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Re-evaluating the Fiscal Deficit and Economic Growth Nexus in West Africa: New Evidence from ARDL-PMG Technique

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Abstract: Fiscal deficit and declining real GDP growth rate in West Africa are some of the fundamental challenges facing the region. This study examines the impact of fiscal deficit on economic growth in selected West African countries (Ghana, Gambia, Nigeria, Sierra Leone, Burkina Faso, Cote d'Ivoire, Senegal and Guinea-Bissau) from 1991 to 2022. Anchored on the Keynesian fiscal deficit and the endogenous growth theories, the study employs panel Autoregressive Distributed Lag Pooled Mean Group (ARDL-PMG) for the joint dynamic effects. The empirical results indicate that fiscal deficit exerts a positive, statistically significant joint impact on economic growth in the long-run; specifically, a 1 per cent point increase in the fiscal deficit-to-GDP ratio leads to a 0.43 per cent point increase in economic growth. Conversely, human capital development, investment, openness, foreign direct investment and exchange rates are insignificant in both the short run and long run. However, the outcome of the Fully Modified Ordinary Least Squares (FMOLS) robustness check validates the growth-enhancing role of most of the control variables, except foreign direct investment. The study concludes that since fiscal deficit can stimulate economic growth, it should be channelled to productive capital investments instead of recurrent expenditure. Hence, the study recommends the implementation of countercyclical fiscal policy, boosting domestic production for export and pursuing deficit-financing that aligns with ECOWAS convergence criteria.

Keywords: ARDL-PMG, Economic Growth, ECOWAS, Fiscal Deficit, West Africa

JEL Classification: H30, H68, O11, O47

1. Introduction

Sustainable fiscal deficit financing and enhancing inclusive growth are crucial for accomplishing the United Nations (UN) Sustainable Development Goals (SDGs) in developing countries, specifically SDGs 8 and 17 that seek to achieve decent work and economic growth, and partnerships for the goals. When a government operates a fiscal policy where projected expenditure exceeds estimated revenue, it presents a compelling reason to borrow domestically or externally to finance the budget. These concerns were tested in the aftermath of

the 2007 global financial crisis, which deepened worries of fiscal deficit sustainability around the globe. Adverse shocks from the meltdown created fiscal vulnerability characterised by high budget deficits and rising public debt in most developing countries (Nguyen, 2018). Consequently, most African countries have continued to depend on external debts and aid from multilateral institutions to augment the shortfall in their financial resources for developmental projects and plans. However, these external funds have only succeeded in providing short-term fiscal stimulus with a long-term debt crisis (Cosmas et al., 2022). According to Gyasi (2020), higher fiscal deficits are disconcerting because they divert resources meant for productive investment. When deficits persist, they result in substantial government debts, and their resultant servicing burden can become unsustainable and threaten economic growth.

The relationship between fiscal deficit and economic growth centres on the dangers of excessive domestic borrowing by the government, which can crowd out private-sector investments and push up the interest rate (Yusuf & Mohd, 2021, 2023). This deficit financing leads to more accumulation of debt and creates the fear that the government might settle for printing more money or seigniorage, thus resulting in an inflation tax (Coppola, 2021; Adewale, 2025). A high fiscal deficit results in higher lending interest rates in the money market, which might reduce domestic investment and economic growth. Additionally, it might increase risk premiums on interest rates, raising the inflation risk and default risk premium. All things being equal, high-interest rate risk premium might discourage domestic private investment, while a high fiscal deficit might signal a considerable tax burden in the future, which might prevent current aggregate expenditures and, therefore, private domestic investment (Kustepeli & Gulcan, 2004; Magehema, 2015). Thus, a sustained fiscal deficit can seriously affect national savings, which in turn reduces domestic or net foreign investment. In either case, the capital owned by individuals declined, which can reduce national income and economic welfare relative to periods of fiscal surplus.

For instance, following the 2008 to 2009 global financial crisis, a new wave of public debt accumulation began, with global debt reaching an all-time high of about 230 per cent of the global gross domestic product (GDP) in 2018 (World Bank, 2020). As a result, the fiscal situation in several West African economies worsened, raising concern about sustainability. In 2019, public debts in West African Economic and Monetary Union (WAEMU) countries such as Burkina Faso, Côte d'Ivoire and Senegal with strict fiscal convergence criteria stood at $6,802 million, $22,472 million and $14,880 million, with an increase of $4,360 million, $6,813 million and $10,052 million since 2009, respectively (International

Monetary Fund [IMF], 2019). This implies that their public debt in Burkina Faso and Senegal in 2019 reached 42.54 and 63.58 per cent of their respective GDPs in 2019, representing rises of 16.67 and 33.64 percentage points from that of 2009.

Similarly, English-speaking countries such as Gambia, Ghana, Nigeria and Sierra Leone with an independent monetary regime recorded debt stocks of $1,498 million, $42,853 million, $130,719 million and $2,952 million, respectively, in 2019. Subsequently, their debt-to-GDP ratios reached 82.97 per cent, 62.69 per cent, 29.17 per cent and 72.45 per cent in 2019, reflecting a percentage point rise of 44.1, 35.9, 21.05 and 24.4, respectively, from 2009 (IMF, 2019). Hence, implementing public expenditure in the region seemingly looks like accumulating more debts. However, the reasons for this accumulation vary; drivers include financing conflicts, investment in massive developmental projects, bank bailouts, government assumption of private sector debts, current expenditure financing, and emerging health challenges such as COVID-19 (Beecroft et al., 2015; Kararach et al., 2020). In addition, inefficient administration has impeded revenue collection, while the inability to curtail government expenditure has led to unnecessary debt accumulation beyond the government's ability to produce the surplus required (Kufa et al., 2003).

