CBN Journal of Applied Statistics Vol. 14 No. 2 (December 2023) 103-131

External Debt Pass-through to Inflation in Nigeria

Emmanuel A. Asue[1,2] and **James V. Ikyaator**[1]

This study examines external debt pass-through to inflation in Nigeria using annual data from 1981 to 2020 based on structural vector autoregressive (SVAR) model. The results reveal that an increase in external debt service leads to a significant depreciation of the exchange rate, which leads to a contemporaneous increase in inflation, while the direct response of inflation to external debt is statistically not significant. The impulse response confirms these results. The forecast error variance decomposition depicts that future values of official exchange rate depend on external debt, inflation and external debt service. The study recommends that the Nigerian government should curtail its acquisition of external loans as much as possible and widen the tax net to ensure that all taxable citizens obey their tax obligations.

Keywords: External debt, external debt service, exchange rate, inflation.
JEL Classification: H63, F34 O24, E31
DOI: 10.33429/Cjas.14223.5/5

1. Introduction

The ever-expanding government expenditure for the provision of law and order as well as the apparent need for critical infrastructure in the face of capital deficiency has pushed developing economies to borrow externally. According to Ezeabasili (2006) and Momodu (2012), less developed countries (LDCs) need these loans to fill the savings-investment gap. However, Calderón and Fuentes (2013) opined that, except where there are sound domestic debt management policies, public debt exerts negative impacts on the economy. There are, however, mixed results about the effects of external debts on Nigeria's economy. Nwannebuike *et al.* (2016), Isibor *et al.* (2018) and Festus and Saibu (2019) report that external debts are inimical to Nigeria's economic progress, while Odubuasi *et al.* (2018), Mba *et al.*(2013) and Sulaiman and Azeez (2012) show results that favour external debts in Nigeria. However, Essien *et al.* (2016) and Natagwandu *et al.* (2021), found no significant effect of external debt on inflation in the economy.

In 2005, Nigeria benefited from the Paris Club partial debt relief resulting in decline in external debt to 12.96 billion USD in 2006 but rose to 15.48 billion USD in 2007 and reached 76.21 billion USD in 2021 (World Bank, 2023a). Although, external

[1]Department of Economics, Benue State University, Makurdi.
[2]Corresponding author: asueemma@gmail.com

debt service fluctuated between 2007 and 2013; about 4.55 billion USD was spent on external debt service in 2014 and 1.60 billion USD in 2015. Following the accumulation of more debts, external debt service obligations rose steadily from 2.49 billion USD in 2016 to reach 8.54 billion USD in 2021 (World Bank, 2023b).

Exchange rate depreciated, while inflation maintained an upward trajectory during this period. For instance, exchange rate depreciated from 148.88 in 2009 to 358.81 naira per USD in 2020 and by June 2023, USD exchanged for 462.9 naira (CBN, 2023). Meanwhile inflation rate increased from 8.1 and 9 per cent in 2014 and 2016 to 13.25 and 16.95 per cent in 2020 and 2021 respectively (National Bureau of Statistics, 2023).

The Nigerian economy appears to be facing a concurrent situation of rising levels of external debt service obligations, a fast deprecating domestic currency and rise in levels of inflation reflecting significant macroeconomic instability, which calls for a systematic investigation. Thus this study explored the interconnectedness of these factors and how increased external debt can trigger a chain reaction from external debt service impacting the official exchange rate and domestic price levels, ultimately affecting consumers and the entire economy. Such analyses are crucial for policymakers to understand the risks and implications of debt accumulation and to formulate appropriate strategies to manage debt levels and their impacts on the economy.

The rest of the paper is structured into: Section 2, which focuses on the theoretical framework, and the empirical literature; Section 3 focuses on the methodology of the study; Section 4 provides analyses and discussion of results, and Section 5 draws conclusion and made recommendations for policy.

2. Literature Review

2.1 Theoretical Literature

The classical economists, argue that government spending could be wasteful and mere payments meant to sustain unproductive labour (Churchman,2001), the actual burden of the community lies in the wasteful spending nature of the government such that it does not truly matter how the funds are raised (whether through taxes or loans). They believed that except for wars and large capital investments, public borrowing may deteriorate economic life and transfer debt burden to the future generation due to inefficiency. Accordingly, tax cuts may not spur consumption in the face of increased public borrowing since people may save against expected future tax hike (Aybarc, 2019). In addition, Modigliani (1961) also posits that public debts shift burdens to the future generation and shrinks the amount of cash flow that would have been

available to it. He argued that, if such loans are applied for investment purposes that may generate future streams of income, they could offset the cost of the debts; making such debts desirable.

However, the argument in favour of public debts, especially external debt, stems from the fact that capital is an essential ingredient for economic growth and such capital is inadequate in developing countries. The postulations by Chenery and Strout (1966) and Romer (1986) in the dual-gap and endogenous growth models respectively, spelt out the role of capital in economic growth. While the latter considered capital as a *sin qua non* for economic growth, the former posited that the requisite capital for investment in developing countries is not adequate, hence the need to borrow from foreign sources. The deficiency of domestic capital has since provided grounds for developing nations to borrow from more advanced economies (Ahenful, 2013 & Nwokoma, 2013).

On the other hand, there is a growing concern that, continuous accumulation of external debts may lead to a situation of debt overhang or crowding out of investment in critical economic sectors. The debt overhang theory describes a situation in which an indebted country can hardly meet up with her huge external debt service obligations. The country either pays much more than it initially contracted or receives negligible benefits compared to her large debts service commitments (Kobayashi, *et al*, 2021; Liebersohn, *et al*, 2022). According to Nambie and Donkor (2022), such huge debt servicing obligation may discourage investors from investing in that economy for the fear that the government may tax them heavily. In most cases, it may scare off investors and push other investors to disinvest due to the fear of future high taxation by the government as a way of generating revenue to cope with huge debt burden and other government functions (Turan & Yan–kkaya, 2021). Thus, high external debt burdens my crowd out both private and public investments since the government may be forced to operate under debt-induced liquidity limitations (Igudia, 2021; Ifeanyi, *et al*, 2021). Saungweme and Odhiambo (2021) explained that due to huge debt servicing obligations, development projects may be suspended since foreign exchange earnings may be dedicated to debts repayment. This submission aligns with Myers (1977) who found that debt overhang can lead to under-investment.

From the theoretical stand point, while external debts may be necessary in bridging the capital gap in Nigeria; judicious applications of such loans to income generating projects should not be compromised. This is because huge accumulation of such loans without proper use may result to debt overhang and crowding out of both private and public investment and dampen the prospects of economic prosperity of the country. Therefore, Nigeria being a capital deficient economy with high level of ex-

ternal indebtedness and external debt service burden, her exchange rate and inflation problems may not be unconnected with external debts and hence the need to invest and manage external loans efficiently.

2.2 Empirical Literature

Empirical studies on the subject matter of external debt in Nigeria appear to be more interested in investigating the impact of external debt on economic growth; such studies as carried out by, Festus and Saibu (2019), Eze *et al.* (2019) Isibor *et al.* (2018), Ujuju and Oboro (2017), Onakoya, and Ogunade (2017), Odubuasi *et al*. (2018) and Nwannebuike (2016). Another strand of empirical literature about Nigeria and other developing countries on external debt focused more on the issue of debt thresholds and sustainability; such as Ndoricimpa (2020) and Omotosho *et al*. (2016). There appears to be no systematic investigation of the pass-through effect of external debt on inflation in Nigeria via intermediating channels of external debt service and exchange rates. However, there are pair-wise studies that investigated the relationship between external debts and either inflation or exchange rate in Nigeria. Again, it is a known fact that high external debts accumulation would lead to high external debt service obligations and as such the relationship between external debts and external debt service appear not to have been explicitly investigated.

A number of studies have investigated the relationship between external debt service and exchange rates in Nigeria with strong empirical evidence to suggest that there is a link between external debt service and exchange rate changes in the country. For instance, Okoh *et al.* (2021) and Saheed *et al* (2015) using dynamic OLS and OLS respectively found that external debt service significantly affects exchange rate depreciation especially that external debt service requires the use of foreign exchange. However, Imoagwu *et al.* (2023) utilizing annual data from 1980 to 2021 and ARDL methodology found that external debts service as percentage of GDP was not a significant factor affecting exchange rate depreciation. This research outcome may be at variance with the findings of Okoh *et al.* (2021) and Saheed *et al.* (2015) partly because of the use of external debt service as percentage of GDP instead of applying the real amount used by Nigeria to service external debt.

