An Empirical Estimate of Inflation and Economic Growth: Evidence from Nigeria

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Abstract

This paper investigated the relationship between inflation and economic growth in Nigeria for the period 1980-2010. Using ex-post facto research methodology. The study employed, Augmented Dickey fuller (ADF) and Phillip Perron (PP). Unit root test as well as Johansen Cointegration test and followed by utilizing Error, Correction Model (ECM). The empirical results lend very strong support to the existence of three long-run relationships between the variables. The results shows that RGDP is influenced by changes in Money Supply (MS) and thus, promotes economic growth in Nigeria, while Inflation(INF) have a negative impact on economic growth, both in the short run and long run in Nigeria. These results as they stand indicate that inflation does not promote economic growth in Nigeria. The study therefore, amongst others recommends that monetary authorities should effectively control inflation rate in the country so as to achieve the desired Macroeconomic stability and output in Nigeria.

Keywords: Cointegration, Error correction model, Inflation, Money supply.

Introduction

Background of the Study

It has been asserted generally that inflationary pressures affect the pattern, composition and the level of productivity and growth of the national income. Major Macroeconomic goals all over the world are the achievement of high level and rapid growth of output low unemployment rate and price stability. Thus the most important measure of output in an economy is the Gross Domestic Product (GDP) which measures the market value of all goods and services. Low unemployment can be described as the rate at which people that are willing to work can be able to get high paying Jobs without necessarily searching or waiting for too long to get a Job. While on the other hand price stability has to do with achieving a low and stable inflation rate in a country. Inflation therefore, can be described as a situation of continuous rise in the general price level. It is also refers to as where too much money is chasing too few goods and services in an economy.

Egbon [1] pointed out that inflation could have a negative effect on growth, especially, if not controlled. He opined that inflation can promote errors in allocation and discourage Capital development which according to him might lead to loss of wealth in the economy.

Still on inflation, Marsha [2] observed that between early 1970s and 1995, Nigeria recorded four major episodes of high inflation in excess of 30 percent. Similarly, Egbon [1] noted that Nigeria experienced high volatility in inflation rates in the early 1970s and mid 1990s. He noted that at a time of relatively marginal growth in the economy inflation peaked at 40 percent in 1985, and that government was under pressure from IMF to devalue the domestic currency in the country, he stressed.

However, it is pertinent to note that there is a remarkable improvement on the inflationary pressure in Nigeria when compared to mid 1985s. The inflationary pressure moderated in 2010 and remained above the single digit as against expectations by monetary authorities. Available estimates show that inflation rate on year on year basis stood at 14.4 percent in January 2010 and went up to 15.0 percent in April, before assuming a downward trend to 13.6 percent by the end of third quarter and 11.8 percent at the end of December, 2010.
As pointed out by Muhanna [3] price stability is achieved when changes in the general price level do not materially affect the economic decision making processes, and that relative price movement will impact on production, consumption, saving and investment, he stressed that the rate of inflation or deflation would be so low that it would no longer be an important factor in economic decision making process.

It has been argued that inflation is an unavoidable phenomenon in the face of economic growth. The structuralist school of thought stresses structural rigidities as the principal cause of inflation in most developing countries and therefore argued that inflation is a necessary condition with growth.

In Nigeria, the conduct of the monetary credit and exchange rate policies are guided by central Bank's monetary, credit, foreign trade and exchange policy guidelines and the overall goal of monetary policy remains price and exchange rate stability (NEEDS, 2004) Indeed, government fiscal stance is that inflation is expected to drop progressively over the years to a single digit as it largely believe that the decline in inflation is further expected to improve the macroeconomic environment for planning and to reduce pressure on domestic costs and real interest rate (NEEDS, 2004). As pointed out by NEEDS (2004) the monetary policy intervention has been basically reactionary and short term leading to this targets and ineffectiveness in performance. They further expressed that despite the fact that the basic goal of monetary policy has been price stability, inflation has been relatively high and above the West African monetary zone targets.

It is in view of the above, this paper seeks to investigate the relationship between inflation and economic growth in Nigeria. The paper is structured as follows, section two provides the empirical review, section three present the research methodology, section four present the estimation results while section five will provide the concluding remarks.

Theoretical Framework
The theoretical framework that will guide this study has to do with the two main theories of Demand pull inflation of the Monetarist and the Keynesians theory respectfully.

