

Does External Resource Inflows Improve Income Distribution? The West Africa Experience

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Abstract—In recent decades, West African countries have experienced significant inflows of aid, remittances, and foreign investments, yet persistent challenges in income distribution remain. This paradox raises questions about the effectiveness of external resources in promoting income distribution, motivating the need for a comprehensive empirical investigation. This study examined the effect of external resource inflows on income distribution in the West Africa sub-region, focusing on net official development assistance, private remittances, and foreign direct investment as proxies of external resource inflows as well as income distribution (proxied by Gini index). The study used annual panel data spanning 2009 – 2023, sourced from the World Bank's World Development Indicators and African Development Bank. The major technique of data analysis adopted is System Generalized Method of Moments (GMM) approach. Empirical results indicate that net official development assistance has a negative and significant effect on Gini index in West Africa sub-region; private remittances has a negative and significant effect on Gini index in West Africa sub-region; foreign direct investment has a negative and significant effect on Gini index in West Africa sub-region. The findings suggest that external resources have the potential to equitable income distribution in West Africa sub-region. Based on the findings, the study concluded that external resource inflows significantly promote equitable distribution of income in the West Africa sub-region. Based on these findings and conclusion, it was recommended among others that policymakers should strengthen institutional frameworks and accountability mechanisms to ensure that external resources are directed toward investments that generate employment, reduce inequality, and alleviate poverty.

I. INTRODUCTION

Globally, external resources play an indispensable role in economic growth/ development and transformation. However, external resources inflows are particularly needed by emerging economies and by extension, the West African sub region. In recent times, concerns have been raised in regard to income distribution, high rates of unemployment and poverty in the West African sub region, which have led many citizens of their own countries to migrate to other parts of the countries in

the world. The West African sub region has faced underdevelopment, even with the blessing of several mineral resources that are available across the region, the citizens are hardworking, and the majority of these countries are facing issues of money laundering, financing of terrorism, and risks and corruption related to foreign aids and inflows in addition to the low level of compliance with the relevant recommendations of the Financial Action Task Force (FATF 2012). According to the Organization for Economic Co-operation and Development (OECD) (2023), official development assistance (ODA), private remittances (PRIMIT) and Foreign direct investment (FDI) are relevant means of development financing in the West-African sub-region. Notably, ODA has been globally identified as of the key pillars of development, as its volume is important for building infrastructure, health, and education, most times, exceeding other forms of aid in certain periods. Despite sustained rise of external resource inflows (ODA, PRIMIT, and FDI) over the years except a decline during the COVID-19 to the West African sub-region, World Bank (2024), which could have greatly improve the livelihoods of receiving countries by smoothing consumption, investment and to enhance economic development across the region but less to show fort in the region. At an aggregate level in the receiving countries, it could facilitate economic stability, improve creditworthiness, and attract investments to promote economic growth and reduce poverty. External resources inflows have not yielded much progress in West African sub-region in regards to income distribution reduction. Notably, these external resources to developing countries indicate that, developing countries have been experiencing high inflows of ODA, PRIMIT and FDI over time. World Bank (2024). Even the shortfall during the COVID-19 did not exceed two years (2020-2021), as its value rose again in 2022, leading to equitable distribution of income.

Globally, the role of external resources inflows such as Net official development assistance (ODA),

Private remittances (PRIMIT) and foreign direct investment (FDI) in development has impressively increased due to empirical evidence of their impacts on the economies of developing countries. ODA, PRIMIT and FDI inflows to the West African region have been growing at a slower pace than those in other regions, despite their potential contributions and benefits. According to Catalin (2014), ODA, PRIMIT and FDI inflows have the capacity to improve the livelihoods of receiving populations by smoothing consumption and enabling investments in human and other capital. At an aggregate level in the receiving countries, they could facilitate economic stability, improve creditworthiness, and attract further investments to promote economic growth and reduce poverty.

However, there has been little or no progress in the West African region, and if there is, to what extent have ODA, PRIMIT and FDI affected income distribution in the region. Notably, the Economic Community of West African States (ECOWAS) has implemented various programs, including the ECOWAS Common Investment Code with the aim to harmonize investment policies across member states to create a more predictable and business friendly environment, the ECOWAS Vision 2050 which positions the region as a preferred destination for national and foreign investment through sustainable development initiatives, and infrastructure focused aid routes that leverage ODA, PRIMIT and FDI to build economic corridors and energy projects, as supported by OECD analyses on sustainable investment policies in ECOWAS. Despite ECOWAS efforts to attract FDI and strengthening economic ties with donors for ODA, PRIMIT and FDI, challenges such as political instability and corruption have stood against progress, with FDI in Africa accounting for only 3.5 percent of global FDI in 2023 in the midst of uncertainties and inadequate infrastructure, leading to income inequality. Hence, this study aimed to examine the effect of external resources inflows on income distribution in West Africa sub-region. Specifically, the study sought to ascertain the impact of external resources inflows (net official development assistance, private remittances and foreign direct investment) on income distribution within the West Africa sub-region.

