

Impact of External Debt Shocks on Real Sector of the Nigerian Economy from 1986 to 2020: Application of SVAR Modeling

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Abstract: This Study investigated the impact of external debt shocks on real sector of the Nigerian economy using annual time series data from 1986 to 2020. Specifically, it investigated the impact of external debt shocks on agricultural output in Nigeria. Augment Dickey Fuller and Phillips Perron unit root tests were used and the tests show that all the variables under study are stationery at first difference. The study, also, employed Structural VAR model, the results from the impulse response functions revealed that, manufacturing output has a negative shocks impacts on agricultural output in Nigeria. External debt has a negative shocks impacts on agricultural output in Nigeria. Exchange rate has a positive effect on the agricultural output in Nigeria. The study concludes that external debt exerts negative impact on the real sector in Nigeria. The study therefore, recommended that Nigerian government should try to avoid excessive external debt due to its negative effect in the long run in the economy and danger of repayment of loans including principal and interest. Loan should also be utilize judiciously in a way to diversify the economy and achieved higher economic growth.

Keywords: External Debt, Agricultural Output, Manufacturing Output.

1. INTRODUCTION

The main goal of any developing nation's economic policy is to reduce poverty and achieve sustainable economic growth while advancing infrastructure. On the other hand, the government must accept financial aid from the outside world, primarily in the form of debt, if it is unable to achieve its growth requirements. A nation's ability to borrow from abroad does not always mean that it will be detrimental until it can earn returns greater than the cost of borrowing; but, misuse of this resource can have dire consequences (Magaji, 2020). According to Pattillo et al. (2004), borrowing from outside sources would increase capacity and output growth, making the debt productive and justified. Conversely, this debt may lead to excessive foreign borrowing and fiscal imbalances, which could increase the nation's susceptibility to various shocks and crises. Because of its impact on the budget deficit and debt, it lessens the efficacy of fiscal policies and restricts the monetary authority's ability to raise interest rates for monetary policy goals (Beetsma & Bovenberg, 2003).

Due to excessive borrowing from foreign organizations and nations at non-concessional interest rates brought on by the drop in oil earnings starting in the late 1970s and the rise in high trade arrears brought on by Nigeria's inability to easily produce or pay for the importation of the necessary goods and services, the country's external debt ballooned to an enormous extent. Nigeria's economic development and growth have been quite disappointing, even with its large foreign borrowing profile prior to 2000. The nation went through its worst economic downturn in the 1980s, marked by a high unemployment rate, hyperinflation, falling growth rates, unbalanced payments, industrial decadence, inadequate infrastructure, and a

significant amount of external debt. With a poverty rate of 65 percent, the nation was ranked among the world's lowest economies in terms of GDP per capita (Musa, Magaji, Eke and Abdulmalik, 2022). The size of Nigeria's public debt, the amount needed to pay it back, and the potential consequences for various economic sectors—particularly the banking industry and overall economic growth—have made the issue of public debt in the country a significant one in recent years, particularly before the debt forgiveness period (Adam, Magaji, Ayi and Musa, 2016). About \$28 billion, or 85%, of Nigeria's US\$34 billion (or N2.7 trillion) external debt in 2005 was owed to the Paris Club of fifteen creditor nations (Emmanuel, 2012). The external debt stock of Nigeria, which stood at \$11.262 billion as of June 2016, would rise to \$41.162 billion after three years when the borrowing plan would have been fully executed, thanks to the federal government's intention to borrow \$29.9 billion. Debt Management Office (DMO, 2006) states that Nigeria's external debt profile has become a source of concern for everyone. Despite the government's successful negotiation of debt forgiveness and exit from the Paris Club and London Club of creditors, which resulted in the fall of external debt from N2.7 trillion in 2005 to less than N451.46 billion in 2006. Given that the country's GDP per capita was less than \$5, it appears that the massive debt load did not result in significant economic growth. Even with the debt relief that was given in 2005 and 2006, the country's basic infrastructure is still in poor condition, and 65% of its citizens live in poverty on average. These factors raise concerns about the necessity of external debt and its potential benefits for the expansion of the Nigerian economy. According to the debt overhang models, high debt stocks have a detrimental impact on poverty because they partially inhibit investment, which in turn slows GDP. Reducing the debt overhang will inevitably lead to economic expansion, encourage investment, and improve per capita income—all of which are necessary for reducing poverty (Elyaqub, Gobna and Musa, 2024). Is it possible to consider this to be true in the Nigerian setting? Has this relief been hampered by significant adverse shocks, policies that distort economic incentives, or macroeconomic instability? According to Soludo (2003), the nation was on the wrong side of the debt-laffer-curve before the relief, with debt inhibiting growth and investment. What might be impeding growth and investment in Nigeria and pushing the government toward further debt after the reprieve?

