

Budget Deficit And Inflation In Nigeria: An Empirical Analysis (1970-2010)

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Abstract

This paper attempts to empirically investigate the long-run causal relationship between budget deficit and inflation in Nigeria within the period 1970 to 2010. Employing a multivariate co-integration regression technique it was empirically confirmed that there exists a causal long-run relationship between budget deficit and inflation with the direction of causality running from budget deficit to inflation. The paper concludes that what should be of utmost concern to policy makers should not necessarily be the level of budget deficit but the various channels of financing the deficit and the ability of the productive base of the economy to absorb the impact of such financing.
Keywords: Budget Deficit, Inflation, Money Supply (M2), Nigeria.

1. Introduction

Today's global economy is prevalent with numerous cases of persistent government budget deficits in both the advanced and developing countries. In Nigeria, Government expenditure has consistently exceeded revenue for quite a number of years (Onwioduokit, 1996). It is widely opined that, budget deficit is one of the factors responsible for price instability and inflationary tendencies in countries all over the world (Oladipo and Akinbobola, 2011; Chimobi and Igwe,2010; and Onwioduokit,1996).

Budget deficit is a situation where total government expenditure exceeds the total government revenue for a specified period of time (Onwioduokit,1996). When government expenditure tends to exceed its revenue, the government resorts to deficit financing in order to address the deficit. There are two major ways by which government can finance its budget deficit. It can borrow by issuing bonds to the public or it can finance the deficit by creating money. In effect, governments do not create money, it is the Central Bank that creates money. But with the Central Bank's Co-operation, the government can, in effect, finance itself through money creation: it can issue bonds and ask the Central Bank to buy them. The Central Bank then pays the government with money it creates, and the government uses that money to finance its deficit. This process is called debt monetization (Blanchard, 2009). But, a deficit can be the source of a sustained inflation only if it is persistent rather than temporary and if the government finances it by creating money rather than by issuing bonds to the public (Mishkin, 2010).

The development of the idea of budget deficit financing is often traced to an Economist called John Maynard Keynes (1883-1941). In his book "The General Theory of Employment, Interest and Money (1936), Keynes advocated deficit financing by the State as a means of overcoming the Great Depression of the 1930s. He postulated that, the deficiency of effective demand causes unemployment and thus, cyclical depression (Mithani, 2010)

He therefore suggested that, since the free enterprise economic system (the market mechanism) was unable to deal with the worsening unemployment problems of the time, it was therefore necessary for the government to intervene through a vigorous use of fiscal policy. Keynes, therefore suggested pump-priming programme of government spending through creation of new money which would stimulate private investment by revising the marginal efficiency of capital through consumption multiplier effect in income generation, which would uplift the level of employment in the country's economy (Mithani, 2010).

Most countries of the world adopted this theory, however, its consequences on macroeconomic variables cannot be underestimated in most countries of the world, Nigeria inclusive (Olomola and Olagunju, 2004). In the advanced countries, the growth of United States Federal deficit provided the impetus for a reassessment of the effect of fiscal deficits on economic activities (Islam and Wetzel, 1991). On the other hand, in the less developed countries including Nigeria, fiscal deficits have been blamed for much of the economic crisis that beset them in

the 1980s: over indebtedness and the debt crisis; high inflation and poor investment performance; and growth. (Onwioduokit, 1996).

The Nigerian government has great influence on the nation's economic activities through the use of monetary and fiscal polices. Budget deficit is a fiscal phenomena while Budget deficit financing is a monetary phenomena. The use of either of the aforementioned policies has enormous impact on macroeconomic variables such as the General Price level, interest rate, exchange rate, consumption, investment, etc. In Nigeria, government expenditure has consistently exceeded revenue for most of the years since independence. According to Oyejide (1972), Nigeria started experiencing budget deficit since 1957 and this situation has persisted up till date. This appalling situation of the Nigerian State despite its enormous resources and potentials is largely due to a number of factors. Some of these factors are: corruption at all levels of government, mismanagement of available resources, political, social and religious crises, fall in the price of oil in the world market, creation of more states and local governments (Egwaikhide, 1996). Others include: inconsistency in government polices, poor or ineffective co-ordination and implementation of public projects, establishment/duplication of more government ministries, departments and agencies.