II. LITERATURE REVIEW

The Classical Theory (of economics) was not developed by a single individual; rather, it was formulated by a group of early economists known as the Classical economists during the late 18th and early 19th centuries. However, the theory is primarily attributed to: Adam Smith, who laid the foundation in 1776 with his seminal work, *The Wealth of Nations*. The classicalist school view industrialization from the positive aspect of remittance, as they posit that developing countries will promote their economic development/ modernization through large-scale technology transfer and industrialization from the developed ones. To the classists, modern knowledge, ideas, innovation, rational and democratic ideas needed to promote the developing countries only flows from the developed countries. Therefore, the exposure of the traditional economy to acceleration stage involves the transfer of knowledge which is a product of migration. Hence, to the classical school of thought, inflows are proceeds from migration which occurs when people move from one region to the other due to industrialization in the destination region.

Also, the Neoclassical Economic Theory is primarily attributed to: William Stanley Jevons – developed marginal utility theory in 1871 (*The Theory of Political Economy*). This theory argued that free flow of external capital, trade, and foreign direct investment (FDI) helps allocate resources more efficiently, boosts productivity and accelerates development, especially when domestic savings are insufficient. The neoclassical schools steep forward to posit that the marginal productivity of labour and subsequently domestic wage will increase when labour migrate. To this school, the migration of labour result to the scarcity of workforce in the source country, which in turn will lead to pressure on the demand for labour resulting from the low supply of labour. The marginal productivity will increase in this process and the pressure from demand will drive domestic wage higher. As against the capitalist view, remittance and foreign capital flow move in opposite direction with the equilibrium in the domestic economy until the developmental role of migration is fully utilized. To the neoclassical school, inflows' will be neutralized in the long run, since the migrants are motivated by higher wage or wage differentials, their leaving will increase the source country's wage, and in the long run, the real wage differential will smoothen out.

As regards, Neo-Marxist Theory, Antonio Gramsci – who developed key Neo-Marxist ideas such as cultural hegemony during the 1920s–1930s (especially in his Prison Notebooks, written between 1929–1935). The Neo-Marxist theory view foreign resource inflows as the force behind the drive of the capitalist system. The capitalist exploits the excess labour from developing countries and underpay them. These remittances are sent to the migrant's family at the source region which in turn increases their wealth. The increase in wealth will cause an increase in the demand for foreign goods because of the high taste of the domestic countries for foreign goods. To them, there is an exploitation of the developing countries by the developed countries, and this will keep the developing countries at the mercy of the developed ones. Even the realization in terms of foreign resource inflows will still be used to increase the foreign market through the demand for foreign goods.

Empirically, so many scholars have investigated the effect of external resources inflows on income distribution. Seth and Oyakhromhe (2025) examined the effects of official development assistance on financial inclusion in Nigeria. The research design for the study was ex-post-facto. Time series secondary data were collected from Central Bank of Nigeria, Statistical Bulletin, 2023. Descriptive statistics, correlation analysis and unit root test were used to analyse the data collected. The model was estimated with Autoregressive distributed lag model. The independent variable was official development assistance, accompanied with both exchange and inflation rates. The findings revealed that official development assistance has a statistically significant and positive effect on financial inclusion in Nigeria. Also, exchange rate has a statistically significant effect on financial inclusion in Nigeria. However, inflation does not significantly influence financial inclusion.

Peace and Asheikh (2024) investigated the amount of official development assistance received by Nigeria for the period 1981-2021, and the changes that such assistance has effected on the GDP of the nation. The study examined the empirical research by other scholars, for the same study, under a spectrum of economic, geographic and political climates. The Auto Regressive Distributed Lag (ARDL) Bounds Cointegration Test and the Granger Causality test were adopted for this study, and the results revealed

that ODA impacted Nigeria's GDP significantly and positively in the period of study.

Aminat and Oluwoye (2024) investigated the impact of foreign direct investment inflows on the performance of Nigeria's agricultural sector. The analytical technique was anchored by the vector autoregressive (VAR) model to capture the relationships between the performance variables and the foreign direct investment. The lag order of 2 was selected based on the Akaike Information Criterion. Having analyzed the series' descriptive, correlation, and stationarity properties, the VAR estimates revealed that FDI has contributed negatively to agricultural output and employment but positively to agricultural exports in Nigeria. This was interpreted as indicating that the foreign direct investment flows majorly to the production of agricultural tradables, i.e., goods that may be exported.

Sutradhar (2020) conducted a panel study on external resource inflows and economic growth across Bangladesh, India, Pakistan, and Sri Lanka. For estimation, the study used pair wise OLS, fixed, and random effects. Bangladesh, Sri Lanka, and Pakistan reported negative economic growth effects from external resource inflows, while India reported a positive effect in Bangladesh from 1981 to 2013.

