



GOVERNMENT BOND PROCEEDS AND INFRASTRUCTURE SPENDING IN NIGERIA

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Abstract

This study examined government bond proceeds in relation to infrastructure spending in Nigeria over 43-years, spanning 1981 through 2024. Secondary data gathered from publications of Central bank of Nigeria's statistical bulletin and official website of the World Development Indicators (WDI), were analyzed using the generalized method of moments (GMM) regression. This approach suitably handles endogeneity and reverse causality inherent in the Nigerian public finance, where projects are funded through bond proceeds in the face of simultaneous infrastructure deficits. Although findings revealed that past infrastructure spending, government bonds, and interest rates have significant impact on current expenditure on infrastructure, the attendant continuous infrastructure deficit is largely caused by corruption and fund diversion. While it is concluded that public funding of sectors from bond proceeds is high, the study recommends the need to strengthen domestic bond market to attract wider coverage of investors to ensure trust and more fund inflow into the market. Deliberate ring-fencing of portions of bond funds, with supervision and reporting, towards achieving successful project development was also recommended.

Keywords: Bond financing, Debt management, GMM, Infrastructure, Nigeria, Debt securities



INTRODUCTION

Background

Public spending, comprising of public recurrent and capital expenditures on services and infrastructure within the public domain, requires the dispensation of funds generated from different sources. A vital one of such sources is the sales of bonds to the public (Eniola, 2024). In the Nigerian economy, public expenditure is an important factor to be considered in the course of wealth creation through the provision of public goods, income transfer, and economic regulation (Storonyanska *et al.*, 2025). Government bonds also known as securities are government-issued debt securities to fund public expenditure without the need for taxes (Antolin-Diaz, 2024). Hence, when an investor decides to invest in a government security, the final effect is that the investor is lending money to the government in exchange for the returns in the form of interest rates and the eventual return of the money at the end of the maturity period. It is the safest form of investment owing to the fact that the power of the government is behind the security in terms of taxing her citizens for funds (Nitsi and Ioannidis, 2025). In the Nigerian scenario, the role of the Nigerian government in issuing securities is multifaceted. It helps in the provision of important infrastructure and services that can help bridge the financial gaps in the Nigerian government (Alamu *et al.*, 2024). The success of infrastructure spending financed by the issuance of government bonds is dependent on proper management of the resulting national debts. When managed well, it catalyzes economic growth, which ultimately results in the improvement of public spending (Abdullahi and Surajo, 2024). Leveraging on this helps the government to generate funds for the execution and implementation of important growth and development projects (Elias *et al.*, 2024).

However, in case the issue related to the spending of proceeds from government bonds is mishandled, it can result in low economic growth (Safdar and Malik, 2020). Issuance of government bonds is dependent on prevailing economic factors that bother around level of interest rates, inflation, as well as worldwide financial markets as well as costs related to issuing them. Inherent here is that public perception is greatly significant (Koroleva and Kopeykin, 2022). In Nigeria, government bond spending on infrastructure is complicated. This is because it has been ineffective in achieving the intended objectives to propel economic growth and development. The process of public expenditure in Nigeria is characterized by several irregularities, especially in infrastructure development, healthcare services, and education, which are fundamental to the economic growth of a nation and upliftment of peoples' standard of living (Amu *et al.*, 2025). It has been a concern that while money is raised by issuing government bonds to fund infrastructure development, it is not always very obvious how it is actually being issued to maximize its impacts. The non-accountability and non-transparent

nature of public financial management lead to concerns about financial irregularities like corruption (Righteous *et al.*, 2024).

It is therefore evident that there exists a lacuna in spending without actual required delivery of services on infrastructure in the country (Osakede, 2021). Without an articulated framework for dispensing funds obtained through bond issuance by the government, there is a clear avenue for mismanagement and ineffective spending that culturally violates the objectives of public financial management (Hassan, 2025). The challenges persist despite various financial reforms implemented to make public expenditure effective (Osmond and Okechukwu, 2024; Olaoye and Alabadan, 2024). A significant one of all measures is the country's attempt at enhancing transparency and accountability through the Open Government Partnership Initiative. Although the policy tried to disclose to the public the efficiency with which funds were been expended, the challenges persist (Agu *et al.*, 2024). However, despite these efforts, the challenges are still there, and this indicates that there is a great need to tackle the problem of having a strong and effective framework of public spending through the use of government bonds in the country. There are various reasons that contribute to the challenges still existing in the use of government bonds in relation to the issues of public spending in the country of Nigeria. First, there are structural challenges in the way public funds are managed, and these can hamper efforts directed at ensuring that funds are well utilized (Olaoye and Alabadan, 2024).

