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The macroeconomic implications of deficit financing in Nigeria: 1986 – 2020

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Abstract

The study examines the macroeconomic implications of deficit financing in Nigeria, centrally focused on the causal impact of Domestic and External debts on Nigeria's Gross Domestic Product (GDP) and the Consumer Price Index (CPI) between 1986 and 2020. The Vector Error Correction Model (VECM) applied in the study uncovered a negative short run dynamic effect of domestic debt on real GDP by 0.16%. Having established at least, one cointegrating equation with 9.7% speed of adjustment towards long run convergence, the study also finds a long run positive impact of domestic debt on real GDP by 0.35% and a negative impact on external debt on real GDP by 0.04%. The Vector Autoregressive (VAR) model on the other hand, estimates a positive lagged effect of external debt on real GDP by 0.03%, and a positive lagged effect of domestic debt on the price level by 0.3%. The study overall concludes that deficit financing initially has an adverse implication on economic growth in a short run before a positive effect on domestic growth in a long run provided, they are obtained from domestic sources. However, the negative impact of external debt on real GDP and Government Expenditures raises concerns regarding the efficient allocation of external resources. Hence, the study recommends channeling external sources of deficit financing into more productive sectors of the economy. Policy makers should also propose appropriate contractional fiscal policy initiatives to provide an enabling environment that optimizes government finances.

Keywords*: Budget Deficit, Inflation, Economic Growth.*

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1. Introduction

Deficit financing is a countercyclical fiscal policy initiative that aggregates funds sourced from a budget deficit, where government expenditures exceed revenues, with the intention to ensure macroeconomic stability, and sustainable development in the long run. According to the Central Bank of Nigeria (2013) deficit financing is an initiative that involve

an expansionary fiscal approach, made up of government borrowings, with the anticipation to expand and create a diversified sector that would be large enough to cover up the short comings associated with incurring a deficit, and ensuring economic growth in the process.

The advent of deficit financing in Nigeria was as a result of the reconstruction, reconciliation, and rehabilitation process that occurred during the post-civil war era. As such, government expenditures soared from ₦556 million to ₦904 million (Central Bank of Nigeria, 2014), between 1969 and 1970. The aggressive expansionary fiscal policy was initiated to foster growth in key economic sectors, particularly the agricultural sector, due to the country's labor-intensive market. Capital and land factors were also subsidized at the time, to restore critical infrastructure that was damaged during the civil war.

Over the years there has been an unpopular sentiment towards deficit financing in Nigeria, according to a few scholars. Okunroumu (1993) and Shuaib et al (2015) have argued that such initiatives are unproductive and could incur inflationary pressures regardless of the sector of public allocation. Moreover, the state of the Nigerian economy would be unable to function well in an environment where there is low-capacity utilization, attributed to the shortage foreign exchange, and an inconsistent government structure, which has directly reflected on its policies (Isaksson, 2001).

Nevertheless, deficit financing remains an intricate source of public finance in Nigeria, as evidence would indicate persistent rise in government expenditures, domestic and external debts from an overall rising budget deficit. Data from the Central Bank annual statistical report (2021) depict a rising deficit, from ₦4.7 billion, during the global financial crisis in 2008 to ₦2.2 trillion in 2016, as a result of the spillover effect of the oil crisis that occurred in 2014 (Central Bank of Nigeria, 2018). Deficit in Nigeria has since then, more than doubled, and continues to climb, accumulating up to ₦6.26 trillion in 2022, 3.39% of GDP (PwC Bulletin, 2021). This consist of ₦5.012 trillion net borrowings for both foreign and domestic, ₦1.576 trillion on project-tied bilateral and multilateral loans, and privatization proceeds of ₦90.73 trillion (Tokede, 2022). A significant uptick in government expenditure in Nigeria is commonly experienced, as public spending has been increasing at an annual average of 12.21% since 2001 (Knoema DataHub, 2020), prior to the COVID-19 pandemic. Afterwards, there has been an accelerated rise in government expenditure from ₦10.16 trillion to ₦14.57 trillion (43.4% increase), between 2020 and 2021 (Central Bank of Nigeria, 2021); (PwC Bulletin, 2021).

Consequently, it has direct implications on the price level, as inflation rate depicts 18.24% as at June 2022, an increase in the commodity price level from 15.5% in the previous year (National Bureau of Statistics, 2022), placing it among the 10 worst countries in the world

that is affected by its price levels (World Bank, 2022). They further went on to state that the persistent rise in the inflation rate could potentially push an additional one million Nigerians below the poverty line. In theory, deficit financing exercises control over the size and relationship of government receipt and expenditure in times of macroeconomic uncertainties and significant fluctuations in aggregate demand (Jhingan, 2010). In other words, it is one of the key countercyclical fiscal policy initiatives that is used by the government and regulators to ensure long run macroeconomic stability, in the process, incurring a short run overall budget deficit, principally associated through government borrowings.

However, despite the excessively high debt outstanding that has been incurred over the last few years, primarily allocated towards the expenditure on critical infrastructure that drive key sectors of the domestic economy, there is yet to be any indication that signals improvement. Moreover, studies like Okah, Chukwu & Anawude (2019); Eregha & Mesagan (2020) confirmed significant effect of deficit financing instruments on Nigerian economy. Furthermore, international organizations like the World Bank (2022) have explicitly stated that such interventionist policies could worsen its position and yet, regulators continue to apply such unconventional initiatives to ensure macroeconomic stability.

Although, there have been several studies regarding the impact of incorporating deficit financing on the domestic economy, empirical findings from various authors remain debatable. Furthermore, there aren't many studies that capture recent and significant periods of recorded massive trend fluctuations were recorded such as the implications of the pandemic, oil volatility, Russia-Ukraine war, domestic insecurity, etc. The research study intends to address this gap. It could in turn, assist in rationalizing the application such policy by regulators, going against the recommendations of local and international scholars, as well as to empirically analyze whether this initiative is appropriate for macroeconomic instabilities as it was initially intended for. However, if these problems are not addressed, the country would be misallocating resources that is financed through debt and as such, could worsen the current situation, as postulated by World Bank (2022).

Therefore, the principal purpose of the study is to assess the macroeconomic implications of deficit financing in Nigeria, centrally focusing on establishing a causal relationship between key deficit financing instruments and macroeconomic indicators. The rest of the paper is organized as follows. The literature review will be categorized into the theoretical and empirical framework. The former looks at prior theories that define and specify growth model, as well as theoretical approaches that support various fiscal policy initiatives towards achieving economic stability. The later primarily focuses on prior analyses regarding

the causal relationship between deficit financing instruments and economic growth in general, while specifying the impact of deficit finance on long term economic stability. Next, the methodological framework describes the empirical approach, centred towards deriving a nexus between deficit financing and economic stability. Further data analyses and interpretation will be made subsequently. The final section draws conclusions and derives recommendations based on the research findings.

