Fiscal Deficits And Inflation In Nigeria: The Causality Approach

Ozurumba Benedict Anayochukwu

Abstract :- This paper examines the causal relationship between inflation and fiscal deficits in Nigeria, covering the period 1970-2009. This was carried out by way of developing an estimation model of inflation and fiscal deficit, with a view to testing causes and effects as well as the relationship between them. The estimation technique used is the autoregressive distributed lag (ARDL) model and the Granger-causality test. The result of the Granger-causality test shows that the null hypothesis which says that fiscal deficit does not cause inflation should be rejected since the result is significant with probability less than 0.05. This implies that fiscal deficit/GDP causes inflation. However, no feedback mechanism was observed. The results from the ARDL test confirm a significant negative relationship between growth in fiscal deficit (% of GDP) and inflation. The above results confirm the a priori expectation. It is recommended that policies targeted at inflationary control in Nigeria could best be achieved if they are aimed at fiscal deficits reduction. In addition, the government should support growth in the real sectors of the economy .

Keywords: fiscal deficit, inflation rate, macroeconomic, monetary policy, Granger-causality , autoregressive distributed lag .

1 INTRODUCTION

One of the most important aspects of fiscal policy is the management of the public sectors fiscal deficit. Such fiscal deficit simply refers to the excess of the public sectors spending over its revenue. Fiscal deficit is generally defined in terms of loan financing and drawing down of cash balances. It therefore, connotes the difference between the budget receipts and budget expenditures financed by withdrawal of cash balances and borrowing from the public (Nwaogwugwu, 2005). Hence, public sector borrowing gives an estimate of the volume of fiscal deficit. Large and persistent fiscal deficit has become characteristic of most less developed countries. It is caused basically by tremendous upward movement in the expenditure variables on the one hand, and sluggish growth of revenue on the other hand (Nwaogwugwu, 2005). While the former can be traced to the strong desire of the government to upgrade the social overhead capital and the quest for as well as lack of or stagnant economic growth and thereby constraining the taxable capacity of the resource bases. Such fiscal deficits have been at the forefront of macroeconomic adjustment- purposeful and coherent set of measures used to respond to (often severe) imbalances in the economy-in the 1980s, both in developing and developed nations. This is because it is widely recognized that fiscal deficits – a key fiscal indicator and macroeconomic indicators (like growth, inflation, the current account, etc) influence each other in both directions Consequently, fiscal deficits were blamed in good part for the assortment of ills that beset developing nations in the 1980s: high inflation, poor investment and growth performance, and over – indebtedness leading to the debt – crisis beginning in 1982. Today, they occupy the center stage in the massive reform programmes initiated in Eastern Europe and the former Soviet Union and by many developing nations spread throughout all continents (Easterly and Schmidt-Hebbel, 1992). The economic consequences of deficits could be severe for a nation that lacks the required macroeconomics management abilities. This could be the case when the deficit-triggered inflation causes every other macroeconomic indicator off balance. But as Obadan and Uga (1996) observed, deficits are not bad if they are sustainable and provides the required stimulus for the economy. Studies have also shown that there is a strong correlation between large fiscal deficits and external current account imbalances, thus demonstrating the sensitivity of real exchange rate to fiscal deficits. In an overly import-dependent country, such as Nigeria, an expansion of any fiscal policy has a way of depleting external reserves and weakening the exchange rate. The development of a budget deficit is often traced to the Keynesian inspired expenditure-led growth theory of the 1970s. Most countries of the world adopted this theory that government has to motivate the aggregate demand side of the economy in order to stimulate economic growth. However, its Consequences on macroeconomic variables cannot be underestimated in most countries of the world, Nigeria inclusive (Olomola and Olagunju, 2004). Monetary policy has over the years in Nigeria been largely expansionary with direct implications for price inflation (including food prices) and exchange rates. Over the years, there has been a persistent rise in private consumption expenditures and developments in the external sector have also impacted strongly on the budget deficit. Government's narrow revenue base, vis-a-vis its expenditure, is likely to have serious consequences for the government's budget balance (Cebula, 2000). Most analysts therefore argued that deficit reduction is crucial to the future growth of an economy, although, economists are divided over its impacts. It is expected that lower budget deficits will lower real interest rates, increase investment, and thereby increase productivity, growth and real income. A country experience deficit in her budgetary system when its expenditure exceed its revenue while budget deficit financing reflect the means of operating budget deficit of the country. However, the source of finance has varying impact of a budget deficit on inflation. The major outcomes of empirical studies examining the relationship between budget deficits and inflation showed strong evidence that the budget deficits financed through monetization and a rising money supply could lead to inflation. The budget deficit recorded for the remaining years were as a result of many factors that made the proposed expenditure to exceed the expected revenue. Some of these factors are: mismanagement of available resources, fall in the price of oil in the world market, corruption, social and religious crises, creation of more states and local governments, Egwaikhide (1996a). Inflation is one of the variables affected by budget deficit operation over the years in Nigeria. Government has continuously pursued an expansionary fiscal policy with the exception of the years 1970, 1971, 1973, 1974, 1979, 1980 and 1996. This was in