Relatedly, empirical evidence equally suggests that both elsewhere and in Nigeria; exchange rate depreciation is likely to influence a rise in the prices of goods and services. For instance, Madhavi (2022) analyzed the impact of ERPT to inflation in Sri Lanka from 2010Q1 to 2021Q4 using VAR approach. The study found that as Sri Lanka rupee depreciated it led to increase in import price, even though, the pass-through was incomplete for all the price indices. Aisen, *et al*. (2021) examined the magnitude and speed of ERPT to inflation in Mozambique from 2001 to 2019

using ARDL and error correction models. The ERPT was found to be asymmetric, significant and fast such that 50 per cent of exchange rate depreciation pass to domestic prices in less than six months. In Saudi Arabia, Algaeed (2018) investigated the exchange rate pass-through to inflation from 1970 to 2015 alongside output gap and shocks in oil prices using ARDL. The study found that exchange rate depreciation and symmetric shocks to oil prices were the main determinants of inflation. In South Africa, Maduku (2017) investigated the pass-through of exchange rate to prices using monthly data from 2002 to 2015. The study used SVAR and the VAR found that exchange rate fluctuations pass-through to inflation via producer price index was 22 per cent. This was attributed to high importation of intermediate goods. Although the impulse response functions were weak, it took a relatively short period of two months for prices to respond to exchange rate fluctuation. In Nigeria, Njoku and Nwaimo (2019) using vector error correction mechanism (VECM) found that depreciation in exchange rate led to imported inflation in Nigeria between 1981 and 2015. Also, Musti (2017) investigated the magnitude and speed of ERPT to consumer prices in Nigeria from 1986 to 2013 using quarterly data. The study employed both VECM and smooth transition autoregressive (STAR) models. It was found that ERPT to inflation was significant in the long run. A similar investigation was carried out by Bada *et al.* (2016) using quarterly data for the period 1995Q1 to 2015Q1 to assess the extent of exchange rate pass-through to imports and consumer prices in Nigeria using VECM. The study found that exchange rate depreciation actually passed through to domestic prices in even though the pass-through effect was greater in imports prices compared to consumer prices. Similarly, Onuoha (2014) found that exchange rate volatility had a profound influence on inflation in Nigeria between 1980 and 2010.

There are also a set of studies that have investigated the direct relationship between external debts and inflation. For instance, Sharaf and Shahen (2023) using annual time series from 1970 to 2020 using ARDL and Non-linear ARDL to examine the impact of external debt on inflation in Sudan. The study found no significant effect of external debt on inflation using ARDL. However, the relationship was found to be very significant when Non-linear ARDL was employed. In Nigeria, Natagwandu *et al.* (2021) using annual data from 1980 to 2020 and utilizing ARDL approach found that, external debts did not significantly affect inflation. Essien *et al.* (2016) applied the VAR approach to relate external debt to output and price level for the period 1970 to 2014 and found that external debt had no significant effect on price level in Nigeria.

From the review of empirical literature, it is evident that the channel of external debt

pass-through to inflation have not been thoroughly investigated. This study systematically traces the impact of external debt on inflation using external debt service and exchange rate as pass-through channels. To circumvent the limitation of VAR model in capturing the dynamics of the transmission channels, this study uses the SVAR which traces out the channel of transmission of external debt shocks to inflation contemporaneously.

2.3 Stylized Facts

This section analyses the dynamics among the variables considered in this study. Figure 1 depicts a picture of an upward fluctuating trend of external debt accumulation followed by an external debt service graph with a similar shape.

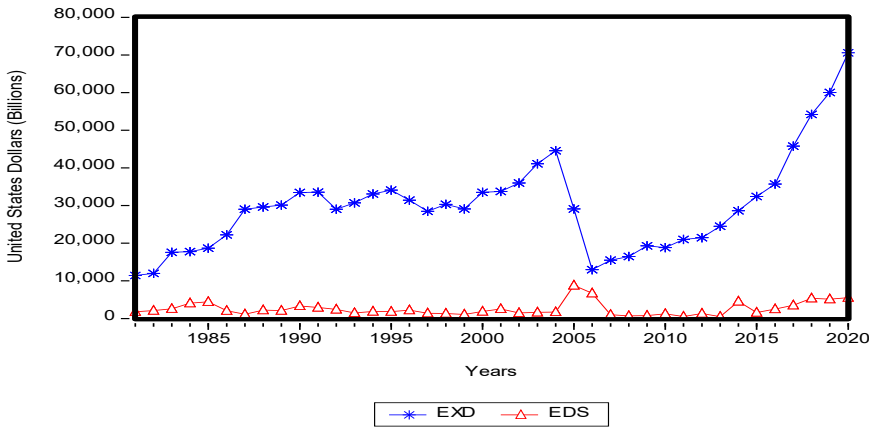

Figure 1: Trends in external debts and external debts service in Nigeria from 1981 to 2020

From 1981, total external debts trended upwards and reached over 40 billion USD in 2004. The country's total external indebtedness declined in 2005 following the partial debt forgiveness from the Paris Club. In line with the conditions of the debt forgiveness, more commitments were made, leading to substantial decline in the external debt stock. In 2005 and 2006, over 8.8 billion and 6.7 billion USD, respectively were used for external debt servicing (as conditions for partial debt relief), and remained relatively low until 2014 before trending upward till 2020 (World Bank, 2022a).

It is also pertinent to show the behaviour of the official exchange rate in Nigeria as the country deploys its resources to service its external debt obligations. Thus, the behaviour of external debt service and official exchange rate are represented in the bar charts in Figure 2.

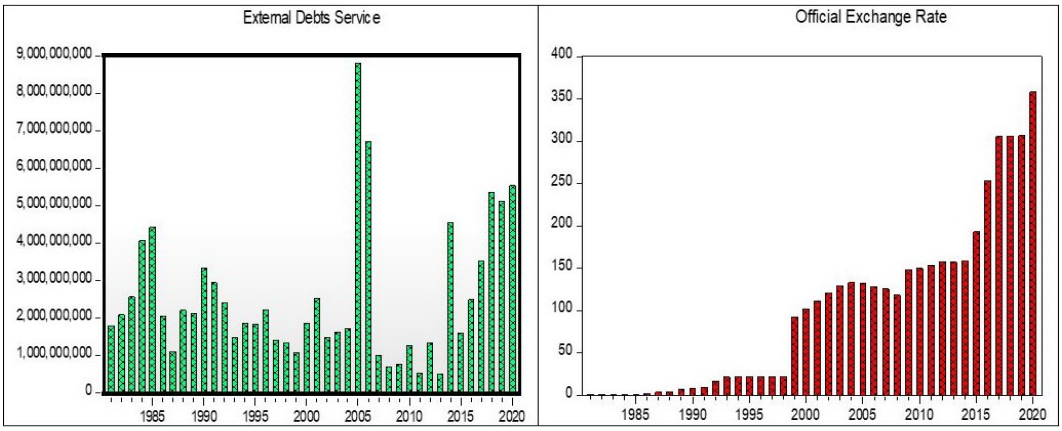

Figure 2: Bar charts showing trends in external debts services and official exchange rates in Nigeria

The left hand side of Figure 2 shows the trajectories of Nigeria's external debts service obligations, while the right hand side shows the trend of official exchange rates in Nigeria from 1981 to 2020. As shown in Figure 2, official exchange rate and external debt service trended upward from 1981 to 1985. The behaviour suggests that exchange rate depreciated slowly. However, following the adoption of the Structural Adjustment Programme (SAP) in 1986, the Naira was devalued, and 2.02 Naira per USD, and maintained a depreciating trend, reaching 133.50 Naira per USD in 2004. Between 2015 and 2020, the depreciating trend in exchange rate vis-a-vis rising external debt service worsened as the Naira exchanged for 193.28 in 2015 and 358.81 Naira per USD in 2020. This trend is consistent with the findings of Nwanne and Eze, (2015) and Aigbedion et al., (2020) that as external debts and external debts obligations in Nigeria rise, the exchange rate depreciates.

Figure 3 presents trends in exchange rates and inflation in Nigeria during the period under investigation. Exchange rate depreciated relatively between 1981 and 2020, though worsened between 2015 and 2020. Inflation rate was in single digit between 1981 and 1986 but jumped to 11.29 per cent in 1987 after the adoption of SAP. However, it trended downward maintaining single digit rate between 1997 and 2000, but reversed and reached 17.86 per cent in 2005.

The rates dropped to 12.10 per cent in 2018, and further to 11.40 per cent in 2019 which was the year for general elections. However, in 2020 after the COVID-19 outbreak, inflation rose to 13.25 per cent and by 2021 it had reached 16.95 per cent. It can be inferred from Figure 3 that inflation rates increased as the exchange rates depreciated especially between 2001 and 2020.

