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DOES FOREIGN CAPITAL FUEL CORRUPTION? INSIGHTS FROM SUB-SAHARAN AFRICAN COUNTRIES

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ABSTRACT

Foreign capital is considered important in augmenting domestic capital and investments, promoting technology transfer, building institutions to check corruption, and ultimately accelerating economic growth. However, the motives of the donor and recipient may not align; understanding how foreign capital affects corruption in Sub-Saharan Africa has profound implications for advancing the African Union's Agenda 2063 and the 2030 Agenda for Sustainable Development Goals in Africa. In this study, we re-investigate the effect of foreign capital on corruption in 27 Sub-Saharan African countries from 2005 to 2023 using a panel quantile regression model, panel-corrected standard errors, and the Driscoll-Kraay Standard Error. The results reveal that the rule of law, government consumption expenditure, and human capital mitigate corruption; in contrast, our findings are consistent with the pessimistic view that natural resources rent, foreign direct investment inflow, and foreign aid induce corruption in SSA countries. Specifically, weak adherence to the rule of law in SSA amplified the worsening effect of foreign aid on corruption. Accordingly, the allocation of foreign capital to the poor countries should be based on a selective approach, in such a way that major conditions for a nation to meet the requirements for foreign capital should be institutional quality reforms.

Keywords: Foreign Capital, Corruption, Sustainable Development Goals, Sub-Saharan Africa.

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1. Introduction

Foreign capital serves as a vital source of financial resources and plays a critical role in fostering the rule of law, economic development, and good governance. It was because foreign capital was supposed to promote rapid economic development that it came to be known as “development assistance”. The recipient, no doubt, believes that foreign capital can accelerate economic development and accepts it for this reason. However, from the point of view of the donor, we may identify the following motives: Promotion of commercial self-interests; Promotion of political interests; Promotion of strategic interests; Promotion of economic development in developing countries; Maintenance of historical and cultural ties; and Support of humanitarian goals, etc.

Proponents of foreign capital believe that foreign capital not only can help to reduce poverty but also it is crucial in attaining the development objectives of underdeveloped countries, because supplementary resources make it possible to reach growth targets and can actually mitigate corruption in developing countries (Karras, 2006; Mohamed et al., 2015; Nicholas 2022; Okada & Samreth, 2012; Suleiman & Fuzhong 2021). On the other hand, critics of foreign capital programs argue that foreign capital often supports corrupt governments and inefficient bureaucracies, bribery and embezzlement by multinational corporations (MNCs) (Svensson 2000; Vincent, Jeleta & Anthony 2022; Maria, Valentina, Rita & Luca, 2023). Although foreign capital inflow to Sub-Saharan Africa (SSA) countries has increased, 67% of the world’s extreme poor still live in the region, according to the World Bank’s 2024 Poverty, Prosperity, and Planet Report. Additionally, Sub-Saharan Africa has remained the most corrupt region in the world with a regional average score of 32% in 2020, 2021, 2022, 33% in 2023, and 32% in 2024 (Transparency International, 2024). The above situations raise doubts about the effectiveness of foreign capital in improving economic performance in Sub-Saharan African economies. It is on these bases that the main objective is to investigate whether foreign capital fuels or mitigates corruption in SSA. Existing evidence from the literature suggests that studies centering on panel case subliminally presume residual cross-sectional independence, leading to erroneous estimations of the relationships of interest. Consequently, this research will address the following questions. Does foreign aid affect corruption in SSA countries? Does foreign direct investment inflow affect corruption in SSA countries?

Research Questions

The study seeks to answer the following research questions:

- a) Does foreign capital inflow (foreign aid and foreign direct investment) influence the level of corruption in Sub-Saharan African countries?

- b) How do institutional and macroeconomic factors, such as the rule of law, government consumption expenditure, human capital, and natural resource rents, moderate the relationship between foreign capital and corruption in Sub-Saharan Africa?

Objectives of the Study

The general objective of this study is to examine the effect of foreign capital inflows on corruption in Sub-Saharan African countries between 2005 and 2023, with particular emphasis on the role of institutional quality.

The specific objectives of the study are to:

- a) Assess the impact of foreign aid and foreign direct investment inflows on corruption in Sub-Saharan African countries.
- b) Evaluate the role of institutional and macroeconomic factors, namely the rule of law, government consumption expenditure, human capital, and natural resource rents, in shaping the relationship between foreign capital and corruption in Sub-Saharan Africa.

