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Capital Inflows, Climate Change and Economic Growth

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Abstract
Economic growth is a key objective for nations seeking to improve living standards and promote sustainable development. In many developing economies, particularly in West Africa, the role of capital inflows has been a subject of considerable debate. Foreign capital inflow is often seen as a catalyst for economic transformation, providing financial resources that supplement domestic savings and investment. However, ongoing climate-related challenges may undermine its benefits by creating an unstable economic environment. This instability can discourage investment and impede development efforts. The study examined the impact of capital inflows and climate change on the economic growth of Ghana, Gambia, Liberia, Nigeria, and Sierra Leone, utilising data from 1980 to 2022. The Feasible Generalized Least Squares (FGLS) estimation technique was employed to analyse the data. The capital inflow was proxied by official development assistance (ODA) and foreign direct investment (FDI), while climate change was measured by temperature (TEM) and precipitation (RAN). The results showed that FDI, ODA, and TEM significantly contribute to positive economic growth, as measured by GDP per capita (in current U.S. dollars). However, precipitation does not affect economic growth. These findings underscore the vital importance of capital inflows in promoting regional economic growth. The governments of the five countries should implement measures to streamline business regulations and simplify investment procedures. By doing so, they can create a more attractive environment for foreign investors, ultimately boosting the flow of ODA and FDI into their economies.

Keywords: *Foreign Direct Investments, Feasible Generalized Least Squares, Official Development Assistance, Temperature*

1. Introduction

Economic growth is a fundamental objective for nations seeking to improve living standards, reduce poverty, and foster overall economic stability. Economic growth in English-speaking West African countries is influenced by various factors, including external capital flows and environmental conditions. Traditionally, Foreign Direct Investment (FDI) and Official Development Assistance (ODA) have been recognised as key drivers of this growth. FDI contributes to capital formation and facilitates the transfer of technology and managerial expertise, helping nations integrate into global markets. Meanwhile, ODA provides essential infrastructure,

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education, and healthcare funding, vital for sustained economic progress. However, in a region where agriculture and natural resource-based activities play a significant economic role, climatic variables—particularly precipitation and temperature—can have critical and sometimes disruptive effects (Dollar & Kraay, 2002; Jena & Sethi, 2020).

FDI is universally acknowledged as a significant catalyst for economic growth, particularly within emerging economies. FDI entails the transfer of capital, technology, managerial expertise, and various other resources from one country to another, generally from multinational corporations (MNCs) or foreign entities to local businesses or projects. This influx of foreign capital stimulates economic activity in the host country by fostering industrial development, improving infrastructure, and generating employment opportunities (Ortega & Sanjuán, 2023; Marwan et al., 2025).

The correlation between economic growth and FDI has been a focal point of extensive academic and policy discussions. Proponents argue that FDI plays a crucial role in promoting economic development by providing developing economies with access to capital, technology, and international markets, which are often unattainable through domestic channels. Additionally, FDI can boost productivity and innovation within local industries by facilitating knowledge transfer, enhancing managerial practices, and introducing advanced production techniques. Furthermore, FDI has the potential to stimulate trade, improve the overall business climate, and create new job opportunities, all of which contribute to sustained economic growth (Nguyen, 2020; Rao et al., 2023).

Conversely, critics emphasize the potential negative impacts of FDI on a host country's economy. Their concerns often focus on issues such as the repatriation of profits, in which foreign investors may withdraw a substantial portion of the income generated, thus limiting the long-term advantages for the host economy. Furthermore, the dominance of foreign-owned firms can stifle the growth of local businesses and industries, leading to a reliance on external capital and technology. In certain instances, FDI inflows may become concentrated in specific sectors, leaving other areas of the economy underserved (Dutta et al., 2016; Belloumi & Alshehry, 2018).

Official Development Assistance (ODA) has long been vital for promoting economic growth in developing countries. Commonly referred to as foreign aid, ODA refers to the financial and technical support extended by developed nations and international organizations/agencies provide to facilitate economic growth, reduce poverty, and strengthen institutions in lower-income countries. Furthermore, ODA is essential in stabilizing economies during crises, delivering humanitarian aid, and tackling global challenges such as climate change and public health emergencies (Fashina et al., 2018; Isiaka & Makinde, 2020).