Monetary Theory of Inflation
The Monetary Theory of inflation as led by Friedman emphasized the role of money as the main cause of demand-pull inflation and that Inflation is always and everywhere a monetary phenomenon that arises from a more rapid expansion in the quantity of money than in total output. He argued that inflation is based on an increased demand for goods and services as people try to spend their cash balances, and that demand for money is relatively stable, thus, the excess spending is the outcome of the rise in the nominal quality of supply to the economy. However, It has been argued that monetary policy may not be effective in controlling inflation, if inflation is largely due to cost-push factors and that monetary policy can only be helpful in controlling inflation due to demand-pull factors (Jhingan, 2010).

The Keynesian Theory
This theory as propounded by the Keynesians emphasizes the increase in aggregate Demand as the main cause of Demand-pull inflation. They stressed that government demands more goods and services to meet the requirements of both civil and military services in a country. The Keynesian theory is therefore based on a short run analysis on which prices are assumed to be fixed, and that there are perfect competition in both the goods and the factors market and that prices as they are will definitely persist in the future.

Consequently, the Keynesians advocated the use of fiscal policy measures in controlling inflation, government expenditure, personal consumption expenditure and private public investment in an economy. However, this theory was not without criticisms. The Keynesians theory was highly criticized on the ground that he lays too much emphasis on demand as the main cause of inflation by neglecting the cost side of inflation. He also fails to realize that a price rise may lead to increase in aggregate demand that may further lead to rise in prices. While the structuralist stresses structural rigidities as the principal cause of inflation in most developing countries and therefore argued that inflation is a necessary condition with growth.

The implications of these theories is that for government to achieve a meaningful economic growth and development, government unproductive/consumption spending/aggregate demand be reduced by effectively moderating and controlling inflation at all levels.

Empirical Review
The issue of inflation and economic growth has drawn the attention of many researchers, policy Makers and government functionary in recent times. Some studies, particularly those of
Keynesians and the structuralist belief that inflation is not harmful for economic growth while those of the monetarist argued that inflation is harmful to economic growth.

Abiola, Nana and Ohwofosa [4] examined the efficiency in the effective operation of monetary policy in Nigeria for the period 1980-2010, by using a simple linear regression and the results suggest that domestic credit, fiscal deficit and a one-year lag of inflation were statistically significant in explaining inflation in Nigeria, and that on the relationship between inflation and the explanatory variables, fiscal deficit, money supply and interest rate have positive correlation with inflation, while exchange rate, trade openness and past level of inflation have a negative impact on inflation. Their study further suggests that impact of inflation on economic growth was negative while that of money supply and domestic credit was positive.

Joseph and Eliab [5] studied the effect of inflation on economic growth in Tanzania used least trimmed square (LTS) method and the empirical results suggest that inflation has been harmful to economic growth in Tanzania.

Acquah, [6] examined the effect of inflation on economic growth in Ghana for the period 1960 to 2000, and the result reveals that the impact of inflation on growth has been undesirable and that on empirical basis, the degree of correlation between inflation and growth was found to be weak, contrary to the evidence suggest by theory.

Mallick and Chowdhury [7] investigated inflation, government expenditure and real income in the long-run and its relationship between inflation and real income in Australia, Canada, Finland, Spain and UK, using cointegration analysis and a vector error correction model and found that the long-run relationship between inflation and real income was positive for most of the countries investigated. The results also indicate that government expenditure was positively related to real income in the long-run.

As reported by De-Gregorio [8] inflation limits economic growth by reducing the efficiency of investment rather than its level. His report suggested a robust negative relationship between inflation and growth. He argued that inflation limits the efficiency of investment rather than its level. His report suggests a robust negative relationship between inflation and growth; he argued that inflation limits growth mainly by reducing the efficiency of investment rather than its levels. On his review of theoretical and empirical literature on how central banks affect inflation and output growth, De-Gregorio opined that, an independent Central Bank can be effective in reducing inflation, only if the public perceives that it is tough on inflation, and argued that inflation persist because the cost of reducing inflation is high. However, he concluded by saying that serious progress has been made in recent years in assessing empirically how central bank affects macroeconomic performance and that the results are inconclusive.

Ruge-Murcia [9] studied government expenditure and the dynamics of high inflation and developed a dynamic model of inflation where the money supply was determined by the governments’ use of newly created money to finance its budget deficits and found that the government deficit was influenced by past inflation rates that reduce the real value of tax receipts.