Nigeria, like the majority of developing nations worldwide, is heavily dependent on foreign funding to finance its infrastructure projects, such as highways, power plants, and iron and steel factories. External loans are typically used to provide this kind of cash. During the initial years of political independence, from 1960 to 1975, these loans often had a long maturity, a small value, a concessionary interest rate, and a bilateral or multilateral source. For example, Nigeria owed over \$150 million in foreign debt in 1960, but things started to change in 1978. Nigeria began borrowing large amounts of money at floating rates and shorter maturities from private sources after being drawn in by the global financial hubs. The "jumbo loan" from 1978 alone was reportedly worth about \$1 billion USD. Nigeria's external debt was valued at US \$18.631 billion in 1982, accounting for more than 160% of the country's GDP in that year. A debt crisis was sparked by the circumstances, and it got worse over time. Nigeria was forced to implement the Structural Adjustment Program (SAP), supported by the World Bank and the International Monetary Fund (IMF), in 1986 in an effort to revitalize the economy and improve the nation's ability to pay down its debt. Nigeria's inflation rate has been rising, in part because of the country's high debt load and in part because of government policies that have proven ineffective (Magaji and Musa, 2015). One such example is the recent increase in the minimum wage, which went from 7,500 Naira to 18,000 Naira and most recently to 30,000 Naira.

The main objective of the paper is to examine the impact of external debt shocks on the real sector of Nigerian economy, specifically, to investigate the impact of external debt shocks on agricultural output in Nigeria. The rest of the paper is organised as follows: literature review which is the second part of the paper, methodology in which the objectives of the paper could be achieved and is the third part of the paper, part four of the paper is presentation and analysis of the empirical findings and the final section concludes the paper.

2. LITERATURE REVIEW

2.1 Conceptual Literature

2.1.1 External Debt

The portion of a nation's overall debt that is owing to creditors outside of the nation is known as its external debt. Governments, businesses, or private households can be the borrowers. "Total external debt is a debt owed to non-residents repayable in foreign currency, goods, or services," according to the World Bank definition. One way that nations might finance their deficits and implement economic initiatives that raise living standards and advance sustainable development is through the issuance of external debt. According to Audu (2004), it is a crucial resource required to promote sustainable

economic growth. External debt is the entire amount of foreign debt that a nation owes, both private and public, according to Todaro and Smith (2011). According to Ajie, Akekere, and Ewubare (2014), an unpaid share of foreign resources obtained for balance of payments support and developmental objectives that could not be reimbursed when they were due are referred to as external debt. The percentage of a nation's debt that was obtained through borrowing from foreign lenders, such as governments, commercial banks, or international financial institutions, is referred to as its external debt (Arnone, Bandiera & Presbitero, 2005). Both bilateral and multilateral sources can contribute to external debt. The amount of a nation's external debt burden that is owed to international financial organizations (IFIs), such as the World Bank and the International Monetary Fund (IMF), is known as multilateral debt (Abdulkarim & Saidatulakmal, 2021). For most of the world's poorest countries, multilateral debt looms larger than other debts because of the IFIs' standing as "preferred creditors," as they offer loans for balance-of-payment and core growth. According to George-Anokwuru and Inimino (2020), multilateral debt is the amount that developing nations owe to the World Bank, the International Monetary Fund (IMF), and other multilateral organizations, regional development banks, and intergovernmental agencies. Bilateral debt is government-to-government debt which is negotiated bilaterally between the debtor country and the official creditor (George-Anokwuru & Inimino, 2020). This debt can be either concessional debt, also known as Official Development Assistance (ODA), or non-concessional debt, simply known as "non-ODA" debt. Non-ODA debt often arises through loans between a government agency or state-owned enterprise (SOE) on the debtor side and, on the creditor side, a commercial partner that benefits from a full or partial guarantee from their specific export credit agency (ECA). Once the guarantee is called, the guaranteed portion of the debt (typically 80%) becomes a claim of the ECA and therefore government-to-government debt. Bilateral debts are debts emanating from bilateral creditors. A sovereign entity lending to another sovereign is considered to be a bilateral creditor (Mhlaba, Phiri & Nsiah, 2019).

