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THE ASYMMETRY EFFECT OF BUDGET DEFICIT AND INFLATION IN NIGERIA

Amina Musa GARBA,
Nile University of Nigeria, Abuja,
musagarbaamina@gmail.com

Abstract

This study evaluates the asymmetry effect of budget deficit and inflation in Nigeria spanning 1986 and 2020. The dissertation employed the Non-linear Autoregressive Distributed Lag (NARDL) approach of Shin, Yu and Greenwood-nimmo (2014) to examine the effect of budget deficit on inflation in Nigeria. The study employed annual data on budget deficit (proxied by budget deficit as a share of GDP), money supply (proxied by money supply), inflation (proxied by consumer price index) collected from Central Bank of Nigeria Statistical Bulletin, 2020 edition. The result of the effect of budget deficit on inflation indicates that in the long run, positive change in budget deficit induces inflation. This result indicates that rise in budget deficit is inflationary in Nigeria. Furthermore, the inflationary role of positive change in budget leads to higher price level. In addition, a negative change in budget deficit exerts an inflationary pressure in the long run though insignificant. Based on the findings of our analyses, the study concludes that budget deficit raises money supply and induces inflationary pressure in Nigeria. The study therefore recommends that there is need for the authorities in Nigeria should reduce the cost of governance by reducing overhead and allowance of political office holder in order to reduce budget deficit.

Keywords*: Asymmetry Effect, Budget Deficit, Inflation, Inflationary Pressure, Money Supply, Money Mass.*

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1. Introduction

Conceptually, fiscal estimate of a country is said to be in deficits when government's total expenditures exceed the revenue that it generates. Budget 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, 2015). A budget deficit is regarded by some as a positive economic event. For instance, John Maynard Keynes believed that deficits help countries to climb out of economic recession. On the other hand, fiscal conservatives such as Bailey (1980), Feldstein (1980), Ariyo and Raheem (2019) among others argue that

governments should avoid deficits in favour of a balanced policy. The magnitude of government fiscal surplus or deficit is probably one of the most important statistics used to measure the impact of government fiscal policy on the economy (Siegal, 2017; Tanzi and Blejer, 2018). Budget deficits in Nigeria were generally financed by the excessive borrowing from the banking sector and external sources (NCEMA, 2019). For instance, the Central Bank of Nigeria (CBN) accounted for a large proportion of the financing from the banking sector (CBN, 2021).

Over the years, high fiscal deficit and inflation has been the two key macroeconomic challenges facing several developing countries like Nigeria. High level of inflation stems from not only instruments of monetary policy (money supply, interest rate) but also the effects of fiscal policy (fiscal deficit, government expenditure, etc.) (Nguyen, 2015). Budget deficit is the excess of government spending including interest payment on public debts in a fiscal year relative to its revenue (Bakare *et al.*, 2014; and Oyeleke, 2021). The developing countries like Nigeria experience persistent budget imbalance due to low level of revenue as a result of low tax base, tax evasion and tax rates (Lin and Chu, 2013). Whenever budget imbalance is financed through selling government bonds to public then budget deficits will not create any inflation as no new money is created in the process. However, if borrowing is made from banks, then monetary deposits will expand and causes inflation (Easterly and Schmidt-Hebbel, 1993; and Ishaq and Mohsin, 2015). However, the government can reduce budget imbalance via the aggregate demand component either by increasing tax revenue or by decreasing expenditure (Fasanya, Fajobi and Adetokunbo, 2021).

Theoretically, there are two main views on the interlinkage among budget imbalance, money supply and inflation, namely the fiscal theory of price level and the monetarist theory of inflation. The former holds that that the when government runs consistently on deficit financing, it can trigger higher inflation as such deficits will be financed by money creation (Sargent and Wallace, 1981; Bajo-Rubio, Díaz-Roldán and Esteve, 2009; and Fasanya, Fajobi, Adetokunbo, 2021). Thus, prices adjust to increases in nominal private sector wealth resulting from bond-financed deficits (Tekin and O'zmen, 2003; and Erkam and Çetinkaya, 2014). Contrarily, the monetarists contend that inflation is a fiscal-driven monetary phenomenon, and nominal monetary growth is endogenously determined by the need to finance exogenously given deficit to satisfy the budget constraint (Friedman, 1956; Maitra, 2015; and Apinran *et al.*, 2019).

