

Impact of Fiscal Policies on Sustainable Economic Development in Nigeria

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Abstract

The critical policy needs to reconcile the often-competing demands of fiscal discipline and sustainable development necessitates empirically investigating the relationship between fiscal policies and sustainable development in order to resolve contradictory evidence in existing literature. Hence, this study investigates the impact of fiscal policies on sustainable development in Nigeria for the periods of 1990 to 2024. The specific objectives are to determine the impact of public debt, government spending and tax revenue on sustainable development in Nigeria. The study employed an ex-post facto research design; it utilized secondary time-series data sourced from the Central Bank of Nigeria statistical Bulletin and the World Development Indicators. The data analysis followed a time-series econometric approach. After confirming stationarity at first difference via Augmented Dickey-Fuller tests, the Johansen cointegration test identified two significant long-run relationships. A Vector Error Correction Model was then estimated to analyze the dynamics. The findings reveal that in the long run, government spending positively influences sustainable development, while public debt and tax revenue have significant negative effects. The study also shows that public debt, government spending and tax revenue have no significant impact on sustainable development in the short run. The study concludes that fiscal policies impact on sustainable development is component-specific and long-term in nature. The study recommends prioritizing productive government expenditure, implementing growth-oriented fiscal consolidation to manage debt and reform tax structures to ensure cohesive and sustainable development.

Keywords: Fiscal Policies, Government Spending, Public Debt, Sustainable Development, Tax Revenue

Introduction

Fiscal policies play a critical role in shaping the trajectory of sustainable development globally. The ambition to achieve the Sustainable Development Goals necessitates effective fiscal strategies that can mobilize resources, foster economic growth, and address social and environmental challenges (Ajeigbe et al., 2023). Research indicates that fiscal stimuli can be associated with increased economic growth, which in turn can lead to improved sustainable development outcomes (Aizenman et al., 2022). However, the global perspective also highlights potential trade-offs, such as the positive association between current Gross Domestic Product (GDP) growth and poverty headcount ratio or pollution in some contexts, suggesting that unchecked growth might not always align with broader sustainability objectives (Aizenman et al., 2021). Therefore, understanding how fiscal instruments are designed and implemented is paramount to ensuring they contribute positively to long-term economic, social, and environmental well-being worldwide (Baştürk, 2025). In Nigeria, the impact of fiscal policies on sustainable development is a subject of significant concern, given the nation's unique economic landscape. Nigeria has historically grappled with challenges such as revenue shortfalls, high public debt burdens, and the need for substantial investments in critical infrastructure and social services (Olushola et al., 2023). The effectiveness of fiscal policy in stimulating GDP and achieving broader development objectives has been a recurring theme in Nigerian economic discourse, with some studies indicating that despite various policy alignments, the country has yet to fully harness the benefits of effective fiscal policy design and implementation (Ugwuanyi & Ugwunta, 2017). This local context underscores the urgency of examining how fiscal policies, particularly public debt, government spending, and tax revenue, specifically

influence Nigeria's path towards sustainable development. Public debt, government spending, and tax revenue are key levers of fiscal policy that profoundly affect a nation's sustainable development. Public debt, while capable of financing essential capital projects and stimulating economic activity, poses a risk to sustainability if not managed judiciously, potentially leading to unsustainable debt dynamics and crowding out domestic investment (Tùng, 2020). Excessive debt can reduce capital stock, increase taxation, and create uncertainty, negatively impacting long-term growth (Olaoye et al., 2022). Government spending, on the other hand, can be a powerful tool for economic stimulation, job creation, and the provision of public goods and services that underpin sustainable development (Guerrero & Ramos, 2021). However, its effectiveness hinges on efficient allocation and governance, as unproductive spending can widen fiscal deficits and hinder long-term progress (Oyadeyi et al., 2025). Finally, tax revenue is fundamental for domestic resource mobilization, enabling governments to fund recurrent and capital expenditures necessary for achieving developmental objectives without relying excessively on debt (Ajeigbe et al., 2023; Olushola et al., 2023). Higher tax revenue and quality governance are linked to stronger economic growth and better sustainable development outcomes (Aizenman et al., 2022). While empirical review offers valuable insights into the global and regional dynamics of fiscal policy and sustainable development, research gaps persist concerning the specific context of Nigeria. Many of the studies are broad in scope, analyzing various regions or a large number of countries (Dutta et al., 2025; Tùng, 2020; Boly et al., 2019; Nakpodia et al., 2024; Ciaffi et al., 2024; Rahman, 2023). This broadness means they may not fully capture Nigeria's unique economic structure, institutional weaknesses, governance challenges, and socio-political landscape that profoundly influence the impact of fiscal policies. For instance, while public debt generally harms social development, the specific mechanisms and thresholds at which this occurs within Nigeria, considering its unique debt composition and economic vulnerabilities, remain under-explored within this literature. Similarly, the efficacy of government spending (Taher, 2024) or taxation in