Fiscal expansion in West African countries between 2000 and 2019 has largely been dominated by a rising debt-to-GDP ratio (African Development Bank [AFDB], 2019). In 2019 alone, the West African region had a combined debt of $253,726 billion and a debt-to-GDP ratio of 36.53 per cent, just above the 35 per cent weak sustainability threshold (IMF, 2019). Similarly, fiscal deficit financing, one of the macroeconomic convergence criteria required to keep West African countries below the 3 per cent of GDP, was not tenable in most countries (AFDB, 2019). In 2018, the estimated real GDP growth for West Africa was 3.3 per cent, up from 2.7 per cent in 2017. However, this slow growth mirrored lower commodity prices and shrinking oil production in Nigeria, the region's largest economy. This growth contraction occasioned by the high debt-to-GDP ratio in Nigeria overshadowed the high growth in some smaller economies and pulled down the region's average (AFDB, 2019).

In addition to fiscal deficit, declining real GDP growth rate remains a fundamental developmental challenge in West Africa. Empirical studies have investigated the fiscal deficit-economic growth linkage using different methods and data frequencies; conclusions remain mixed using different indicators. Furthermore, few studies have examined this nexus within the panel Autoregressive Distributed Lag Pooled Mean Group (ARDL-PMG) techniques.

Given the possibility of endogeneity and the dynamic nature of macroeconomic indicators, deploying a dynamic panel modelling technique is necessary. This procedure is justified because cross-sectional dependence and homogeneous slope coefficients may be possible since the selected countries belong to one regional economic bloc (ECOWAS). In addition, extant literature often omits cross-sectional dependence and assumes uniform short-run coefficients across divergent economies. Thus, the purpose of this study is to examine the impact of fiscal deficit on economic growth in selected West African countries using the ARDL-PMG technique.

In addition to the introduction, Section 2 discusses the literature, Section 3 presents the methodology, while Section 4 is the analysis of results, Section 5 provides the discussion of findings and Section 6 concludes and recommends.

2. Literature Review

2.1. Theoretical Literature

To understand the impact of fiscal deficit on economic growth, the endogenous growth theory and Keynesian fiscal deficit theory were reviewed. The Theory emerged in the 1980s due to dissatisfaction with the idea that exogenous factors determine long-term economic growth. Kenneth J. Arrow developed the endogenous growth model, and Paul Romer overcame the challenges of the Solow-Swan model. This theory argues that economic growth can be influenced by internal factors like human capital, innovation and investment capital rather than uncontrollable external factors. Specifically, the approach emphasised that economic development relied on innovation and adequate investment in human capital. Thus, the theory advocated that the government and private institutions should nurture innovation initiatives and offer incentives to individuals to be more creative through research and development (R&D) funding and intellectual property protection. The central idea is that a knowledge-based economy with spillover effects from investment in technology leads to an increase in national output.

In addition, the Keynesian theory of fiscal deficit was propounded by Keynes in 1936 as one of the policies for the great depression through inducement to invest. Keynesian economists argued that some unemployed workers and individuals have limited access to credit in an economy. According to Eminer (2015), the Keynesian approach emphasised that deficits that arise from the budget impact the economy positively by increasing economic growth. This is because increased government spending on the fiscal deficit contributes to increased private consumption, aggregate demand and bank savings at a specified

interest rate, while assuming some economic resources are unemployed (Kanchori, 2020).

A fiscal deficit can increase capital investment and economic growth as national productivity rises. Thus, aggregate consumption is responsive to a shift in disposable income due to a large number of people who are constrained by liquidity. Kryeziu and Hoxha (2021) suggested that an attempt to reduce fiscal deficit might be counterproductive. Hence, deficits, apart from the fact that they raise interest rates, can also stimulate aggregate savings and investment. Keynesian economists also suggested that a fiscal deficit instigated by increased government expenditure to curb recession can impact economic growth (GDP) positively. This is because increased government spending has the potential to increase consumption and stimulate an economy out of recession (Eminer, 2015). Based on the theory, it is argued that an ambitious fiscal policy that leads to a budget deficit and increased public debt increases aggregate demand through a budget multiplier mechanism and infrastructural development and hence increases aggregate supply. Consequently, these combined effects stimulate economic growth. In formulating the theoretical basis of this study, the endogenous growth theory and Keynesian fiscal deficit theory guided the economic growth model. This study relied on the theories mentioned earlier to argue that improvement in fiscal deficit can stimulate economic growth and spur economic development.

2.2. Empirical Review

2.2.1. Fiscal deficit and economic growth

Oladipo and Ajisafe (2015) used the vector autoregressive model and data from 1980 to 2012 to examine the dynamic impact of budget deficits on economic growth in Nigeria. The results indicated that budget deficit negatively impacts economic growth in the short run but is positive in the long run. Similarly, budget deficit negatively impacts the consumption level proxied by real consumption expenditure per capita in the short run and positively in the long run. The study concluded that budget deficit stimulates economic development through economic growth. In Sri Lanka, Kesavarajah (2015) investigated the impact of fiscal deficit on economic growth using annual data from 1970 to 2015. The study employed the vector error correction model (VECM) and impulse response function (IRF) as estimation techniques. The result indicated a negative and significant relationship between fiscal deficit and economic growth.

