supply has a positive effect on the performance of the banks while loans and advances negatively affected banks' performance. Also, findings showed that changes in other periods vary among the independent variables and dependent variable. Some of the inflation variables have positive influence and others exert negative influence on Return on Asset. Also, the speed of adjustment from adjustment from short-run disequilibrium to long-run is below average signifying that there is little existence of the postulations anchored by theories.

VI. CONCLUSION AND RECOMMENDATIONS

The level of profitability in the banking sector is determined by inflation, money supply, loans and advances. The banking sector functions well in transferred of funds from the surplus to deficit units. In an efficient financial system, it is expected that improvements in profitability increases funds from savers to borrowers, it leads to good quality services to customers. Economic acceleration is supported when banks convert deposits into productive investments. Inflation is one of the factors that determines banks profitability, where it shows a persistent increase in the price level. In this case, it has an impact on the banking sector and also hampers the financial decisions. Inflation affects banks profitability when it transfers money from savers and investors to debtors. Moreover, inflation affects loans policy of banks, thereby affecting their performance resulting to depositors withdrawals from the banking system. Resources of banks are reduced thereby affecting a large proportion of their profitability at a long run. It is concluded that banks provide a safe and accessible environment for individuals and economic entities to deposit and also provide services by packaging deposits into loans that are made available to economic agents. The study recommended the followings

1.   Central bank should consider the policy option that would encourage banks to carry on their investment plans irrespective of inflationary symptoms in the economy

2.   Central bank should use prudential guidelines to effectively manage the exposures of the banking industry to avoid concentration risks in commodity prices

3.   Loans and advances was found to be the most significant contributor towards bank profitability, a more thorough analysis of the loans portfolio may be useful for bank management in structuring a sound, stable and profitable asset portfolio .

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