Assessing the impact of migration on sustainable economic growth in West Africa: A panel ARDL analysis

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Abstract*. The rising trend of international migration poses a substantial challenge to socio-economic development in West Africa, as skilled professionals migrate in search of better opportunities abroad. This study investigated the effect of international migration on sustainable economic growth in West Africa. The annual panel data covering the period of 1991 to 2023 were obtained from the United Nations Development Programme (UNDP) and the World Bank (WB) World Development Indicators (WDI). A panel of sixteen countries of West Africa were covered in the study. The estimation techniques employed are panel Autoregressive Distributed Lag (p-ARDL) and panel cointegration test. The result of the analysis revealed that migration has a significant positive impact on sustainable economic growth in West Africa. Also, remittances showed a significant negative long-term impact. To address the migration issues, effective migration management is essential by enacting migration policies that ensures that public funds are invested in productive areas through mechanisms that channel remittances into small and medium scale enterprises, infrastructure projects and education.*

Keywords*: migration, sustainable economic growth, panel ARDL*
JEL classification*: Q01*

1. Introduction

Intra and inter country migration remains a defining characteristic of the socio-economic landscape in West Africa. Various forms of migration including temporary cross-border workers, unskilled and short-term contract labourers, traders, undocumented migrants, highly skilled professionals and refugees dominate the region's mobility dynamics. These migratory flows occur within the broader framework of sub-regional economic unions, such as ECOWAS, reflecting complex labour and trade interdependencies (Adepoju, 2011). However, the literature presents conflicting views on the economic impacts of migration on both the countries of origin and destination. Migration may serve as a pathway for skilled professionals to access better economic opportunities abroad, which could lead to individual advancement and bolster global economic integration (Obani & Odalonu, 2023). Conversely, the outflow of highly skilled labour, commonly referred to as "brain drain," raises concerns about the adverse effects on the sending economies and the potential resource strains on host nations (Idio et al., 2015).

The West African region has historically struggled with socio-economic volatility, with migration emerging as a key aspect of its economic narrative. Adepoju (2011) emphasized that migration within sub-Saharan Africa is predominantly intra-regional, encompassing a broad spectrum of migrants, from low-skilled labourers to highly skilled professionals and occurring across varying

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socio-economic contexts. The mass exodus from West Africa, particularly among its youth, is primarily driven by unemployment and insecurity, which erode local institutional capacity to absorb the burgeoning skilled labour force. Consequently, migration becomes an appealing option as young professionals seek better employment prospects in more stable economies (Sumaworo, 2020).

Both internal and international migration significantly influence the socio-economic structures of West Africa. However, a notable concern remains the escalating trend of migration abroad. Globalization has facilitated this increase, offering enhanced access to employment, education and greater international interconnectedness. As a result, a substantial number of skilled professionals from West Africa continue to migrate in pursuit of better economic opportunities abroad, further exacerbating the region's "brain drain" dilemma (Obani & Odalonu, 2023). This outward movement of educated and skilled individuals, spurred by limited job opportunities and prolonged unemployment in their home countries, constitutes one of the most prominent effects of labour market failures in the region (Komguep & Nembot, 2021).

Over the years, governments across West Africa have introduced several initiatives aimed at mitigating the adverse effects of migration and unemployment. Notable programmes include the Youth Employment Support Programme (YESP), Jobs for Youth in Africa Strategy, Smart Africa Alliance and ECOWAS Skills Development and Recognition, among others. However, the effectiveness of these interventions in fostering sustainable economic growth remains a subject of debate and analysis. Despite these efforts, the region continues to experience high unemployment rates, particularly among the youth, complicating the socio-economic development challenges West African nations face (Adegboye & Ighodaro, 2020).

The complex challenges facing West Africa in its quest for sustainable economic growth are further compounded by high migration and persistent unemployment rates, particularly among the youth (Sumaworo, 2020). This situation not only impedes the development of productive and sustainable employment opportunities but also stifles overall economic growth and social well-being (Adegboye & Ighodaro, 2020). Moreover, West Africa remains one of the global regions with the highest emigration rates. The increasing outflow of skilled professionals exacerbates the brain drain problem, posing significant hurdles to the region's socio-economic development prospects (Obani & Odalonu, 2023).

While prior studies have examined the effects of migration in West Africa, their focus on sustainable economic growth remains insufficiently explored. Given the unprecedented rise in the working-age population in the region, the need for job creation has become more urgent. The creation of massive employment opportunities is not only essential for individual income generation but also serves as a key catalyst for broader economic development. Thus, the broad aim of this study is to investigate the relationship between international migration and sustainable economic growth in West Africa. Specifically, the objectives are to:

1. Analyze the cointegration relationship between international migration and sustainable economic growth in West Africa; and
2. Estimate the short-run and long-run effects of international migration on sustainable economic growth in West Africa.

Although existing literature recognizes the multifaceted challenges posed by migration in West Africa, the studies fall short of providing a comprehensive understanding of the intricate relationship between migration and sustainable economic growth. This study addresses this gap by analyzing the complex interplay between these variables, offering insights into how migration affects sustainable economic growth. The findings of this research are highly relevant to policymakers, providing empirical evidence that can guide the formulation of informed policies aimed at mitigating the challenges of migration while harnessing the potential of the diaspora. Similarly, this study contributes to strategies for addressing brain drain and leveraging the skills of the diaspora to foster sustainable economic growth in West Africa.