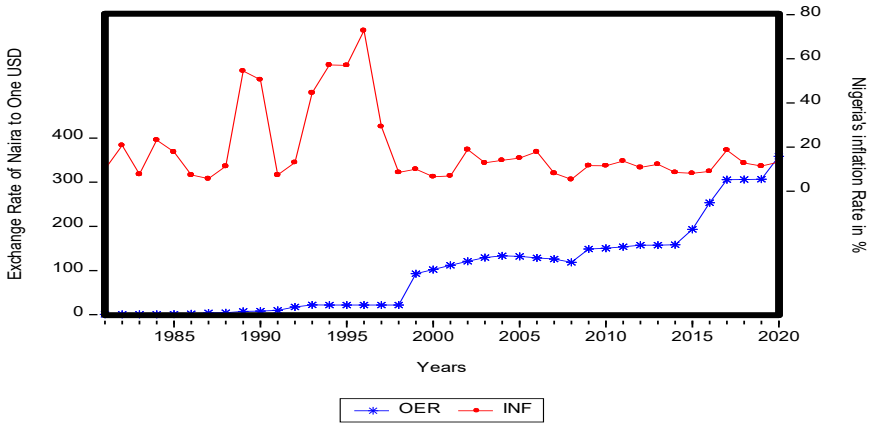

Figure 3: Trends in exchange rates and inflation in Nigeria from 1981 to 2020

3. Data and Methodology

3.1 Data

This study used annual data on external debt (EXD), external debt service (EDS), official exchange rate (OER) and inflation (INF) in Nigeria over the period 1981 to 2020. EXD, EDS, and INF were sourced from the World Bank, while OER was obtained from the Central Bank of Nigeria (CBN). EXD, EDS and OER were logged to maintain uniform unit of measurement while INF was used in its original form.

3.2 Model Specification

Most relationships among economic variables do not strictly hold to be either truly endogenous or exogenous. Thus, the use of dynamic models like vector autoregressive (SVAR) model is necessary. Therefore, this study employs an SVAR model to sort out the contemporaneous relationship among the variables.
The generic form of an SVAR is given by:

$$A_0 Z_t = A_1 Z_{t-1} + \xi_{it} \tag{1}$$

Where A_0 is an nxnmatrix of contemporaneous effects of the endogenous parameters; Z_t denotes an $nx1$column vector matrix of estimable endogenous variables; A_1 is nxn matrix of coefficients of lagged endogenous variables; Z_{t-1} is an $nx1$column vector matrix of lagged endogenous variables; and ξ_{it} denotes an $nx1$column vector of error term.
The central argument in this paper is that; external debts (EXD) bring about external debt service (EDS) and that mount pressure on available foreign exchange reserves, which affects the official exchange rate (OER) of the economy. Given the import dependent nature of Nigeria, it may then affect the domestic consumer prices (INF). Now, following the Cholesky ordering from the most exogenous to the least exoge-

nous variables; the model can be expressed as:

$$Z = [EXD, EDS, OER, INF]' \tag{2}$$

But to maintain the transmission channel of $[EXD \longrightarrow EDS \longrightarrow OER \rightarrow INF]$ which shows that external debt accumulation may give rise to an increase in external debt service which in turn may force official exchange rate to depreciate and this may lead to an increase in inflation. Note that, the prime *(')* sign in equation (2) implies that, the final SVAR specification the order is reversed so that inflation (INF) which is the least exogenous variable interacts with all the other variables in the contemporaneous model and by taking the partial log of equation (2) it yields:

$$Z = [\ell EXD, \ell EDS, \ell OER, INF]' \tag{3}$$

Where ℓ stands for natural logs.

Thus, equation (3) can be expressed in matrix form as:

$$\begin{bmatrix} 1 & -\vartheta_{12}^0 & -\vartheta_{13}^0 & -\vartheta_{14}^0 \\ -\vartheta_{21}^0 & 1 & -\vartheta_{23}^0 & -\vartheta_{24}^0 \\ -\vartheta_{31}^0 & -\vartheta_{32}^0 & 1 & -\vartheta_{34}^0 \\ -\vartheta_{41}^0 & -\vartheta_{42}^0 & -\vartheta_{43}^0 & 1 \end{bmatrix} \begin{bmatrix} INF_t \\ \ell OER_t \\ \ell EDS_t \\ \ell EXD_t \end{bmatrix} = \begin{bmatrix} \vartheta_{11}^1 & \vartheta_{12}^1 & \vartheta_{12}^1 & \vartheta_{12}^1 \\ \vartheta_{21}^1 & \vartheta_{22}^1 & \vartheta_{23}^1 & \vartheta_{24}^1 \\ \vartheta_{31}^1 & \vartheta_{32}^1 & \vartheta_{33}^1 & \vartheta_{34}^1 \\ \vartheta_{41}^1 & \vartheta_{42}^1 & \vartheta_{43}^1 & \vartheta_{44}^1 \end{bmatrix}$$

$$\begin{bmatrix} INF_{t-1} \\ \ell OER_{t-1} \\ \ell EDS_{t-1} \\ \ell EXD_{t-1} \end{bmatrix} + \begin{bmatrix} V_{1t} \\ V_{2t} \\ V_{3t} \\ V_{4t} \end{bmatrix} \tag{4}$$

It may be difficult to estimate the above model since it has been over parameterized. Therefore, the need to use the recursive approach where restrictions have been imposed on the parameters of the A_0 matrix based on institutional knowledge to resolve the issue of identification in the SVAR model. Accordingly, by imposing restrictions based on the recursive approach, we arrive at triangular contemporaneous matrix that is made up of the endogenous variables, their own lags and the error terms. Thus,

equation (4) becomes:

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ -\vartheta_{21}^{0} & 1 & 0 & 0 \\ -\vartheta_{31}^{0} & -\vartheta_{32}^{0} & 1 & 0 \\ -\vartheta_{41}^{0} & -\vartheta_{42}^{0} & -\vartheta_{43}^{0} & 1 \end{bmatrix} \begin{bmatrix} INF_t \\ \ell OER_t \\ \ell EDS_t \\ \ell EXD_t \end{bmatrix} = \begin{bmatrix} V_{1t} \\ V_{2t} \\ V_{3t} \\ V_{4t} \end{bmatrix} \tag{5}$$

Recall that, $Ay_t = A_1^s y_{t-1} + ... + A_P^s y_{t-p} + C^s x_t + Bu_t$ and that, $\xi_t = \beta\mu_t$
Where

$$\beta = \begin{bmatrix} \delta_1^2 & 0 & 0 & 0 \\ 0 & \delta_2^2 & 0 & 0 \\ 0 & 0 & \delta_3^2 & 0 \\ 0 & 0 & 0 & \delta_4^2 \end{bmatrix} \tag{6}$$

It thus implies that, β is a unit variance. Consequently, by setting $A_0 = \beta$, equation (6) can be rewritten as:

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ -\vartheta_{21}^{0} & 1 & 1 & 1 \\ -\vartheta_{21}^{0} & -\vartheta_{21}^{0} & 1 & 1 \\ -\vartheta_{21}^{0} & -\vartheta_{21}^{0} & -\vartheta_{21}^{0} & 1 \end{bmatrix} \begin{bmatrix} INF_t \\ \ell OER_t \\ \ell EDS_t \\ \ell EXD_t \end{bmatrix} = \begin{bmatrix} \delta_1^2 & 0 & 0 & 0 \\ 0 & \delta_2^2 & 0 & 0 \\ 0 & 0 & \delta_3^2 & 0 \\ 0 & 0 & 0 & \delta_4^2 \end{bmatrix} \begin{bmatrix} \mu_{1t} INF \\ \mu_{2t}\ell OER \\ \mu_{3t}\ell EDS \\ \mu_{4t}\ell EXD \end{bmatrix} \tag{7}$$

One distinct characteristic of SVAR as opposed to the conventional VAR is that, it distils out spillovers in errors. This ensures that the errors are uncorrelated and equation (7) can be re-written as:

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ -\vartheta_{21}^{0} & 1 & 1 & 1 \\ -\vartheta_{21}^{0} & -\vartheta_{21}^{0} & 1 & 1 \\ -\vartheta_{21}^{0} & -\vartheta_{21}^{0} & -\vartheta_{21}^{0} & 1 \end{bmatrix} \begin{bmatrix} \mu_{1t} INF \\ \mu_{2t}\ell OER \\ \mu_{3t}\ell EDS \\ \mu_{4t}\ell EXD \end{bmatrix} = \begin{bmatrix} \delta_1^2 & 0 & 0 & 0 \\ 0 & \delta_2^2 & 0 & 0 \\ 0 & 0 & \delta_3^2 & 0 \\ 0 & 0 & 0 & \delta_4^2 \end{bmatrix} \begin{bmatrix} INF_t \\ \ell OER_t \\ \ell EDS_t \\ \ell EXD_t \end{bmatrix} \tag{8}$$

This further implies that:

$$A_0\xi_t = \beta_{\mu_t} \tag{9}$$

Consequently, the initial impulse or variance forecast can be specified in matrix form as:

$$\xi_t = A_0^{-1}\beta\mu_t = \begin{bmatrix} \xi_t^{INF} \\ \xi_t^{\ell OER} \\ \xi_t^{\ell EDS} \\ \xi_t^{\ell EXD} \end{bmatrix} = \begin{bmatrix} a & 0 & 0 & 0 \\ b & c & 0 & 0 \\ d & e & f & 0 \\ g & h & i & j \end{bmatrix} \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \end{bmatrix} \tag{10}$$

Where a is the response of INF_t to its own shock**;** b is the response of $lOER_t$to shock in INF_t; c is the response of $lOER_t$ to own shock; d is the response of $lEDS_t$ to shocks in INF_t; e is the response of $lEDS_t$ to shocks in $lOER_t$; f is the response of $lEDS_t$ to own shocks; g is the response of $lEXD_t$ to shocks in CPI_t; h is the response of $lEXD_t$ to shocks in $lOER_t$; i is the response of $lEXD_t$ to shocks in $lEDS_t$ and j is the response of $lEXD_t$ to own shocks.