2. Literature Review

2.1. Theoretical Review

The ideological concept behind deficit financing emanates primarily form neoclassical economic theories that lay emphasis on fiscal policy, price stability, and economic growth. Hence, this section would explore the Keynesian growth theory, Crowding out theory, and the Fiscal Theory of Price Level (FTPL).

Proposed by John Maynard Keynes (1936), the Keynesian framework recommends the appropriate fiscal and monetary targeted towards macroeconomic stability (Levacic & Rebmann, 1982). It essentially advocates public spending, preferably involving deficit in government fiscal budget to stimulate aggregate demand. Under the three-sector model, government expenditure (G) is an additional input in the aggregate income function (Y) consisting of both consumption (C) and investment (I). In the three-sector model, consumption is a function of autonomous (a_0) and income induced spending (bY_d). While the disposable income (Y_d) is a tax deducted income, defined as the combination of lumpsum tax (t_0) and income tax (tY). In other words,

$$Y = a_0 + b(Y - t_0 - tY) + I + G \qquad (2.1)$$

The Keynesian theory view fiscal expansion as having a multiplier effect (k) on aggregate demand and hence economic growth (Bogunjoko, 2004), which is the inverse function of the Marginal Propensity to Save and Marginal Propensity to tax, (i.e., $k = \frac{1}{1-b+bt}$), obtained from (2.1).

The general theory further extends the view of fiscal policy based on the crowding out effect, which refers to to the reduction in private expenditure (investment) caused by an increase in government expenditure, through deficit budgeting via tax cuts, increased money

supply or bond issue (Jhingan, 2010). The crowding out theory states that government resorts to deficit financing by expansionary fiscal initiative to raise national income, while regulating private expenditures. Hence, the fiscal policy will consist of deficit financing, centrally focused on raising interest rates, in the process, reducing the lending capacity of the private sector. This will reduce (crowd-out) private investment spending (Keynes, 1936).

Freidman (1969) emphasizes on the overall effect of deficit financing (either bond, or money financed) on aggregate demand. He explained that bond financed budget deficit would raise the demand for money, raise bank rates in order to regulate the money supply, and eventually crowd out private expenditure in the process. However, because total expenditure remains unchanged, bond financed fiscal policy may have no expansionary effect on national income. On the other hand, money financed deficit would have an expansionary effect, due to excessive liquidity inflows, however, there would be a decline in interest rates, which may not deter crowding out private expenditure.

The Fiscal Theory of Price Level (FTPL) describes policy rules such that price level is primarily determined by government policies, including government debt, expenditure, present and future tax plans, as well as private consumption plans that makes little to no reference to monetary initiatives (Bassetto, 2006). It is an extension to the New Keynesian model that postulate either monetary policy is active while fiscal policy remains passive, and vice versa (Farmer & Zabczyk, 2019). Advocates of the FTPL are on the opinion that in a policy mix, fiscal policies tend to be more active than monetary initiatives. Their rationale is based on the argument that monetary authorities usually peg their interest rate at a certain level and considers public debt outstanding as a debt valuation, rather than a budget constraint (Cochrane, 2005). Although, the idea of establishing equilibria under 'active' and 'passive' policy mixes originated from Leeper (1991), the FTPL framework was initially proposed by Woodford (1995), aimed at determining equilibrium price level using government liabilities, such as return on issued bonds, return on money, and government expenditure, while exogenizing monetary instruments.

Woodford (1995) adopts 3-sector Keynesian general equilibrium equation $y_t \sim f(c_t, g_t)$, where y_t represents real income treated as the quantity of goods the household is endowed, c_t is consumption, and g_t is the government purchases on goods and services (expenditure). A goods-money market equilibrium (IS-LM) function generated based on a pegged interest rate Δ_t, which is already established to have no significant effect on price level.

To provide a budget constraint that establish a relationship between price level and government liabilities, would first, require specifying a money market (LM) equation, such that the demand for m_t is a function of c_t and Δ_t. In other words, $m_t = L(c_t, \Delta_t)$ or $L(y_t - g_t, \Delta_t)$, where L represents the liquidity preference. An intertemporal based version of the goods market is generated from the LM equation.

$$\lambda(y_t - g_t, \Delta_t) = \beta(1 + r_t^b)\lambda(y_{t+1} - g_{t+1}, \Delta_{t+1}) \tag{2.2}$$

$$\frac{W_t}{p_t} = \sum_{t=0}^{\infty} \frac{(\tau_t - g_t) + \Delta_t M_t}{\prod_{j=0}^{t-1}(1 + r_s^b)} \tag{2.3}$$

Equation (2.5) is also viewed as an equilibrium condition that determines p_t given the predetermined nominal value of net government liabilities, W_t at *t* period, considering the current and future values of real quantities and relative prices that fit the expression of the right side of the equation. Thus, price level can be determined by the core fiscal instruments, i.e., expenditures (g_t) real taxes ($\tau_t = \frac{T_t}{p_t}$), nominal money balances M_t, charged at Δ_t interest rates, and the aggregate real rate return of bonds discount factor of $(1 + r_s^b)$.

2.2. Empirical Review

Policy makers and authors (Onwe, 2014), (Umaru A. D., 2017), and (Okolie & Anidiobu, 2020), among others, recognized the accelerating growth rate of deficit financing because of its instrumental application in maintaining long-run macroeconomic stability in Nigeria, and other parts of the world, in the process warranting the necessity of establishing a relationship between associated variables.

By adopting a simple linear regression model, Onwe (2014) sought to investigate the implication of deficit financing on economic growth in Nigeria, between 1970 and 2013. Although, core explanatory variables like external and non-public source of deficit financing had a positive reaction towards the Gross Domestic Product (GDP), however other explanatory variables like ways and means, and the banking system source of deficit financing had a negative impact on GDP. This was independently corroborated by Nwanne (2014), Richard & Ogiji (2016), Nwaeke & Korgbeelo (2016), most especially with regards to the explanatory influence of non-public source of deficit financing, ways of means and control variables like interest rates.

Onuwrah & Nkwazema (2013) adopted a similar empirical approach to analyze the nexus between deficit financing instruments and GDP, instead, captured domestic and external debt as key explanatory variables. Empirical findings confirmed long run effect of deficit financing instruments and economic growth, with at least, 3 cointegrating equations. Moreover, robustness analysis from Granger Causality tests confirmed bi-directional causality between budget deficits and GDP (Onuorah & Nkwazema, 2013). It, therefore, goes to imply that budget crowd-in investment by reducing the effect of interest rates, contradicting the popular beliefs held by the Keynesians and neoclassical philosophy. Although, Osuka & Achinihu (2014) were able to establish at least, one cointegrating relationship (of order 1) between overall deficit and GDP, interest rate, nominal exchange rate, inflation rate, and inflation, however, Granger Causality tests were unable to detect any causality between the associated variables.