2. Literature review

Sustainable economic growth is not just an economic agenda; it is a comprehensive and ethical commitment to building a resilient, inclusive and environmentally responsible future for generations to

come. According to Siddikee et al. (2022), sustainable economic growth is a multifaceted concept that encompasses the intricate interplay of economic, social and environmental dimensions, with a paramount consideration for the well-being of future generations. Economic sustainability involves the capacity of an economy to maintain and improve its overall well-being over time without depleting resources or compromising future generations' well-being (Piriya, 2012). According to the International Monetary Fund (Koczan et al., 2021), sustainable growth encompasses a broader array of factors, including equitable access to education, healthcare, social protection and decent employment opportunities. Another critical perspective on sustainable growth, highlighted by Chepel et al. (2021), emphasizes the efficient utilization of all available resources, particularly human capital and innovation. This approach seeks to reduce income inequality and promote long-term development by leveraging the full potential of a society's workforce and fostering creativity and technological advancements.

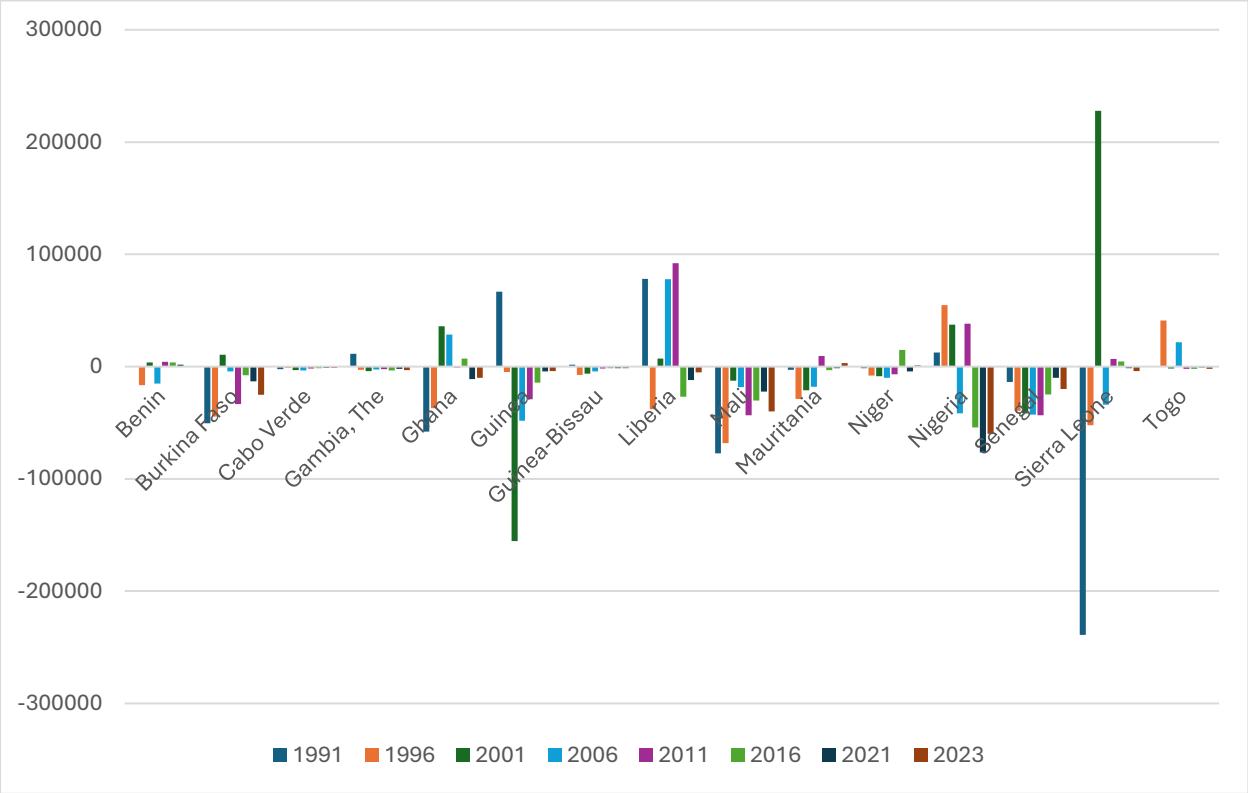
Sustainable economic growth constitutes a fundamental pillar of sustainable development, specifically addressing its economic dimension by emphasizing long-term, inclusive and resilient expansion of economic output. This concept is underpinned by key macroeconomic indicators such as per capita income growth, productivity improvements, labour market efficiency and structural transformation. Moreover, sustainable economic growth necessitates equitable income distribution, broad-based access to quality healthcare and continuous investment in human capital through education, each of which is instrumental in enhancing economic stability and societal well-being. By fostering economic diversification, innovation and institutional efficiency, sustainable economic growth strengthens the foundations for poverty reduction and social equity, ultimately advancing the realization of the Sustainable Development Goals (SDGs) on a global scale (Islam, 2025).

According to Huynh and Vo (2023), migration refers to the movement of individuals across geographical borders for various reasons, including economic opportunities, education and family reunification. The International Monetary Fund Working Paper (Koczan et al., 2021) defines migration as the movement of individuals or groups of people from one place to another, often involving a change in their permanent or semi-permanent residence mainly driven by a variety of factors, including economic opportunities, political instability, social networks, environmental conditions and cultural reasons. Thus, the aforementioned definitions revealed that migration otherwise known as labour migration can occur within a country (internal migration) or across international borders (international migration) (Koczan et al., 2021; Redlin, 2022).

The net migration rate is the difference between the number of immigrants entering a country and the number of emigrants leaving it, per 1,000 populations. A negative net migration rate indicates that more people are leaving the country than entering, which can have implications for the nation's demographic and economic dynamics (Obani & Odalonu, 2023; Bashir & Abubakar, 2022).

