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The Role of External Finance in Promoting Economic Growth Under Corruption: Evidence from Sub-Saharan Africa

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Abstract

The effectiveness of external finance on economic growth has been subjected to intense debate, with most studies focusing on specific external finance that are likely to provide myopic conclusions on the implications of external finance on economic growth. However, aggregating external finance with the recipient's corruption level is most likely to provide robust insight into the impact of external finance on economic growth. Thus, this paper investigates whether external finance propels economic growth amidst corruption in 18 Sub-Saharan Africa (SSA) countries from 2000 to 2023 using the feasible generalized least squares (FGLS) econometrics technique. The empirical findings reveal that human capital, foreign aid, and foreign direct investment enhance economic growth while remittance inflow dampens economic growth in the region. Similarly, corruption impedes economic growth in the region and also inhibits the growth-enhancing impact of foreign aid. In other words, foreign aid does not propel economic growth in SSA amidst corruption. Hence, it becomes apparent for SSA to implement strategies that will help curb the regional corruption in order to achieve rapid economic growth.

Keywords: *Economic Growth, Foreign Aid, Foreign Direct Investment, Remittance Inflow, Corruption, FGLS, SSA*

Background to the Study

The role of external finance in the growth process of developing countries has been a topic of intense debate. Economic growth theories have highlighted that economic growth in developing economies is anchored on capital accumulation, which could be generated internally or externally (Solow, 1956; Romer, 1986). External finance/capital is considered important in augmenting internal/domestic capital and investments, promoting technology transfer, and ultimately accelerating economic growth. The critical role of external finance on economic growth was precisely recognized in the Millennium Development Goals (MDGs) initiatives blueprint. To meet the needs of 148 countries, 0.7% ODA as a percentage of the GNI was set by the United Nations' decision back in 1970. With this commitment, each advanced country was supposed to progressively increase its ODA assistance to the 148 countries by 2015. To ensure the continuation of the MDGs, the Sustainable Development Goals (SDGs) and Agenda 2063 were introduced in 2016 based on 17 Global Goals to be achieved by 2030 and 7 aspirations by 2063. These goals require about $4 trillion US a year, and Africa must spend US$50 billion to US$93 billion per year on the financing gap, which means more ODA is needed if they are to be achieved (Simpson, 2016; OECD, 2018).

The proponents of external finance believe that external finance not only can help to reduce poverty but also is crucial in attaining the development objectives of underdeveloped countries, because supplementary resources make it possible to reach growth targets (Karras, 2006; Nicholas, 2022; Suleiman & Fuzhong, 2021). On the other hand, critics of external finance argue that it often supports corrupt governments and inefficient bureaucracies and fuels rent-seeking or corrupt activities (Moyo, 2010; Maria et al, 2023). The Sub-Saharan African (SSA) region has received a substantial surge in external finance since the early 2000s, driven by improved economic policies, natural resources discoveries, and growing investor interest. According to IMF statistics (2023), foreign aid represents 3.2% of GDP in SSA, equivalent to 50 billion US dollars. Although the inflow of external finance into SSA has increased, more than half of the extremely poor still live in the region (World Bank 2019d).

Against this background, a research work of this nature to evaluate the impact of external finance on economic growth in the region is considered inevitable at this time. This study attempts to answer three questions: (1) Do different types of external finance (e.g., FDI, ODA, remittances) have different effects on economic growth in SSA? (2) What is the effect of corruption on economic growth in SSA? (3) Does corruption affect the relationship between different types of external finance and economic growth in SSA?

Literature Review

Conceptual Literature

Economic Growth: GDP growth (Annual %)

Economic growth – the increase in the production of goods and services in an economy over a specific period of time is usually measured by the percentage change in Gross Domestic Product (GDP). Growth theory holds that economic growth can be fueled by capital accumulation, which can be source internally or externally. The neoclassical approach

assumes that external finance promotes economic growth by introducing valuable capital and technology into recipient countries. Moreover, external finance is one of the main avenues for the movement of technology, management know-how and modern business methods across national borders. Therefore, the rationale for increased efforts to attract more external finance stems from the belief that external finance has several positive impacts on economic growth through bridging resource constraint gap, technology transfers, the introduction of new processes, managerial skills, know-how in the domestic market, employee training, international production networks, and access to markets to bring about structural change and sustainability.

Concept of External Finance

External finance refers to funds or capital obtained from outside sources, such as advanced nations or international financial institutions (IFIs), by developing countries. It provides access to capital that might not be available internally. It could be foreign aid, foreign direct investment, or remittance inflow. Its purpose is to promote economic growth and development of the recipient countries. Foreign aid, also referred to as foreign assistance, development assistance/aid, or external aid, refers to grants and concessional loans net of repayment of previous aid loans which could be either tied or untied (such as loans and grants), technical aid, commodity aid, emergency assistance, project aid, program aid and military aid. It can also come in a variety of physical forms, such as technical assistance, programs, and projects, such as infrastructural development and food aid. Other forms include debt forgiveness, sector assistance, and investment.

Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. It is investment made by an individual or multinational company (MNCs) from one country into a business or organization in another country. It is usually a long-term investment. FDI is presumed to be the key source of technology and know-how to developing countries (Calabrese & Tang, 2020). In addition, its presumed ability to transfer both managerial services and production services to the local firms through spill-over effects makes FDI preferable to other forms of external finance flows such as aid and remittance.