Navaratnam and Mayandy (2016) investigated the causal relationship between fiscal deficit and economic growth in selected South Asian countries

(Bangladesh, India, Nepal and Sri Lanka) from 1980 to 2014. The study used a mixed-method cointegration test, an error correction model (ECM) and the Granger causality test under the VAR framework. The results indicated a negative relationship between fiscal deficit and economic growth, except for Nepal, which had a positive relationship. Similarly, the causality result was mixed, as fiscal deficit causes growth in Bangladesh, Nepal and Pakistan, but the opposite for India and Sri Lanka. Similarly, Aslam (2016) used the Johansen cointegration and vector error correction model (VECM) to examine the short- and long-run dynamic relationship between budget deficit and economic growth in Sri Lanka from 1959 to 2013. The results indicated a positive relationship between budget deficit and economic development. Nkrumah et al. (2016) examined the relationship between budget deficits and economic growth in Ghana. The study employed the ARDL technique and quarterly data from 2000 to 2015. The results showed that budget deficits negatively and significantly impact economic growth. In specific terms, a 100 per cent increase in the budget deficit, in the long run, would lead to a 3 per cent decrease in GDP.

Arjomand et al. (2016) investigated the effect of growth, efficiency and government budget deficit in selected MENA countries from 2000 to 2013. The study employed a random-effects panel estimation technique. The results indicated a positive relationship between budget deficit and economic growth. In Nigeria, Ogunmuyiwa and Maku (2016) investigated the impact of fiscal deficit on economic growth in Nigeria. The study used the classical ordinary least squares (OLS) technique and annual data from 1970 to 2012. The results revealed that fiscal deficit has a positive and significant impact on economic growth during the period under review. Owuru and Farayibi (2016) used the autoregressive distributed lag (ARDL) and error correction technique (ECM) to investigate the relationship between fiscal policy (proxied by government capital expenditure, government recurrent expenditure and budget deficit) and consumption rate in Nigeria from 1980 to 2011. The results indicated that capital expenditure does not reduce consumption, while recurrent expenditure does. Conversely, the budget deficit was found to increase the consumption rate.

Iqbal et al. (2017) used a smooth transition autoregressive model and annual data from 1972 to 2014 to empirically examine the relationship between fiscal deficit and economic growth in Pakistan. The results revealed a 5.57 per cent threshold level of fiscal deficit beyond which deficit hurts economic growth. Specifically, fiscal deficit negatively influenced economic growth because it spurs growth above the threshold level. Tung (2018) applied ordinary least squares (OLS) and error correction model (ECM) to quarterly data from 2003 to 2016

to examine the impact of fiscal deficit on economic growth in Vietnam. The empirical results indicated a cointegration relationship between fiscal deficit and economic growth wherein fiscal deficit hurts economic growth in the short and long run. Abdullah et al. (2018) investigated the impact of fiscal deficit, proxied by a budget deficit, on economic growth in Bangladesh. The study used data from 1975 to 1976 and 2014 to 2015 and employed the vector error correction model (VECM) estimation technique. The results indicated that a budget deficit positively affects economic growth in the long run without a short-run adjustment. Similarly, the budget deficit threshold was discovered to be between 4.55 and 5.0 per cent of GDP.

Onwioduokit and Uduakobong (2018) used the cointegration test using the ordinary least squares (OLS) and parsimonious error correction model (ECM) to examine the linkage between budget deficits and economic growth in Liberia from 1986 to 2016. The results indicated a significant positive relationship between budget deficit and economic growth. Aero and Ogundipe (2018) examined the fiscal deficit's impact on Nigeria's economic growth from 1981 to 2014. The study employed the vector error correction model (VECM) and the threshold regression (TAR) technique. The study found a significant negative relationship between fiscal deficit, financial depth and economic growth. Similarly, a threshold level of 5% was suggested to be conducive to economic growth at a lag of one year. Sharma and Mittal (2019) used a nonlinear autoregressive distributed lag (NARDL) to examine India's fiscal deficit-economic growth linkage from 1980 to 1981 and 2016 to 2017. The result revealed an asymmetric relationship between fiscal deficit and economic growth in the short and long runs.

In South Africa, Mavodyo (2020) examined the relationship between budget deficit and economic growth in South Africa using the dynamic ordinary least squares (DOLS) technique and data from 1980 to 2018. The result revealed that budget deficit stimulates growth within the period of study. The study concluded that budget deficit is growth-stimulating if it is the channel to export-oriented industrialisation to make South African firms more competitive, join global supply networks, transfer technology and overcome economic isolation. In Morocco, Gyasi (2020) investigated the impact of fiscal deficit on economic growth using annual data from 1990 to 2017. The autoregressive distributed lag (ARDL) bounds testing approach to cointegration was employed. The result revealed that fiscal deficit affects economic growth in the long run alone.

Awan et al. (2020) used the autoregressive distributed lag (ARDL) and error correction model (ECM) to investigate the relationship between fiscal deficit

and economic growth in Pakistan from 1990 to 2017. The results indicated no long-run relationship between fiscal deficit and economic development. The findings are in tandem with the neoclassical theory of deficit financing. Abubakar (2021) employed the fully modified ordinary least squares (FMOLS) and random effect technique with panel data from 1986 to 2020 to investigate the impact of deficit financing on economic growth in Sub-Saharan African countries (Cameroun, Kenya, Nigeria and South Africa). The results indicated that deficit financing positively and significantly impacted economic growth in the selected countries. Leshoro (2021) investigated the fiscal deficit-economic growth nexus in South Africa using quarterly data from 1996Q3 to 2021Q2. The study employed autoregressive distributed lag (ARDL) and threshold autoregressive (TAR) techniques. The findings indicated that the neoclassical proposition holds for South Africa since a higher budget deficit affects economic growth. It also revealed a -3.6 per cent threshold close to the 3 per cent healthy deficit level.