Inflation which refers to a sustained rise or general increase in the prices of goods and services, is one of the variables that has been affected by budget deficit in Nigeria over the years. Inflation rates have been double digit for most of the years of this study. In Nigeria, much work has been done on inflation, but very few empirical studies exist on the deficit-inflation nexus. This study intends to fill this gap in order to bring the issue of the inflationary tendencies of budget deficit into sharp focus. It is against this backdrop, that the study seeks to empirically investigate the long-run causal relationship between budget deficit and inflation in Nigeria during the period 1970 to 2010. The specific objective is to determine the nature and direction of causality between budget deficit and inflation in Nigeria. Thus, the research question that we shall attempt to answer is, do budget deficits cause inflation? Or is it inflation that causes budget deficits?

In addition to this introductory section, this paper contains four other sections. The second section reviews related literature on budget deficit and inflation. The third section contains the methodology while the fourth section presents the empirical results. The fifth section offers policy recommendations and conclusion.

2. Literature Review

2.1 Theoretical literature review

Inflation is generally seen as a monetary phenomenon. However, the literature identifies a number of theories of inflation. These theories are: demand-pull, cost-push, structural, monetary and internationally transmitted inflation (i.e, imported inflation). However, for the purpose of this paper, the relevant theory of inflation is the demand-pull theory as viewed by the Neoclassicals and monetarists. The demand pull theory holds that inflation occurs when the aggregate demand for goods and services exceeds the aggregate supply assuming that the economy is operating at full employment level.

2.1.1 Neoclassical or Old Quantity Theory

The origin of the quantity theory of money is traceable to Irving Fisher. Fisher (1911), explained in detail how the quantity of money influences both the level of prices (inflation or deflation) and the rate of production and employment (depression or prosperity) in the economy. He used the "equation of exchange" to illustrate this theory.

$$MV = PQ$$

Where M =Money Stock; V=Velocity of Circulation; P=General Price level;
Q=Quantity of output of goods and services produced and sold in the economy.
V and Q are assumed to be fixed given full employment level of income. Thus any change in M leads to a proportionate change in P. that is,

$$M = P\overline{Q}/\overline{V} \quad \text{therefore, } M = P$$

2.1.2 Monetarist Theory

Friedman (1968) sees inflation as a monetary phenomenon. According to Jhingan (2008). The monetarists hold that inflation arises as a result of increase in the money supply. This model is based on a stable money demand function in which money is demanded for transactions and precautionary purposes only. They assume that money supply is exogenously determined and controlled by the monetary authorities. Here, inflation occurs when money supply expands more rapidly than money demand.

The theory holds that an increase in money supply increases the nominal income of people which leads to an increase in their demand for goods and services. This leads to increase in production and hence, increase in the demand for more production inputs. If the economy is at full employment level, this leads to an increase in production costs which then reduces the profit margin and which in turn increases the prices of goods and services. Inflation occurs depending on how people react to this price increase. If it is a temporary price increase, people will increase their money demand (Jhingan,2008)

2.2 Empirical literature review

The linkage between budget deficit and inflation has been an important issue in both the developed and developing countries of the world. It is a global phenomenon that is peculiar to every government. Several studies have empirically investigated the relationship between deficit and inflation in most countries of the world. It is pertinent to note that the findings from studies conducted to empirically test the relationship between budget deficit and inflation in developed countries have been rather inconclusive (see Ahking and Miller, 1985; Metin, 1995; Hamburger and Zwick, 1981; Dogas 1992 and Dwyer, 1982). However, the evidence of the existence of a positive relationship between budget deficit and inflation in developing countries has been established. (See; Choudhary and Parai, 1991; Hondroyiannis and Papapetrou, 1994). Within the Nigerian context, the existence of a positive relationship between budget deficit and inflation has equally been established.(See Oyejide, 1972; Egwaikhide et al, 1996; Adeyeye and Fakiyesi,1980; Osakwe, 1993). Furthermore, the existence of bilateral or feedback causality between both variables has equally been established.(Onwiduokit,1996; Chimobi and Igwe;2010). However, Oladipo and Akinbobola(2011) revealed the existence of a unidirectional causality from budget deficit to inflation in Nigeria.

3. Methodology

3.1 Model Specification

This study adopts a multivariate co-integration regression analysis in order to find out if there is any long-run relationship between Inflation and budget deficit. This is done in order to avoid spurious correlation and regression results often encountered in non-stationary time series data. The primary model is thus specified.