Figure 1 displayed the trend of Migration in West Africa (1991-2023). As expected, West African countries had different experiences in terms of international migration. Hence, there is a significant fluctuation in the number of net migrations among the countries of the region. As illustrated in Figure 1, the trend analysis of migration patterns in West Africa from 1991 to 2023, assessed in five-year intervals (in millions), reveals significant fluctuations in net migration across the region. These variations reflect shifts driven by economic opportunities, political stability and social conditions. The migration experiences of individual countries differ considerably. While nations such as Ghana and Liberia exhibit alternating periods of net immigration and emigration, others like Guinea, Mali and Sierra Leone display persistent outward migration, indicating sustained emigration trends. Migration dynamics within West Africa are influenced by regional interactions. Countries like Nigeria and Senegal function as key migration hubs, either as primary destinations or transit points, shaping their net migration figures. The prevalence of intra-regional migration underscores the region's interconnected labour and migration networks, as many West African states serve as both sources and recipients of migrants. Recent trends (2016–2023) indicate shifting migration patterns, with some countries experiencing notable changes in migration flows. These shifts may be attributed to economic transformations, political events, or adjustments in migration policies, highlighting the evolving nature of migration in the region.

Figure 1. Net Migration in West Africa



Source: Authors' computation based on World Bank Development Indicators, 2024.

Migration studies have long been informed by various theories that attempted to explain why people move, how far they migrate and the implication of such movement on the economies of both the host and migrant countries. On the link between migration and sustainable economic growth, the theoretical underpinnings of the study draw from Ravenstein's laws of migration and the push-pull hypothesis of migration. Ravenstein's Laws of Migration, formulated by the British demographer Ernest George Ravenstein in the late 19th century captures the patterns and motivations behind human migration. Ravenstein's first law suggests that most migrants tend to move relatively short distances. This intra-regional migration is driven by factors such as proximity, cultural familiarity and economic opportunities. The law of step migration which is the second law posits that migrants tend to move in a series of steps from rural to urban areas. Lewis' economic dualism theory, which explains the transition from traditional to modern sectors, is closely linked to this law. Another law in Ravenstein's Laws of Migration is the law of gravity which suggests that the volume of migration between two places is directly proportional to the size of their populations and inversely proportional to the distance between them. The flow of migrants among African countries can be influenced by population size and geographic proximity. This law highlights how migration tends to concentrate in areas with larger populations and closer geographic ties. Ravenstein's law of counter-migration proposes that there is a significant movement of migrants in the opposite direction of the primary migration stream. This phenomenon can occur due to changing economic conditions, family ties, or other factors (Huynh & Vo, 2023). The push-pull hypothesis posits that individuals migrate to locations offering benefits exceeding costs (pull factors) or to escape locations with costs outweighing benefits (push factors) (Garcia et al., 2014). In the case of West Africa, push factors such as unemployment, poverty, political instability and limited economic opportunities drive individuals to seek better prospects abroad. Pull factors, on the other hand, include the promise of higher incomes, improved living conditions and access to education and healthcare in destination countries. Adepoju's study provides evidence that supports the applicability of this theory to intra-regional migration within SSA (Adepoju, 2011).

Empirically, Huynh and Vo (2023) explored the relationship between migration and unemployment in 47 Asian countries over the period 1990–2020. The empirical findings of the study

reveal that migration has a significant impact on unemployment in Asian countries. The analysis indicates that increased migration is associated with reduced unemployment rates. This relationship holds across different estimation techniques, including fixed-effects and random-effects models, as well as GLS and GMM. Dritsaki and Dritsaki (2024) analyzed the impact of immigration on economic growth and unemployment across 27 EU countries from 1990 to 2020. The empirical results indicate a significant positive correlation between both GDP per capita and the unemployment rate with the net migration rate to EU countries. Long-term causal relationships were found to be bidirectional between migration and unemployment and unidirectional between growth and migration as well as growth and unemployment. Short-term Granger causality tests indicated a bidirectional causal relationship among all variables.

Bruce-Tagoe (2022) investigated the impact of immigration on unemployment and wages in the United States. The results of the pooled OLS estimation revealed that immigration had a trivial impact on the U.S. labour market. Immigrant growth showed a positive but statistically insignificant effect on both the unemployment growth rate and the wage growth rate in the United States. Moreover, the study found significant effects of other factors such as GDP growth and college completion on labour market outcomes. Specifically, an increase in GDP growth rate significantly improved wage growth, while college completion and GDP growth had substantial reducing effects on the unemployment growth rate. To assess the long-term per capita growth impact of refugee migration in Europe, Manthei (2021) focused specifically on Germany. The findings suggest that refugee immigration can contribute to long-term per capita growth in the host country, particularly if the refugee immigrants are relatively young and possess sufficiently high qualifications. Moreover, the study indicates that capital inflows play a crucial role in boosting per capita growth.

In the same vein, Koczan et al. (2021) explored the multifaceted consequences of international migration on various dimensions of inclusive growth. The study shows that the movement of individuals across borders has significant implications for the well-being of migrants themselves. Migration, especially from less developed to more developed countries, often leads to higher income levels for migrants, which, in turn, affects the expected income of their offspring. Younger migrants stand to gain more due to their longer expected lifetime to reap the benefits of higher income. Astuti (2023) analyzed individual characteristics and internal factors influencing migration decisions in Indonesia. The empirical review suggests that age, education and migration experience positively influence migration decisions, while marriage and a higher number of household members negatively impact such decisions.