2.1.2 Real Sector

The real sector of the economy concerns the production, purchase and flow of goods and services within an economy. The real sector, is one of the major components of the Nigerian economy (Magaji and Musa, 2023). The sector is made up of the manufacturing and service industries. These include housing, agriculture, manufacturing industry, mining infrastructures and services. This sector is one of the sectors that is capable, if vibrant, of fast-tracking economic growth and development coupled with high level of massive employment creation. The real sector is one potential area for economic growth and development that cannot be ignored. The sector, apart from the economic viability is a major employer of labour. With dwindling GDP and high rate of unemployment, it will be foolhardy to downplay such an important sector. Nigeria's real sector development problems are still complex and combine elements of both local and foreign traits. The real sector includes the following: agriculture, industry, building and construction, wholesale and retail, and services. On the international front, global financial activities have an impact on developments in the international oil market and the oil and gas sector. As a result, the policy environment needs to be suitably targeted at strengthening the private sector's ability to propel real sector activity and, ultimately, reach the targeted rates of growth. It is undeniable that the intricate relationships between economic agents and activities make it difficult to identify the precise adjustment mechanisms needed to achieve optimal output levels. Econometric models are useful tools that could be used to determine quantitative indicators to help policy makers create and carry out smart policies, albeit they are not all-inclusive. Econometric models have contributed to the differences in industrialized, emerging, and developing economies' approaches to formulating and implementing solid economic policies. Structurally, Nigeria's economy can be classified into three major sectors – primary, secondary and tertiary. The primary sector consists of agriculture and natural resources; the secondary sector is mainly industry, which is made up of processing and manufacturing, as well as building and construction; while services and wholesale and retail trade make up the tertiary sector. The real sector is also classified into oil and non-oil sector. While the oil sector is made up of the crude petroleum and gas production, the non-oil sector is made up of agriculture, industry, wholesale and retail and services.

2.2 Theoretical Literatures

Reiterating the points made by Buchanan (1958) and Meade (1958), Modigliani (1961) contended that the national debt is a burden on future generations since it results in a less flow of income from a smaller stock of private capital. He also mentioned the potential non-linear impact on long-term interest rates, in addition to the direct crowding-out effect: "if the government operation is of sizable proportions it may significantly drive up [long-term] interest rates since the reduction of private capital will tend to increase its marginal product."

The national debt will typically not be costless for future generations, even if it benefits the present generation now and is created as a counter-cyclical measure "in spite of the easiest possible monetary policy with the whole structure of interest rates reduced to its lowest feasible level." According to Modigliani, when debt is used to fund government spending that could increase future generations' real income, like the creation of productive public capital, the overall burden of the national debt may be partially or completely offset.

2.3 Empirical literatures

Obriki and Ese (2022) investigated the effect of external debt on the Nigerian real sector from 1991 to 2021 and specifically to determine the effect of external debt stock on Nigerian agricultural sector. External debt stock, external debt servicing, inflation rate and exchange rate were employed as the independent variables while agricultural sector output, manufacturing sector output and construction sector output were employed as the dependent variable. The Error Correction Model (ECM) indicates that external debt stock had significant effect on Nigerian agricultural sector. The study also found that external debt stock had significant effect on Nigerian manufacturing sector. The study further found that external debt stock had significant effect on Nigerian construction sector. Manasseh et al.'s (2022) investigation looked at how external debt affected economic expansion. Additionally, using the Dynamic System Generalized Method of Moments estimating technique, the study's findings on the interconnections between governance, external debt, and external debt volatility show that these factors significantly and negatively affect economic growth in Sub-Saharan Africa. Additionally, the relationship between external debt and its volatility and governance indicators benefited SSA's economic growth. The study suggests that in order to support the region's ability to invest in its financial prospects and to reduce the risk of loan payback using her meager revenue, the SSA government should make an effort to avoid excessive external debt.

Using the Auto Regressive Distributed Lags (ARDL) model, Akanbi, Uwaleke, and Ibrahim (2022) examined the connection between Nigeria's economic growth and the repayment of its external debt between 1981 and 2020. Co-integration was evident based on the findings of the ARDL bound test. The co-integrating equations' short-run and long-run changed at a rate of 88.86%. The outcome demonstrates the impact of external debt services on growth and resource depletion. Growth and the stock of external debt have a positive but insignificant link. External reserves and the external debt ratio with growth have a positive but insignificant link. Growth and the debt service to export ratio are positively correlated.

