An Analysis of the Long-Run Relationship Between Corruption and Debt Sustainability in Nigeria

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ABSTRACT: Corruption and public debt have continued to increase in Nigeria despite the anti-corruption posture of governments over the years and justifications often advanced for accumulating debts. The rising tides of public sector corruption in Nigeria are pervasive with its debilitating effects on the economy. The government's anti-corruption campaigns have produced minimal results than expected as the country's performance on global ranking by Transparency International remains dismal. Coincidentally, the fiscal stability of the economy has been jeopardized by increased public debts without commensurate investments injected into the system.This paper examined the long-run relationship between corruption and debt sustainability in Nigeria from 1996-2019 and employed the Vector Error Correction Model (VECM) technique of analysis.The choice of the period covered was informed by the need for a large dataset which guarantees a robust outcome in time series analysis and to capture the year 1996 when Nigeria made its first appearance in the assessment of global perception of corruption by Transparency International. Findings revealed that corruption is negatively related to debt sustainability in Nigeria, suggesting that higher incidences of corruption make public sector debt unsustainable. The speed of adjustment of -0.7575869 is negative which is statistically significant at 5%. This shows that there is 75.76%-point adjustment taking place each period towards the long-run periods. There is, therefore, the need for effective anti-corruption institutions, revisiting of the whistleblower policy, and entrenchment of the culture of transparency in financial transactions in order to curtail the ravaging effects of corruption in Nigeria.

KEYWORDS: Corruption, Debt Sustainability, Vector Error Correction Model (VECM)

1. Introduction

Corruption is a global phenomenon with prevalence in both private and public sectors. Although its impacts have been debated in literature, no one can deny that corruption is a major obstacle to growth in many countries. The level of corruption varies from country to country, while some countries have been able to reduce it to a tolerable level others are still grappling with it and its overbearing negative consequences. The 2019 reports from Transparency International reveal that among the first 10 economies perceived as least corrupt in the world are Denmark, Finland, Singapore, Sweden, Switzerland, Norway, Netherlands, Germany and Luxembourg. Whereas, the 10most corrupt countries feature Somalia, South Sudan, Syria, Yemen, Venezuela, Sudan, Equatorial Guinea, Afghanistan, North Korea and Libya.In Sub-Sahara Africa, Seychelles, Botswana, Cabo Verde, Rwanda and Mauritius are ranked among the least corrupt countries with Somalia, South Sudan, Sudan and Equatorial Guinea representing the countries that are hit the most by corruption. Although Nigeria is not among the two extreme cases, it scored the lowest mark on

corruption perception index among 54 countries when it first appeared on the world ranking in 1996. Despite the anti-corruption posture of the present government in Nigeria, corruption seems to be on the rise. Out of the 180 countries used in 2019 analysis, the Transparency International report shows that Nigeria is ranked as 146th which is lower than the preceding year's performance in terms of perceived public sector corruption.

Amidst the rising corruption cases in Nigeria is the heavy debt burden that the country has accumulated in recent times. Presently, the country's public debt has risen to N31.01 trillion ($85.90 billion) out of which $3.36 billion is sourced from Budget Support Loan from International Monetary Fund (IMF). The balance is made up of domestic borrowings targeted at financing the revised 2020 Appropriation Act. The external component of the debt stands at N11.36 trillion or $31.48 billion (DMO 2020). According to the Minister of Finance, Budget and National Planning, Nigeria's total public debt is projected to reach N38.68 trillion by December 2021 (Ogundele 2020). This is outrageous, especially when the levels of borrowing are not matched by corresponding investments. The country's infrastructural deficits and its manifestations in low power supply and bad roads, among others have continued to undermine the growth potentials of the economy.

The coexistence of increasing debt profile and endemic corruption have provoked more questions and greater concerns than answers or solutions. A number of researchers have attempted to explore the relationship between corruption and public debt with the view to addressing the raging concerns. Their efforts have turned in a variety of results but with near-consensus on the devastating impact of corruption on public debt. Interestingly, the negative effects of corruption permeate across all regions of the world as well as the developed and underdeveloped economies. There is a handful of literature that contend that corruption is beneficial by removing government bureaucracies that frustrate investment. Despite the plethora of literature on corruption-debt nexus there are no specific efforts directed at examining the long-run relationship between corruption and debt sustainability in Nigeria. The aim of this paper therefore is to investigate whether changes in public sector corruption has implications on the sustainability of debt in Nigeria. The paper is structured into six parts: introduction; literature review, stylized facts, methodology, data analysis as well as summary, conclusion and recommendations.

2. Literature Review

2.1. The Concepts of Corruption and Debt Sustainability
Corruption
The World Bank (2007) defines corruption as an abuse of public office for private gain and in this sense, the public objective is either put aside or compromised for the self-interest of the perpetrators. This definition presents a narrow view of the concept of corruption as it narrows the meaning of the abuse of public office. In reality, corruption includes even private actions that are not just inimical for smooth social cohesion but undermines the basic principles of societal justice. Transparency International shares a related view on the meaning of corruption and puts it more succinct as the abuse of entrusted power for private gain. Although there is no much difference between the two opinions but replacing the public office with entrusted power links the concept of corruption to political office holders around the world who usually take advantage of the opportunities offered them through election to pursue personal gains at the detriment of the general public. Ogboru (2014) sees corruption as the violation of established societal laws and rules in such a way as to attract benefits to the guilty (public officials) at the expense of the general or wider public. This definition points to the legal aspect of corruption as well as aligns itself with the first two definitions. Summing the views raised above, it is obvious that corruption is a multidimensional concept and vices like economic and financial crimes, nepotism,

favoritism or discrimination and partiality in the discharge of both public and private conducts (Folarin 2014).

In this paper, the definition put forward by Transparency International appears more plausible and has been adopted to assist in the understanding of this work. This is because public servants in Nigeria abuse entrusted power by giving or receiving monetary and non-monetary favors in exchange for their services, while businesses offer bribes to government officials to obtain lucrative deals. Corruption also involves the wrong use of public money as well as granting public jobs or contracts by politicians to their sponsors, friends, and families. It, therefore, follows that corruption can and do occur in business, government, courts, the media, and civil society, and across all sectors of the economy. Corrupt people are found among the politicians, government officials, public servants, businessmen, and members of the general public. The cost of corruption is enormous and covers economic, social, political, and environmental spheres of life. It destroys citizen's trust in public officials, debilitates democratic structures, impedes economic growth and development, and aggravates inequality, poverty, social division, and the environmental crisis.

