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EXTERNAL FINANCIAL FLOWS, FISCAL POLICY AND ECONOMIC SUSTAINABILITY IN NIGERIA: INSIGHTS FROM SOLOW GROWTH HYPOTHESIS

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ABSTRACT

The attainment of the Sustainable Development Goals (SDGs), introduced by the United Nations leaders in 2015, is anchored on three pillars: economic, social, and environmental sustainability. Economic sustainability refers to the capacity to enhance the overall income and output of all economic agents within the circular flow—both in the present and into the future. This study examines the effect of external financial flows and fiscal policy (internal flows) on economic sustainability in Nigeria, within the framework of the Solow Growth Hypothesis. The study utilises secondary data sourced from the World Development Indicators and the Central Bank of Nigeria's Statistical Bulletin, spanning the period from 1991 to 2022. External financial flows are represented by foreign direct investment, foreign aid, remittances, net exports, and external debt, while fiscal policy is captured through government expenditure on education, government expenditure on health and tax revenue. Economic sustainability is proxied by GDP per capita income. The findings reveal that foreign direct investment and remittances have a positive and significant effect on GDP per capita income, whereas net exports exhibit a negative and significant effect. With respect to fiscal policy, government expenditure on health and tax revenue are found to have a positive and significant impact on GDP per capita income. The study concludes that foreign direct investment, net export and remittances when effectively managed and strategically channeled, have the potential to enhance Nigeria's economic sustainability. Furthermore, fiscal policy measures particularly capital expenditure in health and improved tax revenue generation can play a crucial role in sustaining long-term economic growth. It is therefore recommended that the government create a viable market and a conducive business environment to attract foreign direct investment and strengthen fiscal management frameworks.

Keywords: Economic sustainability, external financial flows, fiscal policy, ARDL Model.

INTRODUCTION

Most developing countries do not operate in isolation (i.e., in autarky); rather, they rely on interactions with other nations and global institutions to advance their sustainable development goals. Of the three core pillars of sustainability—economic, social, and environmental— economic sustainability often takes precedence in these nations. This emphasis stems from the central role of economic interactions among key agents—households, firms, and governments—and their ability to absorb and leverage external inputs to drive economic growth. These factors are crucial in shaping the trajectory toward sustainable development (Amaefule, 2020; Oloke et al., 2022; Olowokeere et al., 2021; Sachs et al., 2020).

External financial flows refer to the inflow of financial resources into an economy from external sources, which support efforts toward economic growth and development. Fiscal policy, on the other hand, comprises the set of government tools—primarily government spending and taxation—used to improve social well-being and economic welfare. The choice of fiscal instruments depends on the prevailing economic conditions, with governments opting for either expenditure, taxation or a combination of both to address specific developmental challenges (Maku & Alimi, 2018; Adebayo & Oluwaseun, 2020).

Studies such as Duodu and Baidoo, 2022, Ofierohor et al. (2022), Oloke et al. (2022) have conceptualized two key types of external financial flows that contribute to economic growth and development. Similarly, Debbiche (2020) examined the specific role of external flows in promoting economic growth, while Oloke et al. (2022) investigated the impact of foreign direct investment and external debt on human capital development in Nigeria. However, these and other related studies have yet to comprehensively address the full spectrum of external financial flows—namely, foreign direct investment, foreign aid, external debt, remittances, and net exports—in relation to economic growth and sustainability. To attract and effectively utilize external financial flows, sound and stable macroeconomic policies are essential. These policies enhance both the microeconomic and macroeconomic impacts of external inflows, thereby fostering economic growth (Nwosa & Akinbobola, 2016). In particular, the use of expansionary fiscal policy—characterized by increased government expenditure on social infrastructure such as education and healthcare—and the efficient management of tax revenue are critical to promoting economic sustainability (Tan et al., 2020; Maku & Alimi, 2018; Mazzanti et al., 2020).

Furthermore, attaining economic sustainability requires identifying and leveraging financial resources from both external and internal sources. Internally, fiscal policy serves as a key macro-economic tool, while externally, cross-border financial flows—including foreign direct investment, foreign aid, external debt, remittances, and net exports—play a crucial role. These external channels not only drive progress toward economic sustainability, especially in developing countries, but also support fiscal policy measures such as public spending and revenue generation. Their strategic alignment is essential for achieving the Sustainable Development Goals (SDGs) by 2030 (Adejumo, 2019; Adeosun et al., 2021; Aliedan, 2021).

Nigeria as one of the leading developing countries in Africa, has significantly benefitted from various forms of external financial flows including foreign direct investment (FDI), foreign portfolio investment (FPI), remittances, and external debt (Central Bank of Nigeria [CBN], 2017; National Bureau of Statistics [NBS], 2017; United Nations Conference on Trade and Development [UNCTAD], 2015). Despite the global economic disruptions caused by the COVID-19 pandemic, FDI in Nigeria rose from

\$2.3 billion between 2020 and 2023. Similarly, FPI increased from \$385 million in 2020 to \$407 million in 2021, reaching a substantial level of \$974.1 million by the end of 2021 (CBN, 2021). In terms of foreign aid, Nigeria experienced a notable increase of \$3.3 billion between 2016 and 2017. In West Africa, Nigeria is the second-highest earner of foreign exchange after oil revenue (Wm et al., 2022; Zafar et al., 2022). Globally, Nigeria ranks as the fifth-largest recipient of remittances by value (World Bank, 2020). Remittances inflows to Nigeria have increased from \$25.08 billion in 2018 to \$23.81 billion in 2019, \$24.71 billion in 2020, and \$28.17 billion in 2021, with a continued upward trend driven by growing migration from developing to developed countries (Okeke, 2021; Egbulonu & Chukuezi, 2019).