The economic literature has extensively debated the correlation between ODA and economic growth. Some scholars contend that ODA supplies much-needed financial resources to economies that struggle with insufficient domestic savings and investments, thereby supporting infrastructure development and public services. Numerous ODA programs enhance healthcare, education, and food security, ultimately reducing poverty and improving living standards. Additionally, ODA facilitates the transfer of technology, expertise, and best practices from industrialized to low and middle-income nations, thereby boosting productivity and strengthening institutional capacity. ODA also plays a vital role in humanitarian assistance and post-conflict reconstruction, fostering stability and resilience in fragile states (Mukaddas, 2019; Nguyen, 2020).

Some argue that ODA can create dependency on foreign aid, hinder domestic resource mobilization, and reduce incentives for sustainable growth. Mismanagement and weak governance can diminish its effectiveness. Additionally, ODA, particularly in the form of grants, can distort local markets and stifle private-sector growth. Some programs require recipients to buy from donor nations, limiting economic benefits and autonomy. Moreover, many aid programs focus on short-term relief rather than long-term economic transformation, reducing their potential for sustainable development (Fashina et al., 2018; Zardoub & Sboui, 2023).

West Africa is particularly vulnerable to climate variability, where precipitation and temperature directly affect agricultural productivity, food security, and, ultimately, the broader economy. Changes in rainfall patterns can lead to both droughts and flooding, which can adversely affect crop yields and rural livelihoods. Similarly, rising temperatures, a byproduct of global climate change, can alter growing seasons and increase the incidence of pests and diseases, further

exacerbating challenges to the agricultural sector. Given that many English-speaking West African nations rely heavily on agriculture, these climatic factors are not merely environmental concerns but integral determinants of economic growth (Barry et al., 2018; Carr et al., 2022).

The relationship between external financial inflows and climate variables is complicated. On the one hand, foreign direct investment (FDI) can bring advanced technologies and practices that help mitigate the negative impacts of climate variability, thereby improving resilience. On the other hand, ongoing climate-related challenges can undermine the potential advantages of both FDI and official development assistance (ODA) by creating an unstable economic environment. This instability can discourage investment and hinder development efforts.

1.2 Problem Statement

Despite the recognised importance of capital inflows for financing development and the increasing severity of climate change impacts on vulnerable West African economies, there is an insufficient understanding of how these two critical external factors, individually and in combination, have shaped the economic growth trajectories of Ghana, Gambia, Liberia, Nigeria, and Sierra Leone between 1980 and 2022. This lack of comprehensive empirical evidence hinders policymakers' ability to formulate integrated strategies that effectively leverage external finance for sustainable development while building resilience against climate change in these specific countries.

While capital inflows are typically viewed as beneficial for enhancing economic development, it is essential to recognize that the different forms these inflows may take—such as Foreign Direct Investment (FDI) and Official Development Assistance (ODA)—can exert varying effects on economic growth. Additionally, the overall effectiveness of these capital inflows is often affected by the recipient country's absorptive capacity, institutional quality, and macroeconomic management. Therefore, understanding these nuances is vital for policymakers aiming to maximize the positive impact of capital inflows on their economies (Butkus et al., 2021).

These countries are facing both direct and indirect economic costs due to climate change. These impacts significantly disrupt key productive sectors, including agriculture, fishing, and tourism, which are essential to their economies. Moreover, climate change challenges the infrastructure that

supports these sectors—such as roads, ports, and energy systems—resulting in higher maintenance costs and diminished efficiency. Additionally, human capital is adversely affected, with climate change contributing to health issues, decreased work productivity, and, in some cases, community displacement. Unfortunately, the extent to which these impacts are systematically integrated into economic growth models, particularly about capital flows, remains limited.