Similarly, Roy and Debnath (2011) explored the impact of various economic and non-economic factors on net immigration and examined the influence of net migration on the level of economic development in fifteen major states of India. The study found that net migration is positively influenced by the level of per capita income and road infrastructure. On the other hand, it is negatively influenced by the unemployment rate and the cost of living. Interestingly, the crime rate was found to be insignificant in determining migration patterns. Moreover, the study suggests a positive association between the level of development and net migration, supporting the notion that migration is beneficial for development. González Bautista et al. (2024) analyzed the macroeconomic factors influencing international migration from Ecuador between 2000 and 2021. The results indicate that the most significant macroeconomic variable influencing migration is the unemployment rate. Specifically, an increase in the unemployment rate corresponds to a 0.74% increase in migration to countries that offer better job stability.

Sumaworo (2022) investigated the determinants of mass migration from Sub-Saharan Africa, focusing on unemployment and insecurity as major factors. The study submitted that encouraging entrepreneurship, improving infrastructure and enhancing private sector attractiveness could play a significant role in mitigating unemployment and, subsequently, migration. The study provides valuable insights into the factors influencing migration. However, it lacks specificity regarding the data sources and the countries or regions under consideration. The study by Obani and Odalonu (2023) examined the impact of rising migration on the socio-economic development of Nigeria from 2015 to 2022. The findings showed that the primary drivers of migration from Nigeria include poverty, high unemployment rates, insecurity, poor governance and economic instability. These factors push skilled and unskilled individuals to seek better opportunities abroad. Nigeria has experienced a significant brain drain, losing skilled professionals such as doctors, engineers and academics to developed countries.

This migration has depleted the country's human capital, which is essential for its socio-economic development. Furthermore, the exodus of skilled workers has had detrimental effects on Nigeria's economic growth and social services.

In a nutshell, the literature suggests that migration can reduce unemployment and foster sustainable economic growth in host countries, while addressing factors like unemployment, insecurity and economic opportunities in sending regions is crucial for managing migration flows and maximizing its positive impacts on growth.

3. Methodology and data

This study employs descriptive analysis to provide a comprehensive overview of sustainable economic growth, migration and other relevant macroeconomic variables in West African countries during the period from 1991 to 2023. Descriptive analysis is crucial for highlighting trends, patterns and correlations in the data, laying the foundation for the subsequent econometric modeling. The research methodology draws from econometric models used in prior studies, such as those by Brunow, Nijkamp and Poot (2015); Chepel et al. (2021); Roy and Debnath (2011); and Komguep and Nembot (2021).

The econometric model employed to examine the relationship between international migration and sustainable economic growth is presented as follows:

$$SEG_{it} = (MIGR_{it}, KA_{it}, REM_{it}, INFL_{it}) \quad 3.1$$

where i is the cross-sectional identifier and it stands for the i th country and t is the time identifier for the i th year. The functional model of the relationship between international migration and sustainable economic growth can be rewritten as follows:

$$SEG_{it} = \beta_1 + \beta_2 MIGR_{2it} + \beta_3 KA_{3it} + \beta_4 REM_{4it} + u_{it} \quad 3.2$$

The transformation of equation 3.2 into the basic panel ARDL (p, q) yields:

$$SEG_{it} = \beta_i + \sum_{p=1}^{P} \lambda_P SEG_{i,t-p} + \sum_{q=0}^{Q} \beta_{q1} MIGR_{i,t-q} + \sum_{q=0}^{Q} \beta_{q3} REM_{i,t-q} + \sum_{q=0}^{Q} \beta_{q4} INFL_{i,t-q} + u_{it} \quad 3.3$$

Where:
SEG = Sustainable economic growth;
KA = Capital stock;
REM = Remittance inflows;
INF = Inflation;
$\boldsymbol{\beta_1}$ = intercept parameter;
$\boldsymbol{\beta_1}. . ., \boldsymbol{\beta_5}$ = Slope coefficients
i=1,2,3,4…,16;
t=1,2,...,33; and
u_{it}= stochastic disturbance term

Most studies measure sustainable economic growth using real GDP and GDP per capita, but these metrics have been criticized for inadequately reflecting economic welfare (Sánchez et al., 2020). GDP alone does not account for persistent challenges such as poverty, unemployment and inequality, even in growing economies. As Jansen et al. (2024) argued, policymakers should adopt broader indicators like the Sustainable Development Goals (SDGs), Human Development Index (HDI) and Genuine Progress Indicator (GPI) to assess long-term progress. This study adopts HDI as a proxy for sustainable economic growth, as it prioritizes human capital development over conventional GDP measures (Chepel et al., 2021). HDI, which integrates health, education and living standards, provides a comprehensive assessment of long-term growth, innovation and workforce resilience (Nguyen et al., 2025). Unlike GDP, HDI aligns with Sen's capability approach, emphasizing individual freedoms and adaptability. It also helps policymakers identify development gaps and implement inclusive policies for

economic stability and sustainability (UNDP, 2020). However, HDI may have its limitations as a proxy for sustainable economic growth, but it's better than real GDP and GDP per capita. Regarding migration, various measures are available in the literature, including net migration data from the United Nations (Brunow et al., 2015; Chepel et al., 2021; Huynh & Vo, 2023). This study utilizes UN net migration data due to its reliability, consistency and extensive cross-country coverage, which is particularly advantageous for global comparisons of migration trends. The control variables relevant to the study are based on the empirical evidence and the theoretical framework which are Gross fixed capital formation (KA) that serves as a proxy for capital stock, capturing investment in productive assets that drive long-term growth (Chepel et al., 2021). Remittance inflows (REM) are included due to their role in stabilizing household income, mitigating economic shocks and fostering entrepreneurship (Komguep & Nembot, 2021; Koczan et al., 2021). Inflation rate (INFL) reflects macroeconomic stability, as it influences purchasing power, investment behaviour and overall economic performance (Huynh & Vo, 2023).