promoting sustainable development in Nigeria, beyond general observations, requires context-specific investigation. Moreover, the interplay between the various fiscal components and external factors within Nigeria's unique environment presents a further area for exploration. Vărzaru et al. (2023) highlight the intricate connections between digital transformation, sustainable practices, and government revenues in EU member states, suggesting a similar need to understand how Nigeria's ongoing digitalization efforts might impact its tax base, revenue collection efficiency, and public financial management in the context of sustainable development. There is a dearth of comprehensive studies that integrate the complex interdependencies of public debt, government expenditure composition, and tax revenue specifically within the Nigerian context, examining their collective impact on the nation's progress towards the SDGs. Such targeted research is essential to inform robust, evidence-based fiscal policies tailored to Nigeria's specific developmental needs and challenges, ensuring a more sustainable and equitable future.

The main objective of this study is to examine the impact of fiscal policies on sustainable development in Nigeria, the specific objectives are to;

- i. Assess the impact of public debt on sustainable development in Nigeria.
- ii. Examine the impact of government spending on sustainable development in Nigeria.
- iii. Determine the impact of tax revenue on sustainable development in Nigeria.

The study has five sections, section one presents the introduction. The second part is devoted to the review of literature. The third section presents the methodology. The fourth section is a brief description of the data analysis and results. Finally, the conclusions and recommendations are presented in section five.

Literature Review

Fiscal Policy

Fiscal policy refers to the strategic use of government spending and taxation to influence a nation's

economy. It can also be understood as the set of measures taken by government bodies to adjust public expenditures and revenues in the state budget. Through these instruments, fiscal policy aims to manage the economy to achieve desired macroeconomic objectives, such as promoting economic growth, stability, and full employment (Ugwuanyi & Ugwunta, 2017). These policies ultimately impact the distribution of the tax burden, consumption, disposable income, and assets, contributing to the harmonious development of society and the sustainability of public accounts (Catarino et al., 2021).

Public Debt

Public debt refers to the total financial obligations that a government owes to various entities, including individuals, mutual funds, hedge funds, pension funds, foreign governments, and other state agencies (Qwader & Aloshaibat, 2020). It essentially represents the accumulated amount of borrowing undertaken by the government from both domestic and foreign sources to finance public expenditures that exceed tax revenues (Viphindrartin et al., 2023). This concept encompasses both short-term debts (up to one year), medium-term debts (one to five years), and long-term debts (over five years), which are often facilitated through instruments like treasury bills and government bonds. The total public debt for a country in a year is often measured by summing its domestic and foreign debts.

Government Spending

Government spending, also known as government expenditure, refers to the expenses incurred by the government for its own maintenance, the provision of public goods, services, and works, and to foster economic growth and improve the welfare of its citizens (Anjande et al., 2025). This can involve acquiring goods and services for immediate use or for creating future economic benefits, such as infrastructure and investments (Oyediran et al., 2016). Government expenditures are broadly categorized into capital and recurrent components (Oyediran et al., 2016). Capital expenditure involves spending on public works, fixed assets, and profit-oriented investments like lands, buildings, roads, machines, and equipment, which are expected to

yield benefits over an extended period (Anjande et al., 2025). Recurrent expenditure, on the other hand, covers operational costs such as overheads, salaries, pensions, social security benefits, and miscellaneous expenses that are consumed within a limited period, typically one year.

Tax Revenue

Tax revenue refers to the income governments collect primarily through taxes and social contributions, forming the most significant and reliable source of funding for public programs and activities (Umar et al., 2017). These taxes represent compulsory payments from individuals and legal entities to the state, based on income, wealth, or economic power, and are generally independent of direct individual benefits (Kryeziu, 2021).

Sustainable Development

Sustainable development is a concept that emphasizes meeting the needs of the present generation without compromising the ability of future generations to meet their own needs (Boodhoo & Parumasur, 2017; Brundtland, 1991). This widely cited definition originated from the 1987 Brundtland Commission report, "Our Common Future" (Brundtland, 1991; Kono, 2014). The concept gained prominence through this report, which set a global agenda for changes in development and the environment (Agasty et al., 2023; Padhan, 2023).