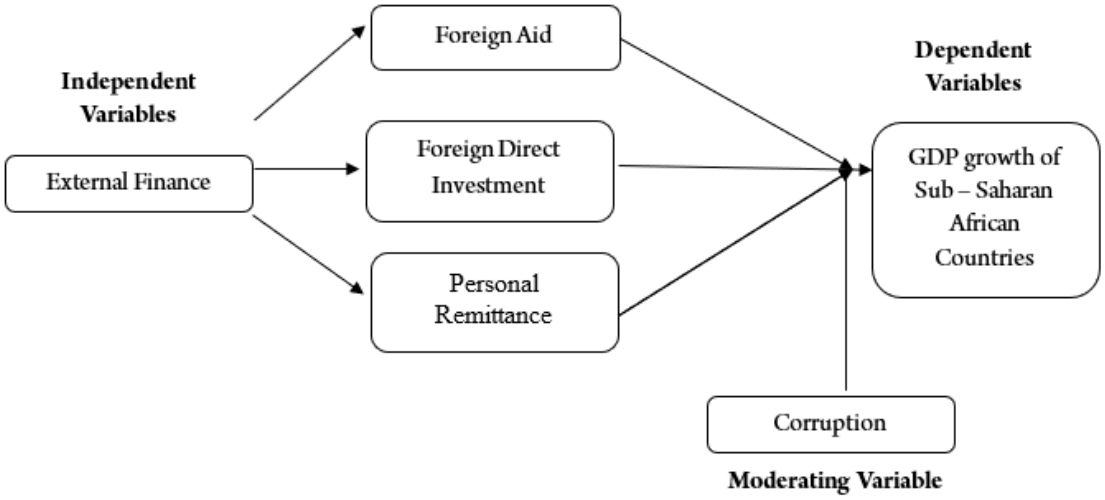
Remittance inflow – money from migrant workers or expatriates in a foreign country to support family members or investment in the domestic country. It comprises personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities. It can provide essential support for families, enabling them to meet basic needs and improve their standard of living. In this view, therefore,

external finance aims at promoting economic development in recipient countries; however, empirical results point to varying purposes and motives.

Concept of Corruption

The World Bank defines corruption as the "abuse of public office for private gain," while Transparency International (TI) views corruption as "the abuse of entrusted power for private gain. World bank Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. It ranging from approximately -2.5 (highly corrupt) to 2.5 (least corrupt). Corruption may severely affect external finance effectiveness, it also disturbs equitable distribution of resources across the people, increasing income inequalities with a much-skewed income distribution, undermining the effectiveness of social welfare programmes, and weakening effective demand in an economy and ultimately resulting in lower levels of investment, trade flows, government effectiveness, and generally human development. This, in turn, may undermine long-term sustainable development, economic growth, and equality (Transparency International, 2014). On the other hand, other scholars have counterargued that corruption is a beneficial grease that lubricates the engine of economic growth (Aidt, 2009; Huntington, 1968; Leff, 1964; Lui, 1985). Given the above controversies with the high incidence of corrupt practices and the staggering nature of economic growth in SSA, the empirical verification of the economic growth effects of corruption is an exercise whose need cannot be disputed.

Figure 1: Conceptual Framework



Source: Author's Sketch,2025

Theoretical Literature

Two-gap theory

The Two–Gap theory, pioneered by Chenery and Strout (1966), highlighted the necessity for external finance, such as foreign aid or investment, as a critical factor for economic growth in

developing countries. It identifies the savings gap and foreign exchange gap as the two major constraints to economic growth in developing countries. The saving gap refers to the insufficient domestic savings in developing economies to fund critical investments for growth. This gap can be bridged through external finance, such as foreign aid or investment, which can supplement domestic savings and ease economic growth. Similarly, external finance provides vital foreign exchange required for importing raw materials and critical capital goods or technology for domestic industrial development.

Grease the Wheel and Sand the Wheel Theory

The Grease the Wheel theory is also called "virtuous bribery" by Wei (1998). It claimed that corruption can make positive contributions to an economy's economic and political growth. That is, corruption, especially bribes, often acts as 'grease', speeding up the wheels of commerce and economic growth, or when the bureaucratic bottlenecks in trade and industry constitute a stumbling block to efficiency. More so, Mydall (1968) and Leff (1964) averred that corruption, especially when it serves as a deliberate weapon against administrative delay (which attracts more bribes) and thus a lubricant to a stagnant economy, can make positive contributions to the growth of an economy. While the Sand the Wheel theory claims that corruption, especially bribery, hinders the economic system, delays economic function, and mitigates economic growth. It describes bureaucratic red tape and regulatory hurdles that can slow down the economic growth process.

Neoclassical Growth Theory

This theory was propounded by Solow in 1956. This theory emphasizes the importance of capital accumulation in promoting long–term economic growth. The capital accumulation includes machinery, equipment, and human capital in the form of education and skills. This theory is also of the opinion that the economy is a major driver (determinant) of the accumulation of capital. When more capital is accumulated, there will be financial resources to advance technology. Based on this model, external finance contributes to economic growth by transferring technology, increasing public spending on infrastructure and the social sector, reducing the tax burden on corporations, and reducing corruption.