Theoretically, the neo-classical and endogenous growth theories serve as a solid foundation for understanding the role of external financial flows in driving economic growth (Solow, 1957; Romer 1990). These financial channels, when complemented by internally driven expansionary fiscal policy measures, can act as catalysts for economic growth and sustainability. Leveraging such financial options can address persistent challenges faced by developing countries like Nigeria, including the savings-investment gap and foreign exchange shortfall. Given Nigeria's ongoing struggles with dwindling public revenue, rising debt burdens, persistent budget and trade deficits, and overall macro-economic instability (Omoyele et al., 2021; Liu et al., 2022; Okafor et al., 2016; Akanyo & Ajie, 2015; Debasish, 2013) it becomes imperative to examine the combined effects of external financial flows and fiscal policy on achieving economic sustainability. This is particularly crucial in light of the 2030 timeline for reviewing and scoring progress toward Sustainable Development Goals (SDGs).

THEORETICAL FRAMEWORK

Solow Growth Hypothesis

The Solow Growth Hypothesis is an economic model rooted in the neoclassical school of thought. The model illustrates the dynamic relationship between capital accumulation, labour productivity, and technological progress as key drivers of economic growth (Snowdown & Howard, 2005). As a foundational model in neoclassical economics, it emphasizes how long-term economic growth is determined not just by increases in capital and labour, but also by technological advancement. The production function in the Solow model is expressed as:

$$Y_t = K_t^a A_t L^{(1-a)} t \dots \dots \dots (1.0)$$

Where Y_t represents the income level, K_t denotes the level of physical capital, L_t is the labour input, A_t refers to the level of knowledge or technological progress, a is the output elasticity of demand. This theory underscores the importance of capital accumulation, labor productivity (often linked to population growth), and technological advancement as key determinants of national income. An extended version of the Solow model incorporates human capital—measured through education and health quality—as an essential factor in driving economic growth. The refined model distinguishes between human capital and physical capital. Recognizing the vital role of human capital in economic development, this extension of the Solow model modifies the production function as follows:

$$Y_t = K_t^\beta H_t^\beta A_t L^{(1-a-\beta)} t \dots \dots \dots (1.1)$$

This theory serves as the foundational framework for examining the economic and social pillars of SDGs in Nigeria. The concept of capital accumulation within the model reflects the role of financial flows—particularly external capital—in alleviating the country’s persistent savings and investment gap. Moreover, labor productivity and human capital—key components of the Solow model—are directly linked with the economic dimension of the SDGs. The model illustrates that sustained income growth has a potential spill-over effect on addressing critical social challenges such as poverty, low education attainment, and inadequate health infrastructure and well-being. Importantly, the theory emphasizes a reciprocal relationship: resolving these social issues can, in turn, enhance human capital and labour productivity, thereby improving the overall income level and fostering a cycle of inclusive economic growth and sustainable development.

REVIEW OF LITERATURE

External Financial Flows and Economic Sustainability in Nigeria

Empirical studies by Duodu and Baidoo (2022), Ofierohor et al. (2022), Oloke et al. (2022), Qwader (2021), and Debbiche (2020) reveal both similarities and differences in their investigation of the impact of external financial flows on economic sustainability, particularly in developing economies such as Nigeria, Jordan, and the Gulf Cooperation Council (GCC) countries. These studies consistently emphasize the significance of foreign capital inflows—including FDI, remittances, FPI, and foreign aid—as critical factors influencing economic outcomes. In most cases, these financial flows serve as key independent variables in models that assess either economic growth or development. The studies frequently employ advanced econometric techniques such as the Autoregressive Distributed Lag (ARDL) model, Error Correction Model (ECM), and Johansen Co-integration Test. These methodologies are well-suited for analyzing both long-run and short-run relationships using secondary time-series data. Data sources typically include internationally recognized institutions such as the World Development Indicators and United Nations Conference on Trade and Development (UNCTAD). A recurring theme across these studies is the inconclusive or even negative impact of FDI on economic growth or development. Specifically, Duodu and Baidoo (2022), Ofierohor et al. (2022), and Oloke et al. (2022) report that FDI exerts either a negative or statistically insignificant influence on economic performance. Similarly, Qwader (2021) and Debbiche (2020) find limited or negligible impact of FDI within their respective national contexts. In contrast, other forms of financial inflows—particularly remittances and FPIs—tend to show more positive results. Remittances, in particular, is frequently identified as having a positive impact on economic outcomes. This is evident in the findings of Duodu and Baidoo (2022), Ofierohor et al. (2022), and Qwader (2021), underscoring the role of remittances as a stable and growth-enhancing financial inflow in developing countries. Overall, these studies focus primarily on economic growth and development, reinforcing the assumption that external financial flows—especially FDI and remittances—are critical drivers of economic performance, often measured through indicators such as GDP, per capita income, and other macroeconomic indicators.