Dahiru, Haladu, and Umar (2021) looked into how government spending and external debt affected Nigeria's economic growth from 1985 to 2019. The Structural Vector Autoregressive (SVAR) model was used in the investigation. The study's findings validated the apriori expectation by showing that the exchange rate had a positive shock effect on both real gross domestic product and external debt. The foreign debt, exchange rate, and government spending dynamic shocks are positively correlated over the course of the period, resulting in a one-unit negative response to the real gross domestic product over the entire horizon. According to the variance decomposition results, long-term exchange rate, government spending, and real GDP shocks can account for 4.5%, 16.6%, and 62.4% of the variation in the data, respectively. In order for the nation to meet its financial obligations, the paper suggests that its borrowing policies be reviewed as well. It also suggests that the nation diversify its economy away from oil exports and toward non-oil exports, such as agriculture, taxes, and tourism, as these sectors generate higher foreign earnings, a more favorable balance of payments, and export surpluses that will boost economic growth.

Using the Johansen Cointegration test and the system Generalized Method of Moments (sys GMM), Ehikioya, Omankhanlen, Osuma, and Inua (2020) investigated the dynamic relationships between foreign debt and economic growth in 43 African nations over the period of 2001–2018. The findings provide evidence in favor of a long-term equilibrium between external debt and African economic growth. The outcome also shows that, over a certain threshold, the short-run converges to equilibrium in the long run, and external debt will begin to negatively affect African economic growth. The study's conclusions support the necessity for policymakers to make sure that foreign debt is applied correctly to economic activity in order to promote long-term economic performance. In addition, a monitoring system needs to be established by the government and development partners to guarantee that borrowed money is being used effectively.

The question of whether external borrowings and its key determinants exchange rate, gross fixed capital formation, and inflation rate have aided in the expansion of the Nigerian economy is investigated by Uchenna, Nwanneka, Adedayo, and Grace (2020). The ordinary least squares method was used to estimate the model's parameters. The application of the generalized least squares technique improved the result's robustness. The outcome demonstrates a strong positive link

between the explanatory variables external debt, exchange rate, and inflation rate and economic growth. However, a negative association was found between gross fixed capital formation and economic growth. The foreign debt, exchange rate, and inflation rate all have a substantial positive impact on economic growth, according to the regression estimates for the ordinary and generalized least squares tests. Additionally, the data indicate that gross fixed capital development has a non-significantly negative impact on economic growth.

Dey and Tareque (2019) used the Vector Autoregressive Model (VAR) and Autoregressive Distributed Lag (ARDL) bounds testing approach to investigate the effect of external debt on economic growth in Bangladesh within a larger macroeconomic scenario. The study shows that foreign debt has a negative influence on GDP growth, but the macroeconomic policy (MEP) index's greater positive impact suggests that solid MEP and suitable HR policies can lessen or even eliminate the negative effects of debt.

In Ndubuisi's (2017) analysis, the effects of Nigeria's foreign debt on economic growth were examined. The variables used to gather data were the GDP, external debt services, stock of external debt, external reserve, and exchange rate. The results show that while external debt stock has a positive and large impact on Nigeria's growth index, debt service payment has a negative and small impact on the country's economic growth. The currency rate and foreign reserve, which are control factors, have a major and beneficial impact on growth.

Ejigayehu and Persson (2013) investigated whether the debt overhang and debt crowding out effects of external debt have an impact on the economic growth of a subset of highly indebted poor African countries. The estimation's conclusion demonstrates that, as opposed to debt overhang, foreign debt has an impact on economic growth through the debt crowding out effect. Furthermore, the thesis discovered that the chosen nations are not paying (servicing) more than 95% of their total debt in an effort to map out their debt servicing histories.

Umaru, Hamidu, and Musa (2013) use the Ordinary Least Squares method to create a straightforward link between the variables under investigation in order to examine the effects of both domestic and external debt on economic growth in Nigeria between 1970 and 2010. Additionally, the OLS results showed that while domestic debt had a favorable impact on GDP growth, external debt had a negative impact on it. Therefore, a country's level of domestic debt rather than its level of external debt can be used to determine how well its economy is performing in terms of per capita growth; as a result, external debt is thought to be detrimental to a nation's ability to advance economically.

Were (2001) looked into Kenya's external debt structure and how it affected the country's economic growth. Using time series data for the years 1970–1995. The study's conclusions show that the majority of Kenya's external debt is official, with a greater share coming from multilateral sources. The amount of external debt has been accumulating over time, with early 1990s debt load indicators showing a steady increase. The findings also showed that rising levels of external debt have a detrimental effect on private investment and economic expansion. This demonstrates that Kenya does indeed have a debt overhang issue. The study did, however, also show that present loan inflows encourage private investment. While debt servicing has some implications on private investment crowding out, it does not appear to have a negative impact on growth.