Empirical Literature

Corruption – Growth Nexus

According to the World Bank, corruption is the biggest obstacle to economic and social development. In other words, corruption harms economic growth. However, the empirical literature on the relationship between corruption and economic growth has contradictory findings regardless of the method of analysis, region, and period under consideration. The first strand of the literature supports that "sand the wheels" corruption negatively impacts economic growth; the second strand supports that "grease the wheels" corruption can positively impact economic growth. Lastly, the third strand of the literature argues that there is no monotonic nexus between corruption and growth.

Isaac (2024) investigated whether the effect of corruption on economic growth is dependent on institutional/governance settings using data for 40 countries in Sub-Saharan Africa from 2012 to 2022. The empirical results show that in situations of underdeveloped or dysfunctional institutional settings, corruption may be conducive to economic growth, at least in the short run. Further analysis reveals that corruption impedes economic growth in the long run and even becomes more detrimental when governance conditions (governance effectiveness and rule of law) deteriorate.

Gebresilassie et al., (2024) examined the impacts of corruption, government effectiveness, and their joint interactive effects on economic growth in 37 SSA countries from 2012 to 2022 using the SGMM technique. The result revealed that corruption has a detrimental effect on the economic growth of SSA countries. Kirsanli (2023) investigated the impact of corruption on economic growth between 1996 and 2020 in 18 MENA countries. The paper utilized panel estimators with country-fixed effects. The results indicated that after the Arab Spring, corruption lowers economic growth. One unit increase in control of corruption decreases economic growth between 1.64 and 2.98%.

Joshua & Happy, (2021) examined the impact of corruption on the economic performance of ten least corrupt African countries spanning the period 1996-2014. The study adopted a panel Granger causality framework, Engle-Granger-based panel cointegration, and FMOLS (fully modified ordinary least squares) estimation. The findings show that Political stability and control of corruption have a negative relationship with economic growth, while government effectiveness and gross domestic savings have a positive relationship. The study recommends more policies that can strengthen the anti–corruption agency by improving the quality of infrastructure in those countries as well as enhancing social responsibility and collective consciousness.

Foreign Aid – Economic Growth Nexus

Foreign aid or official development assistance (ODA) is grant and loans to developing countries, which are supposed to promote the rapid economic development of the recipients' economies. Empirical evidences are subjected to certain institutional conditions, for instance, Legass and Akkas (2024) investigated the relationship between foreign aid and economic growth in 15 selected countries in Sub-Saharan Africa from over 20 years (2002 – 2021) using a panel ARDL model. The findings showed that institutional quality, foreign aid, trade openness, exchange rate, population growth, and unemployment significantly affect economic growth.

Bila et al., (2024) examined the heterogeneous impact of official development assistance on economic growth across 24 Sub–Saharan African countries using the Method of Moment Quantile Regression (MMQREG) approach. The result suggested that ODA has a positive impact on economic growth in the SSA region, with a larger positive impact in countries with high levels of economic growth. This finding is key as it underlines the important idea that though ODA positively influences growth, it doesn't homogenously affect all nations; but

instead, it remarkably enhances it in areas with relatively robust and healthy economic conditions.

Tefera & Odhiambo, (2023) investigated whether aid sources matter for explaining the aid–growth causal nexus among African low–income countries during 2000 – 2017. They found a short–run bidirectional causality between aid and growth for total aid and traditional donors' aid, but not for traditional donors' aid in either direction. In the long run, the study found unidirectional causality from growth to total aid and non-traditional donors' aid but not for traditional donors' aid. The overall results showed that the aid–growth causality among African low-income countries depends on the aid proxies used and the time horizon assessed. Wehncke et al., (2022) examined the causal relationship between foreign direct investment, official development assistance, and economic growth for 20 selected African countries from 2000 to 2018 using Panel ARDL estimation techniques. The results indicated a positive long–term relationship between official development assistance, economic growth, and foreign direct investment.

Foreign Direct Investment – Economic Growth Nexus

Foreign direct investment (FDI) – investment made by foreigners in domestic countries may complement domestic investment and it is presumed to bridge the skills – gap through technological transfer that can be assimilated by local firms through say training of labor and management that may later form own firms or join domestic firms (Konstandina & Gachino., 2020; Karanikic, 2020).

Recently, Jackson et al., (2024) examined the effect of trade openness, foreign direct investment, domestic credit to the private sector, and other factors influencing economic growth among 15 ECOWAS member states from 2005 to 2022 using static and dynamic panel data econometrics estimation. Their findings highlighted a positive relationship between trade openness, FDI, and economic growth, while a negative association between domestic credit and economic growth.

Ayenew (2022) investigated the impact of foreign financial inflows on the economic growth of 31 Sub–Saharan African countries from 2009 to 2019 using two stem GMM estimation techniques. The findings showed that only foreign direct investment has a significant and positive contribution to economic growth. Official development assistance and external debt affect economic growth negatively, and they are statistically significant. Remittance inflow affects economic growth negatively, but it is statistically insignificant.

Similarly, Ayenew (2022) used PMG/ARDL to investigate the effect of foreign direct investment on the economic growth of 22 SSA nations between 1988 and 2019. The findings indicated that in the long run, FDI has a significant and favorable effect on economic growth, but it is statistically insignificant in the short run. The study concluded that FDI boosts long–term economic growth.

Younsi et al., (2021) examined the relationship between foreign aid, foreign direct investment, and domestic investment and their effects on economic growth in 41 African countries from 1990 to 2016 using fixed effect and system GMM estimators. They found a nonlinear relationship between AID, FDI, DI, and economic growth. Besides, the results show that AID and FDI have a significant positive complementing effect on economic growth. It is also shown that FDI complements DI, while the coupled effect of AID and DI remains weak in catalyzing growth. Moreover, the results indicate that the complementarity between AID, FDI, and DI positively influences economic growth, revealing that AID and FDI work as complementary factors to DI and enhance its effectiveness in promoting economic growth.