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a view to improve economic growth and economic development. However, the major impact of the increase in budget deficit was felt in 1993, with high rate of inflation which shows an evidence of a positive relationship between budget deficit and inflation in Nigeria, although other macroeconomic factors could have accounted for this. There exist controversies in the literature as to whether budget deficit is inflationary or not. Oyejide (1972) argues that in a less developed country, sustained growth of deficit financing could hardly take place without some amount of inflation. It should be noted that inflation is persistent increase in price and not high price. Thus, it is against this backdrop that this study intends to empirically investigate the relationship that exists between budget deficit and inflation in Nigeria. Budget deficit inflation nexus has been an issue in both developing and developed countries of the world. Therefore, there is a need to know which of these variables causes the other and the direction of causality in Nigeria. This paper therefore employs the use of Pairwise Granger Causality test and Autoregressive Distributed Lag (ARDL) model. It differs from other previous works with the use of both the Dickey Fuller (DF), Augmented Dickey Fuller (ADF) and Phillip-Perron (PP) tests of stationarity. Section 2 discusses the theoretical framework and literature review on inflation and fiscal deficits; section 3 discusses the model specification, section 4 discusses the results obtained from the ARDL and Granger-Causality tests while section 5 is conclusion and recommendations.

2 THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Government deficits and its financing as a primary cause of inflation has received serious attention since Friedman (1968). Three different connections between budget deficits and inflation are predominant in the literature. The most direct connection between government deficits and inflation is that by increasing the real value of outstanding bonds and perceived net wealth, a deficit can raise total spending and the price level because the economy is operating at full employment (Dwyer, 1982). Empirical investigations examining the relationship between inflation and budget deficits have not reached a consensus on the possible relationship between the rate of inflation and deficits. The empirical evidence is fraught with contradictory results as well. Dwyer (1982) utilized a vector autoregression model to test the linkage between government deficits and macroeconomic variables (such as prices, spending, interest rates and the money stock) in the U.S. over the period 1952-1978. The results are consistent with the hypothesis that there are no perceived wealth effects of predictable changes in government debt held by the public and, as a result, no effects of the debt on inflation. No evidence is found that larger government deficits increase prices, spending, interest rates, or the money stock. The reason for the decline in inflation rates can be attributed to the decline of money growth despite borrowing. Abizadeh et al. (1986) in their studies focus on the link between deficits and inflation. They argue that one way of resolving the controversy over deficits and inflation is "to test the possibility of a causal link between the growth of government expenditures and inflation. This should be done in light of the fact that governments can grow without necessarily generating deficits" (Abizadeh et al.

1986.p.394). The authors' study led them to conclude: "the hypothesis of a direct link between the size of the deficit and the size of government is maintained". An implication was that large deficits are caused by increased government expenditures. If increased government expenditures result in higher deficits, and higher deficits in turn causes inflation, then increased government expenditure can cause inflation. It can be concluded from the above discussion that the inflationary effect of government deficits depends upon the means by which the deficit is financed and the impact of the deficit on aggregate demand. If the government attempts to finance budget deficits through bond issues, this could be justified by the notion that the link between budget deficits and inflation (or inflationary expectations) depends on money creation. Hence inflation is seen as being mainly a monetary phenomenon; in other words, expansion of the money supply is considered to be a factor which, in the medium term, determines the rate of price increases. Furthermore, it is worth noting that there is a direct link between government borrowing requirements and money creation, to the extent that such borrowings are financed by the central bank and the commercial banks (in the form of loans to the Treasury or the purchase of government securities). The authorities may, however, attempt to limit the monetary financing of the budget deficit by selling government securities to the non-bank private sector (households, companies, and financial institutions other than banks). In that case there is no effect on the money supply, as assets are transferred from the private sector to the government and vice versa when the money is spent by the authorities. Thus, whatever the method of financing considered, the effect of the budget deficit on monetary growth will depend mainly on the attitude of the monetary authorities (i.e. whether they decide to accommodate the deficit increase, by allowing the money supply to expand, or not). Hence, from the analysis discussed in this section, it can be said that at the theoretical level there is a close link between deficits and monetary growth on the one hand and inflation on the other. Darrat (1985) examined empirically the link between deficits and inflation in the U.S. during the post-1960 period. The estimation results, using the OLS technique, suggested that both monetary growth and federal deficits significantly influenced inflation during the 1960s and 1970s. In addition, he concluded that federal deficits bore a stronger and more reliable relationship to inflation than monetary growth. Eisner (1989) examined the impact of deficits on inflationary pressure to see if structural deficits contribute to inflation. He found that there is no support for the proposition that the federal budget deficit, by any measure, contributes to inflation. If anything the opposite appears to be true (Eisner, 1989.p.87). Using an error-correction model, Sowa (1994) estimated an inflation equation for Ghana over the period 1963-90. This study found that inflation in Ghana is influenced more by output volatility than by monetary factors, both in the long run and in the short run. Darrat (2000) utilised an error correction model (ECM) to investigate if high budget deficits have any inflationary consequences in Greece over the period 1957-1993. Their empirical results found that the deficit variable exerts a positive and statistically significant impact upon inflation in Greece. They conclude "besides money growth, higher budget deficits have also played a significant and direct role in the Greek inflationary process" (Darrat, 2000,