Inclusively, while Duodu and Baidoo (2022) and Ofierohor et al. (2022) examine a broad range of financial flows—including FDI, FPI, remittances, and external debt—other studies, such as Qwader (2021) and Debbiche (2020), adopt a more limited scope, focusing primarily on FDI, remittances, or foreign grants. Notably, Qwader (2021) does not encompass the full range of international financial flows, which may have constrained the generalizability of the study’s findings. Although most of the reviewed literature centers on economic growth, Oloke et al. (2022) extends the analysis by incorporating human capital development as a key element of sustainable development. Their findings

highlight a negative relationship between trade openness, FDI, FPI, and human capital development—suggesting that not all external financial inflows are beneficial to broader development goals. This emphasis on human capital signals a shift from traditional economic growth metrics toward a more inclusive approach to economic sustainability. The reviewed studies also vary in their theoretical foundations. While Duodu and Baidoo (2022) do not explicitly ground the analysis in a formal theoretical framework, Ofierohor et al. (2022) draws upon the Two-Gap and Three-Gap models to justify the role of external financial flows in development. In contrast, Oloke et al. (2022) applies both the Solow and endogenous growth theories to explain the link between foreign capital inflows and human capital development. The absence of a defined theoretical framework in Qwader (2021) limits the depth and analytical rigor of the study compared to others in the field. Geographic context further differentiates these studies. While Duodu and Baidoo (2022), Ofierohor et al. (2022), and Oloke et al. (2022) focus on Nigeria, Qwader (2021) and Debbiche (2020) examine Jordan and the GCC countries, respectively. These regional differences help explain the divergence in empirical findings. For instance, remittances have a positive impact on economic growth in Nigeria, but in Jordan, their effect is negatively significant. Some studies, such as Ofierohor et al. (2022) and Qwader (2021), distinguish between long-run and short-run effects of financial flows, thereby revealing dynamics impacts over time. In contrast, others, like Debbiche (2020), limit their analysis to short-term outcomes and do not disaggregate financial flows such as FDI and FPI, which restricts the depth of policy-relevant insights.

Fiscal Policy and Economic Sustainability in Nigeria

Several studies—including Stawska and Miszczynska, (2022), Gizaw (2022), Samsuddin (2020), Dauti (2021), Adeosun et al. (2021), Tonade et al. (2021), Al-Masaeed, and Tsaregorodtsev (2018) and Osuka and Okere (2020)—have examined the impact of fiscal and/or monetary policies on economic growth and sustainability. Across diverse contexts such as Europe, Ethiopia, and Nigeria, fiscal policy consistently emerges as a central theme in assessing economic performance, debt management, and public finance. These studies often employ advanced econometric techniques such as including ARDL model, panel data analysis, and Johansen Co-integration tests to explore both long-run and short-run relationships between fiscal policy measures and economic growth. These methods enable robust and dynamic analysis of fiscal impacts. The majority of the studies, notably Stawska and Miszczynska (2022) and Gizaw (2022), are grounded in well-established macroeconomic theories such as exogenous and endogenous growth theories and the IS-LM model. Similarly, Tonade et al. (2021) draw upon Keynesian and Monetarist frameworks, reinforcing the consistency of using theoretical models to interpret fiscal and monetary policy dynamics. A key finding across studies—particularly Gizaw (2022), Adeosun et al. (2021), and Tonade et al. (2021)—is that fiscal policy tends to have a more substantial long-term impact on economic growth compared to monetary policy. Government spending and effective debt management are identified as critical levers for driving sustainable economic growth. Furthermore, studies like Dauti (2021) and Adeosun et al. (2021) underscore the growing challenges of debt management, advocating for fiscal consolidation to achieve a stable and sustainable fiscal balance. This concern is especially pertinent in regions like the European Union and Nigeria, where rising public debt complicates the pursuit of long-term economic sustainability.

However, while Stawska and Miszczynska (2022) and Dauti (2021) focus on the European Union, Gizaw (2022) centres on Ethiopia, and Adeosun et al. (2021) and Tonade et al. (2021) examine Nigeria's fiscal policies. These geographic distinctions result in differences in fiscal policy implementation, economic challenges, and policy recommendations. For example, studies from the European Union emphasize fiscal coordination across member states, whereas the Nigerian studies focus more on domestic debt and fiscal sustainability within local economic contexts. Each study employs distinct

variables to measure the impact of fiscal and monetary policies. Stawska and Miszczyńska (2022) emphasize indicators such as GDP per capita growth, government deficits, and research and development expenditure. In contrast, Gizaw (2022) adopts broader macroeconomic indicators, including labour, capital, and government final consumption expenditure, to reflect a wider set of growth determinants in Ethiopia. Tonade et al. (2021), meanwhile, focus on domestic and external debt, non-oil revenue, and the consumer price index, offering a more targeted examination of debt financing in Nigeria. The studies' recommendations and conclusions vary based on their unique empirical findings. For instance, Gizaw (2022) concludes that fiscal policy has a more significant long-term impact on economic growth in Ethiopia, although both fiscal and monetary policies play important roles in the short run. Adeosun et al. (2021) highlight the issue of policy asymmetries and fiscal instability in Nigeria, advocating for strategic shifts in fiscal policies to manage public debt effectively. Dauti (2021) calls for fiscal consolidation in the European Union to manage expenditure pressures due to debt accumulation. Tonade et al. (2021) and Adeosun et al. (2021) underscore the importance of capital expenditure in driving growth in Nigeria, linking it to development financing, non-oil revenue, and domestic debt management. This focus on capital expenditure contrasts with studies on the European Union, which tend to emphasize fiscal sustainability through metrics like GDP growth and budget deficits or surpluses. Additionally, Gizaw (2022) critiques the limited consideration of environmental and social growth indicators in most fiscal policy studies, stressing the importance of aligning fiscal and monetary policies within broader sustainable development goals. While Stawska and Miszczyńska (2022) focus solely on GDP growth, Gizaw (2022) recommends that future research adopt a more holistic approach by incorporating broader development metrics, reflecting the evolving landscape of fiscal policy analysis.