Remittance – Economic Growth Nexus

Recently, remittances – finance sent by migrants to their home countries have emerged as a substantial and fairly stable source of external financing for African households and economies. Unlike foreign aid and FDI, remittances are private transfers that abridge income inequality and contribute to enhancing domestic saving and investment.

Ergano & Rao, (2025) used the System GMM estimation technique to examine the impact of remittances on important economic factors, such as real gross domestic product, money supply, and government expenditure in Sub–Saharan Africa from 1998 to 2022. The result showed that remittances positively influence real gross domestic product, money supply, and government expenditure. The result suggested that remittances contributed to enhancing domestic saving and investment, thereby stimulating economic growth.

In contrast, Ikwuakwu et al., (2024) utilized the Autoregressive Distributed Lag (ARDL) model to investigate the impact of foreign remittances on economic growth in Nigeria using annual time series data from 1981 to 2019. The result revealed that both in the long run and short run, remittances had a negative and significant effect on economic growth, while FDI had a positive and significant effect on economic growth in Nigeria. It was concluded that the effect of remittances is, though negative, significant in explaining the changes in the economic growth of Nigeria.

Samuel & Pierre (2020) used ARDL bound test estimation techniques to explore the nexus between migrant remittances and Economic Growth in Senegal from 1980 to 2018. The finding showed a negative relationship between remittances and economic growth and an insignificant effect in the long run. Anetor (2019) investigated the relationship between remittances, financial sector development, and economic growth in Nigeria from 1981 to 2017. The study used an autoregressive distributed lag (ARDL) model to analyze the long-run and short – run relationships between the variables. The findings revealed that remittances had a negative and significant effect on economic growth both in the long run and short run.

External Finance – Corruption – Growth Nexus

There are also studies on the relationship between external finance, corruption, and economic growth in the literature, albeit only a few. For example, Makaya et al. (2024) examined the role

of FDI inflow and corruption on economic growth in 46 SSA from 1998 to 2021 using Panel fixed effects. The result revealed a positive relationship between FDI inflows and economic growth. However, corruption was found to reduce the effectiveness of FDI inflows in realizing economic growth

Grace et al., (2022) investigated the interactive effect of corruption and FDI on economic growth across 15 ECOWAS region using GMM estimation and data spanning 2000–2019. Their results reveal that while FDI independently propel economic growth, control of corruption has no direct effect on growth in the region. The interactive effects reveal the complementarity between FDI and control of corruption in promoting economic growth in the ECOWAS region. The growth effect of FDI is larger and stronger given an improvement in the control of corruption across the 1st, 5th, 10th, and 25th percentiles.

Research Gap and Justification

This study distinguishes itself from the existing literature by filling the gap on some aspects absent from previous analysis. First, previous studies have predominantly focused on the specific relationship between external finance and economic growth, thus limiting the broader understanding of the impact of external finance on economic growth. Addressing this lacuna, this study aggregates multiple variables of external finance inflows, such as remittances, FDI and ODA to assess their discrete impacts on economic growth.

Secondly, this paper highlights a research gap in examining the short – term effects of external finance on economic growth, as previous studies have primarily focused on long – term impacts, leaving short – term dynamics underexplored.

Thirdly, this study examines the mediating roles of corruption in the external finance inflow growth nexus for a specific reason. We found that limited study has towed this line leaving a vacuum in the literature.

Finally, most existing studies along this dimension have favor the use of the Ordinary Least Square (OLS), vector error correction model (VECM) and/or the panel vector autoregressive (PVAR) econometrics models. This technique, however, suffers from the problem of serial correlation or heteroskedasticity errors and cross – sectional dependency, which render the estimator inefficient and induce bias in the corresponding standard errors. As a result, this study applied the Feasible Generalized least Square (FGLS) statistical estimation technique because it is considered a viable method to overcome the problems of cross – sectional dependency and heteroskedasticity.

Methodology

Specification of the Model

This section discusses the model specifications to examine the external finance – economic growth nexus. Our model empirical model evolved from the Cobb – Douglas production function given by Mankiw et al. (1992).

$$Y_{it} = A_{it}\, K_{it}^{\propto} L_{it}^{\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The augmented Solow neoclassical model includes human capital as an additional explanatory variable to physical capital and labour. Mankiw, Romer, and Weil (1992) modified the equation to:

$$Y_{it} = A_{it}\, K_{it}^{\propto} L_{it}^{\beta} HC_{it}^{1-\propto-\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

By taking log of the equation (2), we get another equation,

$$\log Y_{it} = \log A_{it} + \theta_1 \log K_{it} + \theta_2 \log L_{it} + \theta_3 \log HC_{it} + \theta_4 \log Z_{it} \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Expressing equation (3) in econometrics form we have:

$$\log Y_{it} = \beta + \beta_1 \log K_{it} + \beta_2 \log L_{it} + \beta_3 \log H\, C_{it} + \beta_4 \log Z_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where economic growth (Y), capital (K), human capital (HC), labor(L) and control variable(Z), critical investment capital for economic growth of developing countries comprises of domestic (DI), foreign direct investment (FDI), official development assistance (ODA) and remittance inflow (PRM)

$$K_{it} = f(DI, FDI, ODA, PRM) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Thus, substituting (5) into (4), produces our refined model in functional form as

$$\log Y_{it} = \beta + \beta_1 ODA_{it} + \beta_2 FDI_{it} + \beta_3 PRM_{it} + \beta_4 \log DI_{it} + \beta_4 \log FDI_{it} + \beta_5 \log L_{it} + \beta_6 \log HC_{it} + \beta_7 \log COR_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

To examine whether corruption affect the impact of external finance on economic growth in SSA we interact corruption with each external finance proxy.

