

# Linking Inflationary Pressure to the Depth of the Financial System in Nigeria, 1961 to 2022

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## ARTICLE INFO

## ABSTRACT

This study investigates the linkage between Consumer Price Index indicators and financial deepening in Nigeria within the time range of 1961 to 2022. Autoregressive Distributed Lag Model is employed, and the study discovers that monetization ratio (BMR) and bank development (CPSGDP) significantly and moderately added to the rate of inflation within the studied period. This resulted from the elasticity of consumer price index to financial deepening activities in Nigeria. It is therefore recommended that appropriate inflation mitigants be introduced along with financial deepening policies so as contain the prejudicial impact of inflation on the financial system.

**Keywords:** Consumer Price Index; Monetization Ratio; Bank Development; Nigeria and ARDL

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## INTRODUCTION

The existing connection between the Consumer price index and financial deepening of an economy has some interesting research, policy and practical significance. Some reviewed literatures have observed that increase in money volume can result from a continuous deepening of the financial system with a tendency of fuelling inflationary pressures. It is against this background that the central bank controls money supply as one of its major functions. The link between consumer price index proxies, financial deepening and other microeconomics variables has been a controversial debate in economic policy making. This paper is targeted to produce a justification, models, verify previous theories on the link between the consumer price index and financial deepening in Nigeria using the period of 1961 to 2022. This enquiry is premised on the idea that increase in consumer price index can be a consequence of financial deepening in Nigeria.

One of the significances of this study is its guide to policy makers in identifying the relationship between inflation and financial deepening while pursuing financial development in Nigeria. Secondly, investors in the financial market may also be able to discover how changes in financial deepening determine rate of inflation; this obviously will guide their hedging and diversification strategies.

The choice of Nigeria as the geography of this study is hinged on the fact that most African countries look up to Nigeria as a standard for economic related investigation due to its rapid growth in population and as the continent's biggest economy.

This is reflected in the increasing foreign direct investment, its thriving economy which provides high yield for investors. Also, Nigeria has a sizable portion of trans-Atlantic trade and investment which has created employment and other heightened effect in the country. These peculiarities make empirical evidence from Nigeria-based studies good enough for generalization especially for countries in the shape and stature of Nigeria.

The estimation techniques chosen for this study is the Auto Regressive Distribution Lag, it serves as a co integration method for forecasting, and to test for an unbiased long run interaction among explanatory variables. It also tests the short run interactions among the variables. The technique was also adopted because its comparative efficiency in such a study whose data sample is small and finite.

In addition, an advantage of ARDL for this study as it can allow the financial deepening indicators and consumer prices indices to assume different lag length and orders of integration. Aside the introduction, this study is divided into four sections. Section two contains a review of related literature, three gives the methodology of the study; the penultimate section presents the results and their discussions while section five concludes.

## REVIEW OF LITERATURE

There are limited and scarce literatures in the area of the nexus between inflation measured by consumer price index and financial deepening. Few investigations have been identified in this field of study and there is a significant need for more exploration.

Ogbuagu and Ewubare (2017), in a study on the relationship between inflation and financial deepening in Nigeria using an open economy approach, used auto regressive distributed lag model in data analysis and were able to discover that import volume index (IMPV) and exchange rate (EXCR) are important variables in the short run that explain the changes in consumer price index (CPI) whereas other variables were not significant on CPI. In the short run, MS<sub>2</sub>/GDP and PSC/GDP ratio variables of financial deepening have no significant impact on consumer price index while, import volume index and exchange rate are significant in the long run. This means that increase in money supply to GDP ratio, (MS<sub>2</sub>/GDP) and private sector credit to GDP ratio, (PSC/GDP) together can cause variation in price level. The result of the variance decomposition test revealed that sudden changes in the GDP ratio, (MS<sub>2</sub>/GDP) can rarely cause a change in price level whereas same change to the private sector credit to GDP ratio (PSC/GDP) can cause a more variation in price in both short run and long run.

Similarly, Mohsin et al, (2001) emphasized on the hypothesis on the barrier of inflation to financial deepening, and the nonlinearity of the relationship which indicates that inflation can have a positive significance below a particular threshold on financial deepening, above which it becomes negatively significant.