p. 635). Aghevei and Khan (1978) also related inflation theoretically and empirically to fiscal deficits. They argue that inflation results in widening fiscal deficit which are often financed through the banking system leading to excessive liquidity in the system and thus generating inflation. Miller (1983) observed that there exist simultaneous relationship between fiscal deficits and inflation. Also, Heller (1980) noted that inflation raises the cost of government services and investments and increases budgetary demands for distributional transfer while simultaneously increasing, the amount of revenue collected. Furthermore, Blejer and Khan (1984) confirmed the two-way causation between fiscal deficit and inflation noted that "fiscal deficit whether financed from borrowing from the public or the banking system are necessarily inflationary". Ariyo and Raheem (1991) maintained that an acceleration of inflation by whatever means has a strong tendency to punch up government outlays on its consumption profile. On the other hand, Ebiringa (1996) examined the macroeconomic impact of public sector deficit on macroeconomic performance with a particular reference to the Nigeria experience for the period 1988-1997. On finding an insignificant negative relationship between growth in public sector deficit (% of GDP) and inflation, he concluded that large accelerations of monetary financing cannot consistently result in higher inflation. This study was based on regression analysis in the form of stepwise regression method.

3. MODEL SPECIFICATION

➢ **Sources of Data:** This study relied basically on secondary data sourced from the Central Bank of Nigeria's publications:
  • Annual Report and Statement of Account, 2009
  • CBN Statistical Bulletin, 2009
➢ **Method of Analysis:** The method of study adopted in this study is both descriptive and analytical. The descriptive tools consist of the use of table and percentages. The analytical tool used is the ordinary least square regression analysis employing autoregressive distributed lag model (ARDL) and the Granger test.
➢ **Granger- Causality Test:** To just assume that since the size of fiscal deficit over the years has continued to increase, and the inflation rate, on the average, during the study period has remained double-digit, then fiscal deficit and inflation simultaneously induce each other is rather simplistic. In an attempt to avoid doubt based on this simplistic assumption, we intend to conduct Granger causality test on fiscal deficit to GDP and inflation rate. According to Granger (1969) causality is said to exist if when Y_t is causing X_t using all available information than if the information apart from Y_t had been used.

We now state the Functional relationship:

$$Y_t = f(Y_{t-1}, X_{t-1}, \ldots, X_{t-1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

If X_t causes Y_t, the functional relationship will be

$$X_t = f(X_{t-1}, Y_{t-1}, \ldots, Y_{t-1})\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

In the simple causal model, a change in the value of lagged independent variable(s) does not have to affect the dependent variable in the same period. Usually, the dependent variable has current period value. In the case of the existence of feedback between Y_t and X_t denoted thus $Y_t <->X_t$, Granger shows that such feedback is said to occur when Y_t is causing X_t and vice-versa.
  ➢ **ARDL Test:** The specific theoretical representation of the causes of inflation for any given period in Nigeria can therefore be put symbolically in a macroeconometric form. Here we adopted a univariate model involving a dependent variable and one regressor. Thus:

$$INF_{ti} = \alpha_0 + \alpha_1 INF_{t-1} + \alpha_2 DGP_t + \alpha_3 DGP_{t-1} + \alpha_4 DGP_{t-2} + \mu_t \ldots\ldots\ldots(3)$$