For foreign aid,

$$\log Y_{it} = \beta + \beta_1 ODA_{it} + \beta_2 FDI_{it} + \beta_3 PRM_{it} + \beta_4 \log DI_{it} + \beta_5 \log L_{it} + \beta_6 \log HC_{it} + \beta_7 \log COR_{it} + \beta_8 (COR_{it} \times \log ODA_{it}) + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

For foreign direct investment,

$$\log Y_{it} = \beta + \beta_1 ODA_{it} + \beta_2 FDI_{it} + \beta_3 PRM_{it} + \beta_4 \log DI_{it} + \beta_5 \log L_{it} + \beta_6 \log HC_{it} + \beta_7 \log COR_{it} + \beta_8 (COR_{it} \times \log FDI_{it}) + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

For remittance,

$$\log Y_{it} = \beta + \beta_1 ODA_{it} + \beta_2 FDI_{it} + \beta_3 PRM_{it} + \beta_4 \log DI_{it} + \beta_5 \log L_{it} + \beta_6 \log H\, C_{it} + \beta_7 \log COR_{it} + \beta_8 (COR_{it} \times \log PRM_{it}) + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Where:
Y = economic growth
ODA = Net official development assistance
FDI = foreign direct investment
PRM = Personal remittance
DI = Domestic investment
L = Labour
HC = Human capital
COR = Control of corruption
COR X ODA = Interaction between corruption and net official development assistance
COR X FDI = Interaction between corruption and foreign direct investment
COR X ODA = Interaction between corruption and personal remittance

Variables and Data Sources
This study employed the use of annual panel data for Sub Saharan Africa countries.
This study employed secondary data on the relevant variables. The data on economic growth (rate of change of real GDP), external finance proxy are Net official development assistance received as a percent of GNI, foreign direct investment as a percent of GDP, remittance inflow as a percentage of GDP, gross fixed capital formation as a percent of GDP is proxy for domestic investment, human capital is proxy with primary school enrollment , unemployment rate and control of corruption estimates were retrieved from World Bank Statistics table 1 provides a comprehensive overview of the data source and the corresponding unit measurements.

Table 1: Variable description and their measurement

Variables	Description	Measurement	Expected sign	Source
GDPPCGR	GDP per capita growth rate	%		World Bank, WDI 2024
PRM	Remittance inflows	% of GDP	±	World Bank, WDI 2024
FDI	Net foreign direct investment inflows	% of GDP	±	World Bank, WDI 2024
ODA	Net official development assistance received	% of GNI	±	World Bank, WDI 2024
DI	Gross fixed capital formation	% of GDP	±	World Bank, WDI 2024
HC	Primary school enrolment	%	+	World Bank, WDI 2024
UNEMP	Unemployment rate	%	±	World Bank, WDI 2024
COR	Control of Corruption	Estimates	±	World Bank, WDI 2024

Sources: Estimation and Interpretation of Results

Descriptive Statistics
The descriptive statistics is basically a summary of all variables included in the study in relation to the number of cases, minimum and maximum values, as well as the means and the extent to which the means represent the collected data (the standard deviation). Table 2 shows a

summary of the descriptive statistics of all variables of interest in this study. The data consists of 432 cases of Sub-Saharan Africa countries for the variables being investigated in this study.

Table 2: Descriptive Statistics

Variables	GDPPG	AID	FDI	PRM	COR	DI	HC	UNM
Mean	1.709626	5.488533	3.002321	2.164041	-0.380846	22.08494	99.44059	7.990833
Median	2.030668	4.443363	2.053288	1.120491	-0.485803	20.19718	99.95637	3.978500
Maximum	11.95851	28.26345	37.32277	11.25190	1.244920	78.00092	156.6143	34.00700
Minimum	-15.89971	-0.247570	-17.29212	0.000000	-1.460652	10.69200	31.84692	0.316000
Std. Dev.	3.541801	4.526146	4.203294	2.494435	0.593919	7.729631	22.76876	7.824921
Observations	432	432	432	432	432	432	432	432

Table 2 above present the descriptive statistics for eight variables: GDPPG, AID, FDI, PRM, COR, DI, HC and UNM. The mean values for each variable are 1.709626, 5.488533, 3.002321, 2.164041, -0.380846, 22.08494, 99.44059 and 7.990833 respectively. Among these variables, human capital (HC) has the highest mean value while corruption (COR) has the lowest mean value. Notice that COR has negative mean value, which aptly reflects the presence of weak institutions within the region. The median values for these variables are 2.030668, 4.443363, 2.053288, 1.120491, -0.485803, 20.19718, 99.95637 and 3.978500 respectively. The maximum values for these variables are 11.95851, 28.26345, 37.32277, 11.25190, 1.244920, 78.00092, 156.6143 and 34.00700 respectively. On the other hand, the minimum values are -15.89971, -0.247570, -17.29212, 0.000000, -1.460652, 10.69200, 31.84692 and 0.316000 respectively. The standard deviation values for these variables are 3.541801, 4.526146, 4.203294, 2.494435, 0.593919, 7.729631, 22.76876 and 7.824921 respectively.