3. METHODOLOGY

3.1 Model specification

The model of the study is adopted from the work of Obriki and Ese (2022) and specified as

$$AGR = F(EXDT, EXDS, INTR, EXRATE) \dots \dots \dots (3.1)$$

The model is modified as:

$$AGR = F(MAN, EXDT, EXRATE) \dots \dots \dots (3.2)$$

Where

AGR = *Agricultural output* Measured as total agriculture percentage of GDP,

MAN = *Manufacturing output* Measured as total manufacturing percentage of GDP,

EXDT = *External debt*, *EXRATE* is the *Exchange rate* measured as official exchange rate.

3.1 Structural Vector Autoregressive (SVAR) Model

The study used structural VAR to ascertain the effects of external debt on government spending in Nigeria in order to meet the goals of the research project. Finding the relationships between the variables is the aim of VAR analysis, not estimating the parameters Enders (20015). Each variable in the system is expressed as a function of both its own lags and the lags of the other variables in the system using the VAR set of equations. As a result, it considers every variable to have endogenous potential. With the use of VAR, one may display the dynamic interaction between stationary variables in econometrics. The VAR model solely incorporates endogenous variables and permits the variables to rely on factors other than their own delays. Enders, 2015.

$$Y_t = b_{10} - b_{12}Z_t + \gamma_{11}y_{t-1} + \gamma_{12}Z_{t-1} + \varepsilon_{yt} \dots\dots\dots(3.3)$$

$$Z_t = b_{20} - b_{21}Y_t + \gamma_{21}y_{t-1} + \gamma_{22}Z_{t-1} + \varepsilon_{zt} \dots\dots\dots(3.4)$$

From equations (3) and (4), y_t and z_t are endogenous variables, b_{12} and b_{21} captures the contemporaneous effect of z_t on y_t and y_t on z_t respectively. The coefficients γ_i captures the lagged relationship between the variables, while ε_{yt} and ε_{zt} are structural errors.

$$B_0Y_t = B_1Y_{t-1} + B_2Y_{t-2} + \dots + B_pY_p + \varepsilon_t \dots\dots\dots(3.5)$$

The reduced form VAR is specified as

$$Y_t = C + A_1Y_{t-1} + A_2Y_{t-2} + \varepsilon_t \dots\dots\dots(3.6)$$

Where ε_t denotes a mean zero serially uncorrelated error term, also referred to as structural shock.

$$AGR_t = \alpha_{10} - \alpha_{20}MAN_t - \alpha_{30}EXDT_t - \alpha_{40}EXRATE_t + \sum_{t-1}^p \beta_{10}^t AGR_{t-1} + \beta_{10}^t MAN_{t-1} + \beta_{12}^t EXDT_{t-1} + \beta_{133}^t EXRATE + \mu_t^{AGR} \dots\dots\dots(3.7)$$

$$MAN_t = \alpha_{20} - \alpha_{30}AGR_t - \alpha_{40}EXDT - \alpha_{50}EXRATE + \sum_{t-1}^p \beta_{10}^t MAN + \beta_{20}^t AGR_{t-1} + \beta_{40}^t EXDT_{t-1} + \beta_{50}^t EXRATE_{t-1} \mu_t^{MAN} \dots\dots\dots(3.8)$$

$$EXDT_t \alpha_{30} - \alpha_{40}AGR_t - \alpha_{40}MAN_t - \alpha_{50}EXRATE_t + \sum_{t-1}^p \beta_{30}^t EXDT_{t-1} + \beta_{40}^t AGR_{t-1} + \beta_{50}^t MAN_{t-1} + \beta_{50}^t EXRATE_{t-1} \mu_t^{EXDT} \dots\dots\dots(3.9)$$

$$EXRATE_t = \alpha_{40} - \alpha_{50}AGR_t - \alpha_{60}MAN_t - \alpha_{70}EXDT_t + \sum_{t-1}^p \beta_{40}^t EXRATE_{t-1} + \beta_{50}^t AGR_{t-1} + \beta_{60}^t MAN_{t-1} + \beta_{70}^t EXDT_{t-1} \mu_t^{EXRATE} \dots\dots\dots(3.10)$$

$$\begin{bmatrix} AGR \\ MAN \\ EXDT \\ EXRATE \end{bmatrix} = \begin{bmatrix} C_1 \\ C_2 \\ C_3 \\ C_4 \end{bmatrix} \begin{bmatrix} 1 & A_{12} & A_{13} & A_{14} \\ A_{21} & 1 & A_{23} & A_{24} \\ A_{31} & A_{32} & 1 & A_{34} \\ A_{41} & A_{42} & A_{43} & 1 \end{bmatrix} \begin{bmatrix} AGR_{t-1} \\ MAN_{t-1} \\ EXDT_{t-1} \\ EXRATE_{t-1} \end{bmatrix} + \begin{bmatrix} 1 & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & 1 & \alpha_{23} & \alpha_{24} \\ 0 & 0 & 1 & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & 1 \end{bmatrix} \begin{bmatrix} U_t^{AGR} \\ U_t^{MAN} \\ U_t^{EXDT} \\ U_t^{EXRATE} \end{bmatrix}$$