Fasoranti and santos (2014) investigated on the relationship between inflation and financial deepening on Nigerian economic growth, within the time range of 1970-2012. In analyzing the influence of the variables, using (VDC), and IRFS, based on VAR framework, they were able to conclude that both the Engel gander and Johansen co integration test suggests that the variables are co integrated and shows a long run relationship using the stock Watson dynamic ordinary least squares model.

They concluded that inflation affects growth and financial development where money supply substituted for financial development (M<sub>2</sub>/GDP), are independent. Furthermore, they also found no evidence of short run connectedness between real GDP and inflation, and no existence of short run interaction between real GDP and financial development. Afangideh, et al (2020) examined the Impact of Inflation on Financial Sector Development in Nigeria from 2002-2017, where broad money substituted for financial development as a share of GDP (M<sub>2</sub>/GDP).

The Auto-Regressive Distributive lag (ARDL) model estimation model was used. The results of the estimation reveal that there is a positive relationship between inflation and financial sector development in Nigeria. The Engle-Granger residual-based cointegration test on the long-run and short-run effects of the impacts of inflation on financial sector development was weak.

Boyd et al. (2001) findings show that market contention is likely to set in when the inflation rate is high or above the threshold, this affects the financial sector performance and credit rationing negatively. It was also observed that there are negligible challenges in the credit market when the inflation rate is low, and hence the level of inflation does not hinder the flow of information and resource allocation. This implies a negative correlation between inflation and returns on savings. Hence borrowers will outnumber savers and savings, and credit becomes scarce.

In conclusion, a negative relationship between inflation and financial deepening is inferred.

Other related literatures focused on the impact of other microeconomic variables on inflation and on financial deepening. These include variables such as economic growth, economic development, exchange rate and interest rate reforms.

For instance, Hasan, Koetter, Lensink, & Meesters (2009) argued that financial restraints reduce the real rate of growth of the economy. He argued that investment responds negatively to the effective real rate of interest and positively to the growth rate. Also, Turgut and Faisal (2018) investigation using lag (ARDL) model shows evidence for a long run relationship between financial deepening and growth. This same position is shared by Kalu, Nkwor and Onwumere (2015) as well as Kalu, Okoyeuzu, Okechukwu and Ukpere (2019). The short run and long run coefficient showed positive impact of deepening and negative impact of inflation on economic growth.

Nwanna and Chinwudu (2016) & Tari and Oliver (2017) found that both stock market and money market deepening proxies had significant and positive correlation on economic growth.

Tomola et al (2012) In a study of Interest rate reforms and financial deepening in Nigeria found a short run and long run significant relationship between financial deepening and interest rates reform in Nigeria. In a like manner, Duncan and Michael (2020) in establishing the research gap on the effect of financial deepening, financial efficiency and interest rate deregulation on poverty levels investigated the effect of financial deepening on poverty discovered that financial deepening could cut down on poverty rate.

At African regional level, series of scholars have carried out cross-sectional studies on the financial and economic growth interactions. According to Kebo (2009), in developing countries, inflation impacts heavily on the economies. A Panel Auto-Regressive Distributed Lag (PARDL) model was used over the impact of inflation

on financial development in seven West African countries (Benin, Burkina Faso, Cote D'Ivoire, Guinea-Bissau, Mali, Niger, and Senegal). The study concludes by finding no long-run relationship between inflation and financial development in six of the countries. In terms of causal influence, the study only finds one country where inflation dampens financial development.

This study takes a flipside look at the position of prior authors by looking at inflation as outcome variable while the financial deepening indicators become the influencing variables. This fills a gap by showing whether financial deepening is a reaction to inflationary pressure or that inflation can be a negative fallout of deepening the financial system.

**METHODOLOGY**

**Data and Variables**

In this study emphasis was given to the dependence of inflation on financial deepening indicators. Inflation was measured by consumer price index with broad money ratio and GDP (BMR), and ratio of credit to the private sector to gross domestic product (CPSGDP) as financial deepening indicators and the control variables are real gross domestic product (RGDP), exchange rate (EXRT). The datasets are monthly series obtained from the of the Central Bank of Nigeria Statistical Database covering the period 1961 to 2022. The datasets are both secondary and quantitative given the ex-post facto nature of the research design. The stretch is considered long enough to cover different episodes of inflation and financial deepening in the investigated economy.