Results and Discussion

This section includes the analysis of the relationship between independent variables and economic growth in SSA countries during 2000 –2023, using FGLS approaches. FGLS estimation technique address the econometrics issue of heteroscedasticity and cross – sectional dependence in our data. First, the correlation analysis was conducted to examine the relationship between the independent variables and to ensure the nonexistence of multicollinearity among them. The statistical analysis for this study was conducted using Stata software, specifically version 16, to ensure accurate and reliable results

Correlation Analysis

The goal of this section is to check the correlation matrix of the variable used. The correlation provides information on the kind and nature of the association among the variables. The report of the pairwise correlation is reported in Table 3 illustrates that AID, FDI, COR, DI and HC are positively correlated with GDPPG, while PRM and UNM are negatively correlated with GDPPG. Also, it is noted that each independent variable showed a correlation that was

less than its correlation with itself (less than 1), reducing the potential multicollinearity.

Table 3: Pairwise Correlations

Variables	GDPPG	AID	PRM	FDI	COR	DI	HC	UNM
GDPPG	1.000							
AID	0.093	1.000						
	(0.053)							
PRM	-0.022	0.443*	1.000					
	(0.646)	(0.000)						
FDI	0.098*	0.004	0.061	1.000				
	(0.041)	(0.931)	(0.212)					
COR	0.202*	-0.267*	-0.169*	0.094	1.000			
	(0.000)	(0.000)	(0.000)	(0.051)				
DI	0.040	-0.018	-0.101*	0.292*	0.048	1.000		
	(0.407)	(0.713)	(0.037)	(0.000)	(0.322)			
HC	0.071	-0.167*	-0.081	0.084	0.149*	0.141*	1.000	
	(0.140)	(0.000)	(0.095)	(0.082)	(0.002)	(0.003)		
UNM	-0.030	-0.557*	-0.519*	0.018	0.369*	0.041	0.330*	1.000
	(0.528)	(0.000)	(0.000)	(0.709)	(0.000)	(0.400)	(0.000)	

Note: Variables are in their logged form: GDPPG: economic growth, AID: official development assistance, PRM: personal remittance, FDI: Foreign direct investment, COR: corruption, DI: Domestic investment, HC: Human capital, UNM: unemployment. Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Testing for Cross Sectional Independence, Heteroscedasticity and Serial correlation
Following the descriptive statistics analysis, correlation analysis, this study examines the cross-section dependence, heteroskedasticity and serial correlation in the panel. First, conduct the cross-sectional independence test to assess cross-sectional independency. Second, examine autocorrelation using Wooldridge test. Finally, assess heteroscedasticity using the Modified Wald test.

Test for Cross Sectional Dependency
Due to similar economic activities among countries of SSA, a cross – sectional dependence (i.e., correlation across the individual countries in the panel) between them may occur. According to Chudik and Pesaran (2013), countries with similar economic activities are prone to common shocks. The results of a CSD test are shown in Table 4 for selected variables.

Table 4: Peraran's Cross-Sectional Dependence

Variable	(CD) test	P-Value
Ln_GDPPG	11.457***	0.000
Ln_AID	10.196 ***	0.000
Ln_FDI	7.162***	0.000
Ln_PRM	18.568***	0.000
Ln_COR	- 0.559	0.576
Ln_DI	12.022***	0.000
Ln_HC	20.525***	0.000
Ln_UNM	1.113	0.266

*** p<0.01, ** p<0.05, * p<0.1

The p – values and test statistics are provided for each explanatory variable. The null hypothesis of no CSD is rejected since the result shows evidence of a CSD for majority of the study variables as demonstrated by the p – values. Thus, the shock felt in one SSA country would be felt across the whole panel.

Test for Serial Correlation

Serial correlation in case of micro panels is usually not anticipated. In technical terms, serial correlation renders standard errors of coefficients smaller than their actual and inflates R^2. Interestingly, F - statistic in table 5a show that null hypothesis is not rejected (p – value = 0.9552) and it can be inferred that there is absence of serial correlation among residual. Consequently, OLS coefficients are BLUE.

Test for Heteroskedasticity

The error term ε can be heteroscedastic if variance of the conditional distribution of ε_i given X_i $(var\ (\varepsilon_i/X_i))$ is non – constant for i = 1, 2, . . . n and specifically does not depend on X, else ε is homoscedastic. Heteroscedasticity can lead to wrong estimates of standard errors for coefficients and hence of their t – values. Results in table 5b show that null hypothesis is rejected (p – value < 0.05) and can be concluded that residuals are not homogenous. Test in subsection is tabulated as follows:

Table 5: Test for Serial Correlation and Group Wise Heteroskedasticity

Wooldridge Test for Serial Correlation		**Modified Wald Test for Group Wise Heteroskedasticity**	
Wooldridge Test		Modified Wald Test	
H_0: No first order Serial correlation		H_0: $\sigma_i^2 = \sigma^2\ \forall\ i$	
$F\ (1,17)$	0.003	$\chi^2(18)$	769.76
$p - val > F$	0.9552	$p - val > \chi^2$	0.000***