Adrian, Edgar and Sanchez [10] estimates the long run relationships and threshold effects between inflation and economic growth in Mexico for the period 1970-2009, using co integrated vector on economic growth, the result suggests that log of real GDP and inflation rate were found to be elasticity significantly negative, and found no causal relationship between the variables using the granger causality test and without finding any directional causality between them. Their findings further suggest that the estimated threshold model suggest 9 percent as the threshold level (structural breakpoint) of inflation above which according to them inflation significantly shows the Mexican economic growth.

Similarly, Ogbokor [11] examined the impact of inflation on Namibian growth for the period 1991-2001 using a general model and found that economic growth reacted in a predictable fashion to changes in the regressors employed in the study. The result further suggests that inflation can be counterproductive if not controlled and therefore recommended appropriate anti-inflationary measures for the Namibian economy.

In a study by Ezirim and Of urum [12] stressed that public expenditure growth was seen to be significantly and positively affect inflation in Kenya, United Kingdom and United States of America but not in Nigeria.

Alavirad [13] examined the effect of inflation on government revenue and expenditure, using the Islamic Republic of Iran as a case study. He used simultaneous equation to examine the effect of inflation on government revenue and expenditure. The results suggest that government budget deficit increased as inflationary condition worsened during period of study and that budget
deficit increased money supply which further intend to aggravate inflation Iran.

In a recent study by Chain, Pervaiz, Jan, Sajjad, Ali and chandhary [14] observed the existence of long run relation among the variables of poverty, economic growth, inflation, investment and trade openness over the period 1972-2008. They used ARDL bound testing approach and the empirical results indicate that economic growth and investment have negative influence while inflation has positive impact on poverty. The effect of trade openness on poverty is significant. On the short run analysis the results reveal that economic growth has negative while inflation has positive impact on poverty whereas the role of investment and trade openness in poverty reduction in the short run is not significant.

In view of the above, this Paper Seeks to bridge the research gap with the main aim at investigating the relationship between inflation and economic growth in Nigeria using cointegration approach.

**Research Methodology**

The research method adopted in this study is ex-post facto research design as a set of regression estimation techniques were further utilized to examine the relationship between inflation and economic growth in Nigeria.

**Sources of Data**

In this study, we used secondary data and they were all sourced from existing relevant literature, such as journals of CBN annual reports and statements of account/statistical bulletin of various years. This is also supported, data from National Bureau of statistics (NBS).

**Model Specification**

However, in order to examine the relationship between inflation and economic growth in Nigeria, a model that justifies the relationship between these variables has been adopted and thus specified in its functional form as follows;

\[ RGDP = f (INF, MS) \] (1)

Thus our linear function of the above is explicitly specified as follows;

\[ Y_t = \beta_0 + \beta_1X_t + \beta_2X_t + \mu_t \] (2)

Where;

- \( Y_t \) = Dependent variable (RGDP)
- \( X = \) Independent variables
- \( X_t = \) Inflation rate (INF)
- \( X_t = \) Money Supply (Ms)
- \( T = \) Annual time series values
- \( \beta_0 = \) the constant term.
- \( \beta_1 - \beta_2 = \) the regression coefficient to be estimated.
- \( \mu_t = \) the error term.

The above equation is hereby restated to carry their parameters as follows;

\[ RGDP = \beta_0 + \beta_1INF_t + \beta_2MS_t + \mu_t \] (3)

**Techniques of Data Analysis**

Our data set is being analyzed using descriptive and analytical econometric methods.

**Empirical Results and Discussions.**

We first, commenced with the analysis of testing the statistical properties of the time series variables so as to determine whether these variables of interest are stationary or not. This is so because most Macroeconomic data often exhibit non stationary behavior. We also employed Augmented Dickey Fuller (ADF) and Phillips Perron (PP) Unit root test to determine the order of integration of the variables and to avoid estimating spurious regression.

**Table 1: Augmented Dickey Fuller (ADF) Unit Root Test Results.**

<table>
<thead>
<tr>
<th>Series</th>
<th>ADF test statistics</th>
<th>5% critical values</th>
<th>10% critical values</th>
<th>Order of integration</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP</td>
<td>-5.191156</td>
<td>-1.952910</td>
<td>-1.610011</td>
<td>1(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>INF</td>
<td>-5.391709</td>
<td>-1.952910</td>
<td>-1.610011</td>
<td>1(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>MS</td>
<td>-4.726597</td>
<td>-1.953381</td>
<td>-1.609798</td>
<td>1(2)</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

Source: Eview output.