The absence of able human resources to handle public funds affects proper application and implementation of public financial management. The presence of such red flags regarding lack of technical knowledge for funding assessments may, and does, affect improper decision-making on how bond-funded money is utilized (Ibrahim, 2022). Furthermore, cultural issues, as manifested in an unwillingness to adopt principles of transparency and accountability, also create hurdles. The absence of widespread publicity regarding the significance of government expenditure impacts on the notion of the masses about appropriation of fund by the government (Agu *et al.*, 2024). Based on the above challenges, the study evaluates the effect of bond-generated funds on infrastructure spending in Nigeria.

Government Infrastructure Spending

Government spending in terms of infrastructure is one of the most conspicuous types of government spending. It relates to the government's allocation of resources for the construction, maintenance, and upgrade of physical infrastructure that helps facilitate economic and social activities. These include roads, bridges, railways, airports, power stations, water provision networks, education institutions, and healthcare. All of these sectors of expenditure make up the

foundation of country development. They facilitate business activities, movement, and social services (Akomolehin, 2025). The significance of government expenditure in terms of infrastructure spending is based on its abilities to generate economic expansion through its effects. When governments choose to invest in road construction, for example, they create job opportunities in the construction sectors while at the same time opening up trade through reduced costs of transportation. The same applies to government spending on the provision of electricity. When governments invest in electricity production, they create job opportunities in sectors that the electricity will support. Similarly, government spending on information technology boosts invention. Ideally, all government expenditure has the ability to meet both short-run and long-run needs of an economy due to its effects (Tarigan and Saharuddin, 2025). In the case of developing economies like Nigeria, infrastructure expenditure assumes particular importance. Nigeria lacks in the area of electricity infrastructure, transport infrastructure, as well as healthcare infrastructure. Government bonds and borrowing were generally employed as tools for funding infrastructure projects because the government realizes the importance of infrastructure for economic development. Other studies such as Abdul-kemi (2014) and Omodero and Alege (2022) add emphasis to the fact that infrastructure expenditure incurred through bonds has a positive effect on economic development because infrastructure expenditure helps the economy by increasing productivity. But the problems of proper expenditure management, corruption, and politicization hinder its success.

Economies, the world over, have relied on infrastructure spending as a key area of economic policies. In America's case, for example, the programs put in place during the 1930s with programs under President Roosevelt's New Deal to get an ailing US economy back on its feet are still evidence of how expenditure on infrastructure can give impetus for development to start. In more contemporary times, for other nations such as China to sustain an economic growth pattern, massive expenditures on infrastructure development are put in place. These are literary proofs of an expenditure on infrastructure for development aim can result to some level of transformation of an entity. However, some level of risks is attached to expenditure on infrastructure development. For example, when infrastructure development is financed via debt, some burdens may result in long-term debts if revenues accruing from infrastructure development are below those required to service debts. Too much reliance on debt infrastructure can lead to a situation where money accruing from infrastructure development may fail to service debts appropriately, such as Akhanolu *et al.* (2018). In addition to that, some of these projects may be ill-planned and end up being what is known as "white elephants," which may lead to a waste of resources but end up not offering their intended benefits. Further complexities may be involved through the political economy of infrastructure expenditure.

Governments may end up investing in infrastructure projects that may bring them short-term political benefits. These include the construction of highly visible infrastructure such as roads and stadiums. However, they may not be so concerned about investing in power and education. This is according to Amaka (2024), which states that “Borrowing for infrastructure in Nigeria is politically driven. Governments borrow to demonstrate their achievements before the elections. This approach makes borrowing less effective”.

LITERATURE REVIEW

Theoretical Review

This review of theoretical work is a comprehensive examination and synthesis of the existing theoretical theory that are relevant to the topic. Three key theories were reviewed which are the Wagner’s theory of rising state activity, Pure theory of public expenditure and the Keynesian law of public expenditure.

Wagner’s theory of ever-rising State Activity: Most of the pioneering theories of public expenditure took their sources from the work of Adolf Wagner in (1883). He postulated a public expenditure growth model to explain evolution or changes in levels of government expenditure. In his study, hypothesized “the law of increasing state activity”. The law expatiated that as the economy of a nation grow over time, the growth is correspondingly followed with rising functions and activities of the government. The increase in public duties and responsibilities, in turn, causes government expenditure to rise. This theory would later be summarized as law of increase in expansion of fiscal requirements (Brown and Jackson, 1994). However, it was noted that the assumed growth in public activities may not be sacrosanct, as financial constraint could impede the assumed expansion of state activities. Wagner posits that regardless of such constraints, peoples’ desire to progress and develop will eventually lead them to surmount the financial challenge, in the long-run.