METHODOLOGY

This inquiry is anchored in the Solow Growth Hypothesis which approaches economic growth and output from a neoclassical perspective. This theory extended the Harrod-Domar model by incorporating the concepts of technology and labour, which, in the Solow model, are assumed to be determined exogenously and independently.

The Solow Growth Hypothesis focuses on the overall output of the economy and examines how factors beyond the financial environment contributes to output and income level. This theoretical foundation is particularly relevant to the present inquiry, which explores how factors like external financial flows and fiscal policy influence economic output—factors that serve as important drivers within Solow's aggregate output framework. External financial flows can significantly enhance capital accumulation, which the Solow model classifies as physical capital, thereby contributing to economic growth. In addition, fiscal policy—particularly in its expansionary form, such as government expenditure on education, health and the mobilization of tax revenue—can increase the volume of capital accumulation in the economy. When combined with external financial flows, these policies can help bridge the investment gap caused by insufficient domestic savings (Beck et al., 1999; Debasish, 2013).

The production function of the model can be expressed as:

$$Y(t) = K(t)^\beta [A(t)L(t)]^{1-\beta} \quad (3.1)$$

Following the classification of capital into human capital and physical capital by Beck et al. (1999), physical capital is recognized as a key determinant of output and economic growth.

Building on the preceding discussion, the theoretical foundation for incorporating external financial flows (both market and non-market) and expansionary fiscal policy into the analysis is based on an extended Solow growth model. This model includes financial flows and government expenditure on education and health. It is expressed as follows:

$$Y(t) = F[K_F(t), G(t), A(t)L(t)] = K_F(t)^\alpha G(t)^\beta (A(t)L(t))^{1-\alpha-\beta} \quad (3.2)$$

Where $\alpha + \beta < 1$

K_F represents the stock of physical capital derived from external financial flows (both market-based and non-market flows). $G(t)^\beta$ represents government expenditure, particularly in education, health and tax revenue. Equation (3.2) extends the traditional Solow model by incorporating external financial flows and fiscal expenditures as drivers of economic output. It shows how the aggregate level of output is determined by a combination of capital (including external inflows), government spending, labour and technology. With reference to equation (3.2), the structural relationship between external financial flows and fiscal policy can be expressed in a simplified functional form as:

$$Y_t = f(a_t X_t Q_t) \quad \dots (3.3)$$

Where Y_t represents economic output at time t , X_t represents the external financial flows variable, Q_t includes fiscal policy indicators—namely, government expenditure on health, education and tax revenue and a_t captures the parameters of interest at time t . Equation (3.4) can be expressed in explicit form as:

$$Y_i = \gamma_t + a_t X_t + a_t Q_t \quad \dots (3.4)$$

By including a white noise term, the equation (3.4) can be rewritten in its econometric form as:

$$Y_i = \gamma_t + a_t X_t + a_t Q_t + \mu \quad \dots (3.5)$$

Where; X_t and Q_t are defined earlier based on the conceptual and theoretical inquiry of the literature. μ represents the white noise, a_t refers to the parameters of interest, γ_t is the intercept and t denotes the time dimension.

The secondary data were sourced from the World Development Index and the Central Bank of Nigeria's Statistical Bulletin (2022). Economic sustainability was measured using GDP per capita income. External financial flows were captured through indicators such as FDI, remittances, foreign aid, external debt and net exports. Internal financial flows were measured using government expenditure on health, government expenditure on education, and tax revenue. The ARDL model was employed for inference, following stationary tests that validated the model's applicability, thereby avoiding violations of the Engel-Granger (1987).

Linear Representation

$$GDPPer_t = (\beta_0 + \beta_1 FDI_t + \beta_2 FA + \beta_3 Rem_t + \beta_4 NetE + \beta_5 ExtD_t + \beta_6 GEE + \beta_7 GEH_t + \beta_8 TAXR_t + \varepsilon_t)$$

The short-run (error-correction model) model and the long-run model (co-integration model) of the ARDL model equation is expressed as follows:

$$\begin{aligned} \Delta LGDPer_t = & \rho Q_{t-1} + \sum_{i=1}^q \alpha_{1i} \Delta LCo_{2t-i} + \sum_{i=0}^q \alpha_{2i} \Delta LFDI_{t-i} + \sum_{i=0}^q \alpha_{3i} \Delta LFA_{t-i} \\ & + \sum_{i=0}^q \alpha_{4i} \Delta LRem_{t-i} + \sum_{i=0}^q \alpha_{5i} \Delta LNetE_{t-i} + \sum_{i=0}^q \alpha_{6i} \Delta LExtD_{t-i} \\ & + \sum_{i=0}^q \alpha_{7i} \Delta LGEE_{t-i} + \sum_{i=0}^q \alpha_{8i} \Delta LGEH_{t-i} + \sum_{i=0}^q \alpha_{9i} \Delta LTAXR_{t-i} + \beta_1 LFDI_{t-1} \\ & + \beta_2 LFA_{t-1} + \beta_3 LRem_{t-1} + \beta_4 LNetE_{t-1} + \beta_5 LExtD_{t-1} + \beta_6 LGEE_{t-1} \\ & + \beta_7 LGEH_{t-1} + \beta_8 LTAXR_{t-1} + \varepsilon_t \end{aligned} \tag{1.1}$$