Empirical Review

Public Debt and Sustainable Development

Dutta et al. (2025) explored the complex relationship between public debt, governance, and sustainable development. Their methodology involved the application of System Generalized Method of Moments models. The study concluded that there is a nonlinear relationship between public debt and sustainable development. Specifically, public debt contributes positively to sustainable development up to a certain threshold of 27.5% of GDP. However, beyond this critical point, the positive impact quickly becomes detrimental as debt levels continue to

escalate. Baret and Menuet (2024) investigated the interplay between fiscal and environmental sustainability. The study proposed a growth model where government financing for environmental abatement could be sourced through taxation or public debt, adhering to a fiscal rule that targets the long-run debt-to-GDP ratio. The study demonstrated the existence of a threshold for the debt ratio, below which both debt and environmental sustainability are maintained. The study found that the debt ratio exerts a non-linear, inverted U-shaped effect on environmental quality. Tùng (2020) investigated the impact of public debt on social development indicators across 17 Asia-Pacific countries from 1980 to 2018. Employing a methodology that included the Granger causal test, the study found that public debt generally harms social development. Specifically, an increase in public debt was associated with a decrease in GDP per capita growth and domestic investment, alongside a rise in the poverty rate. While public debt showed a negative effect on inequality. Youssef and Ayoub (2020) conducted a study on the social sustainability of public debt in the framework of Middle East and North African Countries: Egypt, Lebanon, Morocco, Tunisia, and Turkey. The study utilized the Auto Regressive Distributed Lag panel data estimation technique for a sample of Middle East and North African countries between 1990 and 2018. The study revealed that external public debt service imposed a significant burden on public spending in crucial sectors like health, education, and public investment. Furthermore, the ratio of external public debt to Gross Domestic Product was found to have a negative impact on the population's living standards, indicating that borrowed funds were often channeled into non-productive expenditures that did not improve the welfare of the population. Boly et al. (2019) examined the trade-offs between public debt and environmental debt. They developed a theoretical model of endogenous growth, which was then tested empirically on a sample of 22 countries from 1990 to 2011. The study utilized panel time-series estimators that accounted for heterogeneity in slope coefficients across countries, with environmental debt quantified by cumulative CO2 emissions per capita. The findings indicated a

positive long-run relationship between public debt and environmental debt.

Government Spending and Sustainable Development

Nakpodia et al. (2024) investigated the influence of accounting practices and public financial management on the attainment of Sustainable Development Goals across 96 countries. It employed linear, instrumental-variable, and nonlinear regression models, including Generalized Linear Models and a two-step dynamic system-generalized method of moments. The findings demonstrated that both robust accounting practices and effective public financial management positively impact human development and environmental sustainability. Ciaffi et al. (2024) applied the Local Projections approach to a dataset of 14 OECD countries from 1981 to 2017. Fiscal policy shocks were identified using the Blanchard and Perotti strategy and a narrative approach based on fiscal consolidation episodes. The study concluded that the multipliers of total government spending were above unity, and critically, government investment multipliers were higher than those for government consumption. This indicated that government investment is a more effective fiscal tool for promoting sustainability compared to other forms of government expenditure. Taher (2024) investigated the relationship between government spending and output growth using the Autoregressive Distributed Lag approach. The study built upon Keynesian theory, which posits that government spending can increase output growth. While acknowledging variations in causality, the empirical findings generally supported a positive impact of government spending on economic growth. However, the study also explored the complex interaction between economic growth, government expenditure on green energy, and CO2 emissions, indicating that while government spending can promote economic growth, its effect on environmental sustainability, particularly concerning CO2 emissions, requires careful consideration. Guerrero and Castañeda (2022) examined how government expenditure impact sustainable development across 140 countries. The study involved estimating indicator-country-specific

development gaps and identifying non-linear responses to changes in the total amount of government expenditure. The study revealed significant heterogeneity in development gaps and observed non-linear effects of public spending. A key finding was the identification of "bounds" to how much a development gap could be reduced by 2030 through mere increases in public spending. Othman and Bekhet (2021) explored the dynamic effects of Malaysia's government spending on environment quality. The study applied the STIRPAT model within the Environmental Kuznets Curve framework, utilizing the F-bounds test for cointegration, the ARDL model for short-run and long-run environmental elasticities, and VECM Granger causality to determine the direction of relationships. The empirical results confirmed a cointegration relationship among environmental quality, GDP, population, and Malaysia's government spending. The findings indicated that government spending significantly contributed to reducing environmental quality in Malaysia.