Sagarik (2014) expatiated on Wagner’s proposition from three different perspectives. The study was of the stance that modernization and industrialization held the keys to increased public roles as private institutions give way for government interventions. It was also mentioned that for there to be efficient economic performance, specialization leading to rapid division of labour, urbanization and industrialization needed higher government spending in the areas of law and order, as well as contractual enforcement. Further, the study elucidated on Wagner’s argument that general increase in real income encourages expansion of people’s welfare spending. The extent of a nation’s development as measured by the country’s income per capita, affects the availability of resources to fund public expenditure. This is perceived as being central to Wagner’s theory, as national growth remains developmental goal for decades and

plays critical role within the context of public policy literature. On a final note, Sagarik (2014) iterates on Wagner believed that the public sector was in the best position to manage “natural monopolies”.

Pure Theory of public Expenditure: The Pure Theory of Public Expenditure was for the first time formally stated in the 1950s by the American economist Paul Samuelson. The theory conceptualizes public expenditure as being the basic concept of government services (Samuelson, 1958). However, the theory ignores the political economy aspect of the field of economics (Margolis, 1955). The author supposes a further investigation of the topics related to public expenditure will lead to the mathematics of sociology or welfare economics, meaning any particular truths derived therefrom might possibly be a mere coincidence (Tiebout, 1956). According to Samuelson, public expenditure increases in line with the growth of the labor force (L), implying the need to make more investment in education and training to improve the capabilities of the workforce. This expansion in the workforce is accompanied by expansion in capital (K), which may be done by savings or borrowing. Thirdly, the role of technological advancement (Tn) cannot be overestimated. In capturing output (Q), Samuelson, (1995) expressed the function in the form:

$$Q = f(K, L, Tn) \quad eq.1$$

Researchers on the subject agreed that there was a need at the early stages of national development for substantial investment in social overhead capital, including roads, harbors, power installations, and piped water systems. These social infrastructures are implicit in the discharge of economic activities and in ensuring that the needed services are available to promote growth (Burkhead and Miner, 2007). With the maturing and development of an economy, the public sector's share of capital formation is expected to fall overtime. This is so because private investment will begin to take over and increasingly become strong enough to sustain the growth process.

Keynesian Theory of Public Expenditure: The Keynesian theory of public expenditure, championed by John Maynard Keynes, emphasizes the critical role played by government expenditure. The government spending being an exogenous element which could potentially be utilized for acceleration of economic growth, Keynes asserts that its role does and should not depend on certain economic conditions in the country, rather it should be a vital tool to shape and establish economic stability. The Keynesian Theory presupposes government consumption to work like “magic” for the country (Ansari *et al.*, 1997). In particular, it is noticed that with an increase in government expenditure in consuming various kinds of products or services, employment, profits, and investment are seen to increase in scale or magnitude, as seen in what might be called a multiplier effect, in line with this theory itself. The primary backbone of

the Keynesian theory is brought about with regard to an understanding of its most important assumptions. First, there is an assumption that economies do not constantly operate under full employment. In economic downturns, resources such as labor are grossly underutilized. With increased public expenditure, a government is in a position to fill the vacuum by stimulating demand, thereby creating incentives for firms to hire more workers (Ahuja and Pandit, 2020).

Another assumption is the existence of the multiplier effect. This effect is based on the concept that the first boost in the level of public expenditure causes an advent cascade in economic activity (Obi *et al.*, 2022; Olanrewaju & Funlayo, 2021). Another postulate made by Keynes is the concept of aggregate demand as the engine of economic growth, as it incentivizes the governments to use fiscal policy, or public expenditure, as an economic tool to regulate economic cycles. During periods of economic recessions, governments can regulate or slowdown economic cycles by increasing expenditure. During periods of economic prosperity or economic boom, governments can regulate high expenditure that may result in inflation (Arestis *et al.*, 2021).

Empirical Review

Government bonds have always been recognized for decades around the globe as an important mechanism for financing government expenditure, mitigating deficits, and fostering economic development. The contribution that has been played by government bond issuance for financing expenditures, especially for Nigeria, cannot be overstated, especially when it has encountered financial difficulties. This literature review is a critical analysis of the nexus that exists between government bond issuance and government spending, especially for Nigeria's government, where both theoretical and conceptual approaches will be used for analysis. There exists a nexus between Nigeria's experience on the matter, analysis for the entire African context, and global discourse on these issues, which has been addressed within this review, integrating concepts from Omodero and Alege (2022), Amaka (2024), Righteous *et al.* (2024), Olaoye and Alabadan (2024) and others, while contrasting them with international perspectives such as Ahwireng-Obeng and Ahwireng-Obeng (2020), and Abbasov (2025).

Nevertheless, a different point is taken in Omodero and Alege (2022). The authors explain with clarity how to exploit the bond in the public sector for growth, especially with right application in infrastructure development. The authors, however, posit their thoughts that in a country like Nigeria, which faces low infrastructures, they strongly regard it as a critical tool to bridging this challenge. On the other hand, if it is not well implemented, its effectiveness is lost upon them. The study by Righteous *et al.* (2024) investigates issues of fiscal deficits and their sustainably focus. Based on this paper, this author concurs with them that depending on bonds

to finance fiscal deficits is a threat to the sustainability of the Nigerian economy, however it has posed itself as a chance to enable fiscal responsibilities in the budget. The study by Olaoye and Alabadan (2024) seeks to investigate its relationship with revenue and budget performance.