Money supply is the increase in the quantity of money in circulation (Oyeleke, 2021). Persistent budget deficit financed through credit creation to attain macroeconomic objectives usually raises private sector wealth and demand relative to supply of goods and services leads to higher price and induce inflationary pressure (Cata˜o and Terrones, 2005). Thus, when budget imbalance is financed through money creation, it upsurges money growth which induce inflationary pressure (Dornbusch et al.,1990; and Amassoma, Sunday and Onyedikachi, 2018). According to Abu and Karim (2015), countries where the central bank lacks autonomy or non-independent, it is easier for the government to influence monetary policy and force the central bank to lower interest rates low in order to reduce cost of borrowing and finance budget imbalance which invariably induce inflationary pressure.

Nigerian government is trying to reduce the persistent fiscal deficits by increasing its revenue through increase in tax rate specifically valued added tax. In spite of these concerted attempts, deficit financing has been a foremost policy instrument in fostering growth in Nigeria (Fasanya, Fajobi and Adetokunbo, 2021). Additionally, Nigerian economy has observed the accumulation of public debt which has worsen the undesirable influence of the budget balance on macroeconomic indicators. Data from Central Bank of Nigeria indicates that the value of domestic and external debt was N84.09B and N 298.21B in 1990 and increased to N 898.25B and N 3.097.38B in 2000 respectively. As at 2010, Nigeria domestic debt had increased to N 4551.82B while external debt declined to N 689.84B due to debt relief of 2005. In 2020, domestic and external debt stood at N 16023.89B and N 12705.62B correspondingly as a result of upsurge in budget imbalance. This has invariably impeded the economy by increasing debt servicing costs by this means restraining government resources for productive investment (Nwakobi, Echekoba and Ananwude, 2018).

Empirically, plethora of studies has been conducted on the nexus between budget deficit and inflation with diverse outcomes (Kundrapam and Pattanaik, 2010; Cata˜o and Terrones, 2005; Lin and Chu, 2013; Mohanty and John, 2014; Jalil et al., 2014; Abu and Karim, 2015; Ishaq and Mohsin, 2015; Agoba et al., 2017; Ramu and Gayithri, 2017; Klein and Linnemann, 2020; Tiwari et al., 2015; Ahmad and Aworinde, 2019; Ssebulime and Edward, 2019; Ali and Khalid, 2019, Khan et al., 2020). In Nigeria, few studies have investigated the link between budget deficit and inflation (Olusoji and Oderinde, 2011; Awe and Olalere, 2012; Oseni and Sanni, 2016; Danlami et al., 2019; Apinran et al., 2019; Olaniyi, 2020; and Fasanya, Fajobi and Adetokunbo; 2021). However, these studies considered linear or symmetric modelling of the

linkage between these variables and fail to consider the asymmetric role of budget imbalance on inflation which could lead to model mis-specification of the connection and invalid policy implication especially if the series exhibit nonlinear process. The closest to this is the studies of Abu and Karim (2015) and Olaniyi (2020). Nevertheless, the study of Olaniyi (2020) only considers the asymmetric causality between the two variables and causality result does not give the magnitude and influence of positive and negative changes of budget deficit on inflation and while the study of Abu and Karim (2015) consider nonlinearity between fiscal deficit and inflation in 51 African countries by taking square of fiscal deficit, rather than decomposing fiscal deficit into its positive and negative changes. In addition, any hypothetical deduction drawn from this panel study will only offer overall insight on the nexus between the variables while lacking comprehensive policy inferences for each country (Shahbaz, Hoang, Mahalik, Roubaud, 2017). Thus, taking this asymmetry influence of budget deficit on inflation into account is important because a positive or negative budget deficit on inflation does not have the same impact on inflation. Also, the presence of an asymmetric relationship between budget imbalance and inflation can be caused by oil price because oil revenue is the mainstay.