Tax Revenue and Sustainable Development

Ajeigbe et al. (2023) investigated how effective taxation contributes to domestic resource mobilization for sustainable development. The study reviewed existing literature on taxation in Africa and a data analysis. The findings suggested that improving tax efforts and bases on corporate and income taxes would boost domestic resource mobilization, which could spur growth and development processes in these countries. The study also indicated that increasing tax bases could expand public revenue and investment, thereby promoting the achievement of SDGs. Vărzaru et al. (2023) investigated digital revolution, sustainability, and government revenues: A transversal analysis of how digital transformation and sustainable practices impact sustainable government revenues. The study employed quantitative research methodology involved analyzing relationships among variables using artificial neural networks and cluster analyses across EU member states. The study considered the Digital Economy and Society Index, the Sustainable Development Goals index, and total general government revenue. The findings revealed intricate connections, indicating how digital transformation

and sustainable practices collectively impact government revenues and sustainability across these countries. Rahman (2023) examined the impact of taxes on the 2030 agenda for sustainable development. It utilized secondary data from 38 OECD countries spanning 2000–2021. It employed effective average tax, tax on personal income, tax on corporate profits, and tax on goods and services as tax variables. The study concluded that tax is a potent tool for financing the Sustainable Development Goals, with the additional potential to promote equitable and sustainable development through increased resource mobilization, reduced inequality, and encouragement of sustainable consumption and production patterns. Halim and Rahman (2022) explored the relationship between various taxation forms and the achievement of Sustainable Development Goals. The study analyzed both individual and combined effects of corporate tax rates, personal income tax, sales tax, and effective tax rates with the SDGs. The study found a significant and positive association between taxation and SDG achievement, particularly highlighting that a higher corporate tax rate plays a vital role in reaching sustainable development goals in emerging economies. Aizenman et al. (2022) conducted a study on international evidence of strengthening taxes and spending for sustainable development. The study traced linkages between fiscal expansion and consolidation episodes in 72 advanced and emerging and developing economies. The findings suggested a positive association between fiscal expansions and economic growth, which in turn was linked to better sustainable development outcomes.

Theoretical Framework

Endogenous Growth Theory

Endogenous Growth Theory emerged in the mid-1980s as a significant theoretical advancement in economics, primarily pioneered by economists such as Paul Romer and Robert Lucas, with notable contributions from Robert Barro and Sergio Rebelo (Helpman, 1992; Pietrzyk, 2020; Pokhrel & Khadka, 2019). This theory was propounded as a direct response to the limitations of the neoclassical growth model, which attributed long-term economic growth to exogenous factors like technological progress that were not explained within the model itself (Pokhrel

& Khadka, 2019). The fundamental shift introduced by Endogenous Growth Theory is its premise that the long-run growth rate of an economy is determined by endogenous factors, meaning forces originating within the economic system itself, rather than external factors (Pokhrel & Khadka, 2019). This allows for a deeper understanding of the mechanisms that sustain economic growth over time. The thrust of the Theory centers on the idea that economic growth is driven by the accumulation of capital, particularly human capital and knowledge, and by continuous technological progress (Pokhrel & Khadka, 2019). Key tenets include the recognition of knowledge and ideas as non-rival goods, implying that their use by one entity does not diminish their availability for others, and the presence of positive externalities and increasing returns to scale in production. The Theory is relevant to the study of fiscal policy and sustainable development because it provides a robust analytical framework for understanding how government actions can permanently influence an economy's long-term growth trajectory.