3.3 Estimation Procedure

To avoid spurious results, the SVAR model was estimated using all the necessary procedures. The variables were subjected to Augmented Dickey-Fuller (ADF) unit root test to ensure that the variables were free from unit root problems. In addition, unrestricted cointegration rank test was carried out to ensure that there was long run relationship among the variables. Various lag selection criteria such as Akaike information criterion (AIC), Akaike's final prediction error (FPE), the Schwarz criterion (SC) and Hannan-Quinn information criterion (HQC) were used in selecting the optimal lag.

We checked the model for stability using the inverse roots of autoregressive polynomial. The study estimated the impulse response of each variable and their forecast variance decomposition to examine the impact of each variable on the system and their relative importance. Finally, some post estimation tests were carried out to examine the model for homoscedasticity (test of heteroscedasticity) and serial correlation.

4. Results and Discussion

4.1 Descriptive Statistics

It is apt to describe the variables used in the models to have an idea about their general historical behaviour.

From Table 1, it can be observed that the average external debt in Nigeria during the period was approximately $30 billion with a median value of $29.4 billion and a standard deviation of approximately $13 billion. This shows that the external debt figures fluctuated widely. The lowest external debt stock for the country was recorded in

1981, while the highest was recorded in 2020, when the federal government engaged in large borrowing to finance infrastructural development and to fight COVID-19. Relatedly, external debt service averaged $2.53 billion with a median of $1.96 billion and a standard deviation of $1.80 billion. This implies that despite fluctuations in the values of external debt stocks, the debt service does not fluctuate widely.

Table 1: Descriptive Statistics of Variables

	EXD (Billions USD)	EDS (Billions USD)	OER (Naira: USD)	INF (Percentage)
Mean	29.900	2.530	100.873	18.898
Median	29.400	1.960	107.024	12.500
Maximum	70.600	8.810	358.81	72.800
Minimum	11.400	0.496	0.610	5.400
Std. Dev.	12.600	1.800	100.760	16.922
Skewness	1.128	1.579	0.885	1.819
Kurtosis	4.772	5.386	2.988	5.135
Jarque-Bera	13.718	26.102	5.226	29.660
Probability	0.001	0.000	0.073	0.000

Note: *EXD is external debts, EDS is external debt service, OER is official exchange rate and INF is Inflation rate.*

This may be attributable to the failure of governments to service loans when it attracted stiff penalty prior to the country's return to democracy in 1999. The highest debt service amount was $8.81 billion in 2005, while the lowest was $496 million in 2013.

The official exchange rate in Nigeria has a mean value of 100.87 with a standard deviation of 100.78, indicating that the official exchange rate rose steadily without serious jumps. In 1981, it was at its lowest at 0.61 naira to a dollar (that is 61 kobo to a dollar), while it attained its highest of 358.81 naira to a dollar in 2020. Inflation stood at an average of 18.90 with standard a deviation of 16.92, implying that it has not wondered widely but have mostly been in double digits. However, there are a few outliers about the variable such that its maximum value of 72.80 per cent was recorded in 1996 and its minimum value of 5.4 per cent was recorded in 2008.

Additionally, considering the small probability values of the variables (which are less than the 0.05 critical value) and their high Jarque-Bera statistics; it can be concluded that they are not normally distributed except for OER, whose probability value is 0.0733. Thus, the variables of the model were logged to ensure that their distributions behave better and curtail the influences of out layers. However, the non-normal distribution of a variables may not adversely affect the results of the model given that the sample size of the study is not small.

It can also be observed that all the variables are positively skewed, indicating that they have a tendency for higher values. However, all the variables are leptokurtic (that is, having a peaked distribution) since their kurtosis is greater than the 3.00 threshold except for OER, whose kurtosis is platykurtic (that is, its distribution is not peaked). This implies that apart from OER, all other variables have outliers that may have occurred due to certain shocks at some point in time.

4.2 Pre-Estimation Results

In line with the requirements of the stochastic process that time series variables should exhibit random walk, two sets of unit root tests were carried out on the series to ensure that none of the variables has unit root problems. Thus, the study used Augmented Dickey-Fuller (ADF) and Ng-Perron tests for stationarity of the variables. This was to ensure that the tests complement and validate the results of each other since they are low-power tests. The ADF unit root test is carried out against the null hypothesis that, "the variable under investigation has unit root" (implying that it is not stationary). Usually, the results are reported at 1%, 5% and 10% critical values but this study chose 5 percent in line with all other reports of statistical significance. Where the t-statistic is greater than the 5 percent critical value we do not reject the null hypothesis; otherwise we reject. Alternatively, a probability value of less than 0.05 indicates that the null hypothesis be rejected to conclude that the variable is free from unit root problems otherwise it is not. The ADF unit root test is presented in Table 2.

Table 2: ADF Unit Root Test

Variable	t- Statistic	Critical Values @ 5%	Prob. value	Order of Integration
LOER	-3.635	-2.939	0.009	I(0)**
LEXD	-2.022	-2.941	0.277	I(0)
D(LEXD)	-4.575	-2.941	0.001	I(1)**
LEDS	-3.635	-2.939	0.009	I(0)**
INF	-3.035	-2.939	0.000	I(0)**

*Note: ** indicates statistical significance at 5 per cent level*

The results of the unit root in Table 2 shows that, apart from LEXD which was stationary at first difference; the rest of the variables LOER, LEDS and INF were stationary at levels. This shows that the variables have mixed order of integration.

The asymptotic critical values for Ng-Perron tests are constant all through; that is, Mza (-8.100), MZt (-1.980), MSB (0.233) and MPT (3.170) while the t-statistics vary. The stationarity condition in Ng-Perron test requires that all or majority of the t-static values of a variable be less than their corresponding asymptotic critical values

which are Mza, MZt, MSB and MPT at 5 per cent level of significance. Thus, it can be observed in Table 3 that, like the ADF unit root test results, all the variables were stationary at levels in the Ng-Perron test except LEXD which only became stationary at first difference implying that there is a mixed order of integration of the variables.

Table 3: Ng-Perron Test Statistics

Variables	Mza (-8.100) T-Stat	MZt (-1.980) T-Stat	MSB (0.233) T-Stat	MPT (3.170) T-Stat	Order of Integration
LOER	-15.630	-2.698	0.173	1.927	I (0)**
LEXD	-0.006	-0.002	0.377	13.795	I (0)
D(LEXD)	-17.703	-2.962	0.167	1.432	I(1)**
LEDS	-15.630	-2.698	0.173	1.927	I (0)**
INF	-11.829	-2.431	0.206	2.074	I (0)**

*Note: ** indicates statistical significance at 5 per cent level ACV @ 5% stands for asymptotic critical value for Mza, MZt, MSB and MPT at 5 percent level of significance*

Equally, for time series data, it is also a standard practice to check the series for cointegration to ensure that the variables can still maintain the long run equilibrium path with the passage of time. Thus, Table 4 presents the cointegration results using Unrestricted Cointegration Rank Tests.

Table 4: Unrestricted Cointegration Rank Tests

Number of cointegrating equations	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	50.061	47.856	0.031	31.590	27.584	0.014
At most 1	18.472	29.797	0.531	10.880	21.132	0.660
At most 2	7.592	15.495	0.510	7.447	14.265	0.438
At most 3	0.145	3.842	0.704	0.145	3.841	0.704

The result of the cointegration test in Table 4 showed that there is at least one cointegrating equation for both the trace and maximum eigenvalue tests, since the hypothesis of no cointegration equation was rejected. This implies that the variables can maintain a long run equilibrium path over time suggesting the presence of a long run relationship. In addition, since the VAR method uses actual and lag values of variables in the system, it is a standard practice to test and obtain the optimal lag length that will yield more consistent and efficient estimates. Table 5 showed that the optimal lag for the model is lag one, as indicated by all the lag selection criteria. Hence the model was estimated at lag one.