Ikwaaku et al. (2024) investigated the impact of foreign remittances on economic growth of Nigeria using annual time series data from 1981–2019. Autoregressive Distributed Lag (ARDL) model was utilized. From the ARDL bounds test, it was found that remittances and economic growth was bound by a long-run relationship. The long-run and short-run estimates showed that remittances had a negative and significant effect on economic growth in Nigeria after controlling for FDI, gross fixed capital formation, inflation and exchange rate. The study also revealed that FDI and gross fixed capital formation had a positive and significant effect on economic growth while inflation and exchange rate had a negative and significant effect on economic growth in the long-run. In the short-run, amidst negative and significant effect of remittances.

Christian and Alfredo (2015) investigated the effect of external resource inflows on the formal and informal financial services using Mexican household data and finds positive and statistically significant effects of remittance on the ownership of savings accounts, the existence of debts, and on recent

borrowing. The effect of external resource inflows on borrowing is driven by informal finance rather than by traditional bank loans points to deficiencies of the formal financial sector in addressing the financial needs of remittance – receiving households.

Olaide and Ganiyat (2023) examined the impact of foreign resource inflows on financial development in Nigeria for the period of 1981 to 2021. The study measured financial development by banking sector development and stock market development, and analyzed the data using the auto-regressive distributed lag estimation techniques. The findings of the study showed that international remittance had positive and significant impact on banking sector development while international remittance had insignificant impact on stock market development. Thus, the study concluded that international inflows had different impact on measures of financial sector development.

Kristina and Mindangas (2016) investigated the impact of foreign resource inflows on long-run economic growth. Using an unbalanced panel data covering a sample of 116 countries with different development levels over the 1990 to 2014, they looked at interaction between remittance and the level of economic development, as well as its impact on long-run economic development, because the impact of foreign resource inflows could be influenced by the development level of the receiving countries. To control the endogeneity while estimating the impact of external resource inflows on long-run economic growth, the ordinary least squares (OLS) with first differences transformation and fixed effects approaches and other controls of long-run growth. It showed that general external resource inflows have positive impact on long-run economic but the impact differs based on the country economic development level and the abundance of external resource inflows in the economy.

Mavis et al. (2020) investigated the co-integration and Granger causal relationship between resource inflows and economic growth in West Africa with special reference to Burkina-Faso, Ghana, Guinea-Bissau, Mali, Nigeria and Togo from 2000-2018. An advanced panel econometric methodology such as dynamic panel data techniques were applied, considering the questions of external resource inflows on economic growth West Africa. They suggest that external resource inflows on economic

growth in West Africa exert a positive and significant impact. Furthermore, a positive relationship between external resource inflows, real effective exchange rate, trade openness, investment on economic growth was also confirmed.

Odette et al. (2021) analyzed the impact of the Chinese foreign direct investment (FDI) remittance and foreign aid and human, capital growth and drain. The study data were collected from five African Countries (Nigeria, Kenya, Ghana, South Africa and Morocco) from 2009 to 2018. Secondary data sources were used in the data collection, then autoregressive distributed lag (ARDL) modeling was used in the analysis. Before modeling was done, co-integration tests and panel unit were applied. The results revealed that Chinese FDI, remittance and foreign aid had a significant and positive impact on human capita development in the long term but not the short run. Besides, remittance, Chinese FDI, and foreign aid demonstrated significant negative impacts on remittance in the long-term, not in the short-term.

Mohammed et al. (2023) investigated the nexus between unemployment and remittance in Ghana with a focus on the gender perspective. Using a time series data spanning from the 1990 to 2021, the ARDL model was used as the estimator. From their analysis, it was observed that remittance positively correlate with unemployment. And the explanatory variables like inflation, FDI, export of goods and services and gross capital formation have a long-run association with unemployment rate. Remittance in Ghana tend to also increase female unemployment in the long-run. In the short-run, while the contemporaneous co-efficient is negative, the lagged remittance positively correlates with female and male unemployment in the short run.

Adela and Dietmar (2016) based their study on the impact of external resource inflows on economic growth of six highest inflows receiving countries of Macedonia, Albania, Bosnia Herzegovina, Moldova, Romania, and Bulgaria, using data from 1999-2013. Their result shows a positive and significant relationship with economic growth as well as an increase in growth in relation to the increase inflows relative to GDP.

Umunna and Amos (2023) examined the impact of foreign resource inflows on economic development in Nigeria between 1980 and 2020. ARDL (Auto –

Regressive Distributed Lag) was used in the study. The integrated variables were gross domestic product per capita (GDP), gross fixed capital formation, as well as inflation other variables also looked at was exchange rate household consumption expenditure and remittance. The study found that remittance, gross fixed capital formation and household consumption expenditure were positively correlated with GDP (Economic Development) whereas the real exchange rate was negatively correlated with GDPpc. They concluded that foreign resource inflows are positively associated with economic development in Nigeria.

John et al. (2022) examined the effects of external resource inflows and trade balances. The study examined their impacts in relation to economic growth in West Africa sub-region with secondary data spanning the period 2007-2019. Using system generalized method of moment estimation technique. The result showed that inflows significantly and positively impact economic growth while trade balance exerted a negative and significant impact on economic growth.