Debt Sustainability

Debt sustainability as defined by IMF (2002) is a state in which a country's debt profile is consistent with its debt solvency without a recourse to major balancing correction to income and expenditure given the costs of financing. In the words of Kiptoo (2012), debt is sustainable where the borrowers are able to continually meet their debt servicing obligations without any balancing adjustment to income and expenditure. Loser (2004) asserts that external debt sustainability suggests the need to pursue a time-consistent path that allows such a minimum debt-servicing burden over time in a manner that does not hamper economic growth, and as a matter of fact in more general circumstances should enhance growth and development. According to Muwanga-Zake and Ndhaye (2001), a given debt is considered sustainable when the country indebted is in a position to meet the present and future debt service obligations fully without recourse to additional debt relief or rescheduling and able to avoid build-up of arrears with a minimum acceptable level of economic growth. Ayhan, Kurlat, Ohnsorge, and Sugawara (2017) define public debt sustainability as a part of fiscal space that deals with the long-run ability of any government to manage and fund its debt obligations. IMF (2000) proposed two sets of debt sustainability indicators, the first set includes debt to GDP ratio, foreign debt to exports ratio, share of foreign debt to total debt stock, government debt to current fiscal revenue ratio, short-term debt to total debt stock and share of concessional debt to the total debt stock. The second group of indicators consists of debt service to GDP ratio, government debt service to current revenue ratio, and external debt service to exports ratio.

2.2. Theory of Corruption
Functionalist theory of Corruption

The functionalist's perception of corruption is that it is a way to facilitate the processes of getting things done. Corruption is considered useful and seen as a way to *grease the wheels* of economic progress by reducing the influence of government bureaucracies which slow down the process of decision making and retard the growth of investment. Investors and companies offer bribes to boost their chances of setting up businesses. The general consensus among the theorists is that corruption supports economic growth. Among the scholars that share this line of thought are Dreher and Gassebner (2011), Meon and Weill (2008), Bardhan (1997), Beck and Maher (1986), Lien (1986), Leff (1964), Huntington (1968) and Leys (1965) among others. A corollary to this idea is the *sand the wheels'* theory of corruption. Scholars on the opposing side argue that an economic system that is efficient and less bureaucratic does not require corrupt practices to promote growth.

Therefore, corruption harms such economies by sanding the wheels of societal development as evident in the works of Djumashev (2006), Meon and Sekkat (2005).

However, the functional approach to explaining corruption has been criticized for its inability to provide a justification for the usefulness of corruption in society. It is difficult to determine beforehand when corruption will or will not be useful, the reasons why some people behave in a corrupt manner while others do not even when corruption is considered useful as well as the types of problems that can easily be fixed by functional corrupt solutions (Dupuy and Neset 2018).

The Rational Choice theory of Corruption

In the rational choice philosophy, human actions are driven by self-interest as well as the calculated expected benefits and costs. The concept of rationality in economics suggests that the objective of an individual consumer is to maximize utility and will choose only the best course of actions that guarantees that.

Three scenarios are often presented to provide an explanation to the rational choice theory of corruption: the prisoner's dilemma, the principal-agent problem, and the coordination problem. The prisoner's dilemma case for corruption posits that individuals have tendencies to pursue their personal gains as oppose to working for societal good. In this sense, corruption is rationalized by the need for self-satisfaction at the detriment of collective benefits. Kobis et al. (2016) used the concept of social dilemma to describe a situation where people mortgage long-term collective interest of the society for short-term self-interest by engaging in corrupt practices.

The principal-agent model sees corruption as a product of the relationship between principals (electorates) who entrust the agents (governments) with the power to act on their behalf by providing the needed public goods. Unfortunately, the agents often take advantage of the principals' trust and act in ways that maximize their selfish interests. The absence of perfect knowledge makes it difficult for the principal to monitor the actions of the agents. This spells an abuse of entrusted power for self-benefitting of private gains.

The coordination problem interprets corruption as an outcome of prevailing social norms that encourage corruption. In this case, society perpetuates corrupt practices despite the existence of anti-corruption agencies, the social norm motivates individual members of society to be corrupt. For example, norms such as nepotism increase individual propensity to act in a manner that is corrupt, and corruption in this sense is seen as the expected socially rational behavior. In addition, the mechanism to check corrupt activities in society becomes too weak or does not exist at all.

The implications of the rational choice theory of corruption as noted by Dupuy and Neset (2018) are diverse. Corruption related cases that are traceable to the prisoner's dilemma or principal-agent can be countered by offering rewards for ethical behaviors and punishment for corrupt practices. The provision of financial incentives to good behavior, guarantee the free flow of information, the establishment of accountability institutions as well as monitoring and sanctioning will help check corruption. Whereas, attitudinal change will be required to address corruption cases arising from social norms and coordination problem. There should be an intensive campaign about what ought to be the expected social behavior.

These theories are useful in explaining corruption in relation to its consequences on economy. Therefore, the functionalist and the rational choice theories of corruption have been adopted to guide in the interpretation of results in this study since corruption is the main explanatory variable in the model specified. Moreover, the choice of these theories is informed by their plausible relationships with corruption in Nigeria. For example, the greasing the wheels' proposition of the functionalist school appears to account for the rising cases of corruption among public office holders in Nigeria. Similarly, the self-interest

philosophy of the rational choice theory explains a natural tendency in human beings that may justify the endemic nature of corruption in the country.

2.3. Empirical Review

Abula, Ben, and Ozovehe (2016) examined the impact of corruption on external debt in Nigeria from 1996 to 2014. The study employed Vector Error Correction Technique (VECM) to analyse time series data from following variables: external debt stock, corruption perception index, total public expenditure and exchange rate. Findings revealed that corruption and public expenditure have a significant positive relationship with external debt while the relationship between exchange rate and corruption is negative with respect to Nigeria in the long-run. The paper recommended the pursuit of policy of economic freedom by the government and intensified efforts at combating corruption.