Table 5:VAR Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-256.190	NA	34.796	14.899	15.427	15.084
1	-147.028	175.872*	0.200*	9.724*	10.955*	10.154*
2	-131.653	21.355	0.220	9.759	11.694	10.434
3	-118.972	14.794	0.303	9.943	12.582	10.864

4.3 Estimation of Results

4.3. 1 Contemporaneous Responses

The study estimated an SVAR model and the results are presented in Table 6.

Table 6: Results of the Contemporaneous Response

	INF	LOER	LEDS	LEXD
INF	1			
LOER	1.023	1		
	0.012*			
LEDS	0.076	0.199	1	
	0.729	0.015*		
LEXD	6.855	2.681	7.899	1
	(0.590)	0.599	0.404	

Note: Figures in parenthesis () are probability values.

The results showed the transmission channel from the lower right hand to the upper left-hand side. For a percentage increase in external debt accumulation, external debt service also increased by about 8 per cent, though it is statistically insignificant. Similarly, a percentage increase in external debt service brings about a 0.2 per cent increase in the official exchange rate, and the relationship is statistically significant. It must be noted that the increased exchange rate here implies a depreciation of the naira against the United State dollar. That is, more units of naira are needed in exchange for one USD anytime external debt service increases. Finally, it can be seen that as the official exchange rate increases (as the naira depreciated), the level of inflation in the economy increased. This is because a percentage increase in the official exchange rate led to an instantaneous rise in inflation by over 1 per cent, and the relationship is statistically significant. This has shown a complete channel of how external debts transmit to inflation in Nigeria via increase in external debt services and consequent increase in Nigeria's exchange rate (that is exchange rate depreciation) which translates to high level of inflation in the economy. Thus, external debts are also a source of exchange rate pass-through to inflation in Nigeria and this finding is in line with the submissions of Nambie and Donkor (2022) who found a link between external debts and inflation in 42 African countries. Also, in Nigeria, Onuoha (2014), Nwanne and Eze, (2015), Bada et al (2016), Musti (2017), Njoku and

Nwaimo (2019) and Aigbedion *et al.,* (2020), empirically established that there was a strong pass-through link between exchange rate to inflation. Although, Essien *et al.* (2016) who attempted to find a link between external debt and inflation in Nigeria using VAR found that external debt had no significant effect on output or price level in Nigeria, this may be as a result of a jump in the transmission channels that omitted both external debt service and exchange rate in the analyses or an assumption that external debts and inflation in Nigeria relate on a liner basis. Elsewhere, strong links have been found between exchange rate and inflation as confirmed by Algaeed (2018) about Saudi Arabia, Maduku (2017) about South Africa, Aisen *et al* (2021) about Mozambique and Madhavi (2022) about Sri Lanka.

The rest of the contemporary responses are nonsignificant but positive, indicating a reinforcing tendency of the consequences of external debt on inflation and the official exchange rate. In contrast, inflation still exhibited an increasing contemporaneous response to increases in external debt service. The results imply that, as more external loans are contracted, Nigeria may struggle with the accompanying problems of external debt services, exchange rate depreciation and high inflation.

4.3.2 Impulse Response

Next, we estimated and discussed the impulse response results. It must be noted that, whereas the contemporaneous (SVAR) estimates are representations of historical data; impulse response functions (IRFs) are essentially forecasts about how a given variable will react to a sudden change in another variable within the SVAR framework. The IRFs may or may not conform with the contemporaneous SVAR results. The SVAR and the IRF may produce different results given that they differ in their model specifications, number of variables involved, estimation techniques, sample time periods and underlying assumptions. However, both SVAR and IRFs analyses provide very important insights regarding the dynamic interactions among the variables used in the model. Thus, in interpreting the results of this study, the authors took into account the strengths and limitations of each these approaches.

The study extracted impulse responses of the key pass-through stages for analyses. These channels were; response of external debt service to innovation (or shock) in external debt, response of official exchange rate to innovations in external debt service, and response of inflation to shocks in official exchange rate. In addition, the study included the direct response of inflation to sudden shock in external debt as a check to either affirm or refute the claim that external debts and inflation do not relate directly but through other channels. The IRFs results are presented using Figures 4, 5, 6 and 7.

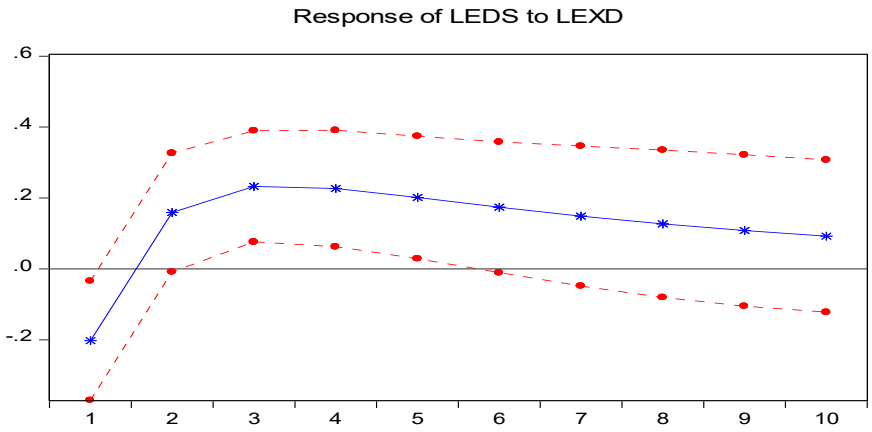

Figure 4: Response of External Debt Service to Shock in External Debt

Figure 4 shows that a percentage standard deviation shock (sudden change) in external debt accumulation would elicit positive instantaneous response from external debt service moving it from -2 in the first period to +2 the second forecast period. The rise in external debt service may even rise further between the second and the third period and remain significantly positive throughout the forecast period. This conforms to the general expectation that as external debt accumulation rises it will be accompanied by rising external debt service obligations. The shock is transient and temporary as it took a down turn after the third year of the forecast horizon and declined slowly up to the end of the forecast period. Thus, such a percentage shock in external debt accumulation may not leave a permanent effect on the economy and the contemporaneous result in Table 6 on the relationship between external debt and external debt seem to suggest so too. A Sudden increase in external debt accumulation will elicit a rise in external debt service obligation but the effect will be temporary and it will fizzle out with time.

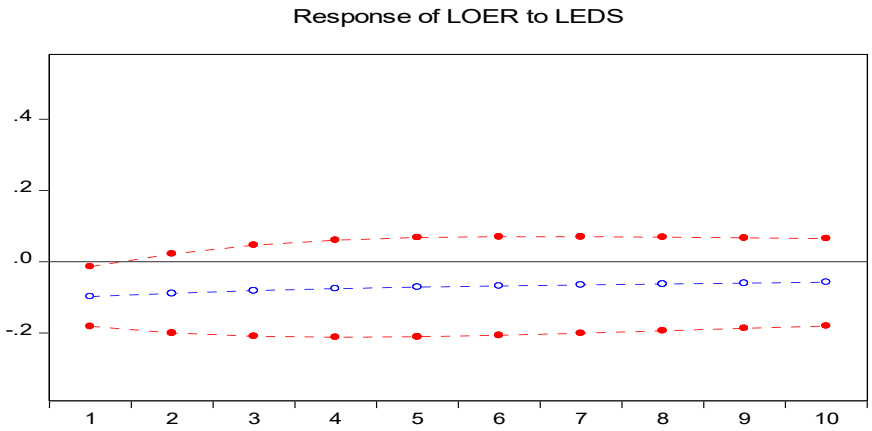

Figure 5: Response of Official Exchange Rate to Shock in Debt Service

Figure 5 shows a percentage standard shock in external debt service in Nigeria may elicit a negative percentage change in official exchange rate. This suggests that, a shock in external debt service will mount increasing pressure on the naira thereby causing it to be devalued. This implies that, as external debt service leads to the devaluation of the naira, the external burden becomes more severe and more naira is required in exchange for the US dollar in order to service Nigeria's loan obligations. This result of the IRF collaborates the conclusions drawn by Okoh *et al.* (2021) and Saheed *et al.* (2015). Another remarkable feature of the response is that; the impact remains stable and permanent throughout the forecast period. This means that exchange rate in Nigeria will permanently depreciate significantly in the face of sudden increases in external debt service. The IRF result collaborates the contemporaneous results in Table 6 which show that external debt service will bring about a contemporaneous significant rise exchange rate in Nigeria. Note that for the contemporaneous results, if exchange rate and external debt service have a direct positive relationship, it implies that as the amount used in servicing external debt rises, more units of the naira are needed in exchange for the dollar (meaning that the naira is depreciating). This result has serious implications for economic policy as it may affect even the investment climate of the country. In some instances, investors may even interpret such devaluations as a sign of economic instability and it might affect their investment decisions and overall capital flows in the country.