Yaya (2022) examines the relationship between external resource inflows, financial development and domestic investment under different levels of financial development in a panel of 10 West African sub region countries. The research used data covering the period 1975 -2019 employed panel pooled mean Group estimator. The result showed that both remittance and financial development have positive effects on domestic investment. The result further revealed that there exists a threshold effect of financial development in the remittance and investment nexus. Beyond the threshold of domestic credit to the private sector of about 21% of GDP, there was a positive and significant relationship between external resource inflows and investment rate, while this relationship is negative under the threshold.

Godfrey and God'stine (2020) studied external resource inflows and unemployment in Nigeria with other independent variables such as exchange rate, inflation and the migrants' income. Data from 1981 to 2019 was calibrated for structural break points and stationary under conditions of regimes changes. While the data was found to have been affected by regime changes and stationary in levels, and instrumental variable regression model was

estimated and it was found that remittance positively and significantly. They also found that when external resource inflows are interacted with the dependents in Nigeria, unemployment was observed to fall.

Buktus et al. (2020) evaluated the poverty effect of external resource inflows on seven central and Eastern European (CEE) countries from 2006 to 2015 using the POLS, fixed and random effects and 3SLS estimators. The study found that remittances proxy for external resource inflows had a significant negative effect on poverty headcount, poverty depth and poverty risk.

In a study on the dynamic effect of remittance on poverty and inequality in Kosovo, Arapi-gjini et al. (2020) found that absolute and relative poverty in Kosovo if were alleviated by external resource inflows. The study used the propensity score matching and dose-response estimations on a cross-sectional dataset of 8,000 households in 2011. Some other empirical studies are reviewed based on the method employed and the relationship among the variables used in the studies.

Nyeadi et al. (2014) showed that for resource inflows to be effective in fostering household welfare and healthcare in developing countries. To determine whether external resource inflows can lead to economic growth, the study set to ascertain what could be the causal relationship between economic growth and external resource inflows in the following inflows'-receiving countries: Nigeria, Senegal and Togo. The study used Granger-causality and co-integration test under Vector Auto Regressive framework for the period 1980 to 2012. The study realized that for Nigeria and Senegal, a Unidirectional causal relationship exists, implying that external resource inflows led to economic growth, but economic growth did not lead to external resource inflows. However, for Togo, there was no causal link between external resource inflows and economic growth.

Beatrice and Samuel (2015) investigated the effect of external resource inflows and economic growth in Kenya from 1993 to 2013, using the Granger causality test and the OLS estimation technique. The variables included in the model are population, investment, openness, enrolment, inflation, net export, government consumption, and remittance. The study found that external resource inflows

impacted positively on economic growth, and a bi-directional causal relationship was established between remittance and economic growth. Apart from secondary school enrolment and inflation which were both negatively related with economic growth, others impacted positively and significantly on economic growth.

However, based on the empirical studies reviewed, it was observed that none of the studies examined external resource inflows on income distribution. Also, none of the studies focused West African countries. Lastly, none of the studies adopted System GMM technique. Hence, this study examined the effect of external resource inflows on income distribution in the West Africa sub-region using System Generalized Method of Moments (GMM) approach.

III. METHODOLOGY

For the purpose of this study, *ex-post facto* research design was used. Most of social research, in contexts in which it is not possible or acceptable to manipulate the characteristics of human participants (events), was based on *ex-post facto* research design. It is also often applied as a substitute for true experimental research to test hypotheses, the relationships or in situations in which it is not practical or ethically acceptable to apply the full protocol of a true experimental design. For the purpose of this study also, panel data were used. These data covered 16 West African countries and were obtained from World Bank data base 2023.

Model Specification

The theoretical anchor of this research is the Neoclassical Economic Theory which posits that free flows of external capital, trade and foreign direct investment helps allocate resources more efficiently, boost productivity and accelerates development, especially when domestic savings are insufficient while the Foreign aid optimism/dependency theory emphasizes external aid can fill financing gaps, support infrastructure, improve human capital and directly contribute to income distribution, particularly in low-income countries. Empirically, the functional form of the income distribution equation is presented as;

$$GI_{it} = f(ODA, PREMIT, REER, GDP, FDI)$$

(1)

A Priori Expectations: $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0,$ and $\beta_5 > 0.$

Where;

GI_{it} = Gini index, as a measure of income distribution in country (*i*), at time (*t*).

ODA_{it} = Net official development assistance in country (*i*), at time (*t*).

$PREMIT_{it}$ = Private remittance received in country (*i*), at time (*t*).

$REER_{it}$ = Real Effective Exchange Rate (*i*), at time (*t*).

GDP = gross domestic product as measure of economic growth in country (*i*), at time (*t*).

FDI_{it} = foreign direct investment in country (*i*), at time (*t*).

Rewriting equation (1), by introducing the stochastic error term we have;

$$GI_{it} = \beta_0 + \beta_1 \text{Log}ODA_{it} + \beta_2 \text{Log}PREMIT_{it} + \beta_3 \text{Log}REER_{it} + \beta_4 \text{Log}GDP_{it} + \beta_5 \text{Log}FDI_{it} + \epsilon_{it}$$

(2)

Where $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 are the parameters to be estimated.