Shittu, Hassan and Nawaz (2018) analyzed the impact of external debt and corruption on economic growth in the selected five SSA countries of Nigeria, Kenya, Malawi, South Africa and Uganda from 1990 to 2015. The gross domestic product which is the proxy for economic growth was expressed as the function of external debt, interest on external debt, corruption and gross capital formation. Using the Fully Modified Ordinary Least Squares (FMOLS) technique, results revealed that a positive relationship between corruption and economic growth and a negative relationship between external debt and economic growth. It was recommended that governments of the countries in the sample examined should adopt other alternative sources of capital for investment rather than resorting to external debt as well as combat corruption with renewed zeal.

Kim, Ha and Kim (2017) investigated the effect of corruption on the relationship between public debt and economic growth using a sample of 77 countries including both developed and developing with a dataset spanning from 1990 to 2014. The key variables used in the study include GDP per capita, human capital, inflation, government size, trade openness, deficit and corruption perception index. The pooled ordinary least squares (OLS), fixed effects models and the dynamic panel generalized method of moments(GMM) models were applied and findings showed that the effect of public debt on economic growth depends on corruption and that the sign of the marginal effect is negative in corrupt countries while public debt promotes growth in countries that are not corrupt and vice versa. Hence, an increase in corruption causes increase in public debt and reduces the prospects of growth in a corrupt economy. The main policy implication is that corruption exerts influence on public debt policies of governments. The paper recommended the strengthening of institutions by combating corruption to reduce the negative effect of public debt on economic growth and maximize the use of revenue in the long-run.

Cooray, Dzhumashey and Schneider (2017) explored the relationship between corruption, the shadow economy and public debt from 1996 to 2012 for 126 countries using Ordinary Least Squares (OLS), Fixed Effects, system of Generalized Method of Moments (GMM) and Instrumental Variable Estimation. The following two measures of corruption: corruption perception index of the Transparency International and the World Bank's Worldwide Governance Indicators were used as independent variable while debt to GDP ratio represented the dependent variable of the model. Results from analysis indicate that increase in corruption leads to an increase in public debt, increases in the size of the shadow economy leads to an increase in public debt and a larger shadow economy compounds the positive influence of corruption on public debt. The paper recommended a corruption reduction strategy that will help to minimize the negative effects of corruption on government debt through government expenditure.

Saad (2012) examined the causality between economic growth, export, and external debt servicing in Lebanon from 1970 to 2010. Using the vector error correction models and granger causality techniques, the paper suggested the existence of both long-run and short-

run relationships among the variables and a bidirectional causal relationship between GDP and external debt servicing. Moreover, the existence of unidirectional causality from external debt to exports, from exports to economic growth, and from exchange rate to economic growth were established. The paper, however, made no recommendations from these findings.

Jalles (2011) examined the impact of democracy and corruption on the debt-growth nexus in developing countries in a panel analysis of 72 developing countries for the period 1970-2005 using the system-GMM. The model expressed GDP per capita as a dependent variable and the lagged values of real per capita income, population growth rate, gross domestic investment as percentage of GDP, gross secondary school enrolment, central government fiscal balances as percentage of GDP and exports plus imports as share of GDP as explanatory variables. Findings revealed that countries with lower corruption manage their debt better and experience lower debt. Also, in countries with lower corruption levels both the positive and negative effects of debt on economic growth, modelled with non-linear specifications, are significant. Although evidence from the sample does not support the Debt-Laffer curve, the level of debt at which the impact on growth becomes negative is higher in countries with lower corruption levels. The paper recommended the implementation of the High Indebted Poor Countries Initiative (HIPC) and additional disbursement to be made in countries with low corruption levels to promote efficiency in governance.

Ogboru (2006) examined the relationship between foreign debts, corruption and infrastructural development in the Nigerian economy from 1980 – 2000. Using both quantitative (OLS) and qualitative techniques of analysis, findings revealed that corruption distorts the economy through waste, misallocation and misappropriation of resources, and contributes to the debt problem in Nigeria. In addition, debt stock and debt servicing were found to reduce the scarce resources available in the country for infrastructural development, while corruption diverts resources from public coffers to private pockets of the political class. The study recommends annual debt rescheduling and debt repudiation.

Del-Monte and Pennacchio (2020) analyzed the relationship between public sector corruption and public debt in OECD countries for the period 1995-2015. The paper employed fixed effects (FE) and Arellano-Bond (AB) first difference Generalized Method of Moments (GMM) to analyze the data. The ratio of general government gross debt to GDP was modelled as the dependent variable with corruption perception index as the main explanatory variables. Other controlled variables in the model are GDP per capita, inflation, interest and government size. Results show that corruption increases public debt and the impact depends on the size of government expenditure. Specifically, reducing corruption by half leads to a decrease in public debt by 2% in the short term. It was therefore suggested that improved control of corruption will likely reduce public debt in advanced economies.

Fagbemi and Olatunde (2019) investigated the long run and short run impact of corruption on public debt in Nigeria from 1996 to 2017 using ARDL bound test to co-integration analysis. Among the variables included in the model include public debt measured as percentage of debt to GDP, corruption perception index, control of corruption, GDP per capita, inflation and national expenditure. Findings revealed that both corruption index and control of corruption have an insignificant adverse effect on public debt in the long run, but with a significant influence in the short run. Also, a bi-directional causality between corruption index and public debt was established with no evidence of causality found between control of corruption and public debt. The paper recommended strong corruption-based control mechanisms to be put in place to decrease fiscal deficits and debt reduction.

Njangang (2018) examined the impact of corruption on public debt using a panel of 29 Sub Saharan African countries for the period 2000 – 2015. The paper employed the system generalized method-of-moment (GMM) estimator and included the following variables in

the model: corruption, debt ratio to GDP, government expenditure, inflation, openness, military spending, GDP per capita, population, and political stability. Results revealed that corruption exerts positive effect on public debt within the sample countries. Hence, it was recommended that the anti-corruption fight in Sub-Saharan African countries be intensified to ensure efficiency in public spending and reduction in debt.

Grechyna (2012) studied the relationship between public corruption and public debt using a panel of 30 OECD countries for the period 1995-2010. OLS and the system GNN estimator techniques were employed for the analysis of data collected on debt, GDP growth, unemployment, debt Service, government size and corruption. Results showed that in developed countries increase in corruption leads to higher public debt. The paper concluded that public corruption might be highly correlated with other political factors, such as political instability and political turnover.