2. Theoretical Framework

This study is conducted in the context of the Fiscal theory of price level credited to Sims (1994) and Leeper (1991) and quantity theory of money credited to Friedman (1968). Originally, the FTPL fits the relationship between budget imbalance (deficit) and inflation. By extension, the FTPL theory contend that the effectiveness of monetary policy in controlling inflation depends critically on its coordination with fiscal policy (Sargent and Wallace, 1981). The FTPL postulates two regimes, the fiscal and monetary dominance regime. The theory posits that during fiscal dominance regime, monetary authority has limited control of inflation, that is, monetary policy plays a passive role and the central bank may not be able to control the price level. In this regime, inflation is due to fiscal policy since the fiscal authorities compel the monetary authorities to finance its deficits through seignorage (Nguyen, 2015). Hence, contractionary monetary policy becomes ineffective to curtail higher price. Contrarily, during monetary dominance regime, the monetary authority is free to set monetary targets for the current and future periods. In this way, the monetary authority decides the seigniorage income that can be provided to the government and it is up to the fiscal authority to balance the remainder of its budget using bond sales to the public (Ekanayake, 2014). Thus, in this

coordination scheme, inflation is completely under the control of the monetary authority (Sargent and Wallace, 1981).

With regard to the link between money supply and inflation, the quantity theory of money by Friedman (1956) postulates that change in the quantity of money produced a proportional change in the price level output level remains fixed at the full employment. The monetarist posits that price is mainly affected by the money supply growth, while having no real effect on the income growth in the long run (Maitra, 2015). Thus, inflation occurs whenever the growth of monetary mass exceeds output growth. Additionally, Friedman and Schwartz (1963), attributes inflation to currency factors and indicates that money supply exceeding money demand causes and exacerbates raising prices. Due to gap between the government expenditure and revenue which result in negative public saving (budget deficit), governments tend to monetize its deficits and monetary authority is forced to create additional money which induce inflationary pressure (Bekiros et al., 2017).

stability.

3. Empirical Review

To examine the situation of the money supply. Budget deficit and inflation in Pakistan, Chaudhary and Ahmad (1995) collected annual time series data ranging from 1973 to 92. In this study the relationship among fiscal deficit, inflation and money supply is analyzed. The results support for a significant nexus between budget deficit and inflation. The conclusion of this research is that the implementation of monetary policy may be resolute by the central bank but the policy is greatly dependent on the fiscal decisions made by the govt. In order to manage inflationary force, government requirements to cut the mass of budget deficit

A study in Bangladesh by Murshed, Amin and Chadni (2018) estimated the causal link among budget deficit, money supply and inflation. The study established a unidirectional causality from budget deficit to inflation using VECM approach and annual data spanning 1980 and 2014. Working with Vietnam monthly data from 1995 to 2012, Khieu (2014) estimates the dynamic link among budget deficit, money growth and inflation. The empirical result of the study via structural VAR (SVAR) claim that money growth induce inflation whereas budget deficit exerts no influence on money growth and inflation in Vietnam.

4. Method of data Analysis

In order to evaluate the asymmetric effect of budget deficit on inflation in Nigeria, this dissertation will utilize the Nonlinear Autoregressive Distributed Lag (NARDL) approach of Shin, Yu and Greenwood-nimmo (2014). In order to demonstrate that the reaction of inflation to budget imbalance and money mass is nonlinear or asymmetric, this dissertation employs the Nonlinear Autoregressive Distributed Lag (NARDL) approach of Shin, Yu and Greenwood-nimmo (2014) to take into consideration the positive and negative change in budget imbalance and money supply. The choice of this estimation technique is due to the fact that this method has the ability to deal with series that are fractionally integrated, but to the maximum of first difference (i.e. series with combination of I(0) and I(1)). Further, the asymmetric ARDL account for asymmetric adjustment paths of the dependent variable (inflation) response to positive and negative shocks coming from the explanatory variables (budget imbalance) through the asymmetric cumulative dynamic multipliers (Tran, 2018). Also, this technique performs better than other cointegration technique because it differentiates between symmetric cointegration, asymmetric cointegration (Katrakilidis and Trachanas, 2012). Lastly, NARDL technique uses negative (decrease) and positive (increase) partial sum decomposition to model asymmetric nexus between variables and overcome the problem of autocorrelation and endogeneity using appropriate lag length for the variables (Shin et al., 2014 and Shahbaz et al., 2017).