The short-run model (Error-correction model):

$$\begin{aligned} \Delta LGDPer_t = & \rho Q_{t-1} + \sum_{i=1}^q \alpha_{1i} \Delta LCo_{2t-i} + \sum_{i=0}^q \alpha_{2i} \Delta LFDI_{t-i} + \sum_{i=0}^q \alpha_{3i} \Delta LFA_{t-i} \\ & + \sum_{i=0}^q \alpha_{4i} \Delta LRem_{t-i} + \sum_{i=0}^q \alpha_{5i} \Delta LNetE_{t-i} + \sum_{i=0}^q \alpha_{6i} \Delta LExtD_{t-i} \\ & + \sum_{i=0}^q \alpha_{7i} \Delta LGEE_{t-i} + \sum_{i=0}^q \alpha_{8i} \Delta LGEH_{t-i} + \sum_{i=0}^q \alpha_{9i} \Delta LTAXR_{t-i} + \varepsilon_t \end{aligned} \tag{1.2}$$

Where:

GDPper stands for GDP per capita income, FDI represents foreign direct investment, FA refers to foreign aid, Rem represents remittances, NetE refers to net export, ExtD stands for external debt, GEE refers to government expenditure on education, GEH stands for government expenditure on health and TAXR represents tax revenue. ρQ_{t-1} is the lagged error correction term for equation 1.1-1.2; $\alpha_1 - \alpha_8$ are the short-run coefficients; $\beta_1 - \beta_7$ is the long-run parameter for the explanatory variables; t is the period in the inquiry; ε_t is the error term.

Table 1

Description of Variables

S/N	Description	Unit	Source
1	Foreign Direct Investment (FDI)	₹ Billion	CBN Statistical Bulletin
2	Foreign Aid (FA)	US Dollars (converted to naira)	(2022) and World Development Indicators
3	Remittances (Rem)	US Dollars (converted to naira)	(2022)
4	External Debt (ExtD)	US Dollars (converted to naira)	
5	Net Export (NetE)	US Dollars (converted to naira)	

(continued)

S/N	Description	Unit	Source
6	Government Expenditure on Health (GEE)	RM' Billion	
7	Government Expenditure on Education (GEH)	RM' Billion	
8	Tax revenue (TAXR)	RM' Billion	
9	GDP per capita Income	RM' Billion (real terms)	

Author's Compilation, 2024

RESULTS AND DISCUSSION

Table 2

Descriptive Analysis

	GDPper	EXT_DEBT	FDI	FOR_AID	GEE	GEH	NET_EXPT	REMIT	TAXR
Mean	3.014178	3.281089	3.483937	8.994511	2.160876	1.957320	6.628978	3.661185	2.912723
Median	2.996838	3.212587	3.546409	9.257645	2.137101	2.010938	6.919588	3.998536	3.101953
Maximum	3.505279	4.534918	4.593828	10.05812	2.596487	2.507382	7.299083	8.333830	3.824655
Minimum	2.431408	2.642356	2.155943	8.181815	1.600755	1.350319	5.313048	0.118105	1.620328
Std. Dev.	0.342640	0.530335	0.657173	0.577609	0.342817	0.387844	0.616041	2.252081	0.645785
Skewness	-0.044867	0.630027	-0.405812	-0.126114	0.072610	-0.211088	-0.853167	0.063689	-0.560416
Kurtosis	1.424412	2.447183	2.371540	1.540015	1.342765	1.519025	2.563353	1.885666	2.128239
Jarque-Bera	3.216933	2.445565	1.361025	2.835434	3.574708	3.063212	4.007054	1.624871	2.604297
Probability	0.200194	0.294410	0.506357	0.242266	0.167403	0.216188	0.134859	0.443776	0.271947
Sum	93.43951	101.7138	108.0021	278.8298	66.98715	60.67692	205.4983	113.4967	90.29442
Sum Sq. Dev.	3.522074	8.437666	12.95629	10.00897	3.525710	4.512684	11.38519	152.1560	12.51115

Note. GDP per (GDP per capita income), FDI (Foreign direct investment), FA (Foreign aid), EXTD (External debt), REM (Remittances), NetE (Net export), GEE (Government expenditure on education), GEH (Government expenditure on health) and TAXR (Tax revenue).

Table 2 presents the descriptive statistics used in the study. GDP per capita income has a mean value of 3.01%, a median value of 2.99%, and a standard deviation of 0.34, indicating low variability. FDI shows a mean of 3.48%, a median of 3.54%, and a standard deviation of 0.65. Foreign aid records a mean of 8.99%, a median of 9.25%, and a standard deviation of 0.57. Remittances have a mean of 3.66%, a median of 2.99%, and a relatively higher standard deviation of 2.25, suggesting greater fluctuation.