**Model Specification**

Autoregressive distributed lag model (ARDL) was used as the estimation technique due to its advantages over other models. ARDL can estimate both long-run and short-run relationships at once and can estimate variables irrespective of the integration order provided they are not higher than I(1). Also, ARDL model can use different lag length for the dependent and independent variables respectively. The functional relationship investigated in this study is expressed thus:

$$CPI = f(CPSGDP, BMR, RGDP, EXRT) \text{ --- (1)}$$

Where: CPI is consumer price index which is a proxy for inflation; BMR is broad money ratio which is the ratio of broad money to gross domestic product; CPSGDP is the ratio of credit to the private sector to gross domestic product and is a measurement of the depth of the banking system with emphasis on credit creation, the RGDP is real gross domestic product, and EXRT is exchange rate. The functional expression is transformed into an estimable equation as in below.

$$CPI_t = a_0 + a_1 BMR_t + a_2 CPSGDP_t + a_3 RGDP_t + a_4 EXRT_t + \varepsilon_t$$

Where t represents the time period, while  $\varepsilon_t$  is the error term. For the variables incorporated in this study, the ARDL model is stated thus:

$$\Delta CPI_t = a_0 + \sum_{i=k}^n a_1 \Delta CPI_{t-n} + \sum_{i=k}^n a_2 \Delta BMR_{t-n} + \sum_{i=k}^n a_3 \Delta CPSGDP_{t-n} + \sum_{i=k}^n a_4 \Delta RGDP_{t-n} + \sum_{i=k}^n a_5 \Delta EXRT_{t-n} + P_1 BMR_t + P_2 CPSGDP_t + P_3 RGDP_t + P_4 EXRT_t + \varepsilon_t$$

Where  $\Delta$  signifies the 1st difference of a variable,  $a_0$  is a constant,  $a_1$  to  $a_5$  represents the short-run coefficients  $P_1$  to  $P_4$  represents the long-run coefficients, i represents time and  $\varepsilon_t$  represents the error term. The ARDL model assumes that long-run relationship exists between the dependent variable and independent variables as follows.

$$\infty_1 = \infty_2 = \infty_3 = \infty_4 = \infty_5 = 0 \text{ --- (4)}$$

If a long-run relationship exists between the dependent variable and the explanatory variables, the error correction model will be estimated. It was stated in the theory that the coefficient of the error correction term must be negative and statistically significant in order to measure short-run impact and necessary speed of adjustment.

A battery of pre-estimation tests (descriptive statistics, unit root tests, correlational analysis) were used to test the adequacy of the dataset for the made linear combinations. Also, some post estimation tests were deployed to

confirm the absence of autocorrelated residuals, heteroscedastic residuals, model stability as well as the normality of the residuals.

## RESULT AND DISCUSSION

The descriptive statistics, a necessary first step in showing the distributional properties of the series is presented in table 1.

**Table 1:** Descriptive Statistics

	BMR	CPI	CPSGDP	RGDP	EXRT	INFLA
Mean	1.775587	33.28678	12.10199	18.04736	153.5138	15.94110
Median	2.319080	2.268726	12.31741	11.14094	99.63622	11.53767
Maximum	53.58227	214.2782	38.38656	113.0764	532.5461	72.83550
Minimum	-51.61567	0.070660	3.696699	5.665685	49.07171	3.726337
Std. Dev.	16.66953	53.10373	6.366250	23.82525	120.7766	15.78989
Skewness	0.182604	1.750442	1.917006	2.290382	1.665024	1.903729
Kurtosis	6.990884	5.218762	8.440210	8.599592	4.939720	6.208357

The results of the descriptive statistics shows that the minimum value for BMR – a measure of the financial deepening is -51.61567 and the maximum is 53.58227; the minimum of the CPI is 0.070660 while the maximum is 214.2782; the minimum of the CPSGDP is 3.696699 and the maximum is 38.38656; the minimum of the RGDP is -5.665685 while the maximum is 113.0764 and the minimum of the EXRT is 49.07171 while the maximum is 532.5461. The variables are found to be properly distributed around their respective means.