The NARDL short and long run asymmetric model of Eq. [3.4] is specified as:

$$\Delta G_t = \alpha_0 + \gamma G_{t-1} + \vartheta^+ Z^+_{t-1} + \vartheta^- Z^-_{t-1} + \sum_{j=1}^{p} \psi_j \Delta G_{t-j} + \sum_{j=0}^{q} \left(\delta_j^+ \Delta Z^+_{t-j} + \delta_j^- \Delta Z^-_{t-j} \right) + \mu_t$$

The positive and negative partial sums decomposition of Eq. [3.6] - [3.7] is represented by (+) and (–) in Eq. [3.8].

Incorporating Eq. [3.3] into NARDL specification of Eq. [3.8] gives:

$$\Delta CPI_t = \alpha_0 + \gamma CPI_{t-1} + \vartheta^+ BD^+_{t-1} + \vartheta^- BD^-_{t-1} + \sum_{j=1}^{p} \psi_j \Delta CPI_{t-j} + \sum_{j=0}^{q} \delta_j^+ \Delta BD^+_{t-j} + \sum_{j=0}^{q} \delta_j^- \Delta BD^-_{t-j} + \mu_t \quad [3.9]$$

From Eq. [3.9], ϑ^+, ϑ^- are the asymmetric long run coefficient while the asymmetric short run coefficients are represented by ψ, δ^+, δ^-. In addition, the long asymmetric coefficients are

estimated based on $L_m^+ = \vartheta^+ / \gamma$ and $L_m^- = \vartheta^- / \gamma$ for positive and negative budget imbalance. Also, p and q are the optimal lag length for the dependent variables (inflation) and explanatory variable (budget deficit) respectively.

5. Descriptive Statistics of the Variables

Table 5.1: Descriptive Statistics

	BD	MS	CPI	GR	INT
Mean	0.7890	15.8060	19.8437	275306.4	18.5257
Median	0.3603	13.0936	12.0000	252816.3	17.9500
Maximum	5.9953	24.8952	76.7588	385349.0	29.8000
Minimum	-2.6767	8.4642	0.2236	200317.9	10.5000
Std. Dev.	2.1117	5.4090	18.4351	68787.74	3.8068
Skewness	0.7761	0.4010	1.7583	0.3296	0.8884
Kurtosis	3.2673	1.5206	4.9420	1.4355	4.5448
Jarque-Bera	3.6185	4.1298	23.5365	4.2032	8.0855
Probability	0.1637	0.1268	0.0000	0.1222	0.0175

Note 1: BD, MS, CPI, GR and INT denote budget deficit, money supply, inflation, income per capita and interest rate respectively.

Source: Author's Computation using Eviews

The Effect of Budget deficit on inflation in Nigeria

The result of the asymmetric effect of budget imbalance on inflation is presented in Table 4.7.

Table 5.2: NARDL Result on the Asymmetric effect of budget deficit on inflation in Nigeria

Dependent Variable: LCPI				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long run Estimate				
C	5.9829	0.6949	8.6096	0.0000***
LCPI(-1)	0.7581	0.1400	5.4136	0.0000***
BD^+	0.1803	0.0781	2.3062	0.0314**
BD^-	0.0481	0.0871	0.5522	0.5866
Short run Estimate				
$\Delta\ BD^+$ (-4)	-0.6034	0.1519	-3.9712	0.0007***
$\Delta\ BD^-$ (-4)	0.5049	0.1756	2.8754	0.0091***