Table 1. Definition of variables, unit and measurement

S/N	Variables	Description	Measurement	Source
1.	Sustainable economic growth	SEG	This is the growth of West Africa countries, measured by Human Development Index (HDI)	United Nations Development Programme (UNDP), 2023
2.	Migration	MIGR	This is the patterns of movement of professionals and experts seeking opportunities abroad (Net Migration)	World Development Indicators, 2024
3.	Capital stock	KA	This is measured by gross capital formation	World Development Indicators, 2024
4.	Remittance inflows	REM	The labour force is measured by the Personal Remittances received (% of GDP)	World Development Indicators, 2024
5.	Inflation	INF	Inflation is measured by consumer prices (Annual %)	World Development Indicators, 2024

Source: Authors' compilation, 2024

The data for this analysis were collected from United Nations Development Programme (UNDP) database, 2023 and the World Bank (WB) World Development Indicators (WDI) database, 2024. The analysis involved EViews 9 to process and analyze the collected data. The analysis focuses on West Africa. The countries comprise Benin, Burkina Faso, Cape Verde, Ivory Coast (Côte d'Ivoire), The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

In the analysis of the data, the study applies pre-estimation tests consisting of Jarque-Bera normality test, multicollinearity test and unit root test. In the unit root test three tests comprising of Levin, Lin, and Chu (LLC), Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were employed under the three categories of unit root specification (i.e., none, with intercept and trend and without intercept and trend). The p-ARDL model is used to analyze the short- and long-run relationships between variables in panel data. It includes lagged dependent and independent variables, capturing both the dynamic effects (autoregressive) and the distributed lag effects. The p-ARDL model was designed to handle non-stationary time series data that may be integrated of different orders, which is a common issue in empirical econometric analysis. This feature offers a more accurate analysis compared to pooled models that assume homogeneity across all entities (Khalid, et al., 2024). The Difference Generalized Method of Moment (D-GMM) is an econometric technique used to estimate dynamic panel data models.

It is particularly useful when there is potential endogeneity in the regressors and accounts for unobserved individual effects.

4. Research results and comments

The descriptive statistics provide critical insights into the data distribution and variability. Table 2 presents these metrics, including the mean, median, standard deviation, skewness, kurtosis and Jarque-Bera statistics, which offer an understanding of the central tendencies and dispersions within the dataset.

Table 2. Descriptive statistics

	SEG	MIGR	KA	REM	INF
Mean	0.439	-13887.0	21.159	4.243	7.480
Median	0.443	-3770.0	19.829	2.338	4.147
Maximum	0.668	227791.0	52.670	26.837	69.584
Minimum	0.214	-291022	-2.424	0.000	-7.797
Std. Dev.	0.094	39992.81	9.820	4.617	10.407
Skewness	0.145	-1.2205.0	1.010	1.691	2.469
Kurtosis	2.935	14.620	4.104	6.286	10.351
Jarque-Bera	1.693	2702.075	101.619	426.207	1503.016
Probability	0.429	0.000	0.000	0.000	0.000
Observations	460	460	460	460	460

Key: SEG: sustainable economic growth, MIGR: migration, KA: capital stock, REM: remittances, INF: inflation. Inference at P<0.05
Source: Author's compilation, 2024.

The mean value of SEG is 0.439, with a standard deviation of 0.094, indicating moderate economic growth in West Africa over the study period. The relatively low standard deviation suggests that the growth values are closely clustered around the mean, reflecting low variability in sustainable economic growth. The skewness of 0.145 points to a slight positive skew, suggesting occasional higher-than-average growth rates. Kurtosis is near the normal distribution value (2.935), indicating a moderate peak in the distribution. The Jarque-Bera statistic of 1.693, with a probability value of 0.429, suggests that the SEG series follows a normal distribution at the 5% significance level. From an economic perspective, moderate growth with low variability highlights a stable economic environment with infrequent growth spurts, which could be linked to structural improvements or temporary economic shocks.

Migration data reveal a mean of -13,887, signaling a net outflow of people from the region, with significant variability as demonstrated by a standard deviation of 39,992. The migration distribution is negatively skewed (-1.220), meaning that large outflows are more common than inflows. The high kurtosis value of 14.620 indicates a sharp peak, suggesting frequent extreme values, likely driven by political or economic crises that spur large-scale migration. The Jarque-Bera test result of 2702.075 with a p-value of 0.000 confirms that the migration data deviate significantly from normality. The economic implication of this is profound: large migration outflows could deplete human capital, while sporadic inflows may strain local resources and infrastructure, creating labour market disruptions and resource allocation inefficiencies.

The mean capital stock is 21.159, indicating a generally positive accumulation of capital across the region. The distribution is right-skewed (1.010), suggesting that high capital stock levels are occasionally observed, likely due to periodic large-scale investments or external capital inflows. The kurtosis value of 4.104 and Jarque-Bera statistic of 101.619 (p-value = 0.000) indicate non-normality, suggesting that while capital accumulation occurs, it is irregular, likely due to fluctuating investment climates. Economically, this irregularity could undermine consistent long-term economic planning, making growth susceptible to external shocks or policy changes.