2. Literature Review

2.1 Conceptual Literature

Foreign capital

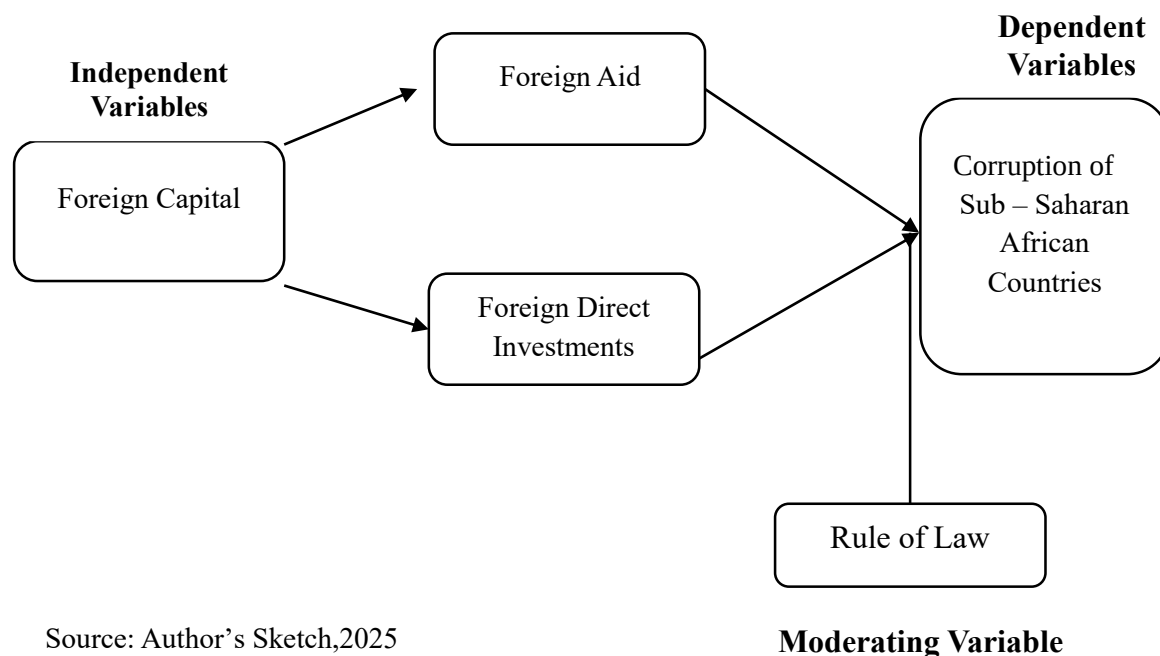
Foreign capital refers to funds or capital obtained from outside sources, such as advanced nations, international financial institutions (IFIs) or multinational company (MNCs) by developing countries. It offers access to capital that might not be available internally. It could be foreign aid or foreign direct investment. Foreign aid in simple terms refers to the transfer of economic resources from advance nations or international financial institutions (IFIs) to developing countries. It could either be through bilateral or multilateral source for the purpose of promoting economic growth and development of the recipient countries. Foreign direct investment are the net inflows of investment to acquire a lasting management interest 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.

The promotion of the rule of law sustained by foreign capital can end violent conflicts, advance economic development, alleviate the woes of post-conflict societies as well as help advance the promotion and protection of fundamental human rights (Izobo, 2020).

Concept of Rule of Law

According to Knack and Keefer (1995), strong institutions are central to the growth of an economy. The theory offers strong support in that effective government institutions are the vital instrument for economic growth in SSA countries. North (1990) defines institutions as “the rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction. It includes: the process by which governments are selected, monitored, and replaced, the capacity of the government to effectively formulate and implement sound policies, and the respect of citizens and the state for the institutions that govern economic and social interactions among them. Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The contribution of adherence to the rule of law in determining long-run causes of economic growth is more significant than other variables, and foreign capital will promote economic growth in the recipient countries under strong adherence to the rule of law (Rodrik, Subramanian, and Trebbi, 2004).

Figure 1: Conceptual Framework of the Relationship of Foreign Capital, Rule of Law and Corruption



Source: Author's Sketch, 2025

Figure 1: Conceptual Framework of the Relationship of Foreign Capital, Rule of Law and Corruption

2.2 Theoretical Literature

The theoretical section of this study examines various theoretical framework that embody the present work.