Diagnostics and Methodological Treatment

After conducting diagnostic procedures to evaluate the assumptions of linear regression and model selection, the analysis reveals the existence of cross – sectional dependency and group wise heteroscedasticity, which could undermine the efficiency of standard estimators. Specifically, group wise heteroscedasticity leads to inefficient and potentially biased estimates when Ordinary Least Squares (OLS) is applied. To resolve this issue, we applied the feasible generalize least square (FGLS) estimator which is specifically designed to account for cross – sectional dependence and group wise heteroskedasticity issues in datasets where the number of number of periods exceeds the cross – sectional units $N < T$ (Beck & Katz, 1995; Baltagi, Kao, & Liu, 2020; Bai, Choi, & Liao, 2020). Feasible Generalized Least Squares (FGLS) is a statistical estimation technique used in econometrics to address issues of cross – sectional dependence and heteroscedasticity within panel data. Unlike Ordinary Least Squares (OLS), fixed effect, and random effect estimation, which assumes constant variance across observations, FGLS estimates different variances for different entities or over time, adapting to the variability observed in the dataset.

Table 6: Feasible Generalized Least Square (FGLS) Regression Result

Dep. Var. GDPPG	1	2	3	4
Ln_AID	0.548***	1.462***	0.547***	0.533***
	(0.165)	(0.499)	(0.166)	(0.171)
Ln_FDI	2.286***	2.110**	2.233*	2.358***
	(0.880)	(0.871)	(1.252)	(0.883)
Ln_PRM	-0.299***	-0.251**	-0.300***	-0.439
	(0.0964)	(0.0982)	(0.0968)	(0.302)
Ln_COR	2.191***	3.332***	1.766	2.286***
	(0.509)	(0.781)	(6.693)	(0.539)
Ln_DI	0.451	0.600	0.445	0.372
	(0.442)	(0.439)	(0.449)	(0.444)
Ln_HC	1.006*	1.105*	1.004*	1.073*
	(0.574)	(0.575)	(0.575)	(0.582)
Ln_UNM	-0.169	-0.128	-0.171	-0.202
	(0.192)	(0.193)	(0.194)	(0.201)
*AID*COR*		-1.132*		
		(0.588)		
*FDI*COR*			0.141	
			(2.211)	
*PRM*COR*				0.183
				(0.393)
Constant	-12.97***	-14.44***	-12.78***	-13.24***
	(3.513)	(3.573)	(4.663)	(3.523)
Observations	424	424	424	424
Number of ID	18	18	18	18
Model Specification Tests	Ramsey Test H_0: Model has no omitted variables		$3,413 = 0.65$	Prob > F = 0.5848
	Link test (Single – equation estimation)		_hat	p – value = 0.000 < 0.05
			_hatsq	p – value = 0.496 > 0.05
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Column 1 shows the direct effects of external finance and the control variable on economic growth. Column 2, 3, and 4 is concerned with the effect of interaction between external finance proxies with corruption on economic growth. In model 1, we find that all the proxy for external finance has statistically significant effects on economic growth at 1%, 5% and 10%.

The coefficient of foreign aid is positive (0.548) and it is statistically significant. This implies that foreign aid inflows in sub – Saharan African countries have contributed to economic growth. By implication, this result underscores the vital role of foreign aid in the growth

process of SSA economies in line with the proposition of the two – gap growth theory and postulation of Solow (1956) who emphasized that foreign aid supplements domestic savings and helps developing countries overcome resource gap (Chennery and Strout 1966). This finding supports the argument and empirical findings of existing studies in the SSA region (e.g., Alghamdi,2022; Bila et al.,2024) that noted that foreign aid has been pro – growth in SSA economy. Likewise, the coefficient of foreign direct investment is positive (2.286) and is statistically significant, which advocates that foreign direct investment play a critical role in economic growth in the SSA countries. Thus, a 1% increase in foreign direct investment inflow will lead to 2.286% increase in real GDP growth. Economic theory argues that FDI inflows trigger growth for host economies by increasing the capital formation, creating new employment opportunities and facilitating the spread of innovation and ICT, which helps to stimulate economic growth. Our results corroborate the predictions of the FDI – led growth hypothesis and the market size hypothesis and the findings of some empirical studies in SSA region such as Ayenew, (2022) and Jackson et al. (2024).

However, the coefficient of personal remittance is negative (-0.299) and is statistically significant. This result is contrary to Ergano et al (2025) studies which found that remittances positively influence real gross domestic product in SSA. A plausible economic reason for this is that a significant proportion of personal remittances inflow into SSA countries are spent on consumption with a smaller part going into saving and/or investments; and remittances are typically saved or invested in extravagant wedding, housing, land, iPhone and jewelry, etc. which are not necessarily productive to the overall economy. Also, Anetor (2019) opined that remittances weaken productivity in low – income countries because they are often spent on consumption likely to be dominated by foreign goods than on productive investments. The findings further reveal that the coefficient of corruption is positive (2.191) and is statistically significant. This suggests that reducing the level of corruption will actually increase economic growth. The empirical results demonstrate that a 1 percent decrease in corruption leads to increase GDP per capita growth by 2.191 percent. Our empirical finding aligns with the "sand in the wheels" hypothesis and with existing studies of Kirsanli (2023) and Gebresilassie et al. (2024). On the other hand, domestic investment has a positive and statistically insignificant effect on economic growth. Along the same line, this finding corroborates the research outcomes of previous studies of Bakari et al (2021); Ben et al (2023) and Ogunjinmi (2022) who noted that domestic investment doesn't have any impact on economic growth in Africa. A plausible economic reason for this is that SSA economies are prone to macroeconomic instability such as high inflation rate, exchange rate volatility, high debt overhang and limited access to finance which choke domestic investment.