It is evident from empirical literature that corruption exerts negative consequences on public debt, increased corruption is associated with rising debt burden and vice versa. In addition, this negative impact of corruption on debt is true for both developed and developing economies. However, much of this previous workshave concentrated on either examining corruption-growth nexus or corruption and public debt relationship with no attention given to how corruption relates to sustainability of debt in Nigeria. The focus of this paper is on corruption and debt sustainability and a new and important variable, the oil revenue has been introduced into the equation to gauge the revenue-debt effect. The inclusion of this variable is based on the fact that the larger share of the country's revenue is derived from oil.

This paper is anchored on the work of Abula, Ben, and Ozovehe (2016) for its degree of relatedness to the current study. Both studies are time series in nature and the methods of analysis applied as well the country of study is similar. Consequently, this has become the premise upon which the outcome this paper is mirrored in terms of its contribution to literature.

3. Corruption and Public Debt in Nigeria

3.1. An overview of the Nigerian Economy

The Nigerian economy is a mixed, resource-endowed, mono-product and an emerging market. It is ranked 6th in the world's oil production scale and often referred to as the biggest economy in Africa. The public sector still plays a dominant role in the ownership and control of resources despite the introduction of the Structural Adjustments Programme (SAP) of the World Bank three decades ago. Besides the abundance of fossil fuels, the country is a home for over 200 million people and often considered the most populous black nation as well as market for variety of finished and unfinished goods.

Like many economies around the world, the Nigerian economy is subject to the fluctuations that are induced by trade cycles. Between 1961 and 2018, the country suffered negative growth rates with the lowest at -15.74% in 1967. Economic growth peaked at 25.01% in 1970 due to oil boom, the economy slipped into a four-year recession in the early 80s and recovered in 1985 when growth rate rose from -1.12% in 1984% to 5.91% in 1985. This positive growth in GDP continued to the period 1993-1995 when another recession set in. From 1996, the economy continued on the path of recovery and boom with positive growth rates until 2016 when changes in global oil prices pushed it to a recessionary period. This suggests how responsive the Nigerian economy is to changes in oil prices. The economy is believed to have picked up and as of 2018, the annual growth rate is put at 1.94% (World Bank 2020).

The performance of the Nigerian economy in the last five years has been dismal, as shown by the three major indicators of inflation, GDP and unemployment figures. Statistics

from World Development Indicators (2020) reveal that inflation skyrocketed from single-digit rate of 9.01% in 2015 to double-digit rates of 15.68% in 2016, 16.52% in 2017, 12.09% in 2018 and 11.40% in 2019. This put pressure on the income of households, eroded the purchasing power of naira with unprecedented rising prices and caused an unbearable rising cost of living. Unemployment figures within these periods have shown a steady rise by moving from 9.00% in 2015 to 13.34% in 2016, 17.46% in 2017, 22.56% in 2018 and 23.10% in 2019 (IMF 2020). The socio-economic effects of the increasing unemployment rates in Nigeria include rising dependency ratio, escalation in crime rates and reduction in national output among other problems that the country is faced with. In addition, the country's population has continued to grow in the past five years. Nigeria's population moved from 181 million in 2015 to 185 million in 2016, 190 million in 2017, 196 million in 2018 and 200 million in 2019 (World Bank 2020). Some of the macroeconomic consequences of population growth are the rise in unemployment rate, reduction in the rate of capital formation and fall in standard of living. The impact of COVID-19 on businesses and individuals has added to the country's economic woes and present a gloomy outlook. IMF (2020) predicts a -5.4% contraction of the Nigerian economy in 2020, suggesting an imminent phase of another recession.

3.2. Corruption in Nigeria

Corruption cases in Nigeria have continued to grow since independence despite efforts of successive governments to combat it. Although the causes of corruption are multi-dimensional, the Nigerian case is often linked to the growth of public sector, the discovery of fossil fuels, personal greed and ethnicity. Corruption in Nigeria is sometimes linked to military intervention in politics, as the military often accused the politicians of corruption and considered this a motivation for venturing into politics (Metz 1991). However, no military government has left the country better off in terms of corruption, for example, it was alleged that the regime of General Ibrahim Babangida failed to account for $12.4 billion, the Gulf War windfall and in 2000, more than $1 billion were discovered in various accounts throughout as loot from Abacha's administration. In 2012, the United States Department of Justice was reported to have announced that a Japanese construction company, Marubeni Corporation offered a bribe of $54.6 million to officials of the Nigerian government in order to obtain a $6 billion worth of contract in oil and gas sector in Bonny (Olokor and Baiyewu 2015). A case of $20 billion oil revenues accrued to the national treasury was reported as unremitted by the then Central Bank Governor during Jonathan's administration in late 2013. In spite of the present government's stance of zero tolerance for corruption, the country's performance on the Transparency International ranking still remains dismal as the 2019 report puts the nation as 34th most corrupt in world. Public sector corruption is endemic and pervasive in sectors like oil and gas, defense and various institutions of government (Premium Times 2020).

Successive governments have evolved laws and established institutions to check the menace of corruption which is believed to have undermined the country's growth and development. The following legislations were brought at different times to fortify the anti-graft war in Nigeria: EFCC Establishment Act 2004, Independent Corrupt Practices and Other Related Offences Act 2000, Advance Fee Fraud and Other Related Offences Act 2006, Money Laundering (Prohibition) (Amendment) Act 2012, Miscellaneous Offences Act, Code of Conduct Act, Nigerian Extractive Industries Transparency Initiative Act, Freedom of Information Act 2011, Fiscal Responsibilities Act 2010, Penal Code Laws of Federation of Nigeria 2004, Criminal Code Law of Federation of Nigeria 2004, Banks and Other Financial Institutions (Amendment) Act 1991and Failed Banks (Recovery of Debts) and Financial Malpractices in Banks (Amendment) Act 1994. These Acts led to the establishment of anti-corruption agencies like the Code of Conduct Bureau (CCB), the

Independent Corrupt Practices and other Related Offences Commission (ICPC) and the Economic and Financial Crime Commission (EFCC).