$Inf = f(M, Bd, Z)$

The function can also be represented in a log-linear econometric format thus:

$Inf_t = a_0 + a_1 \log M2_t + a_2 Bd_t + U_t$ .....(1)

Where:

Inf_t is Inflation rate

Bd_t is Budget Deficit (measured as a ratio of Gross Domestic - Product (GDP))

M_t = Broad money Supply (M2)

U_t = Stochastic error term at time t

t - the time period

a_0, a, and a_2 are parameters of the model representing the coefficients of the explanatory variables and $a_1 > a_2 > 0$

Note: Z in the primary model is a control variable that represents all other variables that influence inflation.

3.2 Data

The series employed are annual observations of Inflation Rate, Broad Money Supply (M2) and Budget deficit (% of GDP) for the period 1970 to 2010, They were sourced from various issues of the Central Bank of Nigeria Statistical Bulletin.

3.3 Estimation Techniques

3.3.1 Unit Root Test

The Unit Root Test involves testing for the order of integration of each time series (variable). A series is said to be integrated of order I (1) if it needs to be differenced once to become stationary. The same holds for an I (2) series which will need to be differenced twice to become stationary. Thus a stationary series is integrated of order zero I(0) (i.e, no differencing is necessary).

Both the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979,1981), and the Philips-Perron (Philip and Perron,1988) "unit root" tests are employed to determine the order of integration of each series.

3.3.2 The Co-Integration

This involves testing for the existence or otherwise of co integration between series that have the same order of integration. The existence of co-integration between series implies the existence of a long-term relationship between such variables and vice versa. This study employs the maximum likelihood test procedure established by Johansen and Juselius (1990) and Johansen (1991).

3.3.3 The Error Correction Model

If the existence of Co-integration is established amongst the series, then an Error Correction Mechanism (ECM) first used by Sargan (1964) and later popularized by Engel and Granger(1969) is constructed to correct for any dis-equibrium in the short run. In an ECM, the dynamics of both short-run (changes) and long-run (levels) adjustment processes are modeled simultaneously, thereby offering the possibility of revealing information about both the short-run and long-run relationship.

3.3.4 Granger Causality Test

The Granger causality test is used to detect the nature and direction of influence or causality between two variables. If two variables are co-integrated then the causality of the co-integrated variables are captured in a vector error correction model (VECM).

4. Analysis And Discussion of Results

4.1 Unit Root Tests

Table 4.1.1 Unit Root Test for Statlonarity

Variable	ADF		PP		Decision
	Level	1st Diff	Level	1st Diff	
Inf_t	-3.387(0)**	-	-3.249(7)**	**	I(0)
LnM_t	0.118(0)	-4.565(0)***	0.048(2)	-4.535(3)***	I(1)
BDt	-4,020(0)***	-	-4.158(3)***	-	I(0)

Note: ***,**,* denotes significance at 1%, 5% and 10% level respectively. The values in brackets ( ) for the ADF test indicate the optimal lag automatically selected by the sic within a maximum lag of 9. For the PP statistic, the values in bracket ( ) indicate the bandwidth selection using the Newey-West Approach.
The results show that the variables Inft and BDt are stationary at levels
and are thus integrated of order zero that is I(0). Furthermore, InMt is
non-stationary at level but is stationary at first difference, hence it is integrated of order one, that is I (1).

4.2 Co-Integration Rank Tests

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.552717	39.52470	29.79707	0.0028
At most 1	0.188491	8.146716	15.49471	0.4499
At most 2	3.Q3E-05	0.001182	3.841466	0.9718

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	Prob.**
None*	0.552717	31.37799	21.13162	0.0013
At most 1	0.188491	8.145535	14.26460	0.3641
At most 2	3.03E-05	0.001182	3.841466	0.9718

Max-eigenvalue test indicates 1 co-integrating eqn(s)at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the table, the trace statistic indicated one (1) co-integration equation at the 5% level of significance-likewise, the maximum Eigen value Statistic also indicates one (1) co-integrating equation at the 5%, level of significance. This result suggests that there is co-integration (long-run relationship between the variables so tested.