$$\begin{aligned}\Delta \text{SD}_t &= \alpha_0 + \lambda_1 \text{ECT}_{\{t-1\}} + \sum \beta_{1i} \Delta \text{SD}_{\{t-i\}} + \sum \beta_{2i} \Delta \text{PD}_{\{t-i\}} + \sum \beta_{3i} \Delta \text{GEXP}_{\{t-i\}} + \sum \beta_{4i} \Delta \text{TAX}_{\{t-i\}} + \varepsilon_{1t} \\ \Delta \text{PD}_t &= \alpha_1 + \lambda_2 \text{ECT}_{\{t-1\}} + \sum \gamma_{1i} \Delta \text{SD}_{\{t-i\}} + \sum \gamma_{2i} \Delta \text{PD}_{\{t-i\}} + \sum \gamma_{3i} \Delta \text{GEXP}_{\{t-i\}} + \sum \gamma_{4i} \Delta \text{TAX}_{\{t-i\}} + \varepsilon_{2t} \\ \Delta \text{GEXP}_t &= \alpha_2 + \lambda_3 \text{ECT}_{\{t-1\}} + \sum \delta_{1i} \Delta \text{SD}_{\{t-i\}} + \sum \delta_{2i} \Delta \text{PD}_{\{t-i\}} + \sum \delta_{3i} \Delta \text{GEXP}_{\{t-i\}} + \sum \delta_{4i} \Delta \text{TAX}_{\{t-i\}} + \varepsilon_{3t} \\ \Delta \text{TAX}_t &= \alpha_3 + \lambda_4 \text{ECT}_{\{t-1\}} + \sum \theta_{1i} \Delta \text{SD}_{\{t-i\}} + \sum \theta_{2i} \Delta \text{PD}_{\{t-i\}} + \sum \theta_{3i} \Delta \text{GEXP}_{\{t-i\}} + \sum \theta_{4i} \Delta \text{TAX}_{\{t-i\}} + \varepsilon_{4t}\end{aligned}$$

Where $\text{ECT}_{\{t-1\}}$ is the lagged error correction term derived from the long-run cointegrating equation.

The empirical procedure involves a structured, multi-step approach. First, preliminary tests, including unit root tests are conducted to determine the order of integration of the variables. Subsequently, the Johansen Cointegration Test is employed to identify the number of long-run equilibrium relationships among the variables. If cointegration is confirmed, it validates the specification of a VECM. The VECM

Methodology

This study adopts an ex post facto research design to examine the causal impact of fiscal policy instruments on sustainable development in Nigeria over the period 1990 to 2024. The research utilizes annual time series secondary data for all variables, sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development Indicators (WDI). The dependent variable, Sustainable Development (SD), is proxied by a composite index comprising key indicators such as the Human Development Index (HDI), Gross Domestic Product (GDP) per capita growth, and the Environmental Performance Index (EPI) to capture the economic, social, and environmental pillars of sustainability. The independent variables are three key fiscal policy proxies: Public Debt (PD), Government Spending (GEXP), and Tax Revenue (TAX). To analyze the long-run equilibrium relationships and short-run dynamics between these fiscal variables and sustainable development, the study employs the Vector Error Correction Model (VECM). The specified VECM is expressed as:

is then estimated, allowing for the analysis of both the long-run coefficients (from the cointegrating equations) which show the sustained impact of fiscal policy on sustainable development, and the short-run adjustment coefficients (from the error correction term) which indicate the speed of adjustment back to equilibrium following a shock. Finally, diagnostic tests (serial correlation, heteroskedasticity, stability) are performed to assess model robustness and the direction of causal influence.

Data Analysis and Results

Table 1: Descriptive Statistics

	PD	GSP	TAX	SD
Mean	4562.991	643.3886	218.0400	49.77143
Maximum	22150.90	2750.800	705.9000	60.70000
Minimum	200.5000	65.30000	45.20000	38.20000
Std. Dev.	5617.334	712.6122	175.3451	7.784168
Observations	35	35	35	35

Source: Eview 12 Output, 2026.

The mean values show that, on average, Public Debt (PD) stood at approximately ₦4.56 trillion, Government Spending (GSP) at ₦643.39 billion, and Tax Revenue (TAX) at ₦218.04 billion. However, the extremely high standard deviations, particularly for PD (₦5.62 trillion) and GSP (₦712.61 billion), which are larger than their respective means indicate that the data points are widely dispersed around these averages. The dramatic range from minimum to maximum values further underscores this volatility: PD ballooned from ₦200.5 billion to ₦22.15 trillion, GSP expanded from ₦65.3 billion to ₦2.75 trillion, and TAX grew from ₦45.2 billion to ₦705.9 billion. This exponential growth, especially in debt and expenditure, highlights a trajectory of fiscal expansion and increasing reliance on borrowing to finance public spending over the decades. In

contrast, the Sustainable Development (SD) index exhibits a more stable and gradual progression. With a mean of 49.77 (on a 0–100 scale), a maximum of 60.70, a minimum of 38.20, and a relatively low standard deviation of 7.78, the SD series shows consistent, incremental improvement with less year-to-year fluctuation compared to the fiscal variables. The narrower range and lower volatility suggest that developmental outcomes, encompassing economic, social, and environmental dimensions have been more resilient and less responsive to short-term fiscal policies.