In Ethiopia, Emana (2021) applied the autoregressive distributed Lag (ARDL) bounds testing technique to investigate the nexus between budget deficit and economic growth using annual data from 1991 to 2019. The empirical results indicated that the relationship between budget deficit and economic growth is negative in the long run but weak and positive in the short run. Gllogjani and Balaj (2021) used fixed-effects and dynamic linear regression techniques to observe the effect of fiscal deficit on economic growth in southeastern Europe from 2005 to 2019. The results showed a significant positive impact of the transition economies' fiscal deficit on economic growth, thereby supporting the Keynesian theory of budget deficit. Umaru et al. (2021) used linear and non-linear techniques to investigate the relationship between budget deficit and economic growth in Nigeria from 1981 to 2019. The study employed the autoregressive distributed lag (ARDL) and threshold autoregressive (TAR) models. The ARDL results indicated that the budget deficit positively drives economic growth. Similarly, the TAR models showed that the positive relationship between budget deficit and economic growth could only hold when it does not exceed the optimal threshold of 2.02 per cent of GDP.

Austine et al. (2022) employed the autoregressive distributed lag (ARDL) technique and annual data from 1981 to 2020 to examine the effect of fiscal deficit on economic growth in Nigeria. The results revealed that fiscal deficit exerts a negative impact on economic growth. Hence, government-borrowed funds should be channelled to capital and infrastructural projects. Tran (2022) used the panel threshold regression (PTR) to examine the relationship between budget balance and economic growth in 48 Asian countries from 2000 to 2019. The study tested

the nonlinear linkage to obtain an optimal budget balance threshold that can stimulate economic growth. The results showed that economic growth is maximised when the government budget deficit is low. Specifically, budget balance thresholds of 22.68 per cent of GDP and 25.19 per cent of GDP were suggested.

3. Data and Methodology

3.1. Data and Sources

This study used panel data (annual) of 8 West African countries from 1991 to 2022 to capture the linkage between fiscal deficit and economic growth. The explained variable is fiscal deficit (FDE) expressed as a percentage of GDP. The core explanatory variable is real GDP annual growth rate (RGDPGR) as a measure of economic growth. Since the Keynesian hypothesis proposed that fiscal deficit will promote economic growth, the coefficient is expected to be positive. There are five variables found to have direct impact on economic growth human capital development (HCD): primary school enrollment rate (Irughe et al., 2020; Alfoul et al., 2024), investment (INV) gross capital formation as a percentage of GDP (Topcu et al., 2020; Sharma et al., 2018), openness (OPN) measured as import plus export divided by GDP (Oloyede et al., 2021; Shan et al., 2024), foreign direct investment (FDI) expressed as a percentage of GDP (Rahman & Alam, 2021; Emako et al., 2022), and exchange rate (EXR) expressed as amount of local currency per US dollar (Ramoni-Perazzi & Romero, 2022; Mesagan et al., 2022). The names of the variables, descriptions, sources, and expected signs are mentioned in Table 1.

Table 1: Variables, Description, Expected Sign and Sources

Variable	*Description*	*Signs*	*Sources*
RGDPR	Real GDP annual growth rate (annual %)	N/A	World Bank, 2025
FDE	Fiscal deficit (% of GDP)	+	World Bank, 2025
HCD	Human capital development (enrollment rate)	+	World Bank, 2025
INV	Investment (% of GDP)	+	World Bank, 2025
OPN	Openness (import plus export divided by GDP)	+/-	World Bank, 2025
FDI	Foreign direct investment (% of GDP)	+	World Bank, 2025
EXR	Exchange rate (local currency per US)	-	World Bank, 2025

Source: Author's compilation

3.2. Specification of Baseline Equations and Estimation Procedures

3.2.1. Economic growth model

This equation captures the objective of the study, and it is anchored on the endogenous growth theory and the Keynesian fiscal deficit hypothesis. It specifies

the relationship between economic growth, fiscal deficit, human capital development, investment, and exchange rate. Thus, the functional economic growth model is expressed as the general endogenous growth theory in equation [1]:

$$Y_{i,t} = A_{i,t} f(K_{i,t}, L_{i,t}) \quad [1]$$

Where: $Y_{i,t}$ = output/income of the individual countries at time t, $A_{i.t}$ = total factor productivity or efficiency parameter, $K_{i,t}$ = capital stock proxied by investment (gross capital formation) for the countries at time t, $L_{i,t}$ = labour proxied by human capital development (primary school enrollment rate) for the countries at time t. Equation [1] assumes that each economy uses the same level of capital and labour. The assumption in this study is that fiscal deficit (deficit/surplus), openness and foreign direct investment impact economic growth (proxied by GDP annual growth rate) through the efficiency parameter ($A_{i.t}$). Thus, since the study aims to investigate the impact of fiscal deficit on economic growth rate in selected West African countries, it is assumed that the efficiency parameter ($A_{i.t}$) is a function of fiscal deficit ($FDE_{i,t}$), openness ($OPN_{i,t,}$) and foreign direct investment ($FDI_{i,t}$) whose presence stimulates the economic growth rate. Thus, the efficiency parameter ($A_{i.t}$) is expressed as:

$$A_{i.t} = f(FDE_{i,t}, OPN_{i,t,} FDI_{i,t}) \quad [2]$$

Hence, combining equations [1] and [2] and substituting for the efficiency parameter, $A_{i.t}$, we have:

$$Y_{i,t} = f(FDE_{i,t}), OPN_{i,t,}, FDI_{i,t}, K_{i,t}, L_{i,t}) \quad [3]$$

Thus, $Y_{i,t} = GDPR_{i,t}$ as a proxy for economic development is expressed as a function $FDIN_{i,t}$ = fiscal deficit, $OPN_{i,t,}$ = openness, $FDI_{i,t}$ = foreign direct investment, $K_{i,t}$ = capital stock, and $L_{i,t}$ = labour force. To make the regression function in an estimation form within the context of this study, the functional form is expressed as:

$$RGDPR_{i,t} = f(FDE_{i,t}, HCD_{i,t}, INV_{i,t}, OPN_{i,t}, FDI_{i,t}, EXR_{i,t}) \quad [4]$$