The mean value of remittances is 4.243, with a standard deviation of 4.617, pointing to significant variation in remittance inflows. The positive skewness of 1.691 and kurtosis of 6.286 highlight that large remittance inflows are frequent, possibly reflecting reliance on expatriate labour.

However, the Jarque-Bera statistic of 426.207 (p-value = 0.000) suggests non-normality. From an economic standpoint, while remittances can support household consumption, their irregularity poses challenges for stable income streams and sustainable development, as remittances are often used for consumption rather than productive investments.

Inflation demonstrates a high degree of variability, with a mean of 7.481 and a standard deviation of 10.407. The positive skewness (2.469) and high kurtosis (10.351) suggest that inflation spikes are common. The Jarque-Bera test (1503.016, p-value = 0.000) confirms non-normality, indicating frequent periods of inflationary pressure. High inflation rates, particularly when volatile, can erode purchasing power, create uncertainty and discourage long-term investment, affecting both household welfare and business planning in the region.

Table 3. Kao Cointegration Test of the effect of migration on sustainable economic growth

Test Statistics	Value	Prob
P – Value	-2.058	0.020
Residual Variance		0.000
Hac Variance		0.000

Source: Author's compilation, 2024.

The Kao cointegration test was employed to examine the long-term equilibrium relationship between migration and sustainable economic growth. As shown in Table 3, the test statistic of P-value is -2.058, with a probability of 0.020, which is below the 5% significance threshold. This indicates the rejection of the null hypothesis of no cointegration, confirming that migration and sustainable economic growth exhibit a significant long-term equilibrium relationship. Economically, this suggests that while migration may cause short-term fluctuations, its long-term effects are tied to sustainable economic development, likely through labour market adjustments and human capital flows.

Table 4. Panel ARDL results of the effect of migration on sustainable economic growth

Dependent variable: SEG				
Variance	Co-efficient	Standard Error	T - Statistics	P – Value
Short Run Coefficient				
Cointeq01	-0.013	0.005	-2.517	0.012
D(SEG(-1))	0.278	0.067	4.144	0.000
D(MIGR)	-0.000	0.000	-1.730	0.084
D(KA)	0.967	0.967	1.000	0.318
D(REM)	0.000	0.000	0.581	0.561
D(INF)	0.000	0.000	0.121	0.904
Long Run Coefficient				
MIGR	0.000	0.000	3.844	0.000
KA	0.006	0.002	4.018	0.000
REM	-0.017	0.006	-2.800	0.005
INF	-0.001	0.001	-0.625	0.532
Diagnostic Tests				
Test Statistics	Test Types	Values	Prob	Decision
Normality Test	Jarque-Bera test	4288.393	0.100	
Wald Test	F – Statistics	8.130	0.000	

Key: SEG: sustainable economic growth, KA: capital stock, REM: remittances, INF: inflation.
Inference at P<0.05
Source: Author's compilation, 2024.

The results from the Panel ARDL model, presented in Table 4, provide insight into both short- and long-term effects of migration and other variables on sustainable economic growth. The error correction term (Cointeq01) has a coefficient of -0.013, significant at the 5% level (p-value = 0.012), suggesting that deviations from the long-term equilibrium are corrected at a rate of 1.3% per period.

This reflects moderate convergence to equilibrium, indicating that while short-term shocks to migration and other factors may disrupt growth, the system tends to return to its long-term path over time.

The lagged dependent variable (SEG(-1)) is highly significant (coefficient = 0.278, p-value = 0.000), implying persistence in economic growth; past growth positively influences current growth, underscoring the role of cumulative investments and productivity improvements in driving sustained growth.

Migration (MIGR) has a marginally negative short-run effect on growth (coefficient = -0.000, p-value = 0.084), significant at the 10% level but not at 5%. This could suggest that migration-induced labour market disruptions or capital outflows hinder short-term growth. In the long run, however, migration has a positive and significant impact on growth (coefficient = 0.000, p-value = 0.000), indicating that over time, the inflow of labour and skills contributes to productivity and economic expansion.

Capital stock (KA) demonstrates a positive and significant long-term effect on sustainable economic growth (coefficient = 0.006, p-value = 0.000), reinforcing the importance of investment in physical assets for economic development. However, its short-term impact is statistically insignificant, indicating that the benefits of capital accumulation materialize over time.

Remittances (REM) show an unexpected negative long-term relationship with growth (coefficient = -0.017, p-value = 0.005), suggesting that these inflows may not be productively invested but rather used for consumption, which can detract from capital formation and long-term growth potential.

Inflation (INF) exhibits an insignificant impact on growth in both the short and long run, suggesting that inflationary pressures, while present, do not exert a consistent influence on sustainable economic development in the region.

The model passes the normality test (Jarque-Bera = 4288.393, p-value = 0.100), indicating that the residuals are normally distributed, fulfilling a key assumption of the ARDL framework. The Wald test result (F-statistic = 8.130, p-value = 0.000) confirms the joint significance of the model, suggesting that the included variables collectively explain significant variation in sustainable economic growth.

In addition to the short- and long-run cross-country effects, this study presents the country-specific short-run effects of migration on sustainable economic growth, as illustrated in Table 5.