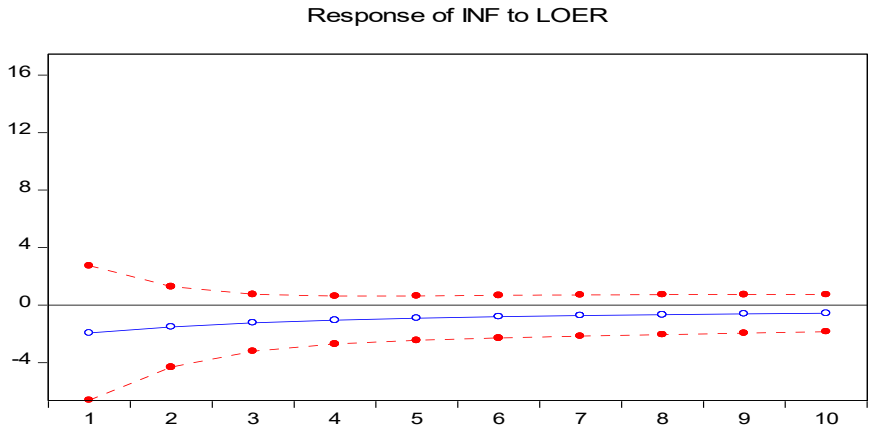

Figure 6: Response of Inflation to Shock in Official Exchange Rate

The impulse response in Figure 6 shows that the impact of the exchange rate shock on inflation may not be immediate. There may be lag effect before the impact of the shock in exchange rate on inflation is felt which may be due to some factors like fixed prices of contracts, adjustments in inventory, or sluggish responses from consumers. It can be seen that the IRF line adjusts faster towards the neutral line

after the second year in the negative region indicating a strong pass-through effect of exchange rate movements on inflation in Nigeria. This implies that after a lag period of one, domestic prices respond very quickly to depreciation of exchange rate in Nigeria, probably due to large share of imported intermediate and finished products in the country. The negative movement of the IRF line suggests that the exchange rate shock may increase import prices thereby aggravating the inflationary pressures in the economy. This forecast is in line with conclusions drawn by Maduku (2017) and Njoku and Nwaimo (2019) that, a sudden depreciation of the naira will slowly adjust prices upwards due to exchange rate pass-through to prices via imports of finished and intermediate goods.

Figure 7 illustrates the likely response of consumer prices to a percentage standard deviation shock in external debt in Nigeria. Note that the neutral line (0) represents the baseline inflation in the economy.

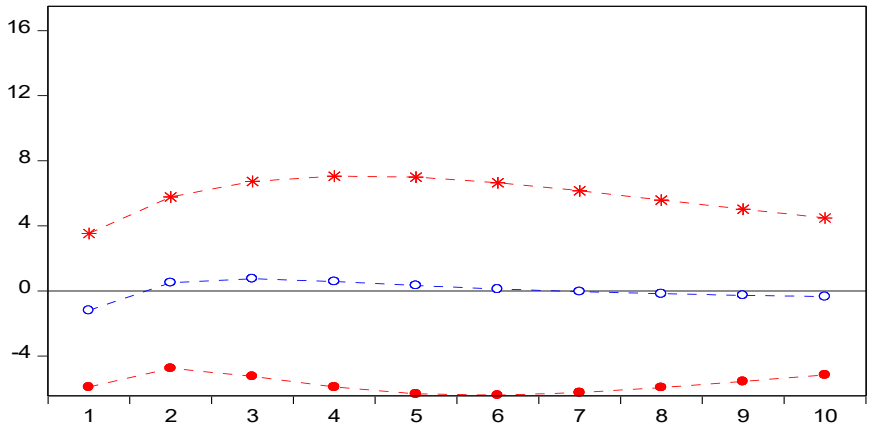

Figure 7: Response of consumer prices to a shock in external debt

A sudden increase in external debt accumulation will attract temporary increase in domestic prices of goods and services given that there is a new inflow of capital. The temporary rise in inflation will reach its peak in the second period of the forecast horizon and will decline steadily to fizzle out in the fifth period. Then, the temporary shock in external debt accumulation on inflation remains unnoticed throughout the forecast period. This finding is in tandem with the contemporaneous results presented in Table 6. This may be due to the fact that external loans in Nigeria do not affect domestic prices directly but through a chain reaction of different channels as pointed out in this study. From the result, it can be inferred that there may be no direct link between external debts and domestic price increase in Nigeria and that the relationship may in fact be an indirect one. When external loans are contracted, they first elicit response from service obligations which may affect exchange rate

and then general consumer prices. This conforms to conclusions drawn by Kincaid (1981), Nagwandu et al (2021) and Sharaf and Shahen (2023) who all found that the direct relationship between external debts and inflation is insignificant.

4.3.3 Forecast Error Variance Decomposition (FEVD)

Table 7 shows the variance decomposition of external debt in Nigeria over ten (10) years. It can be observed that external debt in Nigeria is highly endogenous, with an initial forecast of 100 per cent to explain itself in the first year and gradually declining to close at 96.26 per cent in the 10^{th} year. It can be observed that external debt in Nigeria is highly endogenous, with an initial forecast of 100 per cent to explain itself in the first year and gradually declining to close at 96.26 per cent in the 10^{th} year.

Table 7: Variance Decomposition of External Debt (LEXD)

Period	S.E.	LEXD	LEDS	LOER	INF
1	0.199	100.000	0.000	0.000	0.000
2	0.285	98.853	0.913	0.001	0.235
3	0.342	97.992	1.547	0.002	0.459
4	0.381	97.436	1.920	0.006	0.639
5	0.408	97.066	2.143	0.010	0.781
6	0.427	96.806	2.282	0.016	0.896
7	0.442	96.615	2.373	0.022	0.990
8	0.452	96.469	2.434	0.029	1.068
9	0.460	96.353	2.478	0.037	1.133
10	0.465	96.259	2.509	0.044	1.188

This shows that external debt service, official exchange rate and consumer prices have a low exogenous relationship with external debt. This means they do not drive up external debt in Nigeria. However, the influence of external debt service and inflation on external debt in Nigeria are higher than that of the official exchange rate.

Table 8: Variance Decomposition of External Debt Service (LEDS)

Period	S.E.	LEXD	LEDS	LOER	INF
1	0.559	11.638	88.362	0.000	0.000
2	0.602	16.764	82.743	0.036	0.458
3	0.652	28.430	70.694	0.077	0.800
4	0.699	37.347	61.618	0.105	0.930
5	0.735	43.075	55.839	0.122	0.964
6	0.762	46.719	52.185	0.132	0.964
7	0.781	49.090	49.816	0.139	0.956
8	0.794	50.671	48.240	0.143	0.946
9	0.804	51.748	47.168	0.146	0.938
10	0.811	52.493	46.430	0.147	0.932

Table 8 shows that external debt is truly exogenous to external debt service in Nigeria. This implies that as external debts accumulate, the more money Nigeria needs to service such debts. The predictive power of external debt service on itself declines continuously from 88.36 per cent in the first year to close at 46.43 per cent in the 10^{th} year. However, external debt exerts an increasing predictive power on external debt service throughout the forecast period commencing with 11.64 per cent in the first year to 52.49 per cent in the 10^{th} year. However, the official exchange rate and inflation are weakly exogenous to external debt service since their combined predictive power over external debt service has not exceeded 1 per cent throughout the forecast period.

Table 9: Variance Decomposition of Official Exchange Rate (LOER)

Period	S.E.	LEXD	LEDS	LOER	INF
1	0.259	0.991	14.594	84.415	0.000
2	0.384	6.699	12.372	72.790	8.140
3	0.494	11.822	10.171	62.056	15.951
4	0.592	16.062	8.601	54.088	21.249
5	0.679	19.663	7.534	48.259	24.544
6	0.756	22.796	6.803	43.890	26.511
7	0.824	25.552	6.291	40.521	27.636
8	0.884	27.987	5.924	37.857	28.233
9	0.937	30.137	5.655	35.708	28.500
10	0.984	32.034	5.453	33.948	28.566

From Table 9, it is evident that the official exchange rate is a decreasing endogenous factor of itself starting from 84.42 per cent in the first year to close at 33.95 per cent at the end of the forecast period. However, external debt service and inflation have a strong exogenous influence on the exchange rate in Nigeria. While their influence on the exchange rate remains strong, the influence of external debt increases faster than that of consumer prices. External debt service also has an influence on the future behaviour of the official exchange rate, even though it decreases with the passage of time commencing at 14.60 per cent in the first period to close at 5.45 per cent in the 10^{th} year.