ϵ_{it} is the stochastic error term.

IV. METHODS OF DATA ANALYSIS

For the purpose of this study, System Generalized Method of Moments estimation technique was employed as the data analysis technique. System Generalized Method of Moments (System GMM) is an advanced dynamic panel data estimation technique developed by Arellano and Bover (1995) and further refined by Blundell and Bond (1998) to address key econometric challenges that commonly arise in macroeconomic and development studies involving panel data with many cross-sections and relatively few time periods. System GMM extends the Difference GMM estimator by jointly estimating two equations: one in first differences and another in levels, using appropriate lagged values of the variables as internal instruments. By doing so, it improves estimator efficiency and reduces finite-sample bias, especially when the explanatory variables exhibit persistence over time, a common feature of macroeconomic indicators such as economic development indices, foreign direct investment, remittances, and official development assistance.

V. RESULTS AND DISCUSSIONS

Descriptive Statistics

The descriptive statistics for the study variables are summarized in Table 1:

Table 1: Descriptive Statistics

	GI	ODA	PREMIT	REER	RGDP	FDI
Mean	0.3753	884.195	1842.9033	91.1697	37.6363	774.9988
Median	0.3800	666.500	328.7200	94.0000	9.7000	311.5335
Maximum	0.4300	4440.000	24300.0000	105.0000	433.2000	8841.0620
Minimum	0.3300	80.2800	0.0000	60.0000	1.1000	0.1900
Std. Dev.	0.0321	749.8066	4938.5851	8.7912	95.4405	1301.4817
Skewness	0.1227	1.7638	3.4963	-0.9592	3.5387	3.4003
Kurtosis	1.5656	7.0747	13.7155	3.3260	13.9078	17.1501
Jarque-Bera	21.0017	288.0450	1623.5436	37.5533	1676.6081	2444.1949
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Sum	89.3200	210438.6	438610.99	21698.40	8957.450	184449.71
Sum Sq.						
Dev.	0.2441	133243739	5780340699	18316.5422	2158806.57	401443528.
Observations	238	238	238	238	238	238

Source: Authors' Computation, 2026.

The Gini index has a mean of 0.3753, a median of 0.3800, a maximum of 0.4300, and a minimum of 0.3300, indicating that income inequality is relatively stable and moderate within the sample. The small standard deviation of 0.0321 confirms the limited dispersion of inequality levels, suggesting that income distribution does not fluctuate widely across countries and years. Also, net official development assistance has a mean of 884.195, a median of 666.500, a maximum of 4440.000, and a minimum of 80.2800, demonstrating major variations in aid inflows. The standard deviation of 749.8066 is extremely high, showing that ODA inflows are highly volatile. In addition, private remittance received shows a mean of 1842.9033, a median of 328.7200, a remarkable maximum of 24,300.0000, and a minimum of 0.0000, highlighting extreme disparities in remittance inflows. The extremely large standard deviation of 4938.5851 reinforces this. Furthermore, the real effective exchange rate has a mean of 91.1697, a median of 94.0000, a maximum of 105.0000, and a minimum of 60.0000, showing

moderate fluctuations in currency competitiveness. The standard deviation of 8.7912 signifies reasonable variability. Moreover, real gross domestic product exhibits a mean of 37.6363, a median of 9.7000, a maximum of 433.2000, and a minimum of 1.1000, indicating a vast spread in economic output across observations. The exceptionally high standard deviation of 95.4405 highlights immense disparities in economic size or growth. Lastly, foreign direct investment records a mean of 774.9988, a median of 311.5335, a maximum of 8841.0620, and a minimum of 0.1900, highlighting significant variability. The very high standard deviation of 1301.4817 further emphasizes substantial fluctuations in FDI inflows.

Correlation Analysis

In order to identify multicollinearity with the aid of a correlation matrix, the correlation coefficients between pairs of independent variables must be examined. The correlation matrix's findings are displayed in Table 4.2.

Table 2: Result of Correlation Matrix of Gini Index (GI) Model

	LOG(GI)	LOG(ODA)	LOG(PREMIT)	LOG(REER)	LOG(RGDP)	LOG(FDI)
LOG(GI)	1					
LOG(ODA)	0.116385	1				
LOG(PREMIT)	-0.08306	0.539383	1			
LOG(REER)	0.069615	-0.1692	-0.22424	1		
LOG(RGDP)	-0.01806	0.237655	0.45379	-0.27316	1	
LOG(FDI)	-0.1477	0.578395	0.499276	-0.24084	0.513191	1

Source: Authors' Computation, 2026.