External debt has a mean of 3.28%, a median of 3.21%, and a standard deviation of 0.53. Net exports register a mean of 6.62%, a median of 6.91%, and a standard deviation of 0.61. Government expenditure on health has a mean of 1.95%, a median of 2.01%, and a standard deviation of a variation of 0.42. Government expenditure on education shows a mean of 2.05%, a median of 0.38%, and a standard deviation of 0.34. Tax revenue has a mean of 2.91%, a median of 3.10%, and a standard deviation of 0.64. The descriptive statistics reveal key insights into Nigeria's economic indicators. The close alignment between mean and median values for GDP per capita and FDI indicates steady but modest growth, while the relatively low standard deviations suggest limited volatility across most variables.

The skewness of the variables is as follows: GDP per capita income exhibits a short-tailed distribution with negative skewness at -0.04, indicating a slight concentration of values above the mean. FDI also shows negative skewness at -0.40, suggesting lower-than-average FDI values are more frequent. Similarly, foreign aid presents a mild negative skewness of -0.12. Remittances display a long-tailed distribution with positive skewness at 0.06, indicating occasional high values and reflecting significant volatility in personal transfers. External debt has a more pronounced positive skewness at 0.63, implying sporadic surges in debt levels, which may signal periods of increased borrowing. Net export, despite being described as short-tailed, actually shows negative skewness at -0.85. Government expenditure on health reveals a slight negative skewness at -0.21, while government expenditure on education is positively skewed at 0.07, indicating occasional higher spending levels. Overall, the skewness patterns suggest that lower-than-average values are more common in GDP per capita and FDI, while external debt and remittances exhibit variability due to sporadic high values.

The kurtosis values of the variables are as follows: GDP per capita income shows a platykurtic distribution with a kurtosis of 1.42, as it is less than 3. FDI is also platykurtic at 2.37, as are foreign aid (1.54), remittances (1.88), external debt (2.44), net export (2.56), government expenditure on health (1.51), government expenditure on education (1.34), and tax revenue (2.12). Since all the values are below 3, these distributions are classified as platykurtic rather than leptokurtic. This indicates that the variables have flatter distributions with lighter tails compared to the normal distribution, suggesting that extreme deviations from the mean are less frequent. Such results suggest general stability in the variables, particularly for GDP per capita, FDI, and tax revenue. However, the flatter distributions of remittances and external debt still call for careful monitoring due to their potential for occasional volatility.

Table 3

Correlation Matrix

	GDPper	NET_EXP	GEH	GEE	FOR_AID	FDI	EX_DEBT	REMI	TAXR
GDPper	1.000000								
Net_Export	-0.367239	1.000000							
GEH	-0.456215	0.668813	1.000000						
GEE	-0.772439	0.670670	0.616078	1.000000					
Foreign_Aid	0.289270	0.638019	0.688810	0.652149	1.000000				
FDI	-0.998311	0.683226	0.670475	0.685242	0.618368	1.000000			
External_Debt	-0.489366	0.724541	0.603118	0.646547	0.541298	0.642482	1.000000		
Remittances	-0.299923	0.601788	0.601117	0.715019	0.602570	0.769184	0.440442	1.000000	
TAXR	0.33752	0.652798	0.689127	0.799851	0.633372	0.981283	0.889142	0.783942	1.00000

The correlation matrix presented above is used to assess the presence of multicollinearity among the dependent and explanatory variables. A multicollinearity threshold of 0.90 is considered high and could result in spurious estimations if applied in an ordinary least squares (OLS) regression. However, the correlation coefficients among the variables in this study are all below the 0.90 threshold, indicating that multicollinearity is not a concern. The results reveal that net exports, FDI, external debt and remittances exhibit a negative correlation with GDP per capita in Nigeria. This suggests potential inefficiencies in trade, a dependence on unsustainable foreign borrowing, and limited effectiveness of FDI in promoting inclusive economic growth. These findings underscore the need for export diversification, prudent external debt management, and more strategic use of foreign investments. In contrast, the positive correlation of foreign aid and tax revenue with GDP per capita highlights the importance of strengthening domestic revenue generation and leveraging external financial assistance to support national development. Accordingly, policy interventions should focus on reducing reliance on external debt and fostering a sustainable, locally-driven economic growth model.

Table 4

Unit Root Analysis

Variable	Level T-Stat	Critical Value @ 5%	First Difference T-stat	Critical Value @ 5%	Prob	Order of Integration
GDPper	-3.0783	-3.7777	-5.52045	-3.57424	0.0007	I(1)
FDI	-1.8819	-3.56837	-----	-----	0.0013	I(0)
FA	-2.34611	-3.5875	-5.3015	-3.5806	0.0010	I(1)
REM	-2.6000	-3.5683	-----	-----	0.0000	I(0)
EXTD	-1.50601	-3.5742	-3.7468	-3.5742	0.0349	I(1)
NEtE	-1.7390	-3.5683	-5.5735	-3.5742	0.0005	I(1)
GEE	-2.6623	-3.5683	-5.8412	-3.5742	0.0002	I(1)
GEH	-1.9051	-3.5683	-6.4024	-3.5742	0.0001	I(1)
TAXR	-2.6193	-3.5683	-3.0369	-4.4407	0.0451	I(1)

The Augmented Dickey-Fuller unit root test, a pre-estimation procedure, is used to determine the appropriate econometric technique for analyzing the relationship between the dependent and explanatory variables in the model. The results indicate that FDI and Remittances are stationary at level, i.e., integrated of order zero, I(0). In contrast, GDP per capita income, foreign aid, external debt, net export, government expenditure on education, government expenditure on health and tax revenue are stationary at first difference, i.e., integrated of order one, I(1). Given the mixed order of integration among the variables, the ARDL model is deemed the most appropriate estimation technique. Employing the ARDL approach ensures methodological validity and avoids the pitfall of spurious interference, thereby aligning with the caution highlighted by Granger (1957) regarding improper use of non-stationary data in econometric analysis.