A careful examination of Table 10 shows that, future behaviour of inflation is highly endogenous. This is attributable to other structural factors that may forecast inflation better than the variables in this system. It can be observed that inflation forecasts commenced at 97.24 per cent and closed at 94.68 per cent in the first and tenth years, respectively. Despite this, there is evidence to suggest that within the system, the official exchange rate is more exogenous to consumer price index than the rest of

the other variables; while external debt service is more exogenous to consumer price index than external debt. This result paints a picture of the transmission mechanism of how external debt passes through external debt service and official exchange rate adjustments to affect inflation.

Table 10: Variance Decomposition of Inflation (INF)

Period	S.E.	LEXD	LEDS	LOER	INF
1	14.372	0.682	0.678	1.397	97.243
2	16.706	0.598	1.391	1.656	96.355
3	17.519	0.723	1.741	1.866	95.670
4	17.842	0.799	1.870	2.036	95.294
5	17.984	0.822	1.904	2.173	95.101
6	18.054	0.820	1.906	2.283	94.991
7	18.095	0.816	1.899	2.372	94.911
8	18.122	0.824	1.894	2.445	94.837
9	18.143	0.844	1.891	2.505	94.760
10	18.161	0.877	1.889	2.555	94.680

4.4 Post-estimation Results

4.4.1 Stability Test

The study also checked to determine whether the model was stable. Checking for the stability of the model is to ensure that the estimates obtained from it are no spurious. This was done using an autoregressive root polynomial.

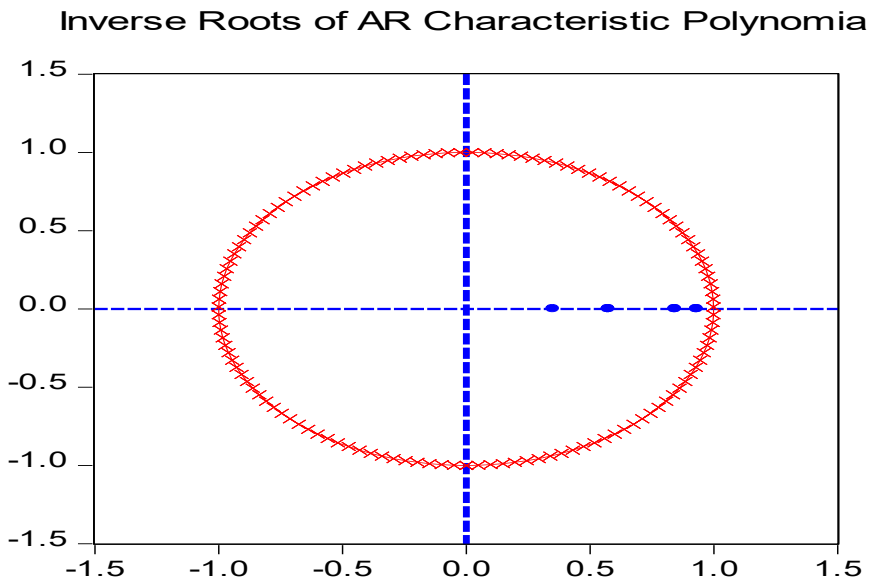

Figure 8: Inverse Roots of Autoregressive Polynomial

The unit root characteristic polynomial shows that the model is very stable since none of the points fall outside the unit circle. This thus makes the model suitable for estimation.

4.4.2 Serial Correlation Test

Table 11: VAR residual serial correlation LM tests

Lag	LRE* stat	Df	Prob.	Rao F-stat	df	Prob.
1	25.983	16	0.054	1.754	(16, 70.9)	0.056
2	13.208	16	0.658	0.819	(16, 70.9)	0.661
3	22.801	16	0.119	1.507	(16, 70.9)	0.122

The probability values at all three lags in Table 11 for both the LRE*Statistic and the Rao F-statistic are greater than the 0.05 critical value, indicating that the residuals are serially uncorrelated.

4.4.3 Heteroscedasticity test

The study also carried out a test to determine whether the residuals possessed the constant variance property.

Table 12: VAR Residual Heteroscedasticity Tests

Chi-sq	Df	Prob.
134.160	120	0.178

The test in Table 11 is carried out against the null hypothesis that, the data is homoscedastic while the alternative hypothesis states that, the data is heteroscedastic. If the P-value is less than 0.05, it can be concluded that the data is heteroscedastic otherwise, it is not. The chi-square statistics (**??**) and its probability (**??**), shows that the residuals of the model exhibited constant variance in tandem with the stochastic process. It can be concluded that, the errors were homoscedastic.

5. Conclusion and Recommendations

5.1 Conclusion

Based on the findings of this study, it is concluded that there is a connection between external debts and inflation in Nigeria through external debt service and exchange rate pass-through. This confirms that the relationship between external debts and inflation in Nigeria is indirect via external debt service and exchange rate depreciation. The contemporaneous and the variance decomposition results confirm that, external debts and external debt services are closely related. As external debts increase, external debt service rises with a corresponding depreciation of the naira. Accordingly, as the naira depreciates, it meant that finished and intermediate imported goods would be purchased at a higher amount, eventually translating to inflation in the economy.

5.2 Policy Recommendations

Based on the findings of this research, it is recommended that the Nigerian government should resort to alternative ways of raising funds for development projects rather than external debts to mitigate against the pressure of using the little available foreign exchange to service foreign loans. The government may consider alternative ways, such as bringing all taxable citizens (both individuals and corporate) into the tax net to enhance tax revenue generation. There is a compelling need for Nigerian public officials to be frugal with public funds in order to curtail leakages and wastages.

Also, to mitigate the effect of external debt service on exchange rate depreciation, Nigeria needs to boost local production to cut down on imports. The country should improve on the quality of its agricultural products in line with international best practices for exports to other nations to boost its foreign exchange earnings.

Furthermore, various tiers of government in Nigeria can provide subsidies in agriculture and the manufacturing sectors to make them more productive in order to provide basic necessities needed by Nigeria and curtail the level of imports in the country. This will ease the pressure on the naira for further depreciation even when external debts are serviced.

References

Aigbedion, I.M., Iyakwari, A. D. B., & Mairai. I. A. (2020). Public external debt and its impact on exchange rate in Nigeria. *International Journal of Advanced Studies in Business Strategies and Management,* 8(1) 25-39.

Aisen, A., Manguinhane, E. & Simione, F. F. (2021). An empirical assessment of the exchange rate pass-through in Mozambique. IMF Working Paper WP/21/132.

Algaeed, A.H. (2018). The exchange rate pass-through into inflation with symmetric oil price shocks: An empirical analysis for Saudi Arabia (1970-2015). *American Journal of Applied Sciences, 15*(1) *30-42.*

Amisano, G. & Giannini, C. (1997). From VAR models to structural VAR models. In: Topics in structural VAR econometrics. Springer, Berlin, Heidelberg. https://doi.org/10.1007/9783-642-60623-6_1

Arhenful, P. (2013). Effect of foreign aid on real exchange rate in Ghana. *Advances in Management and Applied Economics,* 3(5)151-169.

Aybarc, S. (2019). *Theory of public debt and current reflections*. Accessed at: https://dx.dio.org/10.5772/interopen.82730.

Bada, A.S., Olufemi, A.I., Inuwa A. T., Idowu P., Sani B., Anigwe J. O. & Udoko C. O. (2016) Exchange rate pass-through to inflation in Nigeria. *CBN Journal of Applied Statistics*. 7 1(a) 49-64.

Calderón, C. & Fuentes, J. R. (2013). *Government debt and economic growth*. IDB working paper series; 424

Central Bank of Nigeria (2011). *Understanding Monetary Policy Series No.12: Inflation Targeting as a Monetary Policy Framework*. Abuja: Central Bank of Nigeria.

Central Bank of Nigeria (2021). *Statistical Bulletin*. Abuja: Central Bank of Nigeria.

Central Bank of Nigeria (2021). *Understanding Monetary Policy Series No.12: Inflation Targeting as a Monetary Policy Framework*. Accessed at: www.cbn.gov.ng/out/2022/mpd/series%2012.pdf.

Central Bank of Nigeria (2022). *Payment system: External debt*. Accessed at: https://www.cbn.gov.ng/Paymentsystem/SourceExDebt.asp.

Central Bank of Nigeria (2023). Exchange rates monthly moving average. Accessed at: www.cbn.gov.ng/rates/exchratebycurrency.asp.

Chenery, H. B., & Strout, A. M. (1966). Foreign assistance and economic development. *The American Economic Review,* 679-733.

Churchman, N. (2001). Public debt and the economics of David Ricardo. In: *David Ricardo on Public Debt: Studies in the History of Economics*. Palgrave Macmillan, London. https://doi.org/10.1057/9780230509016_2.

Egwaikhide, F. O., Chete, L. N. & Falokun, G. O. (1994). *Exchange rate depreciation, budget deficit and inflation—the Nigerian experience.* AERC Research Paper 26. African Economic Research Consortium, Nairobi.