Table 5. Cross-Section Short-Run Coefficients of the effect of migration on sustainable economic growth

Country	D(SEG(-1))	D(MIGR)	D(KA)	D(REM)	D(INF)	COINTEQ
Benin	0.809 (0.000) [46.290]	-0.00 (0.000) [-3254.777]	0.000 (0.000) [-3719.61]	0.000 (0.000) [210.030]	-0.000 (0.000) [-4441.278]	-0.0138 (0.000) [-77.906]
Burkina Faso	0.714 (0.000) [41.037]	-0.000 (0.000) [-8674287.]	0.000 (0.000) [1640.306]	0.001 (0.000) [191.464]	0.000 (0.000) [2627.050]	-0.0127 (0.000) [-167.389]
Cape Verde (Cabo Verde)	-0.124 (0.027) [-4.074]	-0.000 (0.000) [-345196.2]	-0.001 (0.000) [-12179.41]	0.000 (0.000) [234.540]	0.000 (0.000) [6669.514]	-0.0399 (0.000) [-173.032]
Côte d'Ivoire (Ivory Coast)	-0.464 (0.000) [23.882]	0.000 (0.000) [8.25E+08]	0.000 (0.000) [24169.94]	-0.002 (0.000) [-546.827]	-0.000 (0.000) [-30758.58]	-0.004 (0.000) [-282.963]
The Gambia	0.271 (0.010) [5.852]	-0.000 (0.000) [-1482981.]	0.000 (0.000) [-4590.106]	-0.000 (0.000) [-8859.475]	0.000 (0.000) [6567.495]	-0.012 (0.000) [-204.754]
Ghana	-0.114 (0.021) [4.474]	-0.000 (0.000) [-54989539]	-0.000 (0.000) [-12999.93]	0.001 (0.000) [8331.813]	-0.000 (0.000) [-7996.911]	-0.023 (0.000) [-410.595]

Country	D(SEG(-1))	D(MIGR)	D(KA)	D(REM)	D(INF)	COINTEQ
Guinea	0.481 (0.007) [15.059]	-0.000 (0.000) [-6684839.]	0.000 (0.000) [33008.57]	0.000 (0.000) [122.758]	0.000 (0.000) [344.053]	0.002 (0.000) [24.722]
Guinea-Bissau	0.358 (0.000) [17.050]	-0.000 (0.000) [-1843712.]	0.001 (0.000) [13537.70]	-0.001 (0.000) [2538.282]	-0.000 (0.000) [-19100.41]	-0.000 (0.007) [-6.644]
Liberia	0.088 (0.083) [2.564]	1.554 (0.537) [0.694]	1.674 (0.498) [-37127845]	-0.000 (-579.510) [0.770]	0.000 (0.000) [1063.909]	-0.012 (0.000) [-114.379]
Mali	0.132 (0.015) [5.116]	-0.000 (0.000) [-3564.385]	0.000 (0.000) [4464.652]	0.002 (0.000) [824.833]	-0.000 (0.000) [-8075.653]	-0.048 (0.000) [-312.413]
Mauritania	0.009 (0.019) [4.590]	-0.000 (0.000) [-9999989]	0.000 (0.000) [11340.88]	-0.003 (0.000) [-1138.130]	-0.000 (0.000) [-4512.442]	0.000 (0.083) [5.566]
Niger	0.000 (0.000) [17.832]	0.000 (0.000) [12113204]	0.000 (0.000) [20948.72]	0.001 (0.000) [1610.297]	-0.000 (0.000) [-16624.13]	-0.0120 (0.000) [-113.916]
Nigeria	0.242 (0.016) [4.881]	-0.000 (0.000) [-52257525]	0.002 (0.000) [10.472]	0.000 (0.000) [382.686]	0.000 (0.000) [7480.152]	0.008 (0.000) [243.098]
Senegal	0.368 (0.000) [17.495]	-0.000 (0.000) [-15605841]	0.000 (0.000) [2650.121]	0.003 (0.000) [2121.081]	-0.000 (0.000) [-8310.418]	0.020 (0.000) [197.563]
Sierra Leone	-0.1082 (0.040) [-3.481]	-0.000 (0.000) [-2335312.]	-0.000 (0.000) [-11436.75]	0.002 (0.000) [1332.951]	-0.000 (0.000) [-392.116]	-0.058 (0.000) [-173.384]
Togo	0.049 (0.342) [1.125]	0.000 (0.000) [93859201]	0.000 (0.000) [3091.210]	-0.000 (0.000) [-819.502]	-0.000 (0.000) [-3105.266]	0.002 (0.000) [21.368]

Key: SEG: sustainable economic growth, MIGR: migration, KA: capital stock, REM: remittances, INF: inflation.

Note: Values outside and within the parenthesis are t-statistics and prob. values respectively. Inference at $P<0.05$.

Source: Authors' compilation, 2024.

In Benin, the impact of migration (MIGR) on economic growth is marginally negative, with an estimated coefficient of -0.00, indicating an almost imperceptible influence. Similarly, the variables of capital stock (KA) and remittances (REM) each exhibit negligible effects, both recording coefficients of 0.000. Conversely, inflation (INF) is shown to have a detrimental impact on growth, reflected by a coefficient of -0.000. The error correction term (COINTEQ), with a value of -0.0138, suggests a gradual return to equilibrium following a disturbance.

In Burkina Faso, migration similarly exhibits a negligible impact, also with a coefficient of -0.000. Both capital stock (KA) and inflation (INF) present minimal effects on growth, recording coefficients of 0.000. In contrast, remittances (REM) exert a slight positive influence, indicated by a coefficient of 0.001. The error correction term (-0.0127) further confirms a slow convergence towards equilibrium.

Cape Verde's analysis reveals a negative impact from migration at -0.000, alongside a significant adverse effect of capital stock, which is quantified at -0.001. While remittances exhibit a negligible positive effect (0.000), inflation appears to positively influence growth with a coefficient of 0.000. The error correction term (-0.0399) denotes a slow adjustment process towards equilibrium.