3.3. Nigeria's Debt Story

In 1964, the Italian government advanced a US$13.1 million loan to Nigeria for the building of the Niger Dam, this marked the beginning of Nigeria's indebtedness to Paris Club of Creditor Nations. The post-civil war era marked the beginning of increased borrowing in Nigeria since funds were required for reconstruction and rehabilitation of projects. The fall in crude oil prices in 1982 caused an increase in interest payment as well as penalties associated with defaulting thereby making it difficult for Nigeria to offset her loans. The military era of 1985-1993 and 1993-1998 witnessed a continuous rise in debt as the country even stopped payment of the Paris Club component of her total debt. However, with the return of democracy in 1999, the country began to pursue an aggressive debt relief campaign. The result was US$18 billion in debt relief in 2005 from the US$36 billion accumulated debt stock in 2004 (DMO 2005).

The country's debt which is made up of the external and domestic components has been on the rise since 2006. The figure increased from N2,204.72 billion in 2006 to N23,295.07 billion in 1999. External debt includes the country's indebtedness from multilateral creditors, Paris Club, London, promissory notes, bilateral, euro bond, diaspora bond and others while domestic debt is composed of treasury bills, Federal Government of Nigeria (FGN) bonds, treasury certificates, promissory note, FGN Sukuk, treasury bonds, development stocks, FGN green bond and FGN Saving bond. The FGN Sukuk, green bond and savings bond became part of domestic debt in 2017, but treasury certificate and development stocks have not contributed to domestic debt in the last four decades (CBN 2020).

4. Methodology

The study employed Vector Error Correction Model (VECM) as dictated by the outcome of preliminary tests. Results of unit root tests from the Augmented Dickey-Fuller and Phillips-Perron techniques show that series are integrated in first difference, it became necessary to conduct a co-integration test with a view to determining the existence or otherwise of a long-run relationship. This is confirmed by the trace statistic and hence the choice of VECM. The econometric software used for the analysis is STATA 13.

4.1. Model Specification

Debt sustainability is modelled as a dependent variable with corruption, oil revenue, exports and external debt stock as independent variables.

$$DTS = f(CPI, ORV, XPO, EDS) \tag{1}$$

Where:

$DTS = DebtSustainability$
$CPI = Corruption$
$ORV = OilRevenue$
$XPO = Exports$
$EDS = ExternalDebtStock$

The VECM in a five-variable model (DTS, CPI, ORV, XPO and EDS) becomes:

$$\Delta DTS_t = \gamma + \sum_{i=1}^{p-1} \delta_i \Delta DTS_{t-i} + \sum_{j=1}^{p-1} \phi_j \Delta CPI_{t-j} + \sum_{m=1}^{p-1} \psi_m \Delta ORV_{t-m} + \sum_{n=1}^{p-1} \sigma_n \Delta XPO_{t-n} +$$
$$\sum_{p=1}^{p-1} \pi_p \Delta EDS_{t-p} + \lambda_1 ECT_{t-1} + e_{1t} \tag{2}$$

$$\Delta CPI_t = \eta + \sum_{i=1}^{p-1} \delta_i \Delta DTS_{t-i} + \sum_{j=1}^{p-1} \phi_j \Delta CPI_{t-j} + \sum_{m=1}^{k-1} \psi_m \Delta ORV_{t-m} + \sum_{n=1}^{p-1} \sigma_n \Delta XPO_{t-n} +$$
$$\sum_{p=1}^{p-1} \pi_p \Delta EDS_{t-p} + \lambda_2 ECT_{t-1} + e_{2t} \tag{3}$$

$$\Delta ORV_t = \theta + \sum_{i=1}^{p-1} \delta_i \Delta DTS_{t-i} + \sum_{j=1}^{p-1} \phi_j \Delta CPI_{t-j} + \sum_{m=1}^{p-1} \psi_m \Delta ORV_{t-m} + \sum_{n=1}^{p-1} \sigma_n \Delta XPO_{t-n} +$$
$$\sum_{p=1}^{p-1} \pi_p \Delta EDS_{t-p} + \lambda_3 ECT_{t-1} + e_{3t} \tag{4}$$

$$\Delta XPO_t = \mu + \sum_{i=1}^{p-1} \delta_i \Delta DTS_{t-i} + \sum_{j=1}^{p-1} \phi_j \Delta CPI_{t-j} + \sum_{m=1}^{p-1} \psi_m \Delta ORV_{t-m} + \sum_{n=1}^{p-1} \sigma_n \Delta XPO_{t-n} +$$
$$\sum_{p=1}^{p-1} \pi_p \Delta EDS_{t-p} + \lambda_4 ECT_{t-1} + e_{4t} \tag{5}$$

$$\Delta EDS_t = \nu + \sum_{i=1}^{p-1} \delta_i \Delta DTS_{t-i} + \sum_{j=1}^{p-1} \phi_j \Delta CPI_{t-j} + \sum_{m=1}^{p-1} \psi_m \Delta ORV_{t-m} + \sum_{n=1}^{p-1} \sigma_n \Delta XPO_{t-n} +$$
$$\sum_{p=1}^{p-1} \pi_p \Delta EDS_{t-p} + \lambda_5 ECT_{t-1} + e_{5t} \tag{6}$$

Where:
Δ = difference operator
$p-1$ = lag length reduced by 1
λ_i = speed of adjustment parameter with negative sign, and
ECT_{t-1} = error correction term which is the lagged value of the residuals obtained from the co-integrating regression of the dependent variable on the independent variables
$\delta_i, \phi_j, \psi_m, \sigma_n, \pi_p$ = short-run dynamic coefficients of the model's adjustment long-run equilibrium.
e_{it} = error terms

The long-run equation can be summarized as:

$$DTS_t = \alpha_0 + \alpha_1 CPI_t + \alpha_2 ORV_t + \alpha_3 XPO_t + \alpha_4 EDS_t + \mu_t \tag{7}$$

Where:
α_0 = constant term,
$\alpha_1, \alpha_2, \alpha_3, \alpha_4$ = coefficients, and
μ_t = error term.