Empirical studies examining the influence of foreign capital inflow on economic growth have yielded mixed results. Regarding ODA, Nguyen (2020) concluded that ODA has a positive impact on economic growth. Conversely, Fashina et al. (2018) and Zardoub and Sboui (2023) reported a negative effect, while Isiaka and Makinde (2020) and Awino and Kioko (2022) found no significant influence of ODA on economic growth. Similarly, in the case of FDI, Nguyen (2020) and Rao et al. (2023) identified a positive effect, while Dutta et al. (2016) and Belloumi and Alshehry (2018) showed a negative effect. In contrast, Obwona (2001) and Zardoub and Sboui (2023) reported no impact of FDI on economic growth.

The effectiveness of capital inflows in enhancing climate resilience and adaptation efforts remains unclear; it is possible that these funds are being directed towards sectors that could be vulnerable to climate change or exacerbate existing vulnerabilities. Additionally, the effects of climate change may influence the appeal and stability of capital inflows. Without a comprehensive understanding of these interactions, policy responses may become fragmented and less effective.

Furthermore, the literature has thoroughly explored the individual effects of ODA and FDI on economic growth, as well as the separate impacts of climatic conditions on agricultural productivity. However, there is a notable gap in understanding how these factors are interconnected in relation to economic growth.

1.3 Research Objectives

The primary objective of this study is to investigate the impact of capital inflows and climate change on the economic growth of Ghana, Gambia, Liberia, Nigeria, and Sierra Leone. The specific objectives are:

1. To examine the effect of Foreign Direct Investment (FDI) on economic growth.

2. To analyse the impact of Official Development Assistance (ODA) on economic growth.
3. To assess the effect of temperature (TEM) on economic growth.
4. To evaluate the impact of precipitation (RAN) on economic growth.

1.4 Research Hypotheses

The following alternative hypotheses were developed to address the study's objectives.

$H1_1$: Foreign Direct Investments significantly impact economic growth

$H2_1$: Official Development Assistance affects economic growth

$H3_1$: Temperature significantly impact economic growth

$H4_1$: Precipitation affects economic growth

2.0 Theoretical Framework

The study is based on the Solow-Swan model

2.1 Solow-Swan Model

The Solow-Swan model is a key economic theory that explains long-run growth through labour force growth, technological progress and capital accumulation. It highlights the importance of savings and investment in boosting capital accumulation and, consequently, an economy's output. Capital accumulation occurs when savings are reinvested in the economy, thereby boosting machinery and infrastructure. This increases capital stock and enhances labour productivity, resulting in higher output. The model also considers labour force growth, which is driven by population growth and workforce participation and is vital for economic expansion (Dykas et al., 2023).

The Solow-Swan model serves as a valuable analytical framework for examining how ODA and FDI can foster economic growth. It highlights the importance of capital accumulation as a primary driver of growth while emphasising the role of technological advancement, which, although indirectly, is crucial in enhancing productivity. The model illustrates how ODA can provide essential financial resources for developing countries, enabling them to invest in infrastructure and human capital, thus bolstering their economic capabilities. Simultaneously, FDI brings financial

capital, new technologies, and management practices from foreign investors, further promoting innovation and efficiency in local economies (Njoroge, 2021; Mairafi et al., 2024).

The detrimental effects of climate change pose significant obstacles to achieving sustainable economic growth. Climate change can severely damage physical capital, including infrastructure and real estate, potentially deterring future investments. Furthermore, it adversely impacts labour productivity, as extreme weather events and shifting climatic conditions disrupt work environments and diminish worker efficiency. Additionally, climate change may hinder technological advancement by diverting priorities and resources toward mitigating its impacts, rather than fostering innovations that drive growth. West African countries that speak English should implement policies to maximise the advantages of foreign investment while addressing the risks of climate change to sustain economic growth (Hadero, 2014; Islam et al., 2021).

2.2 Empirical Review

2.2.1 FDI, ODA, and Economic Growth

Obwona (2001) conducted an in-depth study on the effect of ODA and FDI on economic growth in Uganda from 1981 to 1995. The study employed a two-stage least squares (2SLS) estimation technique to analyze the data, which allowed for a more robust examination of the relationships among the variables of interest while accounting for potential endogeneity issues. Their findings revealed that FDI does not impact economic growth during the specified period. Conversely, the results showed that ODA had a substantial and positive impact on Uganda's economic growth.