In Côte d'Ivoire, migration's impact remains negligible, with a coefficient of 0.000. Conversely, capital stock (KA) positively contributes to growth, although remittances (REM) display a negative

effect (-0.002). Inflation (INF) has a minimal negative impact, quantified at -0.000 and the error correction term (-0.004) suggests a slow adjustment towards equilibrium.

The Gambia similarly reports a negligible negative impact from migration (-0.000), with both capital stock (KA) and inflation (INF) exhibiting minimal effects of 0.000. Remittances (REM) also negatively affect growth (-0.000). The error correction term (-0.012) reinforces the notion of a slow adjustment to equilibrium.

In Ghana, migration has a negative impact of -0.000, with significant negative effects observed in capital stock (-0.000). Conversely, remittances positively influence growth (0.001), while inflation negatively impacts growth (-0.000). The error correction term (-0.023) indicates a slow adjustment towards equilibrium.

In Guinea, migration positively influences growth with a coefficient of 0.000, while capital stock (KA) also demonstrates a positive effect (0.000). Both remittances and inflation exhibit negligible effects, recorded at 0.000 each. Notably, the error correction term (0.002) suggests a positive adjustment process towards equilibrium.

Guinea-Bissau presents a positive impact from migration (0.001) and capital stock (KA) (0.001), while remittances have a negative effect (-0.001). Inflation (INF) shows a negligible negative impact (-0.000) and the error correction term (0.002) indicates a positive adjustment process.

In Liberia, migration's impact is minimal, quantified at 0.088, while capital stock (KA) demonstrates a positive yet statistically insignificant effect (1.554). Remittances exhibit a negligible negative impact (-0.000) and inflation positively influences growth (0.000). The error correction term (-0.012) suggests a slow adjustment process.

Mali showcases a positive impact from migration (0.132), with capital stock (KA) also positively affecting growth (0.000). Remittances and inflation show minimal impacts, both recorded at 0.000, while the error correction term (-0.048) indicates a slow adjustment to equilibrium.

In Mauritania, migration's effect is positively correlated with growth (0.009), while capital stock (KA) negatively impacts growth (-0.000). Remittances display a minor positive effect (0.000) and inflation has a negative influence (-0.003). The error correction term (0.000) suggests a slow adjustment towards equilibrium.

Niger shows a negligible effect from migration (0.000). Both capital stock (KA) and remittances (REM) positively influence growth, with coefficients of 0.000 and 0.001, respectively. Inflation presents a minimal negative impact (-0.000) and the error correction term (-0.0120) suggests a gradual adjustment process.

In Nigeria, migration has a moderate positive impact quantified at 0.242. While capital stock (KA) negatively affects growth (-0.000), remittances (REM) have a positive influence (0.002). Inflation (INF) displays a minimal positive effect (0.000) and the error correction term (0.008) indicates a relatively faster adjustment towards equilibrium.

Senegal's analysis shows a negligible negative impact from migration (-0.000). Capital stock (KA) presents minimal negative effects (-0.000), whereas remittances positively influence growth (0.003). Inflation (INF) also shows a minimal negative impact (-0.000), with a moderate positive adjustment suggested by the error correction term (0.020).

Sierra Leone indicates a negligible negative impact from migration (-0.000). Both capital stock (KA) and remittances present minimal effects (-0.000 each), while inflation negatively impacts growth (-0.000). The error correction term (-0.058) reflects a slow adjustment process.

Finally, for Togo, migration exhibits a minimal positive effect (0.049). Capital stock (KA) positively influences growth (0.000), while remittances and inflation present negligible impacts (-0.000 each). The error correction term (0.002) suggests a positive adjustment towards equilibrium.

5. Conclusion

This study examined the relationship between international migration and sustainable economic growth in West Africa, using the Panel ARDL estimation technique to account for both short and long-term effects across countries. The findings indicate that migration has a significant positive long-run impact on sustainable economic growth, while remittances exert a negative long-run effect. This divergence suggests that migration, as a labour mobility mechanism, contributes productively to

development, whereas remittances are often directed toward consumption rather than investment. The results also highlight the heterogeneous nature of migration's impact across the region. While some countries experienced positive migration impacts, others have minimal or negative effects. Capital stock was found to positively influence growth, while inflation had an insignificant effect. These perceptions emphasize the need for tailored policy responses that reflect country-specific migration-growth dynamics and recognize migration as a multidimensional force in regional development.

Based on these findings, several policy actions are recommended. First, governments should design incentives such as matching grants and tax reliefs to encourage the investment of remittances in productive sectors like SMEs, infrastructure and education. Financial institutions should develop tailored investment products for remittance recipients, supported by financial literacy campaigns to promote productive usage. Second, creating an enabling environment for private investment through business-friendly reforms is essential to enhance capital accumulation. Third, labour market policies should support the reintegration of returning migrants and facilitate the recognition of skills acquired abroad, while also leveraging diaspora networks for investment and knowledge transfer. Countries facing negative migration impacts should focus on reducing brain drain by improving local employment opportunities and linking migration to domestic development goals. Lastly, ECOWAS should strengthen regional coordination by harmonizing migration and trade policies, operationalizing labour mobility agreements and investing in shared infrastructure. An integrated migration governance framework, linking fiscal policy, labour mobility and regional cooperation will ensure that migration becomes a sustained driver of inclusive economic growth across West Africa.

Authors' contribution: Introduction, Literature review and Methodology – G. M. Sokunbi; Result and Discussion – O. E. Maku; Conclusion and recommendation – O. A. Adelowokan.

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