Correlation Analysis

Table 2: Correlation Analysis

Correlation Probability	PD	GSP	TAX	SD
PD	1.000000			

GSP	0.696008	1.000000		
	0.0000	-----		
TAX	0.774081	0.688128	1.000000	
	0.0000	0.0000	-----	
SD	0.782152	0.726510	0.690559	1.000000
	0.0000	0.0000	0.0000	-----

Source: Eview 12 Output, 2026.

The correlation analysis reveals that all three independent variables show very strong and significant positive correlations with the dependent variable, Sustainable Development (SD), ranging from 0.691 to 0.782. This suggests that, individually, higher levels of PD, GSP, and TAX are each associated with higher levels of SD in the dataset. The primary multicollinearity implication centers on the relationship between Public Debt and Tax Revenue ($r = 0.774$). While this value does not surpass the stated 0.80 threshold, it does not warrant caution and the correlations do not definitively breach the 0.80 rule.

Table 3: Augmented Dickey-Fuller Unit Root Test**Unit Root Test**

Variables	AT LEVEL			AT FIRST DIFFERENCE				
	ADF Test Statistic	Test Critical Value @ 5%	Prob-Value	ADF Test Statistic	Critical Value @ 5%	Prob-Value	Max Lag	Order of Integration
PD	2.86120	-2.95402	0.986	-3.75659	-2.957110	0.007	6	1(1)
GSP	2.35198	-2.96776	0.999	4.297285	-2.967767	0.000	6	1(1)
TAX	-1.01639	-2.95402	0.735	-5.57402	-2.960411	0.000	6	1(1)
SD	-2.65341	-2.95402	0.092	-5.94107	-2.960411	0.000	6	1(1)

Source: Eview 12 Output, 2026.

The results of the Augmented Dickey-Fuller (ADF) unit root test at the level indicate that none of the variables are stationary in their original form. For Public Debt (PD), Government Spending (GSP), and Tax Revenue (TAX), the ADF test statistics are greater than their respective 5% critical values (or, in the case of TAX and SD, the p-values are greater than 0.05). Specifically, the high p-values (0.986 for PD, 0.999 for GSP, 0.735 for TAX) fail to reject the null hypothesis of a unit root. For Sustainable Development (SD), the test statistic of -2.65 is slightly less negative than the -2.95 critical value, and its p-value of 0.092 > 0.05, also suggesting non-stationarity. Upon taking the first difference of each variable, the tests show that all four series become stationary. The ADF test statistics for the differenced series are all significantly more negative than the 5%

critical values, and their associated p-values are 0.000 or very close to it (0.007 for PD), which is well below the 0.05 significance level. This allows us to decisively reject the null hypothesis of a unit root for each transformed variable. Therefore, the order of integration for PD, GSP, TAX, and SD is consistently identified as I(1), meaning they each require one round of differencing to achieve stationarity. This finding is crucial for specifying a valid time series model, indicating that any subsequent cointegration analysis or regression should be performed on the first-differenced data or within a framework designed for I(1) variables, such as an Error Correction Model if cointegration is established.

Co-Integration Analysis**Table 4: Johansen Co-Integration****Unrestricted Cointegration Rank Test (Trace)**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.545824	56.78143	47.85613	0.0058
At most 1 *	0.433622	30.73553	29.79707	0.0389
At most 2	0.302908	11.97526	15.49471	0.1581
At most 3	0.002047	0.067630	3.841466	0.7948

Source: Eview 12 Output, 2026.

The results of the Trace test for cointegration indicate a significant long-run equilibrium relationship among the variables in the system. The test decisively rejects the first null hypothesis of "None" (no cointegrating equations) at the 5% significance level, as the trace statistic (56.78) exceeds the critical

value (47.86) with a very low probability value of 0.0058. This confirms the existence of at least one cointegrating vector. This finding is crucial because it establishes that the stationary I(1) variables, such as Public Debt, Government Spending, Tax Revenue, and Sustainable Development do not drift arbitrarily apart over time but are bound together in a stable long-run relationship.