Umaru (2017) took a slightly different approach in critically analyzing the impact of deficit financing on price level and economic stability, using disaggregated data and adopting the Autoregressive Distributive lag (ARDL) model, and bounds testing analysis between the years 1980-2016. Empirical findings confirmed no significant impact of deficit financing via external sources and deposit money banks on either indicator. However, those financed through non-banking public sector and the Central Bank of Nigeria (CBN) had a positive impact on inflation and national output at 5% significant level. Ali, Mandara & Ibrahim (2018) arrived at a similar conclusion, using a similar methodological approach and sample space, although, excluding the implications of the price level.

By also applying the ARDL model, Olatunde & Temitope (2017) specified a disaggregated data into the framework on national output, where endogenic factors were categorized according to the five key sectors of the Nigerian economy, form 1981 – 2015. Their results showed that fiscal deficit only had a long run positive effect on output for the industrial sector. Fiscal deficit had a negative impact on all sectors of the economy in the long run, as well as a negative impact on all sectors in the short run.

Okolie & Anidobu (2020) assessed the effect deficit financing on economic growth and development in Nigeria, centrally focusing on the impact on deficit financing from external and non-banking sources on real GDP and per-capita income, between 1986 and 2018. By adopting a structural linear regression model that endogenizes GDP and per-capita income, findings suggest a negative effect of external sources of deficit financing on real GDP and per-capita income. On the other hand, non-banking sources had a positive impact on real GDP and

per-capita income, verifying the usefulness of domestic financing with regards to accomplishing economic development. Similar findings were captured from Nwanna & Umeh (2019), when covering a time period between 1981 and 2016.

Authors like Ezeabasili, Tsegbo & Ezi-Herbert (2014), Umaru & Gatawa (2014) and Abubakar (2016) took a more generalized approach on the empirical analyses relating to the impact of deficit financing on economic growth/ national output by specifying revenue and expenditure shock as contemporaneous exogenous variables, and GDP as the target variables. On one hand, Ezeabasili et al. (2014) opined that expansionary policy and deficit instrument that is inclusive of public expenditures have a negative impact on economic growth. On the other hand, Umaru & Gatawa (2014), Abubakar (2016) applied the Granger Causality technique and Structural Vector Autoregressive (SVAR) model respectively, which they both uncovered revenue and expenditure shocks have a significant positive effect and are inclusive of economic growth, however, findings from Umaru & Gatawa (2014) observed unidirectional causality between government investment spending and output, while Abubakar (2016) suggested that an expansionary fiscal policy possibly contributes to the ongoing rate of unemployment.

Ubi & Inyang (2018) included more macroeconomic indicators, capturing GDP, per-capita income, unemployment, inflation and Balance of Payments (BOP) as control variables in their research study. Likewise, the findings of the study were able to suggest that fiscal deficit was able to impact GDP, per-capita income and BOP stability, closely similar to the findings of Okolie & Anidobu (2020), however, the empirical implications of deficit financing were inclusive of higher inflationary gaps and unemployment (Abubakar, 2016); (Ubi & Inyang, 2018). On the other hand, research findings contradict the findings of Umaru (2017), regarding the perception of deficit financing on price level. It also contradicted the perception of Nkalu (2015); however, the author applied the Seemingly Unrelated Regression (SUR) and the two-stage regression (2SLS) to model the effects of budget deficits on growth, interest rate, and inflation rate in Nigeria and Ghana.

Okoro (2013), Akinmulegun (2014), and Okah, Chukwu & Ananwude (2019) applied the Vector Autoregressive (VAR) model to empirically analyze the instantaneous, dynamic and long run causal impact of various deficit financing instruments on key macroeconomic variables in Nigeria. Okoro (2013) specified trade balances as target /contemporaneous endogenous variable and posits a short run positive impact of budget deficit on trade surplus.

However, a long run positive impact of deficit on trade deficit in Nigeria was uncovered. Akinmulegun (2014) on the other hand, captured real GDP, gross capital formation, real interest rate and inflation as target variables. His findings suggested a negative impact of deficit financing on economic growth. It is independently corroborated by Ezeabasili, et al (2014), Nwamma & Umeh (2019), and Okolie & Anidobu (2020), while contradicting the findings of Umaru & Gatawa (2014) and Abubakar (2016).

Okah, Chukwu & Ananwude (2019) however, could not establish a statistically significant causal relationship between deficit financing and economic growth in Nigeria. Moreover, Momodu & Monogbe (2017) adopted a similar methodological approach to establish a nexus between the overall budget deficit and economic growth in Nigeria. They were able to establish that the lagged value of the annual budget is a contributing factor to the performance of the domestic economy, although, parameter estimates for each lagged variable is substantially low.

Edame & Okoi (2015) performed a comparative analysis between the military regime and the democratic system in Nigeria, pertaining to the impact of incurring a public deficit on economic growth, using the Chow Endogenous break tests and concluded that a fiscal deficit is growth inducing under a democratic system as opposed to a military regime. His analysis was able to highlight the disparities of in the findings of prior literature as a result of rapidly fluctuating and inconsistent initiatives by policy makers that reflect changes in the structure of the domestic government, irrespective of whether the government is military rule or a democratic system.

So far, there is yet to be a collective consensus with regards to the extent deficit financing in Nigeria could affect, or potentially affect macroeconomic stability. Nevertheless, all literature mentioned in this paper, agree that fiscal policy reforms should be considered, specifically with regards to channeling deficit financing towards more productive sectors of the economy.

3. Methodology

To address the objectives of the underlying research study, secondary time series data within a 39-year period, from 1981 - 2020 is obtained from the Central Bank of Nigeria (CBN) Annual Statistical report (2021) and the National Bureau of Statistics (2022).

3.1. Model Specification

In order to fully establish between deficit financing and an overall economic performance, the study would analyse the short run static, dynamic and long run causal relationship between the variables specified. Hence, the Vector Error Correction Model (VECM) is considered to assess dynamic relationship between variables in a short run, the Error Correction (EC) model obtained from the cointegrating equation(s) and VECM to estimate the long run relationship between the contemporaneous variables, and finally, the Vector Autoregressive (VAR) model to determine the causal relationship between variables.