Furthermore, we employed correlation test to examine if the linear association between financial deepening and consumer price index in Nigeria as presented in the table 2 below.

**Table 2:** Correlation Result

	CPI	BMR	CPSGDP	RGDP	EXRT	INFLA
CPI	1	-0.11	-0.07	-0.10	-0.25	-0.07
BMR	-0.11	1	0.21	-0.19	-0.32	-0.30
CPSGDP	-0.07	0.21	1	0.30	-0.01	-0.23
RGDP	-0.10	-0.19	0.30	1	-0.21	0.32
EXRT	-0.25	-0.32	-0.01	-0.21	1	-0.01

The result of the correlation shows that weak negative correlation exists between CPI, BMR, CPSGDP, RGDP and EXRT in Nigeria. This is strong evidence in favour of the absence of perfect collinearity and that the series are independently distributed enough to produce unbiased empirical results.

The stationarity properties of the series are shown in table 3. This is an essential tool in not only confirming if the series has unit root, but it is also essential in providing justification for the chosen estimation method. It is important to note that the ARDL estimator tolerates a combination of I(0) and I(1) series making it necessary to ensure that there is no I(2). This is what the unit root test helped to show, and the results are presented in table 3 below.

**Table 3:** Summary of Unit Root Test

Variable	ADF-Stat/Prob.	Integration Order
CPSGDP	-4.003944 (0.0000)	I(0)
EXRT	-5.774833 (0.0000)	I(0)
BMR	-72.84739 (0.0000)	I(0)
CPI	-19.48473 (0.0000)	I(0)
RGDP	-6.847382 (0.0000)	I(1)

The results of the unit root tests show that some of the variables are integrated of order I(0) for some I(1). At the respective point of stationarity, the ADF stat was more negative than the critical value at the 0.05 level of significance. In addition, the p-values were all less than 0.05. The stationarity properties of the series support the use of ARDL as the principal estimation technique for investigating the nexus between consumer price

index and financial deepening in Nigeria.

To check if a long-run relationship exists between consumer price index and financial deepening, ARDL long-run bound test was used. The bound test has a null hypothesis of “no long-run relationship between consumer price index and financial deepening in Nigeria” and the alternative hypothesis is that “there is long-run relationship between consumer price index and financial deepening in Nigeria”. And thus, the result is presented below:

**Table 4:** Long-Run Bounds Test

ARDL Bounds Test		
Test Statistic	Value	K
F-statistic	7.866703	5
Critical Value Bounds		
Significance	Io Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

It was discovered that a long-run relationship exists between consumer price index and financial deepening since the F-statistic is greater than the Io bound and I1 bound. Thus, the null hypothesis that there is no long-run relationship between consumer price index and financial deepening is rejected. We further examine the long-run elasticity of consumer price index to the financial deepening indicators in Nigeria using autoregressive distributed lag model (ARDL) as reported in table 5.

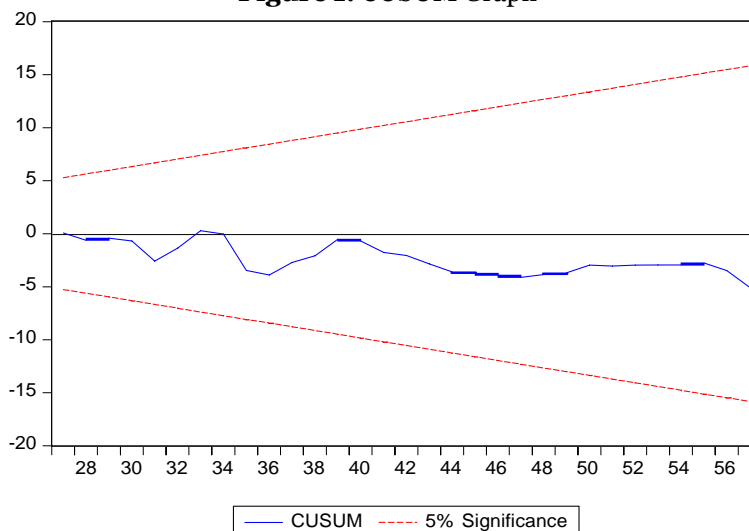
**Table 5:** Result Presentation, Data Analysis and Interpretation of Result