However, it is important to note that, as indicated by Ahwireng-Obeng and Ahwireng-Obeng (2020), there are essential elements that potentiate the development of the bond markets in Africa, such as either institutional factors or macroeconomic factors. For instance, the bond markets in Nigeria, in spite of facing problems in spending on sustainable expenditure in the country, are not effective due to institutional factors in the country, leading to political borrowing by the Nigerian government. Abbasov (2025) provides an insightful argument concerning the budget of the government, its expenditure, as well as sustainability. According to Abbasov, any bond market used for any kind of public spending in any country requires careful consideration of not just short-run growth in the economy, but also sustainability of borrowed debts in the country.

However, the Nigerian government has failed in this aspect. Amaka 2024 provides an insightful argument concerning the political economy of public borrowing, as it is normally done by governments in most countries for short-run political gains. However, the bond market is being utilized by the Nigerian government for populist spending in the country, although it is undermining sustainability. In spite of the fact that some research work mentioned above focuses on macroeconomic variables that affect bond yields, there seems to be a research gap regarding how such variables are interlinked with government expenditure. The nexus between macroeconomic variables like inflation rate and interest rate and bond issued by governments needs to be understood properly to make a thorough analysis of their combined effects on levels of expenditure incurred by governments. More research should be carried out to examine how such variables are interlinked with each other to influence fiscal policies and overall economic performance of Nigeria. For example, Omodero & Alege (2022) argue that there is need to examine how increased rates of inflations affect bond yields to make fiscal policies effectively. This relationship becomes important to consider, especially taking into consideration the tough economy of Nigeria, where rates of inflations have been swinging widely over time, affecting budget and expenditure levels.

THEORETICAL FRAMEWORK

The theoretical framework that underpins the research primarily revolve around the Wagner's Law of Increasing State Activity. The Wagner's Law of Increasing State Activity, developed by Adolph Wagner, in 1883, establishes the underlying principle for growth in public expenditures. Wagner envisioned that as a country advance in its economic growth process

through industrialization and modernization, a synchronized acceleration in the activity level of the government also happens. The natural correlation that exists between the two elements indicates that economic growth is not only a precursor to increased public spending but also a catalyst. Brown & Jackson (1994) summarize this theory under the principle that an increase in public and specifically state activities is related to growing fiscal expenses. According to Wagner's Law, as economies grow and increase in industrialization, the need for public goods and services grows considerably. The main reason for this growth is linked to the requirement for protection and regulation by the state. For example, when an economy becomes more urbanized, there is an increase in the need for laws and regulation for a stable economy. With pe_t being public expenditure and gdp_t representing gross domestic product, Wagner's Law predicts the below equation.

$$pe_t = f(gdp_t) \quad eq.2$$

METHODOLOGY

Type and Source of Data

The study employed the use of secondary data in its analysis. While data series on government bonds GDP, Interest and Inflation Rate were sourced from publications of Central bank of Nigeria's statistical bulletin, data on Population Growth and government spending were gathered from the official website of the World Development Indicators (WDI). The study period spans 43-years, from 1981 to 2024.

The choice of the study period is informed by the need to capture major structural transformations in the nation's public finance architecture, as aided by the availability of data to do so. More so that in Nigeria, 1981 is the baseline for macroeconomic data tracking, which aligns with the publications of the Central Bank of Nigeria (CBN) statistical bulletin and the World Development Indicators. The timeframe captures important economic milestones in the history of Nigeria. This traverses the activation period of the 1986 Structural Adjustment Programme (SAP), the era of transition from military rule to democracy in 1999, and the eventual creation of the Debt Management Office (DMO) responsible for issuance of government bond, in 2000. The study analysis extends through 2024 to include recent available data in order to provide opportunity for sufficient long-term horizon policy planning.

Model Specification

The study utilized a system Generalized method of moments (GMM) regression. The model is ideal given that it does not require assumptions regarding exact distribution of the error terms. It also suitably handles endogeneity through the use of instrumental variables (Gujarati,

2004). Such endogeneity and reverse causality are common to the Nigerian public finance, where projects are funded through bond proceeds, while simultaneous infrastructure deficits often lead the government to issue more bonds. In order to determine the effect of bond proceed spending on infrastructure in Nigeria, the research model specified in the study is underpinned by the theoretical framework discussed above, with slight modification in line with previous studies with variant adaptations; Public expenditure being a function of gross domestic product (Ukwueze, 2015; Jibir and Aluthge, 2019; Mohsen, 2022; Adegboye and Akinyele, 2022; Horobeţ *et al.*, 2023; Piscopo *et al.*, 2024), population (Okafor and Eiya, 2011; Adegboye and Akinyele, 2022; Horobeţ *et al.*, 2023), government bonds (Petlele and Buthelezi, 2025), interest rate (Azmi, 2013) and inflation rate (Okafor and Eiya, 2011; Jibir and Aluthge, 2019).