The correlation matrix result indicates that there is no evidence of serious multicollinearity among the explanatory variables included in the model. The highest correlations are observed between net official development assistance and foreign direct investment (0.578), net official development assistance and private remittances (0.539), private remittances and foreign direct investment (0.499), and Real Gross Domestic Product and foreign direct investment (0.513). Although these values suggest moderate associations, they are well below the conventional threshold of 0.80 that signals severe multicollinearity in econometric analysis. The correlations involving the real effective exchange rate with other variables—such as private remittances (−0.224), real gross domestic product (−0.273), and foreign direct investment (−0.241)—are relatively low and do not

pose any econometric concern. Therefore, based on the correlation matrix results, multicollinearity is not a serious issue in the Gini Index model, and all the explanatory variables can be jointly included without compromising the reliability and stability of the estimated coefficients.

Cross-Section Dependence Test

In panel data econometrics, cross-sectional dependence (CSD) occurs when shocks or errors in one cross-sectional unit (e.g., country, state, firm) are correlated with those in another unit. Ignoring cross-sectional dependence (CSD) can lead to biased standard errors, inefficient estimates, and invalid inference, especially in large panels. Therefore, testing for cross-sectional dependence is crucial.

Table 3: Cross-Section Dependence Test Result of Gini Index (GI) Model

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	1.846518	120	0.0711
Pesaran scaled LM	1.071470		0.1645
Pesaran CD	0.189082		0.8500

Source: Authors' Computation, 2026.

The cross-sectional dependence test results for the Gini Index model examine whether shocks affecting income distribution in one West African country are correlated with those in other countries within the panel. The Breusch–Pagan Lagrange Multiplier test reports a statistic of 1.847 with a probability value of 0.071. Although this probability is relatively close to the 5 percent significance level, it remains statistically insignificant at the conventional 5 percent threshold, indicating that the null hypothesis of cross-sectional independence cannot be rejected. This suggests that income distribution, as measured by the Gini Index, is not strongly influenced by contemporaneous spillover effects across countries in the sub-region during the study period. Similarly, the Pesaran scaled LM test yields a probability value of 0.165, which is also greater than 0.05, further supporting the absence of systematic cross-sectional dependence in the model.

Systems GMM Results of Inequality Equation

To estimate the system's generalized methods of moments (GMM) model, the pool ordinary least squares (OLS) model was first estimated, including the lagged one dependent variable $GI(-1)$ among the regressors. However, the coefficient of the lagged dependent variable in the pool OLS was (0.972809), see appendix II, this serves as the upper bound. With the same equation, the fixed panel regression model was estimated while the coefficient of the lagged dependent variable was (0.842491) serving as the lower bound, see Appendix II. In line with theory, these necessary steps were followed before the estimation of the difference GMM with the same equation. The results of the coefficient of the lagged dependent variable (0.731964) in the difference GMM equation, being lower than the lower bound lagged dependent variable in the fixed effects model (0.842491), implies that the first difference GMM results were downward biased and unsuitable for this model. However, this justifies the estimation of the system's GMM model for the income distribution equation.

Table 4: Results of System Generalized Method of Moments of Gini Index (GI) Model

Dependent Variable: LOG(GI)	
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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.630460	0.951078	0.662890	0.5078
C(2)	-0.812218	0.355495	-2.284751	0.0229
C(3)	-0.090305	0.009832	-9.184442	0.0000
C(4)	-0.169094	0.026273	-6.435987	0.0000
C(5)	0.071812	0.135793	0.528836	0.5972
C(6)	-0.001010	0.015267	-0.066154	0.9473
C(7)	-0.327705	0.079430	-4.125714	0.0001
C(8)	0.002802	0.005559	0.504105	0.6145
C(9)	0.355049	1.198344	0.296283	0.7672
C(10)	-0.023285	0.023973	-0.971286	0.3320
C(11)	-0.014738	0.040413	-0.364672	0.7156
C(12)	0.296360	1.180109	0.251130	0.8018
C(13)	0.375912	0.731282	0.514044	0.6075
C(14)	-0.000346	0.004059	-0.085161	0.9322
Determinant residual covariance	0.000764			
J-statistic	-3.30E-32			
R-squared	0.696542			
Adjusted R-squared	0.635504			
S.E. of regression	0.025680			
Durbin-Watson stat	1.706486			

Source: Authors' Computation, 2026.

The System Generalized Method of Moments results presented in Table 4 examine the determinants of income inequality, measured by the Gini Index, within a dynamic panel framework. The inclusion of the lagged Gini Index captures the persistence of income inequality over time. The coefficient of the lagged Gini Index is -0.812218 , with a t-statistic of -2.284751 and a probability value of 0.0229 , indicating statistical significance at the 5 percent level. This negative and significant coefficient suggests that income inequality exhibits a corrective tendency over time, such that higher inequality in the previous period leads to a reduction in inequality in the current period. Also, the effect of net official development assistance on income inequality is captured by a coefficient of -0.090305 , supported by a t-statistic of -9.184442 and a probability value of 0.0000 . This indicates a negative and highly statistically significant relationship between official development assistance and the Gini Index. The interpretation is that a percentage increase in official development assistance contribute to a 9% reduction in income inequality. This finding implies that when development assistance is effectively channeled toward social sectors, infrastructure, and pro-poor programs, it can improve income distribution by enhancing access to basic services and economic opportunities for lower-income groups.