$\Delta\ BD^{-}$ (-1)	0.5978	0.1880	3.1791	0.0045***
$\Delta\ BD^{+}$ (-1)	-0.5372	0.2002	-2.6820	0.0140**
$\Delta\ BD^{+}$ (-3)	-0.4135	0.1691	-2.4456	0.0234**
R^2	0.8233			
Adjusted R^2	0.7559			
F-statistic	12.230			0.0000***
Long run Coefficient and Asymmetric test				
L_{BD}^{+}	0.2378			0.0000***
L_{BD}^{-}	0.0634			0.0000***
W_{LR}	31.9303			0.0000***
W_{SR}	6.9306			0.0010***

Note 1: BD and LCPI denote budget imbalance and natural logarithm of consumer price index respectively. The negative and positive partial sum are symbolized by "-" and "+"

Source: Author's Computation using Eviews

The result disclosed the effect of positive and negative change in budget deficit on inflation in Nigeria. In the long run, the result in Table 4.7 revealed that positive change in budget deficit induces inflation. Specifically, a 1% increase in budget deficit induces inflation by 0.18%. This result indicates that rise in budget deficit in inflationary in Nigeria. Furthermore, the inflationary role of positive change in budget imbalance supports substantiate the Fiscal theory of price level that fiscal authorities satisfy the immediate budget constraints through the excess money creation, which leads to higher price level. This result validates the findings of Bhat and Sharma (2020) who found that positive change in fiscal deficit induce inflation in India. In addition, the result in Table 4.7 disclosed that a negative change in budget deficit exerts an inflationary pressure in the long run though insignificant. The coefficient of 0.0481 indicates that a 1% fall or reduction in budget imbalance raises price level by 0.048 percent in the long run. This finding is in line with the study of Olaniyi (2020) which found that reduction in budget deficit accumulation does not lead to lower price level in Nigeria.

In the short run, the result revealed that negative change to budget imbalance at lag 1 and 4 is positively related to inflation which suggests that decrease in budget deficit trigger inflationary pressure in the short run. The magnitude of 0.5049 and 0.5978 indicates that reduction in budget deficit will induce higher price by 0.51 and 0.59 percent in the short run. On the other hand, the NARDL result in Table 4.7 disclosed that positive change in budget deficit at lag 1, 3 and 4 are negatively related to price level which implies that rise in budget deficit as a result

of shortfall in government revenue and upsurge in government expenditure will lower price level in the short run. The coefficient value of -0.5372, -0.4135 and -0.6034 suggests that a 1% expansion in budget deficit lower price by 0.53, 0.41 and 0.60 per cent respectively in the short run.

This study evaluates the relationship among budget deficit, money supply and inflation in Nigeria spanning 1986 and 2020 with the view to examine the effect of budget deficit on inflation in Nigeria.

6. Conclusion and Recommendations

Based on the findings of our analyses, the following conclusions are made:

Firstly, since the findings of this study indicates that change in budget deficit raises price level which substantiates the Fiscal theory of price level that fiscal authorities satisfy the immediate budget constraints through the excess money creation, which leads to higher price level. In view of this outcome, the study concludes that budget deficit induces inflationary pressure in Nigeria.

Subsequently this study found that budget imbalance (BD) is positively and significantly linked with money supply in both short and long run. This is conformity with the FTPL hypothesis which contends that budget imbalance financed through printing of money (seigniorage) or borrowing increases money supply in an economy. So, the study concludes that increase in budget deficit raises money supply in Nigeria.

Recommendations

The outcome of this study revealed that change in budget deficit raises price level in Nigeria. On this note, it is recommended that government should revamped and galvanised revenue generation especially tax revenue in order to increase revenue. By doing so, budget imbalance will reduce over time and also inflationary pressure. The study showed that printing of money to finance budget imbalance raises money supply. Therefore, it is recommended that Central Bank of Nigeria should adopt contractionary monetary policy by increasing interest rate and reduce credit to government in order to curb inflationary pressure.

Suggestions for Further Studies

The study extensively analysed the interlinkage amongst budget imbalance, money supply and inflation in Nigeria with the aid of annual data over the period of 1986 and 2020. Further study could consider using quarterly or monthly data to analyse the relationship amongst budget deficit, money mass and inflation. Future research could also be undertaken on comparative analysis amongst budget deficit, money supply and inflation in Nigeria, South Africa and Egypt being the three largest economies.

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