Beneficial Grease Theory:

This theory is also called “virtuous bribery” by Wei (1998). Wei (1998) claimed that corruption can make positive contributions to an economy's economic and political growth. Scholars such as Merton (1958), Myrdal (1968), and Leff (1964) pioneered this theory. The premise of this theory is that corruption, especially bribes, often act as 'grease' when the wheels commence or when the bureaucratic bottlenecks in trade and industry constitute a stumbling block to efficiency. To Wei corruption can be like grease, speeding up the wheels of commerce and economic growth. More so, corruption serves as a deliberate weapon against administrative delay (which attracts more bribes) and thus a lubricant to a stagnant economy; it can make positive contributions to the growth of an economy.

Two gap theory:

The aid effectiveness has been highlighted by two gap theories advocated by Chennery and Strout (1966). The theory propounds that developing countries are facing a saving-investment gap and foreign exchange constraints. Foreign aid supplements domestic savings and helps developing countries overcome savings constraints (resource gap). Similarly, foreign aid provides vital foreign exchange required for importing raw materials and critical capital goods or technology for domestic industrial development (Hansen and Tarp, 2001). Endogenous growth models developed in the early 1990s recognize many other factors such as technology, human capital, new intermediate goods, R&D activities, foreign capital, fiscal policy, trade policy, social capital, and institutional quality and their contribution to economic growth (Easterly, 2003). These growth models have recognized the effect of aid on economic growth and human development in the recipient country. In particular, the endogenous growth model assumes increasing returns to capital; thus, foreign aid could foster growth in the long run. (Kargbo, 2012). Based on this model, foreign capital contributes to development by transferring technology, increasing public spending on infrastructure and the social sector, reducing the tax burden on corporate, and improving governance and accountability (Hansen and Tarp, 2001; Morrissey, 2001; Kargbo, 2012).

2.3 Empirical Review

Recently, Amos, Chukwu and Asukwo (2025) use feasible generalized least squares (FGLS) technique to examined whether external finance propels economic growth amidst corruption in 18 Sub-Saharan Africa (SSA) countries from 2000 to 2023. The result show that foreign aid does not propel economic growth in SSA amidst corruption. Padmaja, Narayan, and Purna (2024) examines the effect of institutional quality

on FDI inflows in 18 South Asian and Southeast Asian countries during the period 2002–2019. Iterated generalized least squares (I-GLS) in the fixed effect model has been employed for the estimation of the results. The results show that the institutional quality index has a positive and significant impact on the FDI inflows in both the regions. They recommended that, for host economies to benefit from FDI inflow, there should be strict measures conducive to control corruption and implement proper rule and regulations in the market.

Cha Sujin (2024) used geographical matching method to explore the relationship between Chinese aid and perceptions of corruption in 33 African countries from 2000 to 2014. The finding shows that Chinese aid projects contribute to a perception of increased corruption among local councilors and government officials. Individuals living near Chinese-funded aid projects are more likely to perceive their local councilors and officials as involved in corrupt activities. Maria et al (2023) explored whether greater involvement of women in recipient countries' political and economic life can enhance the effectiveness of foreign aid by reducing corruption which usually follows a huge amount of foreign aid. The result should that foreign aid contributes to increasing corruption, while greater women's participation in politics and the economy reduces the detrimental effect of aid.

Ade, Hoang, Elin and Fafurida (2023) predict the long-term viability of foreign aid in Indonesia based on international perceptions of corruption and corruption cases in the country using a backpropagation artificial neural network (ANN) for prediction. The results highlight a strong relationship between corruption perception and foreign aid sustainability. Vincent et al., (2022) investigate whether corruption in host countries drives the different routes of Chinese economic engagement with Africa. Using data from 49 African countries for 2000–2018, Corruption in Africa is significantly negatively associated with FDI from China, but significantly positive with both trade and construction. Albian and Demukai (2021) examine whether aid fuel corruption using a Two-step least square method based on a panel framework of 122 countries for the period of 2005 to 2017, their result remains insignificant even after checking with respect to different sample, estimation techniques and the types of aid.

Suleiman and Fuzhong (2021) examine the relationship between foreign aid and corruption in East Africa Community Member countries. They employed Pooled Ordinary Least Square, Random Effect and Fixed Effect approach to find out the external aid effects on corruption. The study used panel data covering from the year from 1996 to 2017 for 5 EAC member nations. Based on their findings, aid flows reduce the level of corruption in EAC member countries. Jamie and Andrew (2021) employ matching methods to explore the relationships between foreign aid flows and corruption in recipient countries. Data were drawn from recipients of foreign aid for the 1996 to 2013 period. Their results suggest, that sustained increases in aid appear to have a corrupting effect on their recipients. Watkins (2021) found that foreign aid in Nigeria, Senegal and Uganda, on average, reduces trust in political institutions, including presidents, parliaments

and local governments. Pavlik and Young (2021) study show that a continuous rise in aid is associated with an escalation in corruption within the recipient nation.