4.2. Description of Variables

Debt Sustainability

This is the dependent variable of the model, measured by total debt service to exports of goods, services and primary income. It is expressed in percentages and used to gauge the level of debt sustainability of countries. The lower the ratio, the better for the economy and the more likely the country is able to sustain its indebtedness. On the other hand, higher values are danger signals and depicts the level of debt burden accrued to the country. The variable is sourced from World Bank development indicators database.

Corruption

Corruption is the main explanatory variable that the research is conceived to determine its impact on the debt sustainability of Nigeria. Corruption siphons resources, both funds borrowed which forms debt and revenue generated thus makes debt service obligations difficult or even impossible. In this context, corruption is measured by the index of its perceptions developed by Transparency International. The index is an average score of a country given by international businessmen and financial journalists polled in a variety of contexts. Its value ranges from 0 to 10, with 0 representing the most corrupt and 10 indicating a clean country where corruption cases are minimal.

Oil Revenue

Revenue is among the many factors that influence debt sustainability and as revenue rises, the government's ability to settle her debt obligation. On the other hand, dwindling revenue makes public debt unsustainable. This study considers oil revenue rather the general government revenue as major determinant in debt sustainability, given that the Nigerian

economy thrives mainly on revenue from the oil sector. The variable is defined as percentage of oil revenue to total federally collected revenue as contained in the Central Bank of Nigeria Statistical Bulletin, 2019.

Exports
Exports constitute the value of goods and services sold to the rest of world and include freight, transport, merchandise, travel, royalties, license fees, services rendered by financial services, communication, construction, information and business sectors as well as personal and government services. An increased export raises a country's ability to obtain foreign exchange and boost her chances of meeting her debt obligations. The theoretical relationship between exports and debt sustainability is therefore a positive one, implying that when exports value increases, debt ratio declines. The variable used in this model is the value of Nigeria's exports expressed as percentage of the country's GDP and sourced from World Development Indicators database of the World Bank.

External Debt Stock
External debt is the part a country's total debt that is borrowed from foreign lenders and settled in the currency it was borrowed. It includes public borrowing, private non-guaranteed long-term debt, IMF credit and short-term debt. It is measured in this study as the ratio of total external debt stocks to gross national income. A rise in external debt increases the debt burden of country and increases the risk of sustaining her debts. Therefore, there exists a negative relationship between external debt and debt sustainability. The higher the external debt stock the lower the debt sustainability. The data for the variable was obtained from International Debt Statistics of the World Bank.

5. Data Analysis

5.1. Unit Root Test
It is customary in time series analysis to examine whether the dataset to be used is stationary or not and if stationary is it at levels I(0), first difference I(1), or second difference I(2). This is not only to guard against the use of non-stationary data but serves as a precondition for determining the choice of technique to be adopted. Anon-stationary data leads to spurious regression and ultimately generates misleading results. Series are considered stationary when they exhibit mean reversion, implying that the data generating process does not evolve around zero. The process of examining the stationarity of a given dataset in econometrics is called unit root test and among the variety of test types available in literature, this study adopts the Augmented-Dickey Fuller (ADF). The ADF is an augmented version of the Dickey-Fuller test expanded to include high order of regressive process in the model. It is simple and accommodates the complexity of econometric models that includes unknown order. The general form of ADF test is estimated by the following regression.

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \beta_t + \omega_t \qquad (8)$$

Where:

Y = time series,
t = linear time trend,
Δ = first difference operator,
μ = constant,
p = optimal number of lags in the depenent variable, and
ω = random error term.

The results for the ADF test are presented below.

Table 1. Unit Root Test

Variable	Augmented Dickey-Fuller			
	Level	First Difference	Order of Integration	Conclusion
DTS	-2.724 (0.0699)	-5.645 (0.0000)	I(1)	Stationary
CPI	-3.156 (0.0936)	-5.890 (0.0000)	I(1)	Stationary
ORV	-2.068 (0.5639)	-5.271 (0.0001)	I(1)	Stationary
XPO	-3.381 (0.0539)	-5.8729 (0.0000)	I(1)	Stationary
EDS	-2.406 (0.1399)	-3.809 (0.0028)	I(1)	Stationary

Source: Authors' Computation

The unit root tests results show that all the variables: DTS, CPI, ORV, XPO and EDS are integrated atfirst difference denoted by I(1) at 1% critical value. The outcome of Augmented Dickey-Fuller test is presented in table 1.

5.2. Descriptive Statistics

These statistics provide information about measures of central tendency and dispersion as well as normality property of the data. Table 2 gives a summary statistics generated from the dataset.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Kurtosis
DTS	24	6.167144	4.600062	2.010662
CPI	24	2.097917	0.616921	2.369867
ORV	24	72.13742	11.20961	2.405657
XPO	24	22.22542	6.789761	2.44955
EDS	24	22.32442	21.27178	1.908376

Source: Authors' Computation

Table 2 gives the summary statistics of the series containing 24 observations and captured mean (measure of central tendency), standard deviation (measure of dispersion) and kurtosis (measure of normality). The average value for DTS is 6.167144 with 4.600062 deviation from its average. DTS is platykurtic with akurtosis value of 2.010662. CPI has a mean value of 2.097917, a standard deviation of 0.616921 and platykurtic with a kurtosis value of 2.369867, implying a peaked curve. The mean value for ORV is 72.13742 with a standard deviation of 11.20961and kurtosis value of 2.405657 which is platykurtic. XPO has an average value of 22.22542 and standard deviation of 6.789761 but exhibits positive kurtosis with value of 2.44955 and hence platykurtic. The mean value for EDS is 22.32442 and its standard deviation is 21.27178while the kurtosis value stood at 1.908376 (platykurtic).

5.3. Correlation Matrix

The total number of observations in this study is 24 and the relationship of interest expresses DTS as the function of CPI, ORV, XPO and EDS.

Table 3. Correlation Matrix

	DTS	CPI	ORV	XPO	EDS
DTS	1.0000				
CPI	-0.6119	1.0000			
ORV	0.2070	-0.5369	1.0000		
XPO	0.0609	-0.4498	0.7598	1.0000	
EDS	0.6467	-0.8579	0.2483	0.2662	1.0000

Source: Source: Authors' Computation

From table 3, the correlation between any variables and itself is 1.0000. The correlation coefficients between CPI and DTS is negative (-0.6119), while DTS and other variables in the model are positively correlated as indicated by the signs of their coefficients. Specifically, ORV and DTS; XPO and DTS; and EDS and DTS all show a positive correlation each with 0.2070, 0.0609 and 0.6467 as coefficients respectively. A positive correlation coefficient means a positive relationship between the variables under consideration, implying that an increase in one will lead to an increase in the other. Conversely, a negative coefficient of correlation connotes a negative relationship, such that an increase in one variable leads to a decrease in the other.