Essien, S.N., Agboegbulem, N. T. I., Mba, M. K. & Onumonu, G. O. (2016). An empirical analysis of the macroeconomic impact of public debt in Nigeria. *CBN Journal of Applied Statistics.* 7 (1a) 125-145.

Eze O. M., Nweke A. M. & Atuma E. (2019). Public debts and Nigeria's economic growth. *IOSR Journal of Economics and Finance (IOSR-JEF)*. 10 (3) 24-40.

Ezeabasili, V. N. (2006). Nigeria external debt: Past, present and future. *The Certified National Accountant.* 14(1) 25 – 43.

Festus, G. E. & M.O. Saibu (2019). Effect of external debt on Nigerian economy: Further evidences. Retrieved from https://mpra.ub.uni-muenchen.de/92704/MPRA. Paper No. 92704.

Fisher, I. (1926). A statistical relation between unemployment and price changes. *International Labour Review.* 785-792.

Gujarati, D. N. (2013). *Basic Econometrics (5^{th} Edition).* Crete: McGraw Hill Education.

Igudia. P.O. (2021). Impact of external debt servicing on human capital development in Nigeria: 1960 to 2019. *International Journal of Business & Law Research*, 9(3), 38-55.

Imoagwu, C.P., Ezenekwe, U.R., & Nwogwugwu, U.C. (2023). Rising external debt and exchange rate: Empirical evidence from Nigeria. *International Journal of Advance Economics* 5(4) 90-106.

Imimole, B., & Enoma, A. (2011). Exchange rate depreciation and inflation in Nigeria (1986- 2008). *Business Economics Journal*, 28(1), 1-13.

Isibor, A. A., Babajide A. A., Akinjare V., Oladeji, T. & Osuma, G. (2018). The effect of public debt on economic growth in Nigeria: An empirical investigation. *International Business Management* 12 (6) 436-441.

Kobayashi, K., Nakajima,T & Takahashi, S. (2021). Debt overhang and lack of lender's commitment. *The Canon Institute for Global Studies*. No.21-010E.

Liebersohn, J., Correa, R. & Sicilian, R. (2022). Debt overhang and the retail apocalypse. Accessed at: http://dx.doi.org/10.2139/ssrn.4102161.

Madhavi, J.A. (2022). An analysis of exchange rate pass-through and impact on domestic inflation in Sri Lanka. Accessed at: http://dx.doi.org/10.2139/ssrn.4138576.

Maduku, H. (2017). *An empirical analysis of exchange rate pass-through to prices in South Africa (2002-2015).* A Dissertation Submitted to the Faculty of Commerce, Administration and Law in Fulfillment of the Requirement of the Master of Commerce (Economics) Degree University of Zululand.

Martin, V., Hurn, S. & Harris, D. (2013). *Econometric Modelling with Time Series*. Cambridge: Cambridge University Press.

Mba, P. N., Yuni, D. N. & Chukwuedo, S. O. (2013) Analysis of domestic debt: Implication for economic growth in Nigeria. *Global Journal of Social Sciences*. 12 (2013) 1-9.

Modigliani, F. (1961). Long-run implications of alternative fiscal policies and the burden of the national debt. *Economic Journal*. 71 (284) 730-755.

Momodu, A. A. (2012). Effect of debt servicing on economic growth in Nigeria. Retrieved from: www.reikojournals.org_.

Musti, B. M. (2017). *Asymmetric and nonlinear exchange rate pass-through to consumer price in Nigeria: 1986 – 2013.* PhD Thesis in Economics, Kingston University London.

Myers, S. C. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics*, 5 (1), 147-175.

Nambie, N.B. & Donkor, M.J. (2022). External debt, exchange rate and inflation in Africa, a moderating role of governance quality. *International Journal of Economics, Commerce and Management, United Kingdom.* 10 (7) 80-98.

Natagwandu, I.M., Dele, O., Amana, S. A, & Hassan, U.U. (2021). Effect of public debt on inflation in Nigeria. *Journal of Economics and Management Sciences.* 6(1) 2; 171-186.

Nazamuddin, B.S., Wahyuni, S.S., Fakhruddin, F., & Fitriyani, F. (2022). The nexus between foreign exchange and external debt in Indonesia: Evidence from linear and nonlinear ARDL approaches. *Journal of the Asia Pacific Economy*, 1-27.

Ndoricimpa, A. (2020). Threshold effects of public debt on economic growth in Africa: A new evidence. *Journal of Economics and Development*. DOI: 10.1108/JED-01-2020-0001.

Ndubuaku, V.C., Uche, M.U., Onwuka, C.C. & Ifeanyi,P.O. (2021). External debt dynamics and sustainable growth in Nigeria. *International Journal of Sustainable Development & World Policy*, 10(2), 51-63.

Njoku, C. O. & Nwaimo, C. E. I. (2019). The impact of exchange rates on inflation in Nigeria (1981-2015). *Management Studies and Economic Systems (MSES).*4 (3) 171-195.

Nwanne, T. F. I. & Eze, O. R. (2015). Assessing the effect of external debt servicing and receipt on exchange rate in Nigeria. *International Journal of Economics and Finance*, 7 (9), 278- 286. doi:10.5539/ijef.v7n9p278.

Nwokoma, N. I. (2013). Capital flows and macroeconomic stability: Theoretical and conceptual considerations. *CBN Journal of Applied Statistics*. 51(4)1-25.

Nwannebuike, U. S., Ike, U. J. &. Onuka, O. I. (2016). External debt and economic growth: the Nigeria experience. *European Centre for Research Training and Development UK* .4(2) 33-48. Retrieved from: www.eajournals.org.

Odubuasi, A. C., Uzoka, P. U. & Anichebe, A. S. (2018). External debt and economic growth in Nigeria. *Journal of Accounting and Financial Management*. 4(6) 98-108. Retrieved from: www.iiardpub.org.

Okoh, J. I., Olowo, S. O., Hassan, C. O., Aderemi, T. A., Peter, O. O., & Alejo, A. (2021). External Debt and exchange rate fluctuations in Nigeria (1990-2017). *African Journal of Business and Economic Research*, *16*(S1), 167-178.

Omotosho, B. S., Bawa, S. & Doguwa, S. I. (2016). Determining the optimal public debt threshold for Nigeria. *CBN Journal of Applied Statistics*. 7 (2) 1-25.

Onakoya, A. B. & Ogunade, A. O. (2017) External debt and Nigerian economic growth connection: Evidence from autoregressive distributed lag approach. *Journal of Economics and Development Studies*. 5 (1) 66-78. DOI: 10.15640/jeds. v5n1a7.

Oner, C. (2017). *Inflation: Prices on the rise. Back to Basics*. Accessed at: https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/Inflation.

Onuoha, I. P. (2014). Impact of exchange rate variation and inflation on the economic growth of Nigeria: An empirical approach. *Research Journal of Finance and Accounting*. 5(22) 166-176.

Romer, P. M. (1986). Increasing returns and long run growth. *Journal of Political Economy*. 94 (5) 1002-1037.

Saheed, Z. S., Sani, I. E. & Idakwoji, B. O. (2015). Impact of public external debt on exchange rate in Nigeria. *European Journal of Business and Management*, 7(21), 51-58.

Saungweme, T. & Odhiambo, N.M. (2021). Public debt service in South Africa and its impact on economic growth: An empirical test. *The Review of Black Political Economy*, 48(3), 313- 327.

Sharaf, M.F. and Shahen, A. M (2023). Does external debt drive inflation in Sudan? Evidence from symmetric and asymmetric ARDL approaches. *MPRA Paper No. 116856*.

Skousen, N. (2007). *The Big Three in Economics: Adam Smith, Karl Marx and John Maynard Keynes*. Armonk: M.E. Sharpe.

Sitompul, S., Ichsan, R.N. & Nasution, L. (2021). The Influence of Exchange Rate, Inflation, For the Results of the Development Assets of Islamic Banks.

Smith, A. (1776). *An inquiry into the nature and the causes of wealth of nations*. Amsterdam: MetaLibri.

Sulaiman, L.A. & Azeez, B. A. (2012). Effect of external debt on economic growth of Nigeria. *Journal of Economics and Sustainable Development*. 3(8)71-81.

Turan, T. & Yan–kkaya, H. (2021). External debt, growth and investment for developing countries some evidence for the debt overhang hypothesis. *Portuguese Economic Journal*, 20(3), 319-341.

Ujuju, L.E. & Oboro, G. O. (2017). The Nigeria debt structure and its effects on economic performance. *International Journal of Business and Management Review*. 5(10) 79-88.

World Bank (2023a). External Debt stock, total (DOD, current US$)-Nigeria. Accessed at: https://data.worldbank.org/indicator/DT.DOD.DECT.CD?locations=NG.

World Bank (2023b). Debt service on external debt, total (TDS, current US$)-Nigeria. Accessed at: https://data.worldbank.org/indicator/DT.TDS.DECT.CD?locations=NG.