Amenawo, Glory, Rebecca, Stephen and Godwin (2020) examined the moderating effect of endemic corruption on foreign aid and the growth rate of the Nigerian economy and human development index using ARDL model with data from 1990 to 2019. Their result revealed that in the long run, given the corruption index, foreign aids will have a significant negative impact on the growth rate of the Nigerian economy; while on the other hand, an insignificant positive impact will be on the human development index in Nigeria. Zangina and Hassan (2020) used non – linear autoregressive distributed lag (NARDL) bounds test technique to investigate Nigeria's asymmetric relationship between corruption control and FDI in Nigeria from 1984 to 2017. The results show that corruption hampers the massive inflow of FDI. In other words, strengthening corruption controls encourages FDI inflows to Nigeria, but decreasing corruption controls has a negligible effect. Brazys and Kotsadam (2020) discovered that foreign direct investment (FDI) inflows have the effect of reducing individual instances of bribery. However, this reduction is observed only in contexts where pre-existing corruption levels are high, and the FDI originates from countries that are comparatively more corrupt. Muhammad, Lubna, and Amna (2019) examine the relationship between corruption and foreign aid in four selected Asian countries (Pakistan, India, Srilanka and Bangladesh) using panel data set from 2000-2014. Their results from panel dynamic ordinary least squares (PDOLS) and fully modified ordinary least squares (FMOLS) indicated that FA has a negative significant impact on CPI, implies that as soon as the FA will increase in the country, the CPI decreases (from 10 = less corrupt to 0 = high corrupt). This means that the country will become more corrupt in the presence of foreign aid.

Uchenna, Ibukun, and Simplice (2019) study the impact of foreign aid flow by sector on receipt corruption using quantile regression, they found that aid flows for the development of economic infrastructure, multi sector and program assistance were consistently reducing corruption. The result stands for both the entire sample and for Africa countries (especially for countries at 25th, 50th and 75th quantiles). Aid flow to social infrastructure and debt relief significantly induce corrupt practices in the sample countries.

3. Methodology

Variable Source and Definition:

The data covers 27 Sub Sharan Africa countries over the period 2005-2023. It seems that interest in Sub-Saharan African countries has increased toward the 2000s. Our selection of countries and time period is purely based on the availability of data for the variables and for the purposes of a balanced panel data. Therefore, we collect the most recent data.

Corruption perception index (CPI) is the dependent variable. There are two main reasons for selecting corruption perception as the primary dependent variable. First, this index is based on perceptions and aims to capture corrupt behaviors such as bribery, diversion of public funds, the use public office for private gain, nepotism in the civil service. Second, it has the great advantage to allow for reliable cross-country and over-time comparisons. Our primary explanatory variable of interest is foreign capital. Foreign capital is a composition of foreign aid and Foreign Direct Investment. We proxy foreign aid by Official Development Assistance (ODA). According to World Bank data, there are several Net ODA indicators, such as Net ODA in current USD, and Net ODA per capita. In this research work, foreign aid is limited to Net ODA (% of GNI) because this is the most accurate Net ODA of each country. FDI, is another independent variable included in the model. It is an investment made by a firm or individual in one country into business interests located in another country. Natural resources variable is measured as the total natural resource rents as a percentage of GDP. Sub-Saharan African economies are well endowed with natural resources and therefore, they can also create vulnerabilities to corruption if not manage properly. Economies that heavily rely on natural resource rents may face a "resource curse," where abundant natural resources discourage investment in other sectors. Government expenditure is proxy with general government final consumption expenditure. An increase in government expenditure may promotes establishment of institutions that discourage political rent-seeking or illegal activities such as bribery or collusion in decision making, which is highly associated with corruption.

Human capital development (HC) can raise the awareness about the negative impact of corruption and promote ethical behaviors. we employed proxy for the human capital accumulation by School enrollment, primary (% gross). It provides children with basic reading, writing, and elementary understanding. Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution ranging from approximately -2.5 to 2.5. The higher score indicates lower corruption level.