Table 5

Lag Length Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11.35233	NA	6.88e-12	-0.162230	0.262104	-0.029334
1	202.8915	250.9824	4.38e-15	-7.785623	-3.542291	-6.456664
2	425.3745	153.4365*	1.99e-18*	17.54307*	9.480738*	-15.01805*

The results of the ARDL model, including both short-run and long-run estimates, were analyzed and interpreted. The Akaike Information Criterion (AIC) was employed to determine the optimal lag length by balancing model fit and complexity. The AIC penalizes the inclusion of excessive parameters, thereby helping to prevent over-fitting. Among the lag structures considered, the AIC value at lag 2 (-17.54307) was the lowest, indicating the most appropriate model specification. According to the AIC minimization principle, the model with the smallest AIC value is preferred, as it offers the best trade-off between explanatory power and simplicity. Therefore, selecting a lag length of two ensures a more reliable estimation of both short-run and long-run estimations within the ARDL framework, while maintaining model parsimony.

Table 6

ARDL Bound Test

The Bound test is a pre-estimation procedure used to determine whether a long-run co-integration relationship exists between the outcome and explanatory variables.

t-statistics	Value	K	I(0)	I(1)
F-statistics	7.809755	8	3.39	2.22

The F-statistics value is 7.809755 exceeds both the lower bound (I(0) = 2.22) and the upper bound (I(1) = 3.39) at the 5% level of significance. Since the calculated F-value is greater than the upper bound critical value, it confirms the presence of a long-run co-integration relationship between the dependent variable and the explanatory variables.

Table 7

Co-integration Form

Variable	Coefficient	Std-Error	t-Statistic	Prob
D(EXTERNAL_DEBT)	-0.038751	0.027123	-1.428690	0.1685
D(FDI)	0.103213	0.064556	1.598814	0.1255
D(FOREIGN_AID)	-0.104046	0.064547	-1.611936	0.1226
D(GEE)	0.126824	0.117049	1.083509	0.2915
D(GEH)	0.246519	0.088810	2.775791	0.0117
D(TAXR)	0.175584	0.078172	2.246133	0.0362
D(NET_EXPORT)	-0.263544	0.087180	-3.023007	0.0067
D(REMITTANCES)	0.035442	0.012627	2.806805	0.0109
ECM(-1)	-0.445310	0.114372	-3.893520	0.0009

Table 7 presents the short-run relationship between external financial flows, fiscal policy and economic sustainability in Nigeria. The results indicate that the error correction term (ECM), represented by the cointegration factor at lagged level [ECM (-1)], is negative and statistically significant, with a coefficient of -1.445310. The model adjusts rapidly toward equilibrium following short-run shocks, with about 44% of the disequilibrium corrected within the first year.

Table 8

Long-run Coefficients

Variable	Coefficient	Std-Error	t-Statistic	Prob
EXTERNAL_DEBT	-0.087020	0.066421	-1.310128	0.2050
FDI	0.231779	0.150573	1.539312	0.0394
FOREIGN_AID	-0.233649	0.149175	-1.566274	0.1330
GEE	0.284798	0.215071	1.324207	0.2004
GEH	0.553589	0.218169	2.537433	0.0196
TAXR	0.394296	0.183606	2.147508	0.0442
NET_EXPORT	-0.591822	0.212918	-2.779578	0.0116
REMITTANCES	0.079588	0.031257	2.546255	0.0192
C	5.403775	1.401694	3.855175	0.0010

The long-run coefficients reveal the following relationships between external financial flows, fiscal policy variables, and GDP per capita income. External debt has a negative but statistically insignificant effect on GDP per capita, indicating that a 1% increase in external debt leads to a 0.08 unit decrease in GDP per capita income. FDI exerts a positive and significant effect, where a unit increase in FDI results in a 0.23 unit increase in GDP per capita. In contrast, foreign aid has a negative but insignificant effect, suggesting that a unit increase in foreign aid is associated with a 0.23 unit decline in GDP per capita. Net exports show a negative and significant relationship with GDP per capita, with a unit increase in net exports leading to a 0.59 unit decrease in GDP per capita income. Remittances, on the other hand, exhibit a positive and significant effect, where a unit increase corresponds to a 0.07 unit increase in GDP per capita. Government expenditure on education shows a positive but insignificant effect, contributing to a 0.28 unit increase in GDP per capita. Similarly, government expenditure on health displays a positive and significant effect, with a unit increase resulting in a 0.55 unit rise in GDP per capita. Tax revenue also has a positive and significant impact, where a unit increase in tax revenue leads to a 0.39 unit increase in GDP per capita. These findings are in line with the Solow growth model, which emphasizes that sustainable economic growth can only be attained through a combination of capital accumulation, technological progress and labour productivity.