5.4. Co-integration Test

Results of the unit root test reveal that the series are integrated in first difference. This suggests the need to test for the existence or otherwise of the long-run relationship among the variables. In this case, it is appropriate to use the Johansen co-integrating technique. Co-integration test is carried out to determine the existence or otherwise of a long-run relationship among the variables under consideration.

The model for Johansen co-integration test expressed VAR of order p is as follows:

$$A_t = \eta_1 A_{t-1} + \ldots\ldots + \eta_p A_{t-p} + \phi B_t + \varepsilon_t \tag{9}$$

Where:

$A_t = \mathrm{K} - \text{vector of non} - \text{stationary I(1) variables,}$
$B_t = \mathrm{d} - \text{vector of deterministic variables, and}$
$\varepsilon_t = \text{vector of innovations.}$

Table 4. Johansen Tests for Co-integration

Maximum Rank	Trace statistic	5% Critical value
0	97.0068	68.52
1	51.5557	47.21
2	28.1221*	29.68
3	11.8762	15.41
4	3.9017	3.76

Source: Authors' Computation

Results of the Johansen test for co-integration show an evidencethat a long-run relationship exist among the variables in the model. From table 4, the trace statistic of 28.1221falls

below the 5% critical values of 29.68. This implies that there is the presence of at least two co-integrating equations in the model and hence, the VECM is employed.

5.5. The Vector Error Correction Model (VECM)

The VECM describes a system with a vector of two or more variables, derived by differencing a Vector Autoregressive (VAR). All the variables in the VECM are endogenous, implying the absent of exogenous variables. The model expressed in equation (2) is employed in the analysis line with the research objective and the results presented below.

Table 5. Vector Error-Correction Model

Dependent Variable: DTS			
Variable	**Coef.**	**z**	**P>|z|**
ECT and Short-run Dynamic Coefficients			
ECT	-0.7575869	-2.59	0.010
DTS	-0.0226772	-0.10	0.921
CPI	-1.951021	-0.60	0.548
ORV	0.1199685	0.72	0.473
XPO	-0.0093154	-0.05	0.958
EDS	-0.406214	-1.48	0.140
C	0.6771934	0.67	0.502
Johansen normalization restriction imposed (Long-run Coefficients)			
DTS	1	.	.
CPI	-3.851946	-2.19	0.028
ORV	0.1066941	1.59	0.111
XPO	0.2540973	2.52	0.012
EDS	-0.1919002	-5.04	0.000
C	-5.054339	.	.

Source: Authors' Computation

The ECT equation becomes:

$$ECT_{t-1} = [1.000DTS_{t-1} + 3.852CPI_{t-1} + 0.107ORV_{t-1} + 0.254XPO_{t-1} - 0.192EDS_{t-1} - 5.054] \quad (10)$$

The short-run VECM equation in (2)can be transformed into:

$$\Delta DTS_t = 0.677 - 0.023\Delta DTS_{t-1} - 1.951\Delta CPI_{t-1} + 0.120\Delta ORV_{t-1} - 0.009\Delta XPO_{t-1} - 0.406\Delta EDS_{t-1} - 0.758ECT_{t-1} \quad (11)$$

While, the long-run equation in equation (7) becomes:

$$DTS_t = -5.054339 - 3.851946CPI_t + 0.1066941ORV_t + 0.2540973XPO_t - 0.1919002EDS_t + \mu_t \quad (12)$$

Results of error correction regression analysis reveal that the speed of adjustment of -0.7575869is negative and statistically significant at 5% given the probability value of 0.010. This shows that there is 75.76%-point adjustment taking place each period towards the long run periods.

Given that DTS is the dependent variable on the model, the coefficients of the normalization equation (long-run coefficients) in Table 5indicates that CPI and DTS are negatively related. This implies that an increase in corruption leads to decrease in the country's ability to sustain its indebtedness. Specifically, a unit increase in CPI leads to -3.851946 decrease in DTS and vice versa. The result is statistically significant at 5% and

consistent with *a priori* expectation which specifies a positive relationship between corruption and debt sustainability. The findings also support the *Sand the Wheels Theory* of corruption which considers corruption as inimical to societal growth.

The relationship between ORV and DTS is positive. It means that when oil revenue increases, debts will become more sustainable in Nigeria. A unit increase ORV leads to an increase DTS by 0.1066941 and vice versa. Although the result is not statistically significant at 5%, it shows that oil revenue has the potentials to reduce the debt burden of country if properly channeled. This is consistent with economic theory.

Similarly, XPO and DTS are positively related, suggesting that increased exports increase the potentials of the country to meet its debt obligations thereby making debt more sustainable. A unit increase in XPO lead to 0.2540973 increase in DTS at 5% significance level. The result conforms with economic theory, supports the export-led growth hypothesis in Nigeria and work of Medina-Smith (2001) for developing countries.

The relationship between EDS and DTS indicates a negative link between the two variables. An increase in external debt stock diminishes the country's ability to settle her debts. A unit change in EDS influences DTS by -0.1919002 at 1% level of significance. The results corroborate economic theory that rising external debt stock is inimical to the country's debt profile.

5.6. Post Diagnostic Tests

In order to ensure that the results obtained are free from common econometric problems and thus can be relied upon for policy formulation, diagnostics tests are necessary. For this purpose, autocorrelation, normality and stability tests were conducted and the results presented in table 6 and 7.