The Vector Autoregressive VAR(*k*) regression model estimates the parameters of $(n \times 1)$ vector time series endogenous variables, and its corresponding cumulative $(n \times n)$ lagged operators, and $(n \times 1)$ unobservable error terms U_t, using the Ordinary Least Square (OLS) method.

$$\begin{pmatrix} \ln RGDP \\ \ln CPI \\ \ln DDO \\ \ln EDO \\ \ln GE \end{pmatrix}_t = \begin{pmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \end{pmatrix}_t + \sum_{i=1}^{k} \begin{pmatrix} \beta_{11} & \beta_{12} & \cdots & \beta_{15} \\ \beta_{21} & \beta_{22} & & \beta_{25} \\ \vdots & & \ddots & \vdots \\ \beta_{51} & \beta_{52} & \cdots & \beta_{55} \end{pmatrix}_i \begin{pmatrix} \ln RGDP \\ \ln CPI \\ \ln DDO \\ \ln EDO \\ \ln GE \end{pmatrix}_{t-i} + \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{pmatrix}_t \tag{3.1}$$

Where $\ln RGDP_t$ is the natural long of the real gross domestic product, $\ln CPI_t$ represent the natural log of the consumer price index, $\ln DDO_t$ and $\ln EDO_t$ are the domestic and external debt outstanding respectively, and $\ln GE_t$ is the government expenditure. Data on all variables are measured in the country's local currency unit (i.e., NGN). The consumer price index, however, is recorded at 100 units for the base year 2009 (i.e., 2009 = 100). $\beta_{10t}, \beta_{20t} \ldots \beta_{50t}$ denote the y-intercept for each corresponding dependent variable; k is the lag order for parameters $\beta_{11i} \ldots \beta_{55i}$ pre-determined based on the recommendations of the FPE, AIC, SBIC and HQIC for lag selection. $\mu_1, \mu_2 \ldots \mu_5$ are the residual error terms. The VECM(*k -1*) is therefore, specified by taking the first difference of (3.1).

$$\begin{pmatrix} \ln \Delta RGDP \\ \ln \Delta CPI \\ \ln \Delta DDO \\ \ln \Delta EDO \\ \ln \Delta GE \end{pmatrix}_t = \begin{pmatrix} \varphi_{10} \\ \varphi_{20} \\ \varphi_{30} \\ \varphi_{40} \\ \varphi_{50} \end{pmatrix}_t + \sum_{i=1}^{k-1} \begin{pmatrix} \beta_{11} & \beta_{12} & \cdots & \beta_{15} \\ \beta_{21} & \beta_{22} & & \beta_{25} \\ \vdots & & \ddots & \vdots \\ \beta_{51} & \beta_{52} & \cdots & \beta_{55} \end{pmatrix}_i \begin{pmatrix} \ln \Delta RGDP \\ \ln \Delta CPI \\ \ln \Delta DDO \\ \ln \Delta EDO \\ \ln \Delta GE \end{pmatrix}_{t-i} + \begin{pmatrix} \gamma_1 \\ \gamma_2 \\ \gamma_3 \\ \gamma_4 \\ \gamma_5 \end{pmatrix} EC_{t-1} + \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{pmatrix}_t \quad (3.2)$$

$\varphi_{10t}, \dots \varphi_{50t}$ denote the $(n \times n)$ short run dynamic coefficient of the vector's adjustment into a long run equilibrium for the *i*th lag, while $\gamma_{10t}, \dots \gamma_{50t}$ represents the $(n \times 1)$ vector series' speed of adjustment parameter for long run convergence. Hence, the EC term obtained from (3.2) after confirming a cointegrating relationship is specified as follows.

$$EC_{t-1} = +\ln RGDP_{t-1} + \delta_1 \ln CPI_{t-1} - \delta_2 \ln DDO_{t-1} - \delta_3 \ln EDO_{t-1} - \delta_4 \ln GE_{t-1} \quad (3.3)$$

3.2. Model Justification

The application of the VAR(*k*) and the VECM(*k – 1*) models are considered due to its relevance modern macroeconomics (Del Negro & Schorfheide, 2010) as it is especially useful in analysing the dynamic behaviour of arrays of time-series data and identifying causal relationships between one variable and another lagged variables (Zivot & Wang, 2006). Moreover, it is supported by the theoretical analyses discussed in the previous chapter, as their propositions were justified through the application of linear models.

The model includes 5 endogenous variables, including 2 target variables. $\ln RGDP_t$ is defined as the aggregate value of goods and services adjusted for inflation at *t* period, while $\ln CPI_t$ measures the overall change in prices based on a basket of commodities for *t* period (National Bureau of Statistics, 2022). Variables represent the macroeconomic indicators and are treated as the contemporaneous endogenous variables. $\ln DDO_t$ and $\ln EDO_t$ proxy the domestic and external sources of deficit finance in Nigeria at *t* period, as such, treated as the

contemporaneous exogenous (explanatory) variables. $\ln GE_t$ is a control variable that would include aggregate public spending at *t* period.

Pre-estimation and post-estimation diagnostics need to be conducted in order to ensure that the fundamental assumptions of the VAR(*k*) and VECM(*k – 1)* models hold. First, unit root tests were carried out to check for stationary series for each variable, using the Augmented Dickey Fuller (ADF) and Philips Peron (PP) methods. Next, the Johansen cointegration technique was applied to check for long run relationship between variables in the equation. Verifying cointegration would enable the application of the Vector Error Correction Model (VECM) to determine the speed of adjustment from a short run to a long run equilibrium. The Jarque-Berra tests, Skewness and Kurtosis distribution tests is applied to check for normal distribution, and the Lagrange Multiplier (LM) test for autocorrelated residual error terms. For robustness, Wald test granger causality to analyse causal relationships and impulse response function was carried out for the VAR model to show the shock effect on variance.

4. Empirical Analysis

4.1. Analysis for Stationarity and Optimal Lag Selection

The study would need to determine the maximum lag length required for the optimal dimensionality of the parameterization of the specified VAR(*k*) model in equation (3.1), by using the recommendations of different order criteria, summarized in the table below.

Table 4.1: Selection Order Criteria

Lag (*k*)	LR	df	FPE	AIC	HQIC	SBIC
0	-	-	1.6×10^{-4}	5.4487	5.5255	5.6687
1	463.37	25	1.7×10^{-9}	-6.0337	-5.7316	-4.7141*
2	54.329	25	1.6×10^{-9}	-6.1539	-5.3096	-3.7347
3	77.734	25	9.4×10^{-10}	-6.9244	-5.6962	-3.4051
4	108.29*	25	$3.1 \times 10^{-10}*$	-8.5435*	-6.9315*	-3.9249
Endogenous variables: $\ln GDP$, $\ln CPI$, $\ln DDO$, $\ln EDO$, $\ln GE$ * Best fit for specified lagged length Source: Author's compilation from Stata (2022)						

While the Schwarz Bayesian Information Criteria (SBIC) recommends a maximum of $k = 1$ lag as the best fit for the specified VAR(*k*) regression model, all other criteria, i.e., the Final Prediction Error (FPE), the Akaike Information Criteria (AIC), and the Hannan-Quinn Information Criteria (HQIC) recommend $k = 4$ as the optimal lag length to best fit the model.