The econometric form of equation 4 is expressed as:

$$RGDPR_{i,t} = \beta_0 + \beta_1 FDE_{i,t} + \beta_2 HCD_{i,t} + \beta_3 LnINV_{i,t} + \beta_4 OPN_{i,t} + \beta_5 LnFDI_{i,t} + \beta_6 EXR_{i,t} + \varepsilon_{i,t} \quad [5]$$

Where: Ln = natural log, i = number of countries,1,2,…, N, t = time dimension,1, 2,…, T, βj = parameters to be interpreted as elasticities, $\varepsilon_{i,t}$ = stochastic error term.

3.2.3. Estimation procedures

To deal with the three objectives of this study, equations were analysed with a mix of estimation techniques employed to investigate various aspects of the

relationship and to observe the consistency of the study outcomes. Before subjecting the equations to the different estimation techniques discussed here, descriptive and correlation analyses were carried out to have a first impression of the nature of the data. In the event of cross-sectional dependence, variables were subjected to second-generation unit root tests. In addition, the cross-sectional augmented Pesaran (CIPS, 2007) and the Fisher ADF tests developed by Maddala and Wu (MW, 1999) were employed. These techniques account for cross-sectional dependence among the constituent units in the panel. In addition, the first- and second-generation panel cointegration tests proposed by Pedroni (1999, 2004) were employed to determine if there was a long-run relationship among the variables in this study. The null hypothesis of no cointegration was rejected at the 1% and 5% significance levels.

The empirical analysis commenced with a cross-sectional dependence verification to justify the choice of the panel ARDL-PMG framework. According to Ditzen (2016), some of the benefits of panel data studies include but are not limited to better degrees of freedom, greater efficiency of the estimates, and reduced occurrence of multicollinearity among the variables. However, the possibility of having cross-sectional dependent panels may be very high due to the proximity of the units and the possibility of sharing common features. Spurious estimates and inferences can occur if the data have cross-sectional dependence (CSD) (Pesaran, 2004). To avoid these, this study engaged the Pesaran (2004, 2007) test for cross-sectional dependence (CD), which is also applied to small and large panels. The null hypothesis of no CSD was rejected at the 5% and 10% levels of significance. Similarly, the validity of the non-constancy of slope homogeneity in the coefficients among cross-sections instigates the importance of slope heterogeneity (Eberhardt & Teal, 2012; Gunduz, 2017). For this reason, this study used the slope homogeneity test developed by Pesaran and Yamagata (2008). This test extends the Swamy test developed in 1970, called the delta $\tilde{\Delta}$ test that is applied to cross-sections relatively small in the time dimension.

To achieve the objective of the study, the panel ARDL-PMG technique proposed by Pesaran et al. (1999) was deployed, as the variables exhibited a mixture of I(0) and I(1) order of integration. The superiority of this technique lies in several crucial attributes: (1) it can be applied regardless of whether the variables are integrated of pure order I(0), I(1) or a mixture of the two (Olayungbo, 2021); (2) it accounts for both short run heterogeneous and long run homogeneous coefficients; (3) when supported with an appropriate trend specification and diagnostic check, it produced well behaved and cross-sectionally

independent residuals, thereby reducing the risk associated with a spurious outcome; (4) it support instrumental variable regressions; (5) suitable for balanced and unbalanced panels; (6) it corrects for slight sample bias (Chudik & Pesaran, 2015). In addition, this technique is crucial because it helps identify effects for each cross-section separately and accounts for unobserved dependencies between the units. The panel ARDL-PMG equation used is specified as:

$$\Delta y_{i,t} = \phi_i (y_{i,t-1} - \theta_i x_{i,t}) + \delta_{0,i} + \delta_{1,it} \Delta x_{i,t} + \epsilon_{i,t} \quad [6]$$

Where ϕ_i represents the error correction speed of adjustment. The panel ARDL-PMG estimation assumes the long-run effects (θ_i) to be homogeneous, while the short-run effects (δ) are heterogeneous. Lastly, we deployed the Fully Modified Ordinary Least Squares (FMOLS) technique proposed by Pedroni (1999, 2004) for a robustness check.

4. Results

4.1. Summary Statistics

Table 2 presents the results of descriptive statistics, such as mean, minimum, and maximum values of selected variables for this study from 1991 to 2022 for the full panel. Investment (INV) and exchange rate (EXR) occupy first and second positions, respectively, in terms of average values in the selected West African countries. The average values of real GDP growth rate (RGDPR) and foreign direct investment (FDI) are 3.85 and 2.65, respectively, and are the lowest among the variables collected for this study. This indicates a low GDP growth rate and low gross capital formation in the selected West African countries. The values of the standard deviation indicate wide dispersions from the sample mean for each variable used in this study.