Where

$$A = \begin{bmatrix} 1 & A_{12} & A_{13} & A_{14} \\ A_{21} & 1 & A_{23} & A_{24} \\ A_{31} & A_{32} & 1 & A_{34} \\ A_{41} & A_{42} & A_{43} & 1 \end{bmatrix}, C = \begin{bmatrix} C_1 \\ C_2 \\ C_3 \\ C_4 \end{bmatrix}, Z = \begin{bmatrix} AGR \\ MAN \\ EXDT \\ EXRATE \end{bmatrix}, Z_{t-1} = \begin{bmatrix} AGR_{t-1} \\ MAN_{t-1} \\ EXDT_{t-1} \\ EXRATE_{t-1} \end{bmatrix}, U_t = \begin{bmatrix} U_t^{AGR} \\ U_t^{MAN} \\ U_t^{EXDT} \\ U_t^{EXRATE} \end{bmatrix}$$

$$\text{and } a = \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix} \text{ such that } U_t \sim iid(0, \alpha^2)$$

Z_t is a 4×1 vector of dependent variables; Z_t is a 4×1 vector of lagged variables; A is a 4×4 matrix of the parameters to be estimated and identified with 1 as a diagonal elements, C is a 4×1 vector of constants, a is a 4×4 matrix of the coefficients of lagged variables and μ_t is a 4×1 vector of the structural / orthogonalized errors which are assumed to be serially uncorrelated with a mean of zero and a constant variance.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Descriptive statistics

Table 4.1 Descriptive statistics

Statistics	LAGR	LMAN	LEXDT	LEXRATE
Mean	1.375959	1.102689	1.486106	1.821217
Median	1.378283	1.102683	1.701171	2.099709
Maximum	1.567792	1.322625	2.358642	2.627075
Minimum	1.255765	0.816428	0.632183	0.244159
Std. Dev.	0.063012	0.158675	0.582822	0.638395
Skewness	0.871305	-0.081275	-0.116722	-0.786664
Kurtosis	4.226881	1.599271	1.441328	2.525086
Jarque-Bera	7.002134	3.065548	3.829429	4.163894
Probability	0.030165	0.215936	0.147384	0.124687
Sum	50.91047	40.79948	54.98593	67.38502
Sum Sq. Dev.	0.142938	0.906394	12.22852	14.67172
Observations	37	37	37	37

Source: Researcher computation using E-views 10, 2024

Table 4.1 shows the result of descriptive statistics of the study, it indicates that the standard deviations of the variables employed are not far away from their means. The Skewness of the distribution shows positive values and less than one of agricultural output, this implies that, this variable is skewed to the right and is normally distributed while manufacturing output, external debt, and exchange rate are skewed to the left and normally distributed. The Kurtosis indicates that all the variables are normally distributed because their values are less than 3, this means these variables normally distributed except of agricultural output. The Jarque-Bera test for normality is also estimated. The result indicates the rejection of null hypothesis of all the variables employed except agricultural output because their probabilities value are greater than 5% this means that manufacturing output, external debt and exchange rate are normally distributed.

4.2 Unit root test

The study estimated unit root test of both Augment Dickey Fuller and Phillips Perron in order to identify the order of integration of the variables under study.

Table 4.2 unit root test

Variables	Test at level		Test at first difference		Order of Integration
	ADF test	PP test	ADF test	PP test	
LAGR	-3.039871	-0.187645	-6.613315	-7.298344	I(1)
LMAN	0.074102	-2.671367	-5.081340	-5.127394	I(1)
LEXDT	-1.213369	-1.260039	-5.808697	-5.808558	I(1)
LEXRATE	-2.904040	-2.903885	-6.398435	-6.566751	I(1)