Nguyen (2020) conducted a study examining the impact of FDI, ODA, and exports on economic growth in Vietnam from 1997 to 2018. The economic growth was proxied by Gross Domestic Product (GDP) in current dollars. The analysis used the Ordinary Least Squares (OLS) estimation technique. The results reveal that FDI and ODA foster positive economic growth.

Rao et al. (2023) explored the influence of FDI and ODA on economic growth in Southeast and South Asia, covering the period from 1980 to 2015. The researchers used an ordinary least squares (OLS) estimation technique to analyze the data. Their findings indicated that FDI had a significant

positive effect on economic growth during this timeframe. In contrast, the results showed that ODA had a substantially negative impact on economic growth.

Wehncke et al. (2022) investigated the influence of FDI and ODA on economic growth within a sample of 20 selected African countries, covering the period from 2000 to 2018. The researchers focused on the GDP growth rate as a measure of economic growth. The data was analyzed using autoregressive distributed lags (ARDL). The study's results revealed that FDI and ODA have a significantly positive effect on the economic growth of the examined countries.

Zardoub and Sboui (2023) analyzed the impact of capital inflow on economic growth in 34 developing countries from 1990 to 2016. The researchers used GDP per capita (measured in current U.S. dollars) to measure economic growth. The data was analyzed using a fixed-effect estimation technique. Their findings revealed that FDI does not statistically affect economic growth. However, the analysis showed that ODA has a significantly negative impact on economic growth.

2.2.2 Climate Change and Economic Growth

Hadero (2014) examined the influence of climate change on Ethiopia's economic growth over three decades, from 1980 to 2012, utilizing a vector autoregressive (VAR) methodology for their analysis. The findings reveal that rising temperatures have a significantly negative impact on economic growth. In contrast, rainfall has a significantly positive influence on economic growth.
Islam et al. (2021) examined the impact of climate change and macroeconomic factors on economic growth in Saudi Arabia over a nearly three-decade period, specifically from 1990 to 2019. They employ the Autoregressive Distributed Lag (ARDL) approach to investigate the complex long-run relationship among these variables. Their study reveals that an increase in temperature correlates positively with economic growth. Conversely, the results indicate that precipitation has a significantly adverse effect on economic growth.

Talib et al. (2021) investigated the impact of climate change on agricultural growth across 32 Sub-Saharan African countries from 1961 to 2019. Utilizing the Autoregressive Distributed Lag (ARDL) approach, they examined the complex long-term relationships among these variables.

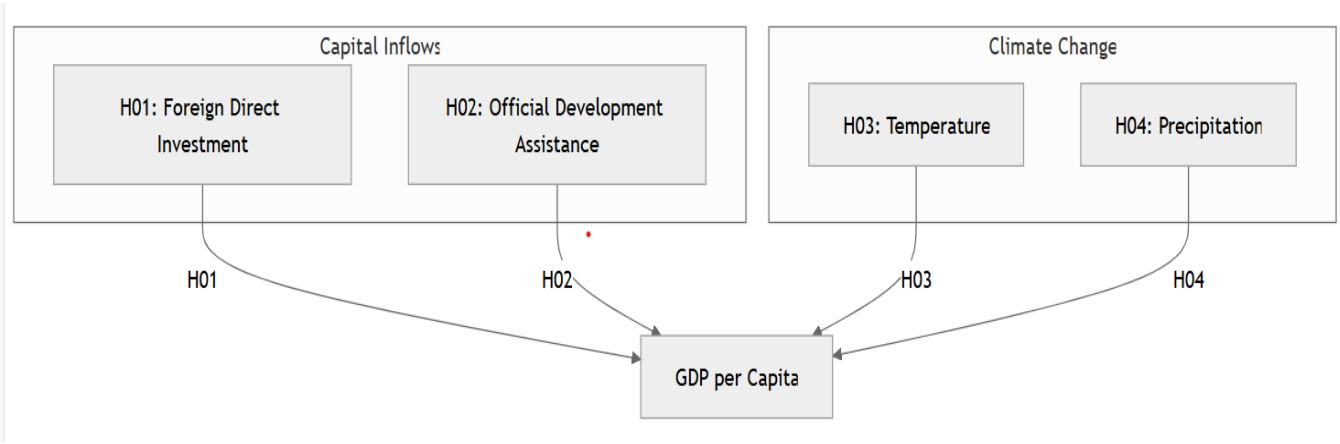
Their findings reveal a negative correlation between rising temperatures and agricultural growth. In contrast, the results show that precipitation has no significant effect on agricultural growth.