Series	$CPI = f(BMR, CPSGDP, RGDP, EXRT)$			
Long-Run Estimates:	Coeff.	Std. error	t-stat	p-value
$CPI(-1)$	-	0.000206	-	(0.0000)
$CPSGDP$	0.020280	-	98.44660	0.0000
$RGDP$	0.330316	0.002173	-152.0178	0.0000
$EXRT$	0.094205	0.005008	-	0.0000
$BMR$	0.111972	0.009805	18.81090	0.0000
Short-Run Estimates:	0.011297	0.005105	2.212928	0.0158
$ECM_{t-1}$	-0.245731	0.001006	-	0.0000
$\Delta CPI$	0.481640	0.037973	244.3234	0.0000
$\Delta CPSGDP$	2.20E-05	4.87E-06	12.68377	0.0000
$\Delta RGDP$	-0.016193	0.001374	4.518943	0.0000
$\Delta EXRT$	0.003867	0.000942	-11.78152	0.0000
$\Delta BMR$	-	0.000567	4.095574	0.0000
Diagnostic Tests:	0.054464		-7.879161	0.0000
$R^2$				0.985743
Normality			899.3258	(0.0000)
Serial Correlation			0.393829	(0.6680)
Ramsey-RESET			0.015847	(0.0000)
White			9.383728	(0.4631)
Heteroscedasticity				

Prior to drawing inferences from the set results, we first discussed the diagnostic tests that point to the validity and reliability of the estimates. The result of the goodness of fit  $R^2$  shows that about 98% of the total variations in the model are explained by the independent variables. The results of other diagnostic tests such as normality test, serial correlation test, heteroscedasticity test and Ramsey Reset test aligned with the basic assumptions of

the regression model. The main finding in the long run shows a that credit to the private sector negatively and significantly affect inflation as a unit increase in credit to the private is found to reduce inflation by over 33%. Nigeria as a private sector driven economy will produce more if credit is extended to the private sector and increase in productivity is anti-inflationary. On the other hand, broad money ratio is found to add to inflationary pressure in Nigeria. It is observed that in the long run a unit increase in broad money ratio creates around 1% increase in inflation. It can be inferred that the dominant and more influential financial deepening indicator is the credit to the private sector ratio which not only exerts greater degree of influence, but also exhibits a in the short run, the error correction term entered with the correct sign showing that short run disequilibrium is restored to equilibrium in the long run. With a 24% speed of adjustment, it shows that it takes about 4years for stability to be restored in the event of shocks arising from short-run distortions. In addition, the error correction term falls less than unity (1) indicating that it is within predictable limits. The interaction between inflation and financial deepening can only thrive in a stable economic environment. This means the test of the stability of the estimated model to be of great essence. The Cumulative Sums of Squares (CUSUMsq) as presented in Fig.1 below was used for this purpose.

**Figure 1: CUSUM Graph**



The CUSUM blue line lies at the 5 percent critical level, sits inside the two broken red lines. This means that the model is stable over the investigated period and guarantees that the model is fit for purpose.

## CONCLUSION

This work is set to measure the nexus between consumer price index and financial deepening in Nigeria. The study covered the period 1961 to 2022. The choice of Nigeria was guided by the fact that it is the largest economy in Africa and that evidence arising therefrom can form a base for generalization. In addition, prior authors have ignored the inflation-creating impact of the financial deepening making this work set to fill a significant gap along that line. This creates uniqueness for this study in terms of its focus and scope. This study makes the following key findings: negative long-run relationships exist between consumer price index and financial deepening in Nigeria. And negative weak correlation exists between consumer price index and financial deepening in Nigeria over the studied period. By way of policy implication, it is expected that financial policies, especially the pro-deepening ones, should create mitigants against the likely transmission effects on inflation. In addition, much as it is desired to achieve a reasonable depth of the financial system, it is also important to bring into consideration the likely collateral outcome of such policies. This may take the form of excess liquidity which worsens inflationary pressures. This study represents a significant departure from prior authors who have discussed deepening-growth/development linkage with less investigative interest on the inflation dimension. This study is expected to ignite research interest in this area not just on a country-specific basis but also on cross country and globalized dimension.

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