Long and Short run VECM Result
Table 5: Long and Short run VECM Result
Dependent Variable: Sustainable Development
(SD)

Cointegrating Eq:	CointEq1			
SD(-1)	1.000000			
PD(-1)	-0.012421 (0.00379) [-3.27457]			
GSP(-1)	0.196560 (0.04227) [4.64957]			
TAX(-1)	-0.448598 (0.06741) [-6.65434]			
C	-21.91936			
Error Correction:	D(SD)	D(PD)	D(GSP)	D(TAX)
CointEq1	-0.771683 (0.33920) [-2.27501]	11.95429 (5.07138) [2.35721]	0.666589 (0.75452) [0.88346]	1.268987 (0.33870) [3.74662]
D(SD(-1))	0.525714 (0.18773) [2.80042]	-18.76252 (103.529) [-0.18123]	1.077154 (15.4030) [0.06993]	9.133862 (6.91439) [1.32099]
D(PD(-1))	-0.000587 (0.00031) [-1.90491]	0.654949 (0.16984) [3.85622]	0.040092 (0.02527) [1.58660]	-0.001069 (0.01134) [-0.09421]
D(GSP(-1))	0.004809 (0.00280) [1.71602]	3.292727 (1.54539) [2.13068]	0.623024 (0.22992) [2.70971]	0.144514 (0.10321) [1.40017]
D(TAX(-1))	-0.001042 (0.00507) [-0.20531]	4.289509 (2.79803) [1.53304]	0.589304 (0.41629) [1.41561]	0.519736 (0.18687) [2.78124]
C	0.321774 (0.14659) [2.19501]	-5.824787 (80.8442) [-0.07205]	3.129531 (12.0280) [0.26019]	-4.956407 (5.39934) [-0.91796]

R-squared	0.478368	0.972816	0.950540	0.838863
Adj. R-squared	0.381770	0.967782	0.941381	0.809023
F-statistic	4.952133	193.2480	103.7798	28.11192

Source: Eview 12 Output, 2026.

This VECM result captures the dynamic interplay between fiscal policy variables and Sustainable Development. The cointegrating equation (CointEq1) defines the statistically significant long-run equilibrium relationship. With SD normalized to 1, the coefficients reveal that in the long run, Public Debt (PD) and Tax Revenue (TAX) exert negative significant effect on Sustainable Development (SD). Conversely, Government Spending (GSP) shows a significant positive long-run effect on SD. This suggests that sustainable development is associated with higher public expenditure but is constrained by high debt and tax burdens in the long term. The constant ($C = -21.92$) represents the equilibrium level around which these variables co-move. The short-run dynamics and the speed of adjustment are shown in the error correction section. For the SD equation $[D(SD)]$, the error correction term (CointEq1) has a coefficient of -0.772 , which is significant. This negative sign is crucial and correct for equilibrium restoration: it indicates that when SD is above its long-run equilibrium value (a positive disequilibrium), the change in SD $[D(SD)]$ will be

negative in the next period to correct it, and vice-versa. The magnitude shows a rapid adjustment, with about 77.2% of any disequilibrium corrected within one period. In the short run, SD shows strong positive momentum from its own past change $[D(SD(-1)) = 0.526]$. The immediate (one-period lagged) effects of changes in PD, GSP, and TAX on SD are insignificant, suggesting that fiscal policy changes impact SD primarily through the long-run channel rather than through short run. The goodness-of-fit for the SD equation is moderate. The R-squared of 0.478 indicates the model explains 47.8% of the variation in short-term changes in SD. The Adjusted R-squared of 0.382 accounts for model complexity and suggests a reasonable explanatory power given the number of predictors. The F-statistic of 4.95 is significant, confirming that the set of explanatory variables in the SD equation (the error correction term and the lagged differences) jointly have explanatory power and are not zero.

Post Estimation Diagnostics Tests

Table 6: Post Estimation Diagnostics Tests

Test	P-Value
Heteroskedasticity Test	0.1127
Serial Correlation LM Test	0.3691
Normality Test	0.1731

Source: Author's Computation from E-view 12 Results, 2026.