Doğanlar et al. (2024) investigated the impact of climate change on economic growth in the top 20 countries responsible for the largest carbon emissions from 1990 to 2019. Using the Generalized Method of Moments approach, they analyzed the relationships among these variables. Their findings indicate a positive correlation between rising temperatures and economic growth. However, their results indicate that precipitation does not have a significant impact on economic growth.

2.3 Conceptual Framework

The study examines the impact of capital inflows and climate change on economic growth, using Gross Domestic Product (GDP) per capita as a proxy for economic growth. The framework integrates two main dimensions: capital inflows and climate change, each operationalized through measurable indicators.

Figure 2.1: Conceptual framework for the effect of capital inflows and climate change on economic growth



Source: Researcher's Design (2025)

Figure 2.1 depicts the dependent and independent variables in the study. H_{01}: explores the impact of foreign direct investment on economic growth. H_{02}: investigates the effect of official development assistance on economic growth. H_{03}: examines the influence of temperature on economic growth. H_{04}: explores the impact of precipitation on economic growth.

3. Research Methodology

3.1 Population, Scope, Sources of Data and Sample Size

The sample comprises five English-speaking West African countries: Ghana, Gambia, Liberia, Nigeria, and Sierra Leone. It spans the period from 1980 to 2022. The time-series data for this study were sourced from the World Bank's World Development Index.

3.2 Model Specifications

$LGDPC_{it} = \beta_0 + \beta_1 LFDI_{it} + \beta_2 LODA_{it} + \beta_3 LTEM_{it} + \beta_4 RAN_{it} + + \mu_{it}$

Where:

GDPC = Gross Domestic Product per Capita (current US$)

ODA = Official Development Assistance (current US$)

FDI = Foreign Direct Investment (current US$)

TEM = Temperature

RAN = precipitation

μt = error term

β0 = represents the constant β1 -β4 = represents the coefficient of the independent variables

β_0, β_1, β_2, β_3, and β_4, = Model Intercept

4. Data Analysis and Results

4.1 Descriptive Statistics

Table 4.1 displays the results of the descriptive statistics. **GDP per capita (GDPC):** The average GDP per capita (GDPC) across the five countries is approximately $755.06, indicating low-income levels typical of many developing nations in West Africa. The lowest GDP per capita recorded is $61.49, reflecting extreme poverty in at least one country, while the highest is $3,088.72, suggesting significant economic growth or resource exports in certain years. With a standard deviation of $644.48, there is significant variability in GDPC per capita, indicating substantial economic disparities among countries. The GDPC per capita distribution is positively skewed (1.554), indicating that most countries have lower values, with a few significantly higher ones, often due to factors such as Nigeria's oil revenue. A kurtosis value of 4.549 indicates a leptokurtic

distribution, suggesting that extreme GDPC values are primarily driven by crises, policy changes, or external shocks that affect countries differently.