Similarly, private remittances exert a significant negative influence on income inequality. The estimated coefficient of private remittances is -0.169094 , with a t-statistic of -6.435987 and a probability value of 0.0000 , indicating significance at the 5 percent level. This negative relationship implies that a percentage increase in remittance inflows is associated with a 16.9% reduction in income inequality. The implication is that remittances enhance household income, particularly among low- and middle-income families, thereby narrowing income gaps. In contrast, the real effective exchange rate shows a positive but statistically insignificant relationship with the Gini Index. The coefficient of the real effective exchange rate is 0.071812 , with a t-statistic of 0.528836 and a probability value of 0.5972 . This indicates that a percentage increase in exchange rate exerts an insignificant 7.2% increase on income inequality within the study period. Although the positive sign suggests that exchange rate appreciation may widen income disparities, the lack of statistical significance implies that this effect is weak and unreliable. In addition, the estimated coefficient of Real Gross Domestic Product is -0.001010 , with a t-statistic of -0.066154 and a probability value of 0.9473 , indicating statistical insignificance. This suggests that economic growth

does not have a direct or immediate impact on income inequality. While the negative sign implies a potential inequality-reducing effect of growth, the magnitude is extremely small and statistically insignificant. The implication is that growth in output, without inclusive growth strategies and redistributive policies, does not automatically translate into improved income distribution.

Moreover, the effect of foreign direct investment on income inequality is captured by a coefficient of -0.327705 , with a t-statistic of -4.125714 and a probability value of 0.0001 , indicating a statistically significant negative relationship. This finding suggests that a percentage increase in foreign direct investment will reduce income inequality by 32.8% . The implication is that foreign direct investment may generate employment opportunities, enhance skill acquisition, and stimulate income growth among broader segments of the population when it is labor-absorbing and well-integrated into the domestic economy.

Turning to the model diagnostics, the Determinant of the Residual Covariance Matrix is reported as 0.000764 . This relatively small value indicates stability in the variance-covariance structure of the residuals and suggests the absence of serious numerical or specification problems in the model. The implication is that the estimated parameters are stable and reliable, lending credibility to the estimated relationships between external resource inflows, macroeconomic variables, and income

inequality. The J-statistic, reported as -3.30×10^{-32} , is effectively zero and relates to the Hansen test of over-identifying restrictions. This statistic tests the null hypothesis that the instruments used in the System Generalized Method of Moments estimation are valid and uncorrelated with the error term. Given that the statistic approximates zero, the null hypothesis cannot be rejected, implying that the instruments are appropriate. The implication is that the estimated coefficients are not biased by invalid instruments, strengthening the robustness of the results. Finally, the overall explanatory power and serial correlation properties of the model further support its adequacy. The Adjusted R-squared value of 0.635504 indicates that approximately 63.6% percent of the variations in the Gini Index are explained by the explanatory variables included in the model. This reflects strong explanatory power for a dynamic income inequality model. In addition, the Durbin-Watson statistic of 1.706486 is close to the benchmark value of 2 , suggesting the absence of serious first-order autocorrelation in the residuals. The implication is that the model is well specified and suitable for drawing reliable policy conclusions regarding the role of external resource inflows and macroeconomic factors in shaping income inequality.

Wald Test

The Wald test is a widely used post-estimation statistical test in panel data analysis for examining the joint significance of one or more explanatory variables in a regression model. However, the result of the Wald Test is presented in Table 5:

Table 5: Wald Test Result of Gini Index (GI) Model

System: SYS_GMM			
Test Statistic	Value	df	Probability
Chi-square	1278.372	5	0.0000
Null Hypothesis: $C(1)=C(2)=C(3)=C(4)=C(5)=0$			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(1)	-0.291978	1.924813	
C(2)	-0.890327	0.174725	
C(3)	-0.048951	0.058573	
C(4)	0.036708	0.049834	
C(5)	-0.045357	0.287625	

Source: Authors' Computation, 2026.

The Wald Test results reported in Table 5 assess the joint significance of the estimated coefficients in the

System Generalized Method of Moments model. The null hypothesis of the Wald Test states that the

coefficients of the included regressors are jointly equal to zero, implying that they have no combined effect on the dependent variable. The reported Chi-square statistic is 1278.372 with 5 degrees of freedom and an associated probability value of 0.0000. Since the probability value is far below the conventional 5 percent level of significance, the null hypothesis is decisively rejected. This indicates that the explanatory variables included in the model jointly and significantly influence the Gini Index, confirming the overall relevance and statistical validity of the model in explaining variations in income inequality.

The null hypothesis summary further shows the normalized restriction values for the individual coefficients. Although the standard errors differ across coefficients, the joint Wald Test outcome implies that net official development assistance, private remittances, real effective exchange rate, real gross domestic product, and foreign direct investment are not simultaneously equal to zero. In practical terms, this result suggests that these variables collectively play a meaningful role in shaping income distribution dynamics. The implication is that income inequality, as measured by the Gini Index, is influenced by a combination of external resource inflows and macroeconomic conditions rather than by a single factor in isolation. Consequently, policy interventions aimed at reducing income inequality should adopt a comprehensive approach that

simultaneously considers development assistance, remittance flows, exchange rate management, economic growth, and foreign investment.