The Likelihood Ratio (LR) test also corroborates this recommendation. Hence, the study will accept $k = 4$ lags, based on the recommendations of AIC, HQIC, FPE and LR tests.

Table 4.2: Unit Root Tests

t-statistic	Augmented Dickey Fuller (ADF)		Philips Peron (PP)	
Variable	Base level I(0)	1st difference I(1)	Base level I(0)	1st difference I(1)
$\ln RGDP$	-1.041	-3.996***	0.451	-3.667***
$\ln CPI$	-1.673	-3.249**	-1.550	-3.655***
$\ln DDO$	-1.560	-3.465***	-1.863	-4.621***
$\ln EDO$	-1.526	-3.520***	-2.547	-4.810***
$\ln GE$	-1.554	-4.252***	-1.232	-7.417***
Note: Lag length selection based on AIC, SBIC & HQIC recommendations *, **, *** statistical significance at 10%, 5% & 1% respectively H_0: Unit root presence Source: Author's compilation from Stata 16 (2022)				

Although, results from both ADF and PP could not reject unit root presence at I(0), however stationarity was confirmed for all endogenous variables at I(1), statistically significant at less than 5% for all endogenous variables. Verifying stationarity at first difference that could further imply cointegrating equations between variables and long run relationship.

Table 4.3: Johansen tests for Cointegration

Max. rank (r)	Eigen value	Trace	Critical Value	Max-Eigen	Critical Value
0	-	180.43	68.52	98.15	33.46
1	0.9346	82.28	47.21	46.59	27.07
2	0.7259	35.68	29.68	20.63	20.97
3	0.4362	15.05*	15.41	10.12*	14.07
Note: H_0: No cointegration * Do not reject null hypothesis at 5% significance level Source: Author's compilation from Stata 16 (2022)					

The Johansen technique was applied to check for cointegrating equations, determining whether the model has a long run relationship. Both the Trace and Maximum-Eigen statistics confirmed a maximum of three (3) cointegrating equations in the underlying VAR(*k*) regression model, as the null hypothesis of no integration at r =0, r = 1, and r = 2 were rejected at 5% significant level. It, therefore, implies that there exists a long run relationship between the endogenous variable. Hence, confirming cointegration would enable the generation and estimation of the VECM(*k -1*) model to determine the short-run dynamic causal and long run relationship between variables.

4.2. Discussion of Findings

Table 4.4: Vector Error Correction Model (VECM)

Variables	$\Delta \ln RGDP_t$	$\Delta \ln CPI_t$	$\Delta \ln DDO_t$	$\Delta \ln EDO_t$	$\Delta \ln GE_t$
EC_{t-1}	-0.0972 (0.03)***	-0.0174 (0.13)	0.1264 (0.16)	1.3810 (0.44)***	0.8194 (0.11)***
$\Delta \ln RGDP_{t-1}$	0.1847 (0.18)	-0.6046 (0.79)	-0.3930 (0.98)	1.9791 (2.66)	3.4651 (0.65)***
$\Delta \ln RGDP_{t-2}$	-0.1257 (0.18)	-0.1620 (0.79)	1.1449 (0.97)	5.433 (2.64)**	0.5399 (0.64)
$\Delta \ln RGDP_{t-3}$	-0.1925 (0.15)	0.1958 (0.68)	0.4110 (0.83)	-4.6391 (2.25)**	1.1584 (0.55)**
$\Delta \ln CPI_{t-1}$	0.1032 (0.07)	0.4524 (0.32)	-0.5559 (0.39)	-2.660 (1.07)**	-0.9537 (0.26)***
$\Delta \ln CPI_{t-2}$	0.1318 (0.06)**	0.2715 (0.28)	0.1413 (0.33)	-0.2787 (0.90)	-0.8618 (0.22)***
$\Delta \ln CPI_{t-3}$	0.0338 (0.07)	-0.0456 (0.28)	-0.4815 (0.35)	-2.910 (0.95)***	-1.1423 (0.23)***
$\Delta \ln DDO_{t-1}$	-0.1615 (0.05)***	0.3301 (0.28)	0.1700 (0.27)	1.6897 (0.74)**	-0.0258 (0.18)
$\Delta \ln DDO_{t-2}$	-0.0429 (0.05)	0.0199 (0.22)	0.2417 (0.27)	0.8047 (0.74)	0.7948 (0.18)***
$\Delta \ln DDO_{t-3}$	-0.0649 (0.05)	0.1672 (0.22)	0.1316 (0.27)	0.1721 (0.72)	0.4986 (0.18)***
$\Delta \ln EDO_{t-1}$	0.0203 (0.01)	0.3097 (0.56)	-0.0129 (0.07)	0.2558 (0.19)	-0.0084 (0.18)
$\Delta \ln EDO_{t-2}$	-0.0078 (0.01)	-0.0454 (0.06)	0.0016 (0.07)	-0.1678 (0.19)	-0.1333 (0.05)***
$\Delta \ln EDO_{t-3}$	0.0106 (0.01)	0.0556 (0.05)	-0.0016 (0.07)	-0.2279 (0.18)	-0.0059 (0.04)
$\Delta \ln GE_{t-1}$	-0.1746 (0.06)***	-0.0179 (0.27)	0.4107 (0.33)	1.3785 (0.91)	1.1624 (0.22)***
$\Delta \ln GE_{t-2}$	-0.0889 (0.05)*	0.3747 (0.22)*	0.4339 (0.27)	1.5241 (0.72)**	1.3358 (0.18)***
$\Delta \ln GE_{t-3}$	0.0581 (0.04)	-0.0591 (0.17)	0.2046 (0.21)	1.1698 (0.58)**	0.7873 (0.14)***
φ_{0t}	0.0662 (0.02)***	0.0055 (0.09)	0.2120 (0.11)	0.1075 (0.29)	-0.1764 (0.07)**
R^2	0.8663	0.8508	0.7763	0.6554	0.9331
Jarque-Berra	1.694	4.053	0.362	102.09***	2.099
Skewness	-0.466	0.724*	0.214	-1.911***	-0.551
Kurtosis	3.509	3.777	2.757	10.311***	2.572
LM_{t-1}	20.8041	Note: Lag length selection based on FPE, AIC, & HQIC recommendations ( ) standard errors *, **, *** reject H_0 at 10%, 5% & 1% significant level respectively Source: Author's compilation from Stata 16 (2022)			
LM_{t-2}	21.9454				
LM_{t-3}	20.7296				

The table (4.4) above, summarizes the parameter estimates of the VECM(*k – 1*) model specified in equation (3.2). The only viable estimate uncovered from the *EC* parameter comes from the change in real GDP (i.e., $\ln \Delta RGDP_t$), which indicated 9.7% speed of adjustment to a long run equilibrium, statistically significant at less than 1% level. Although, the consumer price index ($\ln \Delta CPI_t$) depicts 1.7% adjustment rate, the parameter is statistically insignificant. Other significant findings are as follows.