Table 2: Descriptive Statistics of Full Panel

Variable	*Observation*	*Mean*	*Median*	*Std. Dev.*	*Minimum*	*Maximum*
RGDPR	256	3.8505	4.2658	4.8246	-28.0999	26.5241
FDE	248	-0.1414	-0.1960	3.1229	-13.2169	8.2982
HCD	256	81.5481	82.3976	21.6494	32.5577	156.4500
INV	256	8860.051	1046.431	22585.90	7.3471	158890.9
OPN	256	52.8420	52.5963	15.5465	16.3522	116.0484
FDI	256	2.6455	1.6152	3.2513	-0.9707	32.4144
EXR	256	288.6128	282.1069	261.1874	0.0368	732.3977

Source: Author's computation

4.2. Correlation Matrix

The result of the correlation matrix is presented in Table 3. The results indicate a positive correlation between real GDP growth rate (RGDPR) and exchange rate (EXR), investment (INV) and fiscal deficit (FDE). Similarly, a positive correlation was observed between the fiscal deficit (FDE) and real GDP growth rate (RGDPR). In this instance, fiscal deficit can be seen as promoting economic growth. However, the coefficients between investment (INV) and output gap (OPG), and primary balance (PB) and fiscal deficit (FDE) indicate a high correlation. Hence, they were not used in the same equation. Thus, there is no evidence of multicollinearity among the variables used in this study.

Table 3: Correlation Matrix Results

Variable	*RGDPR*	*FDE*	*HCD*	*INV*	*OPN*	*FDI*	*EXR*
RGDPR	1.0000						
FDE	0.1436	1.0000					
HCD	0.1318	-0.0256	1.0000				
INV	0.0510	-0.1053	0.1150	1.0000			
OPN	0.1197	-0.0644	0.1992	-0.3227	1.0000		
FDI	0.1404	-0.0294	0.3899	-0.1119	0.3261	1.0000	
EXR	-0.0105	0.0015	-0.1423	-0.0547	-0.1758	-0.3699	1.0000

Source: Author's computation

4.3. Unit Root Tests

The Im, Pesaran and Shin (IPS, 2003) and Fisher augmented Dickey-Fuller (Fisher-ADF) tests were employed to examine the time series properties of the variables included in the equations developed for this study. Table 4 presents the second-generation unit root test statistics results with auxiliary regressors of 0 and 1 lag. Real GDP growth rate (RGDPR) and fiscal deficit (FDE) are stationary at level and integrated at order I(0) with trend specifications at 5 per cent level of significance. Conversely, exchange rate (EXR), human capital development (HCD), investment (INV), openness (OPN), and foreign direct investment (FDI) became stationary after first difference and integrated of order I(1) with trend specifications at 5 per cent level of significance. Thus, variables included in the equations developed for this study exhibited a mixed order of integration and therefore, panel autoregressive distributed lag (Panel-ARDL) Pooled Mean Group (PMG) procedures were adopted.

Table 4: Unit Root Test Results

Variables	*IPS*				*FISHER ADF*				
	Level	*Prob.*	*1st Difference*	*Prob.*	*Level*	*Prob.*	*1st Difference*	*Prob.*	*Remark*
RGDPR	-5.7634	0.0000***	NA	NA	-3.6754	0.0001***	NA	NA	I(0)
FDE	-2.1097	0.0174	NA	NA	-2.2233	0.0131***	NA	NA	I(0)
HCD	0.8290	0.7965	-3.2962	0.0005***	2.9714	0.9985	-2.6368	0.0042***	I(1)
INV	5.7727	1.0000	-7.0721	0.0000***	1.2062	0.8861	-6.3025	0.0000***	I(1)
OPN	-1.1075	0.1340	-9.6943	0.0000***	-1.7515	0.1399	-7.2427	0.0000***	I(1)
FDI	-1.7967	0.1362	-10.5713	0.0000***	-1.1022	0.1352	-7.8549	0.0000***	I(1)
EXR	3.0428	0.9988	-4.4619	0.0000***	2.0490	0.9798	-4.2351	0.0000***	I(1)

Note: *** indicate statistical significance at 5% level; Prob. = probability; NA = not applicable
Source: Author's computation

4.4. Panel Cointegration Test

After determining the optimum lag(s) to be used in each estimated equation, the study attempted to look for the generic long-run relationships between variables. Table 5 reports the within and between-dimension panel cointegration statistics for fiscal deficit sustainability, economic growth, consumption and unemployment models, respectively. For the economic growth model, the null hypothesis of no cointegration was rejected for four test statistics at the 5 and 10 per cent significance levels. Conclusively, the finding indicates at least two cointegrating equations in the fiscal deficit sustainability and economic growth models developed for this study.

Table 5: Cointegration Test

Within Dimension	*Statistic*	*Probability*	*Between Dimension*	*Statistic*	*Probability*
			Economic growth model		
Panel v-Statistic	-0.9502	0.8290	Group rho-Statistic	1.4659	0.9287
Panel rho-Statistic	-0.0309	0.4877	Group PP-Statistic	-15.4692	0.0000***
Panel PP-Statistic	-10.7256	0.0000***	Group ADF-Statistic	-2.6179	0.0044***
Panel ADF-Statistic	-4.2095	0.0000***	Cross-sections	8.0000	8.0000

Note: *** and ** indicate the statistical significance at 5% and 10% levels
Source: Author's computation

4.5. Cross-sectional Dependence and Slope Homogeneity Test

To avoid spurious regression results, the Pesaran (2004) cross-sectional dependence test was conducted, and the results are presented in Table 6. The results reject the null hypothesis of no cross-sectional dependence at the 1% significance level, suggesting that any shock in one country may be transmitted to other countries among the selected West African countries. The plausible reasons for this dependence could be proximity and similarities among countries

in the panel. In addition, all eight West African countries selected belong to ECOWAS and are primary commodity exporters. Hence, any regression equation with such cross-sectional dependence often leads to bad results and cannot be relied upon for policy formulation. However, the cross-sectional dependence among these West African countries is crucial for the attainment of the ten macroeconomic convergence criteria in the long run. It deepens international integration within the sub-region to attain balanced development.