- Baseline Structural Equation and the GMM Estimator

The research models infrastructure spending as a function of bond proceeds, GDP, population growth, interest and inflation rates, and past spending on infrastructure. The study employed the lag of infrastructure spending given that infrastructure projects are time and path-dependent.

$$Infra_t = f(Govt. Bond_t, GDP_t, Pop_growth_t, Int_rate_t, Inf_rate_t, Pub_spending_{t-i}) \quad eq.3$$

The explicit form of eq.3 is provided below

$$INFRA_t = \beta_0 + \beta_1 BOND_t + \beta_2 INFRA_{t-1} + \beta_i X_t + \varepsilon_t \quad eq.4$$

The orthogonality or moment conditions are applied to estimate the vector of coefficients (β). This makes the estimator to be asymptotically efficient, robust and resistant to heteroskedasticity and autocorrelation. It is expressed as shown below

$$g(\beta) = \frac{1}{T} \sum_{t=1}^T Z_t \Delta \varepsilon_t(\beta) = 0 \quad eq.5$$

Where: $INFRA_t$ = Infrastructure spending in year t ; $INFRA_{t-1}$ = Lagged infrastructure spending; $BOND_t$ = Government bond proceeds raised in year t ; X_t = A vector of macroeconomic control variables (GDP, Population Growth, Interest Rate, Inflation Rate); ε_t = The idiosyncratic error term; Z_t = Matrix of instrumental variables such as $BOND$ and past lags of $INFRA$.

Inherent in eq.4 is the fact that $BOND_t$ and $INFRA_t$ may be simultaneously determined within the context of the economy, and this could lead to endogeneity. This is because a fiscal deficit may result when the government wants to spend more on infrastructure or when there is a shortfall in revenue to fund infrastructure projects. This triggers the Debt Management Office (DMO) to forcefully issue more bonds

RESULTS

Descriptive Analysis

The pre-estimation techniques employed in the analysis encompassed descriptive analysis, correlation analysis, unit root analysis, and co-integration analysis.

Table 1: Descriptive Analysis Result

	$lngis$	$lngsh$	$lngse$	$lngdp$	p	$lngb$	ir	if
Mean	3.734	3.911	4.553	9.040	2.611	6.843	17.250	19.401
Median	2.569	3.518	4.254	9.432	2.657	7.127	16.922	13.127
Maximum	6.273	6.150	6.624	12.534	3.075	10.883	31.650	72.836
Minimum	1.517	2.474	3.365	4.937	2.083	2.415	8.917	5.388
Std. Dev	1.582	1.381	1.247	2.520	0.236	2.361	4.730	16.232
Skewness	0.494	0.391	0.411	-0.322	-0.990	-0.302	0.400	1.796
Kurtosis	1.467	1.507	1.541	1.687	3.520	1.948	3.719	5.275
Jarque-Bera	6.095	5.209	5.141	3.919	7.679	2.698	2.119	33.137
Probability	0.047	0.074	0.076	0.141	0.022	0.260	0.347	0.000
Sum	164.322	172.071	200.320	397.758	114.878	301.107	758.980	853.660
Observation	44	44	44	44	44	44	44	44

Note that gis_t is Government Infrastructure Spending, gsh_t is Government Spending on Healthcare, gse_t is Government Spending on Education, gdp_t is Gross Domestic Product, p_t is Population Growth, gb_t is Government Bonds, ir_t is Interest Rate & if_t is Inflation Rate

On the average, government education spending is the largest among the spending categories with a mean of 4.553, followed by healthcare spending (3.911) and infrastructure spending (3.734). Mean GDP is 9.040. The average population growth rate is 2.611, the mean government bond measure is 6.843, the average interest rate is 17.250 and the mean inflation rate is 19.401. Median values are generally close to the means, indicating no extreme asymmetry for most variables. For example, the median GDP (9.432) is slightly above its mean, while the medians of the spending series are slightly lower than their respective means. Standard deviations indicate moderate dispersion for the spending series. GDP shows greater variability (std. dev. 2.520). Interest rate and inflation exhibit much larger spread, with standard deviations 4.730 and 16.232 respectively, reflecting considerable fluctuation in those series. Most series display modest positive skewness, indicating a tendency for a longer right tail for the spending and bond series. GDP shows slight negative skewness (-0.322). The inflation series is strongly right-skewed (1.796), consistent with the high maximum relative to its mean. Several variables have kurtosis below the normal value of 3, implying flatter (platykurtic) distributions with thinner tails than normal. Inflation (5.275) and interest rate (3.719) show

leptokurtic behavior, indicating heavier tails and a higher likelihood of extreme values. The relatively stable distributed variables suggest more predictable behaviour for fiscal series in this sample. Skewness and kurtosis patterns are further considered when choosing estimation methods and inference reporting.