The rate of change of price level and domestic debt outstanding ($\ln \Delta CPI_{t-1}, \ln \Delta DDO_{t-1}$), have a causal impact on Nigeria's real GDP by 0.13%, -0.16%, at less than 5% significant level. Government expenditure ($\ln \Delta GE_t$) also depict a negative impact on economic growth by 0.17%, at less than 1% significant level for the first lag. The underlying regression model did not establish any causal influence on the price level, aside from public expenditure, which has an influence on the domestic price level by 0.37%, only at less than 10% significant level. Empirical findings also suggest a short run dynamic impact of the lagged differences of real GDP ($\ln \Delta RGDP_{t-2}$, $\ln \Delta RGDP_{t-3}$), price level ($\ln \Delta CPI_{t-1}$, $\ln \Delta CPI_{t-3}$), domestic debt (($\ln \Delta DDO_{t-1}$, and government expenditure ($\ln \Delta GE_{t-2}$, $\ln GE_{t-3}$) on external debt outstanding ($\ln \Delta EDO_t$), by 5.43%, -4.64%, -2.66%, -2.91%, 1.52%, and 1.17% respectively, at less than 5% significant level. Lastly, the short run dynamic shift of public expenditure is influenced by the changes in real GDP by 3.46% and 1.16%, price level by -0.95%, -0.86% and -1.14%, domestic debt by -0.79% and 0.49%, as well as the external debt incurred by -0.13%. Empirical results could not establish the causal influence of domestic debt outstanding on any of the other endogenous variables. Overall, analyses from the VECM(*k -1*) model showed a bidirectional causal relationship between real GDP, price level, and government expenditure, while indicating a unidirectional causal relationship between the target, explanatory, and control variables.

The Jarque-Berra, Skewness and Kurtosis test were able to confirm normal distribution across the VEC system except for external debt. LM tests confirm absence of autocorrelated residuals for all three lags. Moreover, the coefficient of determination (R^2) indicated high explanatory power for all equations in the model specified in equation (3.2), implying the system is correctly specified.

The only justifiable *EC* parameter suggest the cointegrating equation to select real GDP as the contemporaneous endogenous variable, as indicated in equation (3.3). Hence, the parameter estimates for long run relationship is depicted as follows.

$$EC_{t-1} = 21.37 + \ln RGDP_{t-1} + 2.14\ln CPI_{t-1} + 0.35\ln DDO_{t-1} - 0.04\ln EDO_{t-1} - 2.51\ln GE_{t-1}$$

[0.130]*** [0.079]*** [0.019]** [0.149]***

(4.1)

As illustrated, there is a significant impact of consumer price index, and the proxied deficit finance indicators on domestic growth at less than 5% level. While price level and domestic debt contribute to 2.14% and 0.35% respectively to the real GDP, external debt and government expenditure have a negative impact on real GDP BY 0.04% and 2.51% respectively in the long run, assuming all other variables to be constant.

Table 4.5: Vector Autoregressive Model (VAR)

Variables	$\ln RGDP_t$	$\ln CPI_t$	$\ln DDO_t$	$\ln EDO_t$	$\ln GE_t$
$\ln RGDP_{t-1}$	0.7288 (0.13)***	-0.5442 (0.54)	-0.8235 (0.80)	5.7635 (2.07)***	3.4908 (0.49)***
$\ln RGDP_{t-2}$	0.1636 (0.17)	-0.4852 (0.74)	2.2903 (1.09)**	-0.9649 (2.80)	-1.8914 (0.67)***
$\ln RGDP_{t-3}$	-0.1454 (0.16)	0.8086 (0.66)	-0.5048 (0.97)	-7.3219 (2.50)***	0.5471 (0.59)
$\ln RGDP_{t-4}$	0.1454 (0.09)	-0.4673 (0.41)	-0.4213 (0.61)	1.7404 (1.58)	-0.9935 (0.37)***
$\ln CPI_{t-1}$	-0.0539 (0.04)	0.7472 (0.16)***	-0.2041 (0.24)	-0.3591 (0.61)	0.8364 (0.14)***
$\ln CPI_{t-2}$	0.1318 (0.06)**	-0.4686 (0.22)**	0.6855 (0.33)**	1.9744 (0.84)**	0.153 (0.19)***
$\ln CPI_{t-3}$	-0.9448 (0.05)*	-0.0908 (0.22)	-0.5729 (0.33)*	-2.4947 (0.84)***	-0.3079 (0.19)
$\ln CPI_{t-4}$	-0.4934 (0.04)	-0.0677 (0.15)	0.3548 (0.22)	2.7574 (0.58)***	1.0551 (0.14)***
$\ln DDO_{t-1}$	-0.1966 (0.03)***	0.3051 (0.14)**	0.9795 (0.20)***	2.1643 (0.53)***	0.1294 (0.12)
$\ln DDO_{t-2}$	0.011 (0.05)	0.0179 (0.21)	-0.0695 (0.31)	0.5704 (0.79)	0.5813 (0.19)***
$\ln DDO_{t-3}$	0.0202 (0.04)	0.0615 (0.15)	-0.0217 (0.23)	-1.0318 (0.59)*	-0.1924 (0.14)
$\ln DDO_{t-4}$	0.0415 (0.03)	0.2224 (0.13)*	-0.1894 (0.19)	0.5929 (0.51)	-0.55 (0.12)***
$\ln EDO_{t-1}$	0.0289 (0.01)***	0.0010 (0.04)	0.0070 (0.05)	0.8877 (0.14)***	-0.0036 (0.03)
$\ln EDO_{t-2}$	-0.0174 (0.01)	-0.0678 (0.05)	0.0265 (0.07)	-0.4208 (0.19)**	-0.1085 (0.03)*
$\ln EDO_{t-3}$	0.0019 (0.01)	0.0631 (0.05)	-0.0454 (0.07)	0.1005 (0.19)	0.0708 (0.05)