A priori, $a_1 > 0$; $a_2 < 0$, $a_3 < 0$, $a_4 < 0$

Where (a period of one-year interval) ranges from 1970 - 2009. The variable notations are explained as follows:

INF = Annual Inflation rates
DGP = Ratio of fiscal deficit to gross domestic product
μ_t = Error-term

4 RESULTS AND DISCUSSIONS

Before estimating the model, the variables were subjected to the unit root test of stationarity using both the Dickey-Fuller (DF), the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests. It is important to note that stationarity of time series data implies that the mean, variance and autocovariances (at various lags) remain the same, no matter what time we measure them, i.e., they are time invariant. This is very important in the sense that it ensures the reliability of the above statistics, making a model suitable, reliable and appropriate for both control and prediction purposes (Hill et al; 2008). Empirically, the DF, ADF and PP tests involve running a regression of the first difference of a series against the series lagged once lagged difference terms and optionally with a constant and time trend. The null hypothesis for the three tests is that the series in question has a unit root (i.e. it is non-stationary) whereas the alternative hypothesis is that the series has no unit root (i.e. it is stationary). The decision rule of rejecting the null hypothesis is that their t-statistic derived from the tests must be largely negative, and its absolute value greater than the reported critical values. The results of the unit root test carried out on the variables are presented in table 1 (see appendix). Table 1 shows the results of the three tests- DF, ADF and PP on the two variables been tested-inflation rate (INF), and budget deficit (DGP). The tests on the levels of the variables with only a constant and no trend in the equations, show that the null hypothesis of a unit root can be rejected at the 5 percent or 10 percent levels. In this case the series were differenced once in order to make them 1(0) series. From the above, it may be concluded that any dynamic specification of the model in levels of the series is likely to be appropriate and may be devoid of problems of spurious regression. Since our variables are differenced at levels i.e. 1(0), we then proceed with the ordinary least square (OLS) estimation using the

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autoregressive distributed lag estimates (ARDL) since it is a case of univariate and the Granger-causality test

❖ **Global Test Statistics:** In Table 2 (see appendix), the regression coefficient along with the standard errors, t-values, F-ratio and Durbin-Watson statistic are reported. It can be observed that inflation model for Nigeria is statistically significant as shown by the statistically F-value of 6.96.   The results of the estimation show that the explanatory variable accounts for 47.3 percent variations in inflation rate in Nigeria. From the equation specified and estimated above, it was observed that the independent variable (Deficit/GDP) in the model in the preceding two years lagged was statistically significant at both the 5% and 10% level and with the expected signs while inflation was also significant at 10% level. The adjusted R^2 of 40.5 per cent was also significant. Hence, inflation though may not only be caused by fiscal deficits, however a significantly high variation in inflation could be explained by the corresponding linear influence of fiscal deficit. The value of the DW at 1.596 and DH-Statistic of 2.153 are within the good region of no serial correlation. However, this should be interpreted with caution as the appropriate test for serial correlation in the presence of lagged endogenous variables should be Durbin's h – statistic. The other diagnostic tests carried out as shown in Table 2 above include the lagrange multiplier (LM) test and the heteroskedasticity test. Both results are significant at 5% and 10% significance level. The LM test of residual serial correlation confirms the absence of autocorrelation.

❖ **GRANGER-CAUSALITY TEST:-** In Granger-causality test, the thrust is to regress autoregressive distributed lag model of DGP on INF. Models based on Granger-causality as in equation(2) are expressed in this paper, as follows:

$$DGP_t = \alpha_0 + \alpha_1 DGP_{t-1} + \alpha_2 DGP_{t-2} + \alpha_3 INF_t + \alpha_4 INF_{t-1} + \alpha_5 INF_{t-2} \quad ....(4)$$

$$INF_t = \alpha_0 + \alpha_1 INF_{t-1} + \alpha_2 INF_{t-2} + \alpha_3 DGP_t + \alpha_4 DGP_{t-1} + \alpha_5 DGP_{t-2} \quad ....(5)$$

Null hypothesis	Obs	F-stat	Probability
DGP does not granger cause INF	38	4.35522	0.02096
INF does not granger cause DGP		0.02470	0.97562

The model was estimated using two lags for the variables. Granger-causality results from the table 3 (see appendix) shows that the null hypothesis which says that fiscal deficit (DGP) does not Granger cause inflation is rejected since the result is significant with probability less than 0.05. This implies that fiscal deficit could cause inflation. However, no feedback mechanism was confirmed, thus accepting that there is a uni-directional causality running from fiscal deficit to inflation.