Correlation Analysis

Table 2: Correlation Analysis

	<i>Lngis</i>	<i>Ingsh</i>	<i>Ingse</i>	<i>Ingdp</i>	<i>p</i>	<i>Ingb</i>	<i>ir</i>	<i>if</i>
<i>Lngis</i>	1.000	-	-	-	-	-	-	-
<i>Ingsh</i>	0.949	1.000	-	-	-	-	-	-
<i>Ingse</i>	0.948	0.499	1.000	-	-	-	-	-
<i>Ingdp</i>	0.837	0.290	0.190	1.000	-	-	-	-
<i>p</i>	-0.633	-0.627	-0.627	-0.547	1.000	-	-	-
<i>Ingb</i>	0.844	0.193	0.393	0.199	-0.606	1.000	-	-
<i>ir</i>	-0.210	-0.189	-0.210	0.065	0.105	0.103	1.000	-
<i>if</i>	-0.210	-0.268	-0.283	-0.247	-0.086	-0.198	0.358	-

Note that gis_t is Government Infrastructure Spending, gsh_t is Government Spending on Healthcare, gse_t is Government Spending on Education, gdp_t is Gross Domestic Product, p_t is Population Growth, gb_t is Government Bonds, ir_t is Interest Rate & if_t is Inflation Rate.

Table 2 presents pairwise Pearson correlations among each pair of the series used in the study. There is a strong positive correlation among fiscal spending series and GDP indicating that the three government spending categories move closely together in the sample, with periods of higher infrastructure spending coinciding with higher healthcare and education spending. These categories spending also strongly correlate with GDP. This suggests expansion in fiscal outlays with respect to economic size and activity. Government bonds closely track GDP and all forms of spending because government bond is positively and strongly correlated with GDP and other spending. This pattern implies that the government bond measure moves almost in step with GDP and public spending in the sample, which may reflect financing patterns that scale with the economy or with fiscal activity. Population growth is negatively related to spending and bonds. Population growth shows moderately strong negative correlations with the spending measures and bonds. This suggests that periods of higher population growth are associated with relatively lower logged government spending and bond measures in the sample, or conversely that lower population growth coincides with higher spending and bond levels.

There is a weak relationship between interest rate and inflation. Inflation has small negative correlations with spending and GDP, while having a modest positive correlation with interest rate. This implies that higher inflation is slightly associated with higher interest rates but not strongly related to neither public spending nor GDP. This is consistent with a monetary policy response. The positive relationship among spending, GDP and bond are consistent with procyclical fiscal patterns, scaling with economic size.

Unit Root Test

The tests for unit root on the employed series were carried out through the use of Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test. The results are presented and discussed below

Table 3: Unit Root Test Matrix

Variable	Order	ADF Test	PhillipPherron Test
<i>lngis</i>	Level	0.054 [0.958]	-0.299 [0.917]
	First Diff.	9.843 [0.000]***	-9.465 [0.000]***
<i>lngsh</i>	Level	0.381 [0.980]	0.684 [0.990]
	First Diff.	-6.239 [0.000]***	-6.728 [0.000]***
<i>lngse</i>	Level	0.851 [0.994]	0.544 [0.986]
	First Diff.	-8.941 [0.000]***	-8.870 [0.000]***
<i>lngdp</i>	Level	-1.379 [0.583]	-1.110 [0.704]
	First Diff.	-3.594 [0.010]**	-3.515 [0.012]**
<i>p</i>	Level	1.559 [0.999]	-1.042 [0.730]
	First Diff.	-3.251 [0.024]**	- 5.461 [0.000]***
<i>lngb</i>	Level	-1.966 [0.300]	-2.313 [0.173]
	First Diff.	-6.976 [0.000]***	-7.033 [0.000]***
<i>ir</i>	Level	-2.547 [0.112]	-2.556 [0.110]
	First Diff.	-6.959 [0.000]***	-6.965 [0.000]***
<i>if</i>	Level	1.732 [0.107]	-2.715 [0.152]
	First Diff.	-6.707 [0.000]***	-10.428 [0.000]***
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$			

Note that gis_t is Government Infrastructure Spending, gsh_t is Government Spending on Healthcare, gse_t is Government Spending on Education, gdp_t is Gross Domestic Product, p_t is Population Growth, gb_t is Government Bonds, ir_t is Interest Rate & if_t is Inflation Rate

From the test statistics for the unit root test at levels, it is observed that none of the variables reject the null hypothesis at level, since the p -values of all the variables are extremely

high (more than the required threshold values). Therefore, it can be said that the series do not have any property of stationarity when they are taken at levels. When the series are taken after first difference, the situation changes. The results showed that for government infrastructure spending, government health expenditure, government education expenditure, government bonds, interest rate, and inflation rate, the null hypothesis is rejected strongly at the 1% level ($p < 0.01$) in both the tests. These variables are said to be stationary after differencing them only once and thus are considered to be integrated to the order of one. Gross domestic product and population growth also exhibit non-stationarity at levels. After differencing, they become stationary where GDP is significant at the 5% level in both tests and population growth at the 5% level in ADF and at the 1% level in PP.