4.3 Granger Causality Result

Pairwise Granger Causality Test at Lag2 (1970-2010)

Null Hypothesis	**Obs**	**F-Statistic**	**Probability**
LnM2 does not Granger Cause Bd(% of GDP) Bd(% of GDP) does not Granger cause LnM2	39	0.88200 0.75028	0.42321 0.47989
Inf does not Granger cause Bd(%of GDP) Bd(% of GDP) does not Granger cause Inf	39	0.05334 3.72886	0.94814 0.03434
Inf does not Granger cause in M2 LnM2 does not Granger cause Inf	39	0.45133 1.84200	0.64054 0.17397

Using two lags for the variables, the Granger-Causality results show that the null hypothesis that money supply (LnM2) does not Granger cause Budget deficit (Bd% of GDP) and vice versa is rejected given that the computed F-statistic values are greater than the critical table values.

On the other hand, we accept the null hypothesis that inflation (Inf) does not Granger cause Bd (% of GDP) given that the computed F-Statistic value of 0.05334 is less than the critical table value of 0.94814. however, we reject the null hypothesis that Budget deficit (Bd) does not Granger Cause Inflation (Inf) given that computed F-statistic value of 3.72886 is greater than critical table value of 0.3434.

Lastly, the null hypothesis that inflation (Inf) does not Granger Cause money supply (LnM2) is accepted given that the F-statistic value of 0.45133 is less than the critical table value of 0.64054. Alternatively, we reject the

null hypothesis that money supply (LnM2) does not Granger Cause Inflation (Inf) given that computed F-Statistic value of 1.84200 is greater than critical table value of 0.17397.
The implication of these outcomes for this study is that there is a unidirectional (one-way) causality between Budget deficit and inflation in Nigeria, with the direction of causality running from Budget deficit to inflation.

4.4 Parsimonious Error Correction Result

Variables	Coefficient	Std. Error	t-Statistic	Prob
Constant	-10.270	3.133	-3.279	0.003***
AI_nM2	46.591	16.746	2.782	0.009***
AInf(-l)	0.196	0.111	1.763	0.087*
Bd	0.917	0.525	1.747	0.089*
ABd(-l)	1.029	0.363	2,837	0.008***
ECM(-l)	-0.694	0.155	-4.483	8.39e-05***
R-Squared	0.480	Mean dependent variable		0.247
Adjusted R-Square	0.401	S.D. dependent Var		17.057
S.E of regression	13.204	Akaike info criterion		317.445
Sumsquared residual	5733.686	Hannana-Quinn Criterion		321.026
Log likelihood	-152.722	Durbin's H Stat *		0.838
F-Statistic	5.471			
Prob (F-Statistics)	0.001			

Note: ***/**/* denote significance at 1%, 5% and 10% levels respectively.
The coefficient of the error correction term is statistically significant given that it has a negative sign. This term confirms the evidence that Budget deficit and money supply accounts for a large share of the explained variation in inflation as stated in our equation. The estimated coefficient shows that 69% of the errors in the short run are corrected in the long run.

5. Policy Recommendations and Conclusion

In this study, an attempt was made to empirically investigate the long-run causal relationship between budget deficit and inflation and also to determine the nature and direction of causality. Employing a muitivariate co-integration econometric technique, the results indicated the existence of long-run relationship between budget deficit and inflation and a unidirectional causality between them with the direction of causality running from Budget deficit to inflation.

Based on this empirical analysis, given that budget deficit is a fiscal phenomenon and budget deficit financing is a monetary phenomenon, there should be an appropriate mix of fiscal policy and monetary policy if the inflationary impact of budget deficit financing is to be minimized. Appropriate policies that will enhance the role of budget deficit without necessarily being inflationary should be instituted. There should be an effective coordination of government policies especially monetary and fiscal policies to enhance their complimentarity. Furthermore, government policies targeted at controlling inflation could be more successful if they are also formulated to target budget deficits reduction. Also, all arms and levels of government should adhere strictly to fiscal discipline if government policies are to be effectively implemented.

Summarily, what should be of utmost concern to policy makers as regards the budget deficit-inflation nexus should not necessarily be the level of fiscal deficits but the channels through which the deficits are financed and the ability of the productive base of the economy to absorb the impact of such financing. Thus, inflation-targeting policies should also aim at bringing about appropriate positive changes in the productive sector if the inflationary tendencies of budget deficit is to be reduced to the barest minimum.

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