Table 6. Autocorrelation and Normality Tests

	chi2	df	Prob>chi2
Panel A: Lagrange-multiplier test			
lag			
1	20.7002	25	0.70920
2	14.7348	25	0.94736
Panel B: Jarque-Bera test			
Equation			
D_DTS	3.258	2	0.19617
D_CPI	1.38	2	0.50168
D_ORV	1.702	2	0.42697
D_XPO	0.986	2	0.61070
D_EDS	1.006	2	0.60461
ALL	8.332	10	0.59645

Source: Authors' Computation

Results of Lagrange-multiplier test show no evidence of autocorrelation in the series, both in lags 1 and 2. Similarly, the Jarque-Bera test for normality reveals that errors of the individual as well as the overall equations are normally distributed. The reasons for these conclusions were deduced from the probability values associated with the tests conducted. All the values as indicated in the table 6 are more than 5% critical, hence the need to accept the null hypotheses of no autocorrelation and normally distributed errors.

Table 7. Stability Test

Eigenvalue	Modulus
1	1
1	1
1	1
1	1
-.5469159 + .2417896i	.597979
-.5469159 - .2417896i	.597979
.5322501	.53225
.1169575 + .5108754i	.524092
.1169575 - .5108754i	.524092
-.02406096	.024061

Source: Authors' Computation

The result of Eigenvalue stability condition test shows that the VECM specification imposes 4 unit moduli, indicating that the model is stable.

6. Summary, Conclusion and Recommendations

Results from the analysis indicate that an increase in corruption as well as external debt stock make debt unsustainable in Nigeria. On the other hand, reducing corruption and external debt stock will have a reverse effect of enhancing the sustainability of the country's debt. However, rising oil revenues and exports will increase the government's ability to meet her indebtedness and vice versa. It can therefore be concluded that corruption in Nigeria worsens the national debt position and makes it less sustainable. In line with the findings, the following recommendations are advanced:

- There is need for a renewed vigor in the fight against corruption and effective institutions remain a critical factor in this regard. The Economic and Financial Crime Commission (EFCC) and other anti-corruption related agencies should be made truly independent, divorced of the influence of other arms of government. The whistleblower policy should be revisited and sustained and special courts be established and manned with incorruptible judges. Governments at all levels are to imbibe the culture of transparent financial transactions using ICT resources to track with ease the movement of funds.
- Nigeria's external debt stock should be regulated to reflect the actual growth of the economy. The debt management office should provide the government with useful guide based on the annual performance of the indicators of debt sustainability.
- Efforts to boost oil production should be intensified by implementing policies necessary for a peaceful Niger-Delta. Government should move beyond rhetoric to effect the cleaning up of Ogoni-Land which has become a major demand of the people of oil-rich region in order to boost oil revenue. In addition to this, government should work to secure a favourable deal with Organization Petroleum Exporting Countries (OPEC) regarding supply in a manner that ensures price stability.
- Export promotion policies are necessary to boost export content of the economy. To achieve this, the government should pursue its diversification agenda with all seriousness by looking into potentials that are inherent in the agricultural, mining and tourism sectors of the economy.

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Appendix I
Raw and Transformed Data used for Analysis

Year	DTS	CPI	ORV	XPO	EDS	dDTS	dCPI	dORV	dXPO	dEDS
1996	13.140000	0.690000	78.072067	23.020000	64.315236	-	-	-	-	-
1997	8.710000	1.760000	71.517358	28.650000	54.512873	-4.430000	1.070000	-6.554709	5.630000	-9.802363
1998	13.070000	1.900000	69.953633	18.140000	58.546020	4.360000	0.140000	-1.563725	-10.510000	4.033147
1999	7.610000	1.600000	76.320242	21.330000	50.254059	-5.460000	-0.300000	6.366608	3.190000	-8.291961
2000	8.760000	1.200000	83.501702	36.020000	51.143351	1.150000	-0.400000	7.181461	14.690000	0.889292
2001	12.720000	1.000000	76.517422	28.250000	44.924817	3.960000	-0.200000	-6.984280	-7.770000	-6.218534
2002	8.060000	1.600000	71.071980	23.240000	35.592654	-4.660000	0.600000	-5.445443	-5.010000	-9.332163
2003	5.930000	1.400000	80.551586	26.750000	37.748820	-2.130000	-0.200000	9.479607	3.510000	2.156166
2004	4.470000	1.600000	85.570718	20.250000	31.532993	-1.460000	0.200000	5.019132	-6.500000	-6.215827
2005	15.410000	1.900000	85.847679	21.030000	15.823019	10.940000	0.300000	0.276961	0.780000	-15.709974
2006	10.980000	2.200000	88.641686	29.520000	4.155071	-4.430000	0.300000	2.794007	8.490000	-11.667949
2007	1.440000	2.200000	77.920597	21.240000	4.604080	-9.540000	0.000000	-10.721089	-8.280000	0.449009
2008	0.760000	2.700000	83.016805	25.670000	4.078808	-0.680000	0.500000	5.096208	4.430000	-0.525272
2009	1.280000	2.500000	65.886616	18.630000	5.748673	0.520000	-0.200000	-17.130189	-7.040000	1.669865
2010	1.500000	2.400000	73.881896	25.660000	4.503249	0.220000	-0.100000	7.995280	7.030000	-1.245424
2011	0.510000	2.400000	79.869498	31.620000	4.557685	-0.990000	0.000000	5.987602	5.960000	0.054437
2012	1.340000	2.700000	75.327649	31.550000	4.145364	0.830000	0.300000	-4.541849	-0.070000	-0.412321
2013	0.490000	2.500000	69.768180	18.050000	4.319933	-0.850000	-0.200000	-5.559469	-13.500000	0.174569
2014	5.320000	2.700000	67.473631	18.440000	4.603129	4.830000	0.200000	-2.294549	0.390000	0.283195
2015	3.140000	2.600000	55.408248	10.660000	6.078750	-2.180000	-0.100000	-12.065383	-7.780000	1.475622
2016	6.320000	2.800000	47.964889	9.220000	7.892029	3.180000	0.200000	-7.443359	-1.440000	1.813279
2017	6.820000	2.700000	55.202149	13.170000	11.111724	0.500000	-0.100000	7.237261	3.950000	3.219694
2018	8.260000	2.700000	58.060261	15.490000	12.415290	1.440000	0.000000	2.858112	2.320000	1.303567
2019	1.971462	2.600000	53.951467	17.810000	13.178354	-6.288538	-0.100000	-4.108794	2.320000	0.763064

Sources:
- World Bank Development Indicators database
- Transparency International
- Central Bank of Nigeria Statistical Bulletin
- International Debt Statistics of the World Bank.