As such, results obtained from ADF test and PP test indicate that the variables taken into consideration are non-stationary in levels but stationary in first difference form. They therefore exhibit first order integration properties. It is essential to highlight that the above conclusion is extremely significant since it will aid in the application of cointegration analysis in the investigation of long run relations amongst the aforementioned macroeconomic variables.

Co-Integration Test

Johansen co-integration test was conducted to test for equilibrium relationships among the following variables, and the results are reported as below

Table 4: Johansen Co-integration Analysis

Hypothesized No. of CE(s)	Trace test		Max-Eigen	
	Statistic	Prob.**	Statistic	Prob.**
None*	0.722	0.000	0.722	0.036
At most 1	0.651	0.002	0.651	0.081
At most 2	0.554	0.021	0.554	0.208
At most 3	0.467	0.083	0.467	0.296
At most 4	0.362	0.205	0.362	0.422
At most 5	0.257	0.322	0.257	0.501
At most 6	0.142	0.355	0.142	0.561
At most 7	0.062	0.101	0.062	0.101

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level.

Note that gis_t is Government Infrastructure Spending, gsh_t is Government Spending on Healthcare, gse_t is Government Spending on Education, gdp_t is Gross Domestic Product, p_t is Population Growth, gb_t is Government Bonds, ir_t is Interest Rate & if_t is Inflation Rate

The trace test revealed existence of three co-integrating vectors at the 5% level of significance, while the maximum eigenvalue test shows the existence of one co-integrating vector at the 5% level of significance. It is normal for there to be differences in results from these two criteria because it is believed that the trace test is stronger when searching for multiple co-integration vectors compared to the maximum eigenvalue test. In essence, there exist stable long-run relationships among government expenditures (infrastructure, healthcare, and education), GDP, population growth, government bonds, interest rate, and inflation. It is vital to note that this kind of result implies that disturbances in one variable will affect other variables over a long time, hence implying that there are links between fiscal indicators and macroeconomic indicators. We thus conclude that the variables are co-integrated with evidence of minimum of a co-integration relation but with a maximum of three relations.

The GMM Regression

Results of the estimated system of Generalized method of moments (GMM) capturing the effect of government bonds generated fund on infrastructure spending in Nigeria, are presented and reported below:

Table 5: GMM Regression Output

Variable	Coefficient
$lngis_{t-1}$	0.777 [0.000]***
$lngdp_t$	0.117 [0.451]
p_t	0.030 [0.939]
$lngb_t$	0.205 [0.002]***
ir_t	-0.022 [0.001]***
if_t	0.001 [0.632]
$cons_$	-0.049 [0.972]
<i>R-square</i>	0.920
<i>Adjusted R-square</i>	0.907
<i>Durbin-Watson Stat.</i>	2.468
<i>J-stat.</i>	0.000
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$	

Dependent Variable: $lngis_t$

Note that gis_t is Government Infrastructure Spending, gdp_t is Gross Domestic Product, p_t is Population Growth, gb_t is Government Bonds, ir_t is Interest Rate & if_t is Inflation Rate

Table 5 presents the results of the effect of government bonds generated fund on government infrastructure spending in Nigeria. The results show that lag of government infrastructure spending, government bonds and interest rate are statistically significant in determining government infrastructure spending but both lag of government infrastructure spending and government bonds have positive significant effect on government infrastructure spending in Nigeria while interest rate has a negative significant effect on government infrastructure spending in Nigeria. A positive and highly significant coefficient of the lagged value of government infrastructure spending indicates persistence or gradual adjustment in infrastructure outlays: past infrastructure spending strongly predicts current infrastructure spending. This captures budgeting inertia, multi-year project phasing, or persistent policy commitments to infrastructure. Policy shocks or reforms to infrastructure budgets will likely take time to show full effect because spending paths are partially predetermined by prior allocations and ongoing projects. Ensuring efficient allocation and monitoring in one period propagates into subsequent periods. Persistence in public spending is strongly felt, thereby replicating the Peacock and Wiseman-type dynamics and other empirical work showing public expenditure stickiness (Peacock and Wiseman, 1961). Studies on government expenditure determinants (Ukwueze, 2015; Jibir and Aluthge, 2019; Ahuja and Pandit, 2020) also found that past spending levels help explain current public outlays, consistent with the positive lag effect reported here.