Table 4.1: Descriptive statistics

Stats	GDPC (current US$)	FDI (current US$)	ODA (current US$)	TEM	RAN
Mean	755.058	804,000,000	603,000,000	26.993	1665.489
Min.	61.490	-739,000,000	31,700,000	24.780	830.680
Max.	3088.721	8,840,000,000	11,400,000,000	29.050	3058.120
Std. Dev.	644.4783	1,590,000,000	1,120,000,000	1.047	699.310
Skewness	1.554	2.800	5.471	-0.294	0.434
Kurtosis	4.549	11.565	45.594	2.126	1.404
Obs. (N)	215	215	215	215	215

Source: Authors' Computation (2025)

Foreign Direct Investment (FDI): The average FDI inflow for the five countries over the period is $804 million, indicating a moderate annual attraction of FDI, with some countries, such as Nigeria and Ghana, likely receiving higher amounts. The dataset shows the lowest inflow of -$739 million, where capital outflows exceeded inflows, and the highest inflow of $8.84 billion, signifying a peak in foreign investment. The standard deviation of $1.59 billion suggests significant fluctuations in FDI, while a skewness value of 2.800 indicates a long right tail due to a few large inflows from larger economies. The kurtosis value of 11.565 indicates a leptokurtic distribution, suggesting the presence of extreme outliers in the data.

Official Development Assistance (ODA): The five countries collectively receive approximately $603 million in average annual ODA, indicating substantial financial assistance. The lowest ODA recorded is $31.7 million, while the highest is $11.4 billion, reflecting significant fluctuations likely due to humanitarian crises or major projects. A high standard deviation of $1.12 billion points to variability in aid, influenced by donor policies and geopolitical factors. The data shows a positive skew (5.471), indicating that a few years with high ODA inflows raise the average. A high kurtosis

value of 45.594 suggests the presence of extreme outliers and a concentration of low ODA amounts, with occasional spikes.

Temperature (TEM): The average temperature across five West African countries over 43 years is approximately 26.99°C, indicating a slightly warm climate. The lowest recorded annual mean temperature is 24.78°C, while the highest reaches 29.05°C. A standard deviation of 1.047°C reflects moderate variability, suggesting that temperatures have remained relatively consistent. The negative skewness of -0.294 demonstrates a tendency for more years to have above-average temperatures, with fewer extremely low readings. A kurtosis value of 2.126 indicates that the temperature distribution is nearly normal, albeit with slightly fewer extreme values than would be expected in a perfectly normal distribution.

Precipitation (RAN): The average annual precipitation for the five countries over 43 years is 1,665.489 mm, suggesting a generally wet climate with notable variations. Coastal countries like Liberia and Sierra Leone likely experience higher rainfall compared to more inland countries like Nigeria and Ghana. A minimum of 830.680 mm indicates some regions experienced droughts, while a maximum of 3,058.12 mm suggests extreme rainfall events. The standard deviation of 699.310 mm indicates significant variability in rainfall, and the positive skewness of 0.434 suggests that more years have below-average precipitation. The kurtosis of 1.404 implies a relatively flat distribution, suggesting fewer extreme outliers.

4.2 Test for Multicollinearity

Tables 4.2 and 4.3 present the correlation matrix and the VIF (Variance Inflation Factor) test results.

Table 4.2: Correlation Analysis

	LFDI	**LODA**	**TEM**	**LRAN**
LFDI	1.000			
LODA	0.613	1.000		
TEM	0.020	0.068	1.000	
LRAN	-0.037	0.051	-0.8032	1.000

Source: Authors' Computation (2025)

Table 4.3 Variance Inflation Factor

Variable	VIF	1/VIF
LRAN	3.010	0.332
TEM	3.000	0.333
LODA	1.720	0.582
LFDI	1.660	0.603
Mean VIF	2.35	

Source: Authors' Computation (2025)

A significant negative correlation of -0.8032 exists between temperature and precipitation, indicating that precipitation tends to decrease as temperatures rise. This phenomenon is common in various climatic systems, where warmer regions typically experience reduced rainfall. A moderate positive correlation of 0.613 was observed between ODA and FDI. This suggests that countries that receive more ODA also attract more FDI. The Variance Inflation Factor (VIF) is below 10, indicating no concerns about multicollinearity. This means the independent variables are not highly correlated, enhancing the reliability of the model's coefficients and results.