**Table 2 Philips Perron (PP) Unit Root Test Results.**

<table>
<thead>
<tr>
<th>Series</th>
<th>ADF test statistics</th>
<th>5% critical values</th>
<th>10% critical values</th>
<th>Order of integration</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP</td>
<td>-5.175847</td>
<td>-1.952910</td>
<td>-1.610011</td>
<td>1(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>INF</td>
<td>-9.048519</td>
<td>-1.952910</td>
<td>-1.610011</td>
<td>1(1)</td>
<td>Stationary</td>
</tr>
<tr>
<td>MS</td>
<td>-4.936077</td>
<td>-1.953381</td>
<td>-1.609798</td>
<td>1(2)</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

Source: Eview output.
From table 1 and 2 above the ADF and PP Unit root test indicates that all the variables are stationary after first difference. Having determined the order of integration, we proceed to perform Johansens Cointegration test and found that the linear combination of all the variables are stationary. The results of trace test are therefore presented in table 3 below.

Table 3: Johansen Co integration Rank Test (Trace)

<table>
<thead>
<tr>
<th>Hypothesized No of CE(S)</th>
<th>Eigen Value</th>
<th>Trace Statistic</th>
<th>5% Critical values</th>
<th>Prob**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>0.453680</td>
<td>36.35325</td>
<td>29.79770</td>
<td>0.0079</td>
</tr>
<tr>
<td>At most</td>
<td>1* 0.302864</td>
<td>18.82129</td>
<td>15.49471</td>
<td>0.0152</td>
</tr>
<tr>
<td>At most</td>
<td>2* 0.250415</td>
<td>8.358826</td>
<td>3.841466</td>
<td>0.0038</td>
</tr>
</tbody>
</table>

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
Source: Eview output.

The Cointegration Rank test (trace) from table 3 above between the variables of interest such as RGDP, INF and MS respectively. The existence of the long run level of significance, meaning that the null hypothesis of cointegrating equilibrium also provides the application of no co integration is hereby rejected at the 0.05% of Error Correction Model (ECM) so as straighten or level of significance. The results lend strong support of the existence of three unique cointegrating equations the Error Correction Model (ECM) estimates.

Table 4: Error Correction Model (ECM) Results.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>t-statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>20318.53</td>
<td>9126.833</td>
<td>2.226242</td>
<td>0.0349</td>
</tr>
<tr>
<td>D (INF)</td>
<td>-27.19443</td>
<td>434.4421</td>
<td>-0.062596</td>
<td>0.9506</td>
</tr>
<tr>
<td>D (MS)</td>
<td>0.016443</td>
<td>0.011950</td>
<td>1.376030</td>
<td>0.1806</td>
</tr>
<tr>
<td>ECM</td>
<td>(-1)-0.197930</td>
<td>0.100123</td>
<td>-1.976882</td>
<td>0.0588</td>
</tr>
</tbody>
</table>

\[ R^2 = 0.145331 \]
\[ F-statistic = 1.473709 \]
\[ Prob (F-statistic) = 0.244766 \]
\[ Durbin-Watson Stat = 1.467 \]
Source: Eview Output.

The Error Correction Model result from table 4 reveals that the Coefficient of the Error correction term is statistically significant and has the correct a priori sign as expected. The error correction term coefficient is -0.197930. The negative sign of the ECM satisfies one condition while the fact that \( R^2 \) is 0.145331 is different from zero also satisfies the second condition of significance. The error correction coefficient is -0.197930, meaning that the system corrects or adjust to its previous disequilibrium at a speed of 19.79% annually and again our \( R^2 \) value of 0.145331 is lower than DW value, thus, our model is deemed to be adequate and is not a spurious model or regression. The \( R^2 \) shows that 14.53% of the total variations in RGDP is well accounted for by the explanatory variables. Thus, RGDP can be said to be influenced by changes in Money Supply (MS), thus promotes economic growth in Nigeria. While Inflation (INF) have a negative impact on economic growth. Our results are consistent with the findings by Joseph and Eliab (2000).

Conclusion and Recommendations

This paper investigated the relationship between inflation and economic growth in Nigeria for the period 1980 to 2010 using Augmented Dickey Fuller (ADF) and Phillips Perron. The results shows that RGDP is influenced by changes in Money Supply (MS) and thus, promotes economic growth in Nigeria, while Inflation (INF) have a negative impact on economic growth, both in the short run and long run in Nigeria. These results as they stand indicate that inflation does not promote economic growth in Nigeria. The study therefore, amongst others recommends that monetary authorities should effectively control inflation rate in the country so as to achieve the desired Macroeconomic stability and output in Nigeria.
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References