The positive and statistically significant coefficient of government bonds implies that higher government bond financing is associated with greater government infrastructure spending. In other words, proceeds from bond issues are directly or indirectly used to finance infrastructure projects. Developing a deeper, well-functioning government bond market can provide a sustainable financing source for infrastructure investment. Policymakers seeking to expand infrastructure can consider bond issuance as an instrument, while ensuring debt sustainability and project selection to avoid misallocation. This finding accords with research that links domestic public borrowing and fiscal financing to higher public capital outlays (Abdul-kemi, 2014; Omodero and Alege, 2022; Petlele and Buthelezi, 2025). The result is also consistent with literature arguing that domestic bond markets enable governments to fund capital projects when other resources are limited (Akitoby *et al.*, 2006; Ahwireng-Obeng and Ahwireng-Obeng, 2020). The negative and significant coefficient of interest rate indicates that higher interest rates are associated with lower government infrastructure spending. Higher interest costs raise the effective cost of financing (including bond servicing) and can crowd out capital spending in constrained budgets. If interest rates rise, governments may reduce new infrastructure commitments or reallocate spending away from infrastructure toward debt

servicing and recurrent obligations. Macroeconomic policies that reduce interest rate volatility or lower borrowing costs (subject to prudent monetary policy) can support infrastructure investment. This negative relationship aligns with studies highlighting the crowding-out effect of high domestic borrowing costs on public investment and the adverse effects of costly debt on fiscal capacity (Azmi, 2013; Oshadami, 2006; analyses of domestic debt burdens in Nigeria such as Asogwa, 2005 and discussions in the Debt Management Office reports). It also complements work showing that high interest rates can constrain capital formation and infrastructure provision.

DISCUSSION OF FINDINGS

Foremost, the attendant continuous infrastructure deficit is largely caused by corruption and fund diversion. However, results showed that past infrastructure spending, government bonds, and interest rates have significant impact on current expenditure on infrastructure in Nigeria. This proves that there is persistence in infrastructure expenditure, which implies that what happens in previous years greatly determines what will happen in the current year. The strong persistence in infrastructure spending is consistent with the literature on public expenditure stickiness (Ukwueze, 2015; Jibir & Aluthge, 2019; Ahuja & Pandit, 2020). The government bonds exhibit a significant positive impact, signifying that fund raised from bond issuances are successfully used in infrastructure development. The evidence strengthens the fact that an efficient bond market can act as a viable means of capital formation. The positive effect of government bonds supports earlier studies that domestic borrowing and bond markets provide sustainable financing for capital projects (Abdul-kemi, 2014; Omodero and Alege, 2022; Akitoby *et al.*, 2006). Conversely, interest rate has negative and strong influence, implying that higher interest rate discourages infrastructure investment. Hence, it is important for nations to keep low and stable interest rate for infrastructure development. The negative effect of interest rates aligns with studies highlighting the crowding-out effect of high borrowing costs on public investment (Azmi, 2013; Oshadami, 2006; Asogwa, 2005). It is noteworthy to further mention that the positive role of government bonds is consistent with Abdul-kemi (2014) and Omodero and Alege (2022), who argued that bond financing augments public service investment. Rising interest rates tends to increase debt servicing costs, reducing fiscal space for healthcare, while inflation erodes the real value of health budgets and undermines effective service delivery. These findings highlight the vulnerability of healthcare financing to macroeconomic instability. The negative effects of interest rates and inflation mirror evidence that macroeconomic instability constrains social sector spending (Azmi, 2013; Asogwa, 2005; Castelló Climent, 2010).

CONCLUSION AND RECOMMENDATIONS

The study concludes that public funding of sectors from bond proceeds is strongly persistent over time, with past allocations being the strongest predictor of current spending. Also, higher interest rates tend to consistently reduce infrastructure and healthcare spending.

In addition to the offered empirical evidence in this study, subsequent studies in this area may wish to disaggregate infrastructure spending into sector-specific where areas such as power, transportation and logistics, service networks, and so forth will be individually examined. This will lay bare which class of asset has the highest marginal returns. Also, future research work could examine the importance, viability and effectiveness of the Islamic Sukuk bond and the green bonds, as alternative financing windows, in relation to infrastructure spending and in comparison, with conventional sovereign debt instruments.

The study emphasizes on the need to strengthen and deepen the domestic government bond market to attract a broader investor base such as pension funds, insurers, foreign investors and so forth. This ensures that more funds flow into the market to finance infrastructure projects. The inflow of funds largely depends on the level of confidence built by the public in bonds market facilities. Strategic and transparent usage of bond proceeds for productive capital projects in various infrastructure projects is a necessity. This involves the deliberate act of ring-fencing or earmarking portions of bond funds towards achieving successful project development with appraisal and reporting, to ensure value-for-money and public confidence.

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