4.2 Empirical Results

4.2.1 Pre-Estimation Checks

Table 4.4 Pre-Estimation Checks Results

Variables	Pesaran CD Test	Im-Pesaran-Shin Test		Westerlund Test
		Level	1st Diff.	
LGDPC	12.634***	-1.2565	-7.7748***	2.5592**
LFDI	12.517***	-3.4185***		
LODA	14.964***	-1.8704**		
TEM	17.421***	-5.7909***		
LRAN	8.630***	-7.9333***		

Source: **Authors' Computation, 2025**
Statistical significance levels at 0.10*, 0.05 **, and 0.01 ***

Table 4.4 presents the pre-estimation check results. These checks include (1) assessing cross-sectional dependence to ascertain whether observations impact each other, (2) testing for stationarity to verify the stability of time series properties, and (3) performing co-integration tests to uncover long-run equilibrium relationships among variables.

The results of the Pesaran CD test indicate a strong cross-sectional dependence among all variables. The IPS test findings show that GDP per capita is non-stationary at the level but becomes stationary after first differencing. In contrast, all other variables are stationary at their levels. Additionally, the Westerlund test results demonstrate that GDP per capita (GDPC), ODA, FDI, temperature, and precipitation share a long-run equilibrium relationship.

Table 4.5: Empirical results

Variable	Coefficient	Prob.
C	-6.058**	0.010
LFDI	0.167***	**0.000**
LODA	0.121***	**0.000**
TEM	0.268***	**0.000**
LRAN	-0.031	**0.824**
Wald Test	331.840***	**0.000**

Source: **Authors' Computation, 2025**
Statistical significance levels at 0.10*, 0.05 **, and 0.01 ***

The results presented in Table 4.5 highlight the findings of the panel regression analysis. Wald Test (331.840, p-value = 0.000): This indicates that the model is significant, suggesting the variables explain economic growth.

1. **Foreign Direct Investment (FDI)**: The result reveals a significant positive correlation with a coefficient of 0.167 and a p-value of 0.000. This implies that a 100% increase in FDI is associated with an approximate 16.7% increase in economic growth if other factors remain constant. In summary, the evidence reinforces the pivotal role of FDI in driving economic progress. The findings align with those of Nguyen (2020) and Wehncke et al. (2022). However, this conclusion differs from the research conducted by Obwona (2001) and Zardoub and Sboui (2023), which indicated that FDI does not impact economic growth. FDI provides essential capital for investment in key sectors such as manufacturing, telecommunications, oil and gas, and agriculture. It brings multinational corporations (MNCs) into the market, fostering business establishment, job creation, and reduced unemployment. Additionally, foreign companies often provide training and skills development, enhancing the local workforce's productivity. FDI also facilitates the transfer of advanced technology, modern production techniques, and effective management practices to domestic enterprises, thereby boosting productivity and competitiveness in key industries such as manufacturing and agriculture.

2. **Official Development Assistance (ODA)**: The influence of ODA on economic growth has a coefficient of 0.121 and a p-value of 0.000, indicating a statistically significant impact at the 1% significance level. This implies that every 100% rise in ODA would lead to an approximate 12.1% rise in economic growth. This finding highlights ODA's significant contribution to stimulating economic growth and its crucial role as a vital financial resource for developing countries. The results align with the findings of Nguyen (2020) and Wehncke et al. (2022). In contrast, research by Rao et al. (2023) and Zardoub and Sboui (2023) showed that ODA negatively impacts economic growth. ODA is crucial in bolstering infrastructure development across various sectors, including transportation networks, energy systems, healthcare facilities, and educational institutions. This comprehensive support lays a solid foundation for sustainable economic growth and fosters long-term resilience within communities. Moreover, ODA-funded programs frequently incorporate capacity-building initiatives to strengthen local institutions and enhance workforce skills and knowledge. These programs empower individuals and communities to thrive by investing in human capital. In addition to its focus on infrastructure and human development, ODA actively assists economies in diversifying their sources of income. By reducing over-reliance on commodity exports, ODA promotes agricultural investments, the development of small and medium-sized enterprises (SMEs), and various social sector projects. This multifaceted approach helps create a more balanced and robust economic landscape, ultimately contributing to sustained growth and improved living standards.