The cross-sectional dependence is also crucial for harmonisation of monetary, fiscal and financial policies and macroeconomic stability in line with the ECOWAS convergence criteria. In addition, the slope homogeneity test results presented in the lower part of Table 6 reveal that the effect of the regressors on the regressand differs from country to country. This heterogeneity is observed because the probability value of the economic growth equation is significant at the 5 per cent and 10 per cent levels of significance. This finding reinforces why the panel ARDL-PMG technique is appropriate for this study because of its ability to generate country-specific short-run coefficients.

Table 6: Residual Cross-section Dependence and Slope Homogeneity Test Results

	Cross-section Dependence		
Test	*Statistic*	*d.f.*	*Probability*
Breusch-Pagan LM	75.6839	28	0.0000***
Pesaran scaled LM	6.3720	28	0.0000***
Pesaran CD	4.1072	28	0.0000***
	Slope Homogeneity		
Equation (Eq.)	*Delta* ($\tilde{\Delta}$)	*Adjusted Delta* ($\tilde{\Delta}_{adj}$)	
Economic Growth	1.786** [0.074]	2.021*** [0.043]	

Note: [ ], *** and ** indicates probability, significance at 5% and 10%; d.f: = degree of freedom
Source: Author's computation

4.6. Panel ARDL-PMG results

4.6.1. Estimated long and short-run coefficients for economic growth model

The objective of this study was achieved by using the panel autoregressive distributed lag (ARDL) Pooled Mean Group (PMG) technique for the full sample. The panel ARDL-PMG procedure assumes that the long-run coefficients are homogeneous while the short-run coefficients are heterogeneous across the

constituent units in the panel. The estimated homogeneous long- and short-run coefficients for the economic growth model are presented in Table 7. The results indicate a positive and significant joint relationship between the real GDP growth rate (RGDPR) and the fiscal deficit (FDE) in the long run. The coefficient of 0.4338 for the FDE revealed that a 1 per cent point increase in fiscal deficit, all things being equal, increased economic growth by 0.43 per cent point in the long run. This finding conforms to the Keynesian fiscal deficit hypothesis that fiscal deficit impacts economic growth positively.

Conversely, other variables like human capital development (HCD) and exchange rate (EXR) exert positive but insignificant joint impact on real GDP growth rate (RGDPR) in the long run. Similarly, investment (INV), proxied by gross capital formation, trade openness (OPN), and foreign direct investment (FDI), exert a negative but insignificant impact on the real GDP growth rate (RGDPR) in the long run. These findings contradict the endogenous growth theory.

In the short run, the fiscal deficit (FDE) and exchange rate (EXR) exert a negative but insignificant impact on the real GDP growth rate (RGDPR). Similarly, human capital development (HCD), investment (INV) proxied by gross capital formation, trade openness (OPN), and foreign direct investment (FDI) exert a positive but insignificant impact on the real GDP growth rate (RGDPR) in the short run. The error correction term [ECT (-1)] from the estimated full-sample short-run economic growth model has a negative sign and is statistically significant at the 5 per cent significance level. Based on theoretical expectations, the ECT (-1) coefficient is correctly signed and significant. The error correction coefficient indicates that the economic growth model has a high speed of adjustment of 87.29 per cent from the short-run disequilibrium to the long-run equilibrium.

Table 7: Panel ARDL-PMG Estimate for Full Sample Economic Growth Model

Dependent Variable: D(RGDPR)
Selected Model: ARDL (1, 1, 1, 1, 1, 1, 1) chosen based on Akaike information criteria

Variables	*Coefficient*	*Std. Error*	*t-Statistic*	*Probability*
		Long-Run Coefficients		
FDE	0.4338	0.1127	3.8505	0.0002***
HCD	0.0432	0.0368	1.1751	0.2416
INV	-6.4700	9.2205	-0.7014	0.4840
OPN	-0.0042	0.0241	-0.1750	0.8613
FDI	-0.0896	0.1292	-0.6938	0.4888
EXR	0.0027	0.0028	0.9535	0.3417

		Short-Run Coefficients		
D(FDE)	-0.0365	0.1477	-0.2469	0.8053
D(HCD)	0.0159	0.0957	0.1662	0.8682
D(INV)	0.0095	0.0071	1.3446	0.1805
D(OPN)	0.0510	0.0762	0.6691	0.5044
D(FDI)	0.3081	0.3160	0.9751	0.3309
D(EXR)	-0.8039	0.6589	-1.2199	0.2242
CONSTANT	0.0628	0.7858	0.0799	0.9364
@TREND	0.0155	0.0398	0.3891	0.6977
ECT(-1)	-0.8729	0.1116	-7.8245	0.0000***

Note: *** indicate significance at the 5% level
Source: Author's computation

4.6.2. Residual Diagnostic Test

Similarly, normality, cross-section dependence and serial correlation tests were conducted to ascertain the predictability and reliability of the fiscal deficit sustainability equation estimates. The results are presented in Table 8. The results indicate that the variables used in the economic growth model are normally distributed, and the null hypothesis of no cross-section dependence and serial correlation is accepted.

Table 8: Test for normality and serial correlation test results

Test	*Statistic*	*Probability*	*Remark*
Jarque-Bera Normality Test	0.4164	0.8120	Normally distributed
Arellano-Bond Serial Correlation Test	0.5396	0.5894	No serial correlation

Source: Author's computation

4.7. Robustness Check

For robustness of the results obtained from the full-sample panel ARDL-PMG estimation technique, the economic growth model was further analysed using the Fully Modified OLS technique. The results obtained for the economic growth model are presented in Table 9. From the economic growth model, the fiscal deficit (FDE), human capital development (HCD), investment (INV), trade openness (OPN), and exchange rate (EXR) are essential determinants of economic growth (RGDPR) in the panel of the selected West African countries. This is evidenced by their coefficients and respective probability values. Specifically, the FMOLS technique validates the outcome from the panel ARDL-PMG technique for one variable, indicating that the fiscal deficit (FDE) promotes economic growth by 33 per cent. Similarly, human capital development (HCD) promotes economic growth (RGDPR).