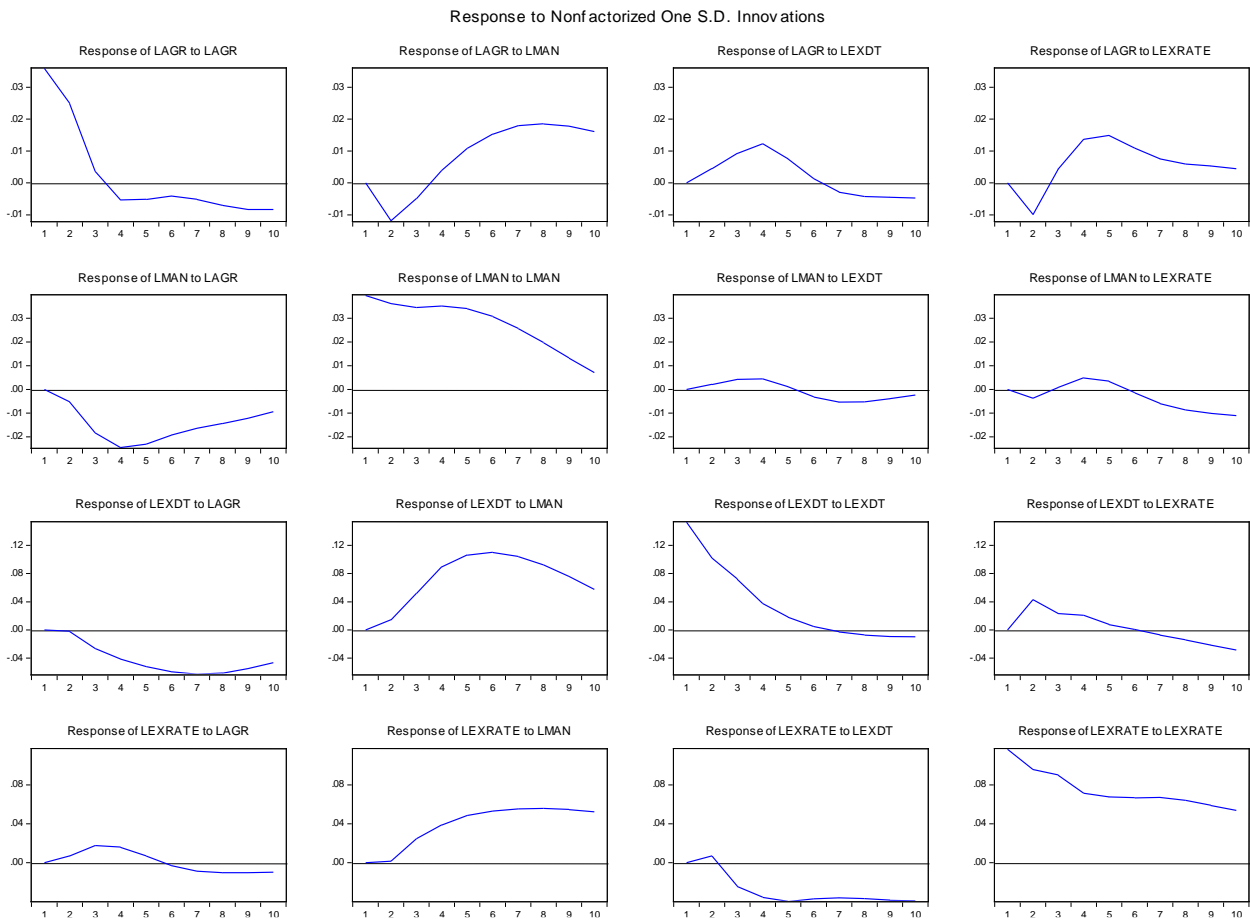
Source: Researcher computation using E-views 10, 2024

Table 4.2 depicts the result of Augment Dickey Fuller and Phillips Perron unit root test, the tests show that all the variables under study are stationary at first difference in both ADF and PP

4.3 Impulse Response Functions (IRF)

Impulse Response Functions (IRFs) are one of the useful tools of the unrestricted VAR approach for examining the interaction between the variables in this study. They reflect how individual variables respond to shocks from other variables in the system. When graphically presented, the IFRs give a visual representation of the behavior of variables in response to shocks. The results can be presented in the figure

4.1 Figure 1 Impulse Response Functions (IRF)



Source: Researcher computation using E-views 10, 2024

According to the impulse response function presented above, one unit response of agricultural output shock to its own is positive in period one to three and quickly change to negative up to period ten. The responses of agricultural output to manufacturing output is negative from period one to four and quickly change to positive up to period 10. The shock effect of agricultural output to external debt is positive in period one to six and dies positively. The response of agricultural output to exchange rate is negative from period one to two and quickly changes to positive till the last period. The response of manufacturing output to agricultural output is negative throughout the horizon period. The response of manufacturing output to external debt is positive from period one to five and become negative till last period. The response of manufacturing output to exchange rate is positive from period one to five and change to negative till last period. The shock effect of external debt to agricultural output is negative throughout the horizon period. The shock effect of external debt to manufacturing output is positive throughout the horizon period. The response of external debt to exchange rate is positive from period one to five and change to negative till last period. The shock effect of exchange rate to agricultural output is positive from period one to six and change to negative till last period. The shock effect of exchange rate to manufacturing output is positive throughout the horizon period. The response of exchange rate to external debt is positive in period one to two and dies negatively.