3. **Temperature (TEM):** The results show that temperature positively and significantly affects economic growth. A 100% increase in temperature corresponds to a 26.8% increase in economic growth, assuming all other variables remain constant. The findings agree with the results of Rigas and Kounetas (2021) and Doğanlar et al. (2024). However, this conclusion differs from the research conducted by Talib et al. (2021) and Meyghani et al. (2023), which indicated that TEM negatively impacts economic growth. The positive impact of temperature on economic growth in English-speaking West African countries can be attributed to several factors. Warmer temperatures can enhance the growth of certain crops, including cocoa in Ghana and Nigeria, as well as oil palm, which thrive in tropical climates. Extended growing seasons and improved yields for heat-tolerant crops contribute significantly to economic prosperity. Additionally, warmer weather, particularly in coastal regions like The Gambia and Sierra Leone, can attract tourists seeking beach resorts and wildlife experiences. This surge in tourism leads to job creation and increased revenue for the

hospitality, transportation, and local business sectors. Unlike colder regions, these countries incur minimal heating costs, allowing households and businesses to redirect their income towards other economic activities. Moreover, lower heating expenses help reduce government spending on energy subsidies.

4. **Precipitation (LRAN):** The result shows that precipitation slightly negatively affects economic growth, represented by a coefficient of -0.031. However, this effect is considered statistically insignificant, as indicated by a p-value of 0.824. This high p-value suggests that fluctuations in rainfall patterns do not significantly impact the economic growth of these countries. The results align with the findings of Talib et al. (2021) and Doğanlar et al. (2024). In contrast, research by Islam et al. (2021) and Meyghani et al. (2023) showed that RAN negatively impacts economic growth. The insignificant impact of precipitation on economic growth can be attributed to several factors. Many of these nations have economies that are not exclusively reliant on rain-fed agriculture. Significant contributions to GDP come from sectors such as oil and gas (notably in Nigeria), mining (in Ghana and Sierra Leone), and services, thereby diminishing the direct influence of rainfall on overall economic performance. Furthermore, investments in irrigation and modern agricultural practices have reduced reliance on rainfall. For instance, Ghana and Nigeria have established irrigation systems that support agricultural activities, making precipitation less critical. Additionally, a growing proportion of the population in these countries resides in urban areas where economic activities focus more on industry, services, and trade rather than agriculture, resulting in urban economies that are less sensitive to variations in rainfall.

5. Conclusions and Recommendations

This study examined the effect of capital inflow and climate change on economic growth in Ghana, Gambia, Liberia, Nigeria, and Sierra Leone between 1980 and 2022, using Feasible Generalised Least Squares (FGLS). The capital inflow was proxied by ODA and FDI, while climate change was measured by temperature (TEM) and precipitation (RAN). The results showed that FDI, ODA, and TEM significantly contribute to positive economic growth, as measured by GDP per capita (current US$). However, precipitation does not affect economic growth. The results indicate that FDI is a vital source of external financing, enhancing capital formation, promoting technological advancements, and stimulating employment opportunities. Similarly, ODA has played a crucial role in supplementing domestic resources, funding infrastructure projects, and supporting social

programs that contribute to economic growth. The findings of this study highlight the significant advantages associated with capital inflows, particularly in fostering economic development and enhancing investment opportunities. However, they also stress the critical importance of implementing strategic policies designed to maximise the positive impacts of these inflows on sustainable economic growth. To effectively harness the potential benefits of foreign capital, the following policy recommendations are proposed. To attract increased foreign direct investment (FDI), governments should pursue policies that foster a stable macroeconomic environment, strengthen property rights, and refine regulatory frameworks. Recipient countries should allocate official development assistance (ODA) towards productive sectors such as healthcare, education, and infrastructure to foster long-term economic growth and positive development outcomes. Policies should facilitate the integration of foreign investment with local industries to encourage knowledge transfer, skill development, and the diffusion of technology. Additionally, policymakers should investigate climate adaptation strategies that optimise temperature benefits while mitigating the risks associated with extreme weather events.

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