In addition, the estimated coefficient of human capital (1.006) is statistically significant at 10% threshold, suggesting that economic growth in SSA is enhanced due to a rise in primary school enrollment which is a proxy for human capital formation. A rise in educational attainment leads to an improved social norm, less nepotism, and better workplace performance resulting in higher economic growth. A one percent increase in primary school enrollment results in a 1.006 percent rise in GDP per capita growth. Furthermore, the estimated coefficient of unemployment (-0.169) suggests that higher levels of unemployment

are associated with lower economic growth, which conform economic intuition. However, this coefficient is not statistically significant. While the separate impacts of external finance proxies and corruption on economic growth have been established, it is also important to determine the intervening effect of corruption on the external finance – economic growth nexus, which is the main objective of this study.

Column 2, comprises of the interaction terms between corruption and foreign aid (AID*COR). The coefficient of the interaction term between corruption and foreign aid is negative (- 1.132) and statistically significant at 10%. The implication of these estimates is that corruption in SSA region do not support foreign aid in the fulfilment of its growth – enhancing potentials; rather, it exerts a dampening effect on growth. Put differently, corruption in the SSA region give room to leakages from the positive impacts of foreign aid on economic growth, thereby preventing foreign aid from being an effective driver of growth as intended. Another implication of these estimates is that corruption and foreign aid fail to be complementary in the growth process as posited by Johnson et al. (2002) with respect to several transition economies. This finding conforms to earlier results of Maruta et al (2020) and Adewale (2021).

Column 3, comprises of the interaction terms between corruption and foreign direct investment (FDI*COR). The coefficient of the interaction term between corruption and foreign direct investment is positive (0.141). The implication of these estimates is that corruption and FDI are complementarity factor in promoting economic growth in the SSA region. However, the empirical results found no evidence that corruption moderate the effect of FDI on economic growth in SSA at this point.

In column 4 the interaction term between corruption and remittance (PRM*COR) is positive (0.44). This indicates that although the direct impact of remittance on economic growth is negative, the impact turns positive once it is coupled with corruption. That is to say, reduction in corruption as a whole help remove negative effect of remittance on SSA economy. Thus, lower corruption is a positive externality to remittance that acts as channels for remittance to contribute to economic growth. However, this coefficient is not statistically significant, indicating a less robust relationship. For testing model specification, Ramsey test for possibility of omitted variables and link test for single equation model, are applied. Both Ramsey test statistic and estimated hat – squares in link test are insignificant, implying correct specification of the model.

Conclusion

This current study has aim to investigate whether external finance propel economic growth in Sub – Saharan African countries using a panel data from 2000 to 2023. The study was subjected to a correlation matrix in order to check for multicollinearity among the variables Therefore, the result finds absence of multicollinearity. The Hausman test were conducted to determine whether either fixed or random effect model is suitable for the study. While the feasible generalized least square (FGLS) estimation technique which is robust to the problem

of heteroskedasticity and cross – sectional dependence in our data was use as the baseline techniques to ascertain the objective of the study. This study also performs Ramsey test for possibility of omitted variables and link test for single equation model, Both Ramsey test statistic and estimated hat – squares in link test are insignificant, implying correct specification of the model.

The finding suggests that human capital is critical in SSA in their efforts to induce economic growth. Similarly, foreign aid and foreign direct investment foster economic growth while remittance inhibits economic growth in SSA, indicating that SSA has not completely utilized external finance. On the other hand, corruption dampens economic growth in the region and inhibit the positive effect of foreign aid on economic growth, indicating that corruption in SSA region prevent foreign aid from being an effective driver of growth. In other word, foreign aid does not propel economic growth amidst corruption in SSA. This result is consistent with the earlier research findings that corruption in receipt country has important implications for aid effectiveness (Maruta et al 2020; Adewale, 2021).

Additionally, domestic investment has a positive insignificant impact on economic growth while unemployment insignificantly impedes economic growth in SSA. Similarly, corruption has an insignificant interaction effect with FDI and remittance.

In conclusion several policy implications and recommendations can be derived from our results. Firstly, Since the effect of remittance on economic growth was negative and significant because a large fraction of them is spent on consumption instead of economically productive investments, it is needful that policy makers in SSA should create investment engine like diaspora bonds and maintain a viable macroeconomic environment, to encourage the SSA citizens working abroad to lend their hands to national development and transfers funds by nationals living and working abroad does not lose its value to unfavorable macroeconomic environment in SSA. Secondly, improvement in institution to curb corruption and to increase the efficiency of foreign aid in promoting growth and welfare. Bureaucratic processes should be streamline to reduce administrative burdens on investors.
Thirdly, policies and reforms which align national objectives with human capital and economic growth needs of countries should be instituted to strengthen human capital development.

Limitation
As with most empirical investigations, this study is not free from limitations. First, the study is a regional – level analysis and might face aggregation problems. Therefore, country – specific investigations will be very important to strengthen the findings of this study. Further, due to data limitations in the public domain only 18 Sub – Saharan African countries are considered in the empirical analysis. Therefore, researchers with adequate research funds can collect sufficient country – level data from local government offices and will widen the scope of the study.

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