5. CONCLUSION AND RECOMMENDATIONS

From the statistical computation, analysis and findings of our test carried out, we found out that:

➢ The inflation is dependent on the performance of the budget deficit

➢ There is a uni-directional causality running from fiscal deficit to inflation.

➢ Policies targeted at inflationary control in Nigeria could be best achieved if they are targeted at fiscal deficits reduction.

➢ The Nigerian government should be mindful about the sources of the budget deficits so as to be able to manage the economic fluctuations and increase activities in the real sector.

➢ The need to entrench fiscal discipline in government operations at all levels that will ensure management of public finances, improve budgetary processes, including openness in the budget preparation, execution and reporting is been advocated.

➢ There is need to support growth in the real sectors of the economy by encouraging investors to have access to investible funds from banks.

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Appendix

Table 1: Stationarity Tests of the Model Variables

Variable	DF Test	ADF Test	PP Test	Order of integration
INF	-3.1327 -1.9496**	-3.1470 (-2.9389)**	-3.0504 -2.9389**	1(0)
DGP	-3.1784 -1.9496**	-3.1784 (-1.9496)**	-3.5743 -2.9389**	1(0)

Note: Critical values are in parenthesis
    *   Implies 1% significance level
    **   Implies 5% significance level
    ***   Implies 1% significance level
DF = Dickey-Fuller Test,
ADF = Augmented Dickey-Fuller Test
PP = Phillip-Peron Test
Source: computed from data obtained from CBN Stattistical bulletin (2009)

Table 2: The ARDL Result
Autoregressive Distributed Lag Estimates
                    ARDL(1,2) selected
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Dependent variable is INF
36 observations used for estimation from 1974 to 2009

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Regressor	Coefficient	Standard Error	T-Ratio[Prob]
INF(-1)	.42126	.13788	3.0553[.005]
DGP	-.22633	.42360	-.53431[.597]
DGP(-1)	.081066	.50273	.16125[.873]
DGP(-2)	-1.1361	.45415	-2.5016[.018]
C	7.8464	3.5708	2.1974[.036]

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R-Squared	.47336	R-Bar-Squared	.40541
S.E. of Regression	12.9690	F-stat. F(4, 31)	6.9660[.000]
Mean of Dependent Variable	20.6083	S.D. of Dependent Variable	16.8189
Residual Sum of Squares	5214.1	Equation Log-likelihood	-140.6425
Akaike Info. Criterion	-145.6425	Schwarz Bayesian Criterion	-149.6013
DW-statistic	1.5968	Durbin's h-statistic	2.1531[.031]

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Diagnostic Tests

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*   Test Statistics *   LM Version   *   F Version   *
****
*   *   *   *   *
* A:Serial Correlation*CHSQ(1)= 3.4136[.065]*F(1, 30)= 3.1426[.086]*
*   *   *   *   *
* B:Functional Form   *CHSQ(1)= 5.2213[.022]*F(1, 30)= 5.0893[.032]*
*   *   *   *   *
* C:Normality   *CHSQ(2)= .097917[.952]*   Not applicable   *
*   *   *   *   *
* D:Heteroscedasticity*CHSQ(1)= 13.4538[.000]*F(1, 34)= 20.2885[.000]*
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  A:Lagrange multiplier test of residual serial correlation
  B:Ramsey's RESET test using the square of the fitted values
  C:Based on a test of skewness and kurtosis of residuals
  D:Based on the regression of squared residuals on squared fitted values

Based on ARDL regression of INF on:
 INF(-1)   DGP   DGP(-1)   DGP(-2)   C
 36 observations used for estimation from 1974 to 2009

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Test Statistic	LL	AIC	SBC	HQC
DF	-4.8695	-128.1212	-129.1212	-129.8695	-129.3730
ADF(1)	-4.8296	-126.9727	-128.9727	-130.4692	-129.4762
ADF(2)	-3.5871	-126.9585	-129.9585	-132.2032	-130.7138

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 95% critical value for the Dickey-Fuller statistic = -4.8513
 LL = Maximized log-likelihood   AIC = Akaike Information Criterion

SBC = Schwarz Bayesian Criterion   HQC = Hannan-Quinn Criterion

Table 3

Pairwise Granger Causality Tests
Date: 08/09/11   Time: 17:01
Sample: 1970 2009
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
DGP does not Granger Cause INF	38	4.35522	0.02096
INF does not Granger Cause DGP		0.02470	0.97562