4.4 Variance Decomposition

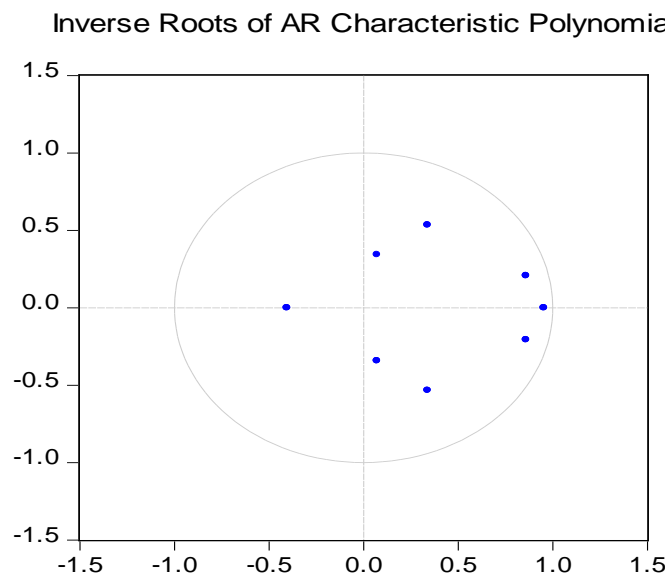
The variance of agricultural output is always caused by 100 percent to itself in the first year. The fluctuation in agricultural output in both the short-run and long-run are explained by its own shock, approximately 88 percent in the 3 period and only to fall to 57 percent in periods 10. The shock attributable to is very minimal, able to explain only 23 percent of manufacturing output variability in the long-run. Also in the long-run external debt is 6 and exchange rate is 13 percent as a result of fluctuations in agricultural output. Manufacturing output in the short run explained itself by 95 percent in first period, in 3

periods is 82 percent and it continues to fall in long run to 63 percent. The shock attributable to agricultural output is 17 percent in the short run and 33 percent in the long run. External debt in the short run explained itself by 73 percent but it continues to only fall to 24 percent in the long run. The shock attributable to agricultural output is 3 percent in the short run and 25 percent in the long run. Exchange rate explained itself in the short run and long run by 92 and 70 percent. In the long run, shocks attributable to agricultural output is 1 percent in the short run and 8 percent in the long run.

4.5 SVAR Stability Test

The SVAR stability test was employed to check whether all the Eigen values are less than one or all the moduli are lies inside the unit circle. The figure 1 shows that all the moduli lies inside the unit circle. This indicates that SVAR model is stable, it implies that the impact of the shocks are finite and calculable. Hence, the SVAR satisfies its condition.

Figure 2 SVAR Stability Test



Source: Researcher computation using E-views 10, 2024

4.6 Diagnostic Test

The diagnostic test is conducted to check the consistency and reliability of the estimated coefficients included in the model. Test such as Serial Correlation, Heteroscedasticity and normality test, SVAR stability tests are also conducted.

Table 4.3 post estimation test

Residual serial correlation LM tests		
Lags	LM-Stat	Prob
1	24.14160	0.0865
2	13.84851	0.6100
3	33.86167	0.5057
Residual heteroscedasticity tests		
Chi-square	Df	
157.1507	160	0.5489
Residual Normality tests		
Jarque-Bera	Df	
216.2840	8	0.0000

Source: Researcher computation using E-views 10, 2024

From table 4.3, it is clear that the model is free from serial correlation and Heteroskedasticity because their p-values are greater than 5% while Normality test indicates that we cannot reject the null hypothesis because its p-value is less than 5%.

5. CONCLUSION AND RECOMMENDATION

The paper investigates the impact of external debt shocks on real sector in Nigerian economy using annual time series data from 1986 to 2020. Augment Dickey Fuller and Phillips Perron unit root test, the tests show that all the variables under study are stationery at first difference. The results from the impulse response functions revealed that, the shock of manufacturing output to agricultural output is negative throughout the horizon period. The shock effect of external debt to agricultural output is negative throughout the horizon period. The shock effect of exchange rate to agricultural output is positive from period one to six and change to negative till last period. The study concludes that external debt exerts negative impact on the real sector in Nigeria. The study recommends that Nigerian government should try to avoid excessive external debt due to its negative effect in the long run in the economy and danger of repayment of loans including principal and interest. Loan should also be utilize judiciously in a way to diversify the economy and achieved higher economic growth.

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