Model Specification

The empirical model for estimating the nexus between corruption and foreign capital for Sub – Sahara Africa is anchored on the beneficial grease the wheel and rent-seeking theory, we posit that:

$$COR_{it} = \beta_0 + \beta_1 ROL_{it} + \beta_2 HC_{it} + \beta_3 GCE_{it} + \beta_4 NR_{it} + \beta_5 FDI_{it} + \beta_6 ODA_{it} + \varepsilon_{it} \dots (3.2.1)$$

To examine whether rule of law affect the impact of foreign capital on corruption in SSA we interact each foreign capital proxy with rule of law.

$$COR_{it} = \beta_0 + \beta_1 ROL_{it} + \beta_2 HC_{it} + \beta_3 GCE_{it} + \beta_4 NR_{it} + \beta_5 FDI_{it} + \beta_6 ODA_{it} + \beta_7 (FDI * ROL)_{it} + \beta_8 (ODA * ROL)_{it} + \varepsilon_{it} \dots (3.2.2)$$

The influence of rule of law on the foreign capital – corruption nexus in this model revolves around the magnitudes of β_5 , β_6 , β_7 and β_8

Where i and t stand for each cross-section and time identifiers in SSA countries

FDI*ROL = Interaction between foreign direct investment and rule of law

ODA * ROL = Interaction between foreign aid and rule of law

ε_{it} = error term

Table 3.2: Tabular summary of Variables, Expected sign and Data Source

Variable	Measurement	Expected sign	Source
Corruption (COR)	Scores		TI 2024
	Estimates		WDI 2024
Government size (GCE)	Percentage (% GDP)	-	WDI 2024
Foreign direct Investment (FDI)	Percentages (% GDP)	$\pm$	WDI 2024
Foreign aid (ODA)	Percentages (% of GNI)	$\pm$	WDI 2024
Human Capital (HC)	Percentages (% gross)	-	WDI 2024
Natural resources (NR)	Percentages (% of GDP)	$\pm$	WDI 2024
Rule of Law (ROL)	Estimate	-	WDI 2014

Empirical Model

This section summarizes the analytical methods used in this study to analyze the data. First, the descriptive statistics have been conducted, followed by multicollinearity test. Then, the cross-sectional dependence analysis was applied to the data. After that, panel quantile regression was performed. Then, to verify the robustness of our estimation results, the panel corrected standard error (PCSE) and Driscoll-Kraay Standard error (DKSE) with fixed effect have been employed.

Before starting the empirical analysis, a descriptive statistical analysis was employed to characterize the data. After that, to assess the data normality, three metrics have been used: the normality test proposed by

Jarque and Bera (1987), and skewness and kurtosis. Furthermore, the Shapiro-Wilk W test was employed to this end, where the null hypothesis states that the variable is normally distributed. Since this study uses panel data, one of the first things to do, after verifying the absence of multicollinearity, is to explore the existence of Cross-Sectional Dependence (CSD). Due to the rising wave of globalization, the possibility of cross-sectional dependence cannot be ruled out in particularly when Sub – Saharan African countries closely collaborate for their regional cooperation and economic prosperity. There are a variety of tests for cross - sectional dependence. The literature offers the following tests: Breusch–Pagan LM, Pesaran scaled LM, Baltagi, Feng, and Kao bias-corrected scaled LM, Pesaran CD. The test statistics are calculated as in Eq. (3.3.1) for CDLM test Eq. (3.3.2) for LM adjusted and Eq. (3.3.3) for Pesaran CSD test.

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{k=i+1}^N (D_{r_{ij}}^2 - 1) \dots \dots \dots (3.3.1)$$

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{k=i+1}^N \left(\frac{[D - m]_{r_{ij}}^2 - \mu_{D_{ij}}}{W_{D_{ij}}} \right) \dots \dots \dots (3.3.2)$$

where $W_{D_{ij}}$, $\mu_{D_{ij}}$ and r_{ij} represent variance, mean and correlation between cross sectional units.

$$CD = \sqrt{\frac{2T}{N(N-1)N} \left(\sum_{i=1}^{N-1} \sum_{k=i+1}^N \widehat{Corr}_{it} \right)} \dots \dots \dots (3.3.3)$$

Where $\widehat{Corr}_{it}$ is here, there is a pairwise correlation in Equation (3.3.3).

Our null hypothesis of the CSD test is the cross – sectional independence across the units against the alternative hypothesis of cross – sectional dependence across the variables of