Arellano-Bond Serial Correlation Test

The Arellano–Bond serial correlation test is a post-estimation diagnostic test used in dynamic panel data models, particularly those estimated using the Generalized Method of Moments (GMM) such as the difference GMM and system GMM estimators developed by Arellano and Bond (1991). Dynamic panel models typically include a lagged dependent variable as an explanatory variable, which makes standard panel estimators (fixed or random effects) biased and inconsistent. The GMM framework addresses this issue by first-differencing the model to eliminate unobserved individual effects and then using suitable lagged values of the variables as instruments. However, for these instruments to be valid, the error term must not exhibit serial correlation beyond the first order. The Arellano–Bond test is therefore designed to detect serial correlation in the first-differenced residuals, rather than in the original error term.

Hypotheses of the Arellano–Bond Test

The Arellano–Bond test is conducted separately for different orders of serial correlation, most commonly AR(1) and AR(2). However, the result of the Arellano-Bond Serial Correlation Test is presented in table 6:

Table 6: Arellano-Bond Serial Correlation Test of Gini Index (GI) Model

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-1.004892	-0.016851	0.025369	0.9183
AR(2)	-1.014526	-0.002088	0.010734	0.9372

Source: Authors' Computation, 2026.

The AR(1) test, which checks for first-order autocorrelation, reports a m-statistic of -1.004892, a rho of -0.016851, with a standard error of 0.025369 and a probability value of 0.9183. Since the probability value is greater than 0.05, we fail to reject the null hypothesis of no first-order serial correlation. This indicates that the residuals of the model do not show significant autocorrelation at the first lag, supporting the consistency of the GMM estimates for the Gini Index. Similarly, the AR(2) test, which checks for second-order autocorrelation, yields a m-statistic of -1.014526, a rho of -0.002088, with a

standard error of 0.010734 and a probability value of 0.9372. The high probability value confirms that there is no second-order autocorrelation in the residuals. The absence of significant autocorrelation implies that the instruments used in the model are valid and not correlated with the error term. In practical terms, this strengthens the reliability of the estimated effects of net official development assistance, private remittances, real effective exchange rate, real gross domestic product, and foreign direct investment on the Gini Index, ensuring

that the conclusions drawn about income inequality are statistically sound and unbiased.

VI. DISCUSSION OF FINDINGS

The result of analysis reveals that net official development assistance (ODA), private remittances (PREMIT), and foreign direct investment (FDI) exert significant effects on income distribution within the West Africa sub-region. Specifically, net official development assistance (ODA) has a negative and statistically significant effect on Gini coefficient. This indicates that increases in official development assistance are associated with a reduction in income inequality, as measured by the Gini Index. The negative relationship suggests that the allocation and utilization of foreign aid may be effectively reaching lower-income groups, potentially benefiting only certain sectors or elites. This finding aligns with earlier empirical studies such as Buktus, Kvedaraitė and Tvaronavičienė (2020) in Nigeria, which highlighted that external resource inflows, including foreign aid, often benefit consumption or investment for a small segment of the population, thereby exerting little impact on reducing inequality in the long run. Also, private remittances (PREMIT) contribute to decreasing income inequality in the West African context. This finding is partially consistent with Aminat and Oluwoye (2024), who noted that while remittances have the potential to improve household welfare and finance development projects, the distribution of such resources is often unequal. Households receiving remittances tend to benefit more than those without access, creating disparities that reflect in the Gini Index. Relatedly, while foreign direct investment is often promoted for its capacity to stimulate economic growth, technology transfer, and employment creation, the findings suggest that in West Africa, the benefits are concentrated among capital-intensive sectors or urban populations, leading to decreased income inequality. This observation resonates with the empirical conclusions of Sutradhar (2020), who noted mixed or negative effects of external resource inflows on economic equality in developing countries.

VII. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study empirically examined the effect of external resources inflows on income distribution in

West Africa sub-region. Based on the findings, the study concluded that external resource inflows, comprising net official development assistance, private remittances, and foreign direct investment, significantly promotes equitable distribution of income in the West Africa sub-region.

Recommendations

Based on the findings and conclusion, the following conclusions were made:

First, given that net official development assistance (ODA) can reduce income inequality West African governments should improve the targeting and management of aid programs. Policies should prioritize labor-intensive projects and inclusive social programs that directly benefit marginalized populations, ensuring that net official development assistance contributes to both poverty reduction and more equitable income distribution.

Secondly, governments should implement policies that facilitate the smooth, low-cost transfer of remittances, such as reducing transaction fees, improving access to banking and mobile financial services, and encouraging formal channels for inflow.

Lastly, governments should design foreign direct investment policies that emphasize local employment, skills development, and technology transfer, ensuring that foreign investment contributes to inclusive economic growth. Incentives for investors could include requirements to engage local suppliers, hire local labor, and support community development projects.

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