$\ln EDO_{t-4}$	-0.0059 (0.009)	0.0251 (0.04)	0.0275 (0.05)	0.0285 (0.14)	0.0542 (0.03)*
$\ln GE_{t-1}$	0.2154 (0.03)	0.0969 (0.12)	0.0455 (0.18)	-1.1919 (0.47)**	-0.0243 (0.11)
$\ln GE_{t-2}$	0.0978 (0.02)***	0.3784 (0.11)***	0.1436 (0.16)	-0.2516 (0.40)	0.2817 (0.09)***
$\ln GE_{t-3}$	0.1707 (0.02)***	-0.1176 (0.12)	-0.1088 (0.18)	-0.6305 (0.47)**	-0.3882 (0.11)***
$\ln GE_{t-4}$	-0.0065 (0.02)	-0.0231 (0.10)	-0.1846 (0.15)	-1.4312 (0.39)***	-0.7249 (0.09)***
β_{0t}	-1.7496 (0.87)**	-1.8387 (3.68)	-6.9621 (5.42)	61.1222 (14.01)***	9.2379 (3.3)***
R^2	0.9991	0.9988	0.9976	0.9726	0.9972
Jarque-Berra	0.746	1.104	1.200	23.978***	1.504
Skewness	0.027	0.335	0.014	9.135***	0.899
Kurtosis	0.719	0.769	1.187	14.843***	0.605
LM_{t-1}	35.6733	Note: Lag length selection based on FPE, AIC, & HQIC recommendations ( ) standard errors *, **, *** reject H_0 at 10%, 5% & 1% significant level respectively Source: Author's compilation from Stata 16 (2022)			
LM_{t-2}	24.3370				
LM_{t-3}	32.3102				
LM_{t-4}	21.8044				

The VAR(*k*) model estimates the static causal relationship between the treated variables at different lag periods. The above table (4.5) provides the parameter estimates of the specified model in equation (3.1). The significant estimates of the underlying regression model can be summarized as follows.

All deficit finance indicators treated in the study (i.e., $\ln DDO_{t-1}$, $\ln EDO_{t-1}$, $\ln GE_{t-2}$, $\ln GE_{t-3}$) have causal implications on Nigeria's real GDP by -0.19%, 0.03%, 0.09%, and 0.17% respectively. The price level ($\ln CPI_{t-2}$) is also a contributing factor to the real GDP by 0.13%. Estimates are statistically significant at less than 5% level. Domestic debt ($\ln DDO_{t-1}$) and public expenditure ($\ln GE_{t-2}$) also have positive causal effect on Nigeria's price level by 0.3% and 0.38% respectively, and conversely, economic indicators specified have a causal impact on the domestic debt by 2.29% ($\ln RGDP_{t-2}$) and 0.68% ($\ln CPI_{t-2}$), as well as the external debt by 5.76% ($\ln RGDP_{t-1}$), -7.32% ($\ln RGDP_{t-2}$), and 1.97% ($\ln CPI_{t-2}$), -2.49% ($\ln CPI_{t-3}$), 2.76% ($\ln CPI_{t-4}$) at less than 5% significant level. Furthermore, domestic debt and public spending has a significant (less than 5%) impact on external deficit, by 2.16% for $\ln DDO_{t-1}$ and -1.19%, -0.63%, -1.43% for $\ln GE_{t-2}$, $\ln GE_{t-3}$ and $\ln GE_{t-4}$ respectively. Finally, the first, second, and fourth lagged difference of real GDP and price level have a causal impact on public expenditure, by 3.49%, -1.89%, -0.99% for real GDP, and by 0.84%, 0.15%, and 1.05% for the price level at less than

1% significant level. The second and fourth lags of domestic debt outstanding also have less than 1% statistically significant causal effect on public expenditure by 0.58% and -0.55% respectively. Overall, the VAR(*k*) model suggest bidirectional causality between real GDP and each deficit finance instrument, price level and government spending, as well as domestic, external debt and government spending. A unidirectional causal effect is also indicated between all other endogenous variable treated in the study.

Similar to what was depicted in the VECM results, the post-estimation diagnostics of the VAR model indicate stationary endogenous variables across the system equation (except for $\ln EDO_t$) from the Jarque-Berra, Skewness, Kurtosis tests, and little to no evidence of serially correlated residuals obtained from the LM tests in all four lags. The coefficient of determination (R^2) also showed high explanatory power of the underlying regression model.

The key emphasis that need to be noted in the underlying findings can be summarized as follows. The short-run dynamic shift in domestic debt and government expenditure has a negative effect on real GDP by 0.16% and 0.17% respectively with a 9.72% speed of adjustment to a long-run equilibrium. Evidence also indicates a positive effect of external debt on real GDP by 0.03% at the initial period. Hence, deficit financing from domestic sources has a negative impact on real GDP, while positive from external sources. While there is no evidence to suggest external deficit has an effect on the domestic price level, financing from domestic debt, however, raises price levels by 0.3% at the initial period. In the long run however, domestic debt has a positive influence on real GDP by 0.35%, while external debt and government expenditure has a negative impact on real GDP by 0.04% and 2.54%.

4.3. Robustness

The study conducts robustness analyses post estimation to corroborate the interpretations found in the underlying regression model and provide additional information pertaining to the research objective. Hence, this section would conduct the Wald tests for Granger Causality and simulate an Impulse-Response Function (IRF) analysis for robustness.

Table 4.6: Granger Causality Wald tests

Equation	Excluded Variable	Wald (χ^2)
$\ln RGDP_t$	$\ln CPI_t$	20.272***
	$\ln DDO_t$	55.668***
	$\ln EDO_t$	16.55***
	$\ln GE_t$	57.875***
	ALL	143.83***
$\ln CPI_t$	$\ln RGDP_t$	13.146**
	$\ln DDO_t$	22.334***
	$\ln EDO_t$	9.436*
	$\ln GE_t$	17.452***
	ALL	111.12***
$\ln DDO_t$	$\ln RGDP_t$	10.211**
	$\ln CPI_t$	4.938
	$\ln EDO_t$	0.463
	$\ln GE_t$	3.169
	ALL	35.495***
$\ln EDO_t$	$\ln RGDP_t$	25.923***
	$\ln CPI_t$	25.275***
	$\ln DDO_t$	35.242***
	$\ln GE_t$	27.203***
	ALL	68.942***
$\ln GE_t$	$\ln RGDP_t$	109.63***
	$\ln CPI_t$	98.445***
	$\ln DDO_t$	57.782***
	$\ln GE_t$	27.613***
	ALL	205.87***
Note: 16 degrees of freedom for each input equation ***,**,* reject H_0 at 1%, 5% and 10% significant level respectively Source: Author's compilation from Stata 16 (2022)		

The Chi-square results obtained from the Granger Causality tests as shown in the table above presents statistically significant bi-variate granger causality between most endogenous variables treated in the study. An exception is the domestic debt outstanding ($\ln DDO_t$), that depict univariate causality between variables. In other words, while the domestic debt outstanding granger causes $\ln CPI_t$, $\ln EDO_t$, and $\ln GE_t$ do not granger cause $\ln DDO_t$. However, the above result also indicates bi-variate causal relationship between domestic debt and real GDP.