In general, the results from FMOLS analysis are in tandem with those of the panel ARDL-PMG estimate of the fiscal deficit-economic growth linkage while contradicting others. This could be because the panel ARDL-PMG technique controls for dependence among these selected West African countries. Hence, reliance on the result of the FMOLS technique alone may give flawed and ambiguous outcomes, given the likelihood of common shocks permeating across the countries.

Table 9: FMOLS Results for Economic Growth Model

Dependent Variable: RGDP				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Probability*
FDE	0.3336	0.0865	3.8571	0.0002***
HCD	0.2428	0.0362	6.7087	0.0000***
INV	0.0093	0.0034	2.7009	0.0075***
OPN	0.0956	0.0230	4.1481	0.0000***
FDI	0.1489	0.1403	1.0608	0.2900
EXR	-0.3270	0.1179	-2.7723	0.0060***

Note: *** indicates probability and significance at the 5% level
Source: Author's computation

5. Discussion of Findings

The empirical outcome of this study shows a subtle dynamic relationship between fiscal deficit and economic growth in the selected West African countries. The long-run joint coefficient of fiscal deficit (FDE) is positive and statistically significant, revealing that a 1 per cent point increase in fiscal deficit-to-GDP leads to a 0.43 per cent point increase in real GDP growth rate. On the contrary, this impact is negative and insignificant in the short run. This finding validates the Keynesian fiscal deficit theory, which hypothesises that when fiscal deficit financing is deployed to instigate aggregate demand and public expenditure during economic downturn, it can trigger long-term economic growth. In addition, the result aligns with extant literature on developing economies such as Arjomand et al. (2016) and Gyasi (2016), which found that a moderate and well-managed fiscal deficit finance can stimulate economic growth.

Contrarily, the baseline ARDL-PMG results reveal that control variables such as human capital development (HCD), investment (INV), openness of trade (OPN), and foreign direct investment (FDI) in the economic growth model do not have a joint significant impact in both the long and short runs. This finding presents a theoretical divergence with the Endogenous Growth Theory, which concludes that internal factors such as human capital and private sector domestic

investment are the classical drivers of sustained economic growth. These statistically insignificant variables in the estimated baseline model suggest that capital accumulation and enrollment in primary education are inadequate to spur growth in West Africa. The plausible reason could be because of the structural bottlenecks such as institutional weakness, infrastructural deficits and low quality of human capital formation in the subregion.

Remarkably, the FMOLS check results indicate that HCD, INV, OPN and exchange rate (EXR) can become significant drivers of GDP growth when cross-sectional dependence is managed in a different way. Rather than revealing an empirical inconsistency, this divergence indicates the discrete structural assumptions entrenched in each econometric procedure. The plausible reasons for the different outcome could be that the ARDL-PMG technique filters out cross-sectional common shocks and accepts short-run dynamic heterogeneity. Conversely, the FMOLS estimator can suffer from bias in the presence of cross-sectional dependencies because its calculated long-run coefficients are derived from an aggregate group-mean averaging technique that only accounts for serial correlation and variable endogeneity. This divergence of outcomes suggests that while these underlying factors possess growth-enhancing potential as hypothesised in the Endogenous Growth Theory, their effectiveness is responsive to the prevailing regional macroeconomic environment and the presence of common shocks.

As a policy implication, these findings have crucial consequences for fiscal policy formulation in the West African subregion. The long-run positive effect of fiscal deficit on growth implies that deficit financing is not hurtful; rather, its effect depends largely on the quality of public expenditure undertaken. Hence, governments of West African states must ensure that borrowed funds are stringently ploughed into productive capital investment (infrastructure, technical education, and technology) rather than recurrent expenditure (salaries and wages or debt servicing) without long-term productive returns. In addition, the suggested ECOWAS macroeconomic convergence, which mandated fiscal deficit financing of no more than 3 per cent of GDP, may be overly restraining, especially for developing economies still undergoing structural transformation. Empirical evidence from extant literature suggested a moderately high but sustainable fiscal deficit threshold that is tied to a developmental project.

6. Conclusion and Recommendations

This study examined fiscal deficit sustainability and economic development in selected West African countries (Ghana, Gambia, Nigeria, Sierra Leone, Burkina

Faso, Cote d'Ivoire, Senegal and Guinea-Bissau) from 1991 to 2022. To achieve the objectives of the study, a mixture of descriptive and econometric techniques was used to estimate the linkage among variables in the fiscal deficit and economic growth. The empirical results showed that the variables are integrated at order I(0) and I(1) with a long-run relationship. The outcome of the economic growth model indicates that fiscal deficit exerts a positive and significant impact on economic growth in the long run and is insignificant in the short run for the full sample. The joint impact of human capital development on economic growth was insignificant both in the long and short runs. The impact of investment on economic growth was insignificant for the full sample in both the long and short runs. Similarly, the impact of openness on economic growth was not significant in either the long or short runs for the full sample. Furthermore, foreign direct investment has no significant joint impact on economic growth in both the long and short runs. Exchange rates do not have a significant impact on economic growth for the full sample in both the long and short runs. Based on these findings, the study concludes that the positive joint impact of fiscal deficit on economic growth, in the long run, requires that deficit spending of the West African countries be directed more to real productive investments in the short run. At the same time, ECOWAS should ensure strict compliance with the 3 per cent deficit-financing threshold for capital-intensive spending.

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