The positive and significant impact of foreign direct investment (FDI) and remittances on GDP per capita support the Solow model’s proposition that capital inflows and external financial resources contribute to capital accumulation and economic development. Similarly, the positive and significant impact of government expenditure on health, along with the positive though statistically insignificant effect of education spending, aligns with the extended Solow model, which incorporates human capital—through health and education—as a vital determinant of economic growth. Conversely, the negative effects of external debt and net exports contradict the Solow’s model expectation that increased capital should enhance growth. These findings suggest inefficiencies in the use of external debt and suboptimal trade dynamics that undermine long-term development. This deviation from theoretical expectations highlights underlying structural challenges in Nigeria’s debt management and trade policy

frameworks. Additionally, the negative, albeit insignificant, impact of foreign aid also questions the Solow model’s assumption that external financial support inherently boosts productivity, suggesting that such aid may not be effectively channeled into productive investments.

The findings are partially consistent with previous empirical studies. For instance, Duodu and Baidoo (2022) and Oloke et al. (2022) also found that FDI positively impacts economic growth, while external debt exerts a negative effect—corroborating this study’s long-run results. However, Ofierohor et al. (2022) reported that the impact of FDI on growth was statistically insignificant, which diverges from the significant positive effect identified in the present study. Similarly, the positive effect of remittances observed in this study aligns with Duodu and Baidoo (2022) but contrasts with Oloke et al. (2022), who found remittances to have an insignificant effect on human capital development. Overall, while the results generally support the capital-accumulation framework of the Solow Growth Theory and are in agreement with several empirical findings, the negative impact of external debt and trade underscores the urgency of implementing structural reforms in Nigeria's financial and trade sectors to promote sustainable economic growth.

Diagnostic Tests of Financial Flows and Sustainable Development in Nigeria

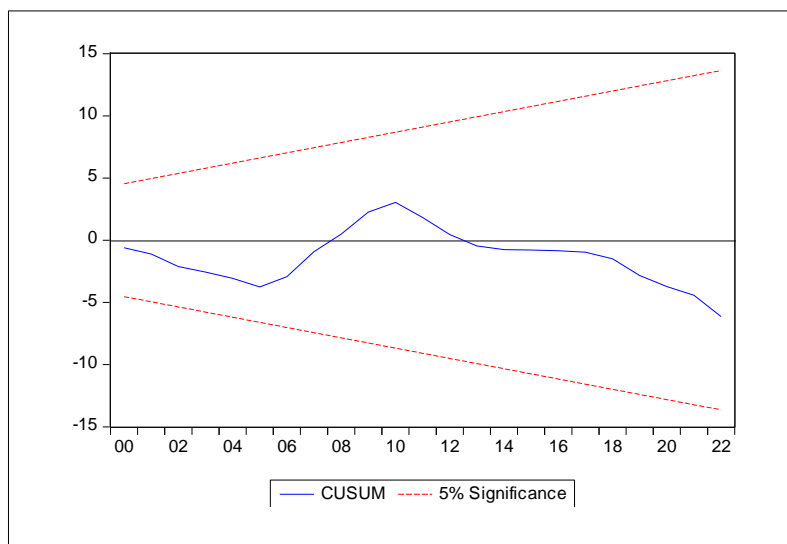
Table 9

Ramsey Resent Test and CUSUM Test

	Value	Probability
F-statistics	13.0086	0.9202
Likelihood	24.98577	0.8071

Figure 1

CUSUM Stability Test



The diagram above indicates that the model and internal parameters remain within the 5% level of significance critical bounds. This suggests that the model estimated is dynamically stable, thereby validating its reliability for policy recommendations.

CONCLUSION AND RECOMMENDATIONS

The findings reveal that foreign direct investment (FDI) and remittances have a positive effect on GDP per capita income. This suggests that creating a favourable business environment and offering attractive interest rates for foreign investors can enhance the overall GDP per capita. In the case of remittances, the inflow of funds from migrants in developed countries contributes significantly to improving the overall absorptive capacity of the economy, thereby supporting economic growth. Net exports show a negative and significant effect on economic growth. This indicates that the importation of intermediate goods and technology currently exceeds exports. However, if such imports are consistently geared toward productive purposes—such as enhancing technological capacity and industrial development—they could eventually contribute positively to economic growth. Government expenditure on health and tax revenue also demonstrates a positive significant impact on GDP per capita income. Investment in the health sector, including infrastructure development, improves the well-being and life-expectancy of the population. A healthier population can contribute more effectively to the overall economic capacity and productivity of the country. Similarly, improvements in tax revenue collection, through expanded channels and compliance, can enhance the government's capacity to fund development initiatives, thereby supporting long-term economic growth. Based on the above findings, the following recommendations are proposed: The government should foster a vibrant market and create a conducive business environment to attract and sustain foreign direct investment. Financial institutions and regulatory bodies should streamline the process for receiving remittances and reduce transaction costs to encourage higher inflows. Fiscal authorities should ensure efficient and transparent allocation of health care resources to sustain and improve population health, ultimately boosting economic productivity. The government must identify all taxable income sources and enforce strict penalties for tax evasion to improve revenue generation. The limitations of this study include its reliance on the ARDL technique, which, while robust, may not capture the full complexity of the relationship between the dependent and independent variables. Additionally, fiscal policy is a broad construct in development finance, and this study only captures it through government expenditure on education and health, which may not fully represent its multifaceted nature.

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