Prior parameter estimates obtained from the VECM($k-1$) and the VAR(k) models were unable to present little to no significant causal relationship between certain variables, most especially the implication of incurring a deficit from external sources on the macroeconomic indicators and other expansionary instruments specified in the model. The Wald Granger

Causality statistical inferences was able to detect higher explanatory power, with regards to the influence of the external debt in the domestic economy.

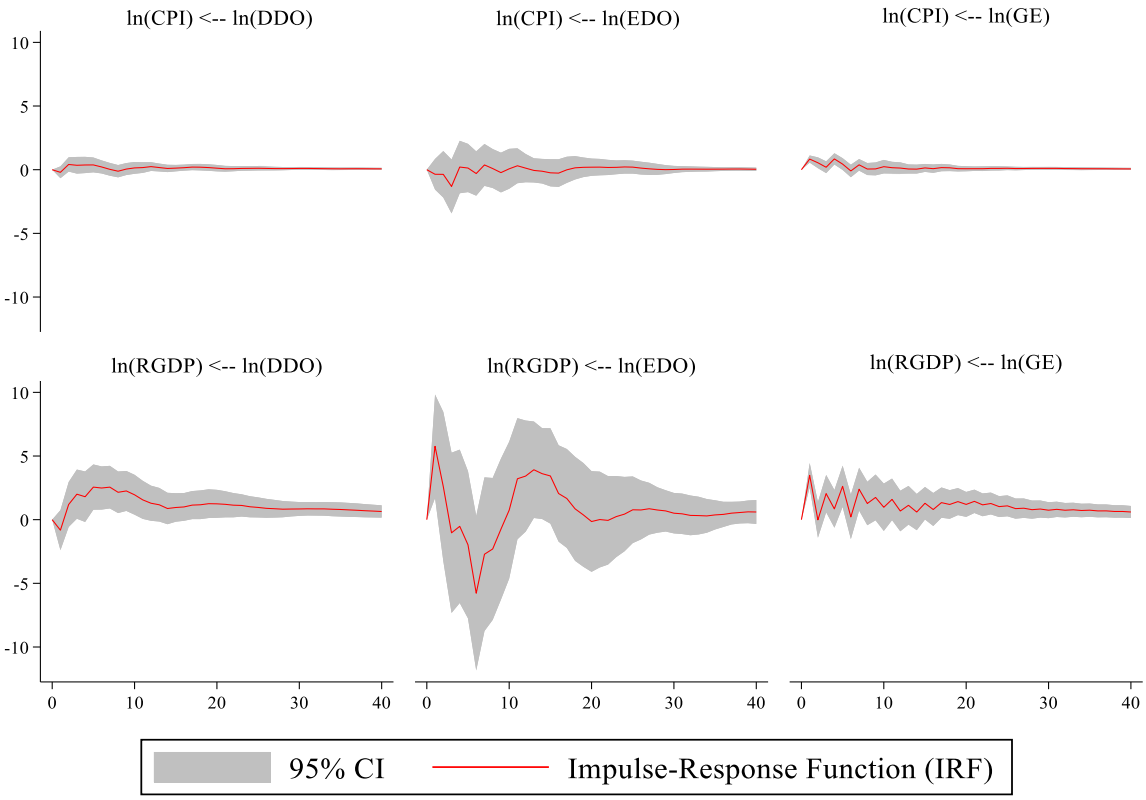

Figure 4.1: Orthogonalized Impulse Response Function (IRF)

Source: Author's compilation from Stata 16 (2022)

The Impulse Response Function (IRF) as illustrated in the above representation (figure 4.1) depict the overall standard deviation shock effect of debt outstanding and government expenditure on Nigeria's economic growth and price level. Higher volatility is mostly concentrated between the first and tenth lag, before stabilizing from the 20th lag.

Similar to what was uncovered in the prior analyses, the standard deviation shock effect between the deficit indicators and the price level shows a relative inactivity, signaling no significant influence of deficit financing on the price level in the long run. On the other hand, debt outstanding and government expenditures could incur inflationary pressures in the short term. The standard deviation shock effect of debt outstanding and government expenditure signals a relatively higher volatility on real GDP in a short run, which could eventually spillover on a long-term basis.

Hence, the most important point obtained from the above illustration is deficit financing could have relatively unstable implications on the domestic economy regardless of its level of

necessity, more so on the GDP than inflation, hence the need for such initiatives to be properly managed.

5. Conclusion and Recommendations

The principal purpose of the study sought to investigate the macroeconomic implications of deficit financing in Nigeria, from 1986 – 2020. It captured the real Gross Domestic Product and the Consumer Price Index to proxy key macroeconomic indicators, as well as Domestic and External Debt Outstanding to proxy the sources of deficit finance, alongside Government Expenditure as a control variable to capture other form of deficit finance instrument that reflect on the country's expansionary initiatives.

The study found that deficit financing from domestic sources have a negative effect on the Nigerian economic growth in the short run, and a positive effect on domestic growth in a long run. Deficit financing from external sources and overall fiscal expansion on the other hand, have positive implications initially, it incurred negative implications on the Nigerian economy in the long run. Although, research findings did not depict evidence of long run implications of deficit financing on the price level, there were however, signals of expansionary fiscal instruments widen inflationary gaps. The underlying findings independently corroborates prior studies like Onuwrah & Nkwazema (2013), Umaru (2017), Nwanna & Umeh (2019), and Okolie & Anidibu (2020), while contradicting Ezeabasili, Tsegbo & Ezi-Herbert (2014), and Onwe (2014) Abubakar (2016) and Okah, Chukwu & Anwade (2019). Research findings support Woodward (1995) Fiscal Theory of Price Level, however, does not support either of the neoclassical growth theories.

The study recommends channeling deficit financed resources to more productive sectors of the economy, such as the industrial sector as initially proposed by Olatunde & Temitope (2017). The study also recommends contractionary policy initiatives that would be better suited in financing critical infrastructure that would improve key economic sectors, generate income which would enable macroeconomic stability in the long run, without being overly reliant on government borrowings.

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