The post-estimation diagnostic tests indicate that the VECM model is statistically well-specified and reliable for inference. All three key tests for heteroskedasticity, serial correlation, and normality of residuals return p-values comfortably above the conventional 0.05 significance threshold. Specifically, the heteroskedasticity test p-value of 0.1127 suggests that we fail to reject the null hypothesis of constant variance in the residuals. This means there is no strong evidence of

heteroskedasticity, implying that the error terms do not exhibit changing variance over time and that the standard errors of the coefficient estimates are likely consistent and efficient. Similarly, the serial correlation LM test p-value of 0.3691 indicates we cannot reject the null hypothesis of no autocorrelation in the residuals. This confirms that the model has adequately captured the dynamic structure of the data, and the lag length specified in the VECM is sufficient, leaving no significant unexplained pattern in the errors over time. The normality test p-value of 0.1731 shows that the residuals do not significantly deviate from a normal

distribution. While not always a strict requirement for consistency, normally distributed errors support the validity of standard hypothesis tests (like t-statistics and F-statistics) and confidence intervals, which are often predicated on this assumption. Collectively, these results validate the model's assumptions. Therefore, the estimated coefficients, their standard errors, and the subsequent inferences drawn from the VECM analysis (including the long-run equilibrium relationships and short-run dynamics) are considered robust and trustworthy for drawing conclusions about the relationship between fiscal policy variables and sustainable development.

Discussion of Findings

Based on the comprehensive empirical review and the results from the econometric analysis, this study key findings align with, and sometimes contrast, a complex body of existing literature. The long-run VECM results reveal that Government Spending has a significant positive effect on Sustainable Development, while both Public Debt and Tax Revenue exhibit significant negative long-run coefficients. This supports the findings of Nakpodia et al. (2024) and Ciaffi et al. (2024), who identified a positive role for effective public financial management and government investment in promoting sustainability. Similarly, the negative impact of public debt resonates with studies like Youssef and Ayoub (2020), who found debt burdens crowding out productive spending and harming living standards, and Tùng (2020), who associated higher debt with negative social outcomes. Conversely, several studies present findings that diverge from these results. Regarding public debt, the work of Dutta et al. (2025) and Baret and Menuet (2024) emphasizes a non-linear, inverted U-shaped relationship, where moderate debt can be beneficial before becoming harmful. For taxation, a significant strand of literature, including Ajeigbe et al. (2023), Halim and Rahman (2022), and Rahman (2023), strongly argues that tax revenue is a positive and potent tool for financing and achieving the SDGs through resource mobilization and redistribution. This study negative long-run tax coefficient directly contrasts this prevailing view, potentially indicating issues with the efficiency of tax usage, the structure of the tax system, or specific macroeconomic

conditions in the sample that differ from those in other studies. Furthermore, research like Othman and Bekhet (2021) on government spending warns that such expenditure can degrade environmental quality, highlighting that the composition of spending is critical, a dimension not disaggregated in the current model. In synthesis, this study corroborates the established view that prudent government spending is a pillar of sustainable development but contributes a critical perspective by highlighting potentially significant long-run trade-offs associated with both high public debt and high tax revenue within its specific analytical framework. The divergence in findings, particularly on taxation, underscores that the relationship between fiscal policy and sustainability is not universal but is heavily mediated by contextual factors such as institutional quality, governance, the efficiency of public investment, the structure of the tax system, and the initial levels of debt and development.

Conclusions and Recommendations

Based on the empirical findings of this study, three primary conclusions can be drawn regarding the relationship between fiscal policy and sustainable development. Government spending demonstrates a significant positive influence, acting as a primary driver, while both public debt and tax revenue exhibit significant negative long-run coefficients. This indicates that sustainable development is not a product of aggregate fiscal expansion but is instead the net result of a careful balance, where the benefits of productive expenditure can be undermined by the constraints imposed by high debt burdens and taxation. Finally, the impact of fiscal policy is predominantly a long-run phenomenon. The short-run dynamics show that immediate fluctuations in debt, spending, and tax revenue have weak or statistically insignificant direct effects on changes in sustainable development, underscoring that policy effectiveness must be evaluated over extended horizons rather than through short-term discretionary shocks. Based on the strong positive long-run relationship between government spending and sustainable development found in this study, the primary recommendation is that government should deliberately channeled their resources into

development-enhancing sectors with proven positive multipliers, such as sustainable infrastructure, education, healthcare, and green technology. Given the significant negative long-run coefficients for both public debt and tax revenue, the second recommendation is that debt management, authorities should establish a prudent ceiling based on the country's specific economic context to avoid the detrimental threshold effects. New borrowing must be strictly tied to financing high-return, productivity-enhancing projects that directly support sustainable development objectives, ensuring debt sustainability. Concurrently, tax policy should shift from increasing rates to implementing structural reforms. This involves broadening the tax base, improving collection efficiency, and enhancing progressivity to mobilize necessary revenues without constraining economic activity, thereby mitigating the negative long-run association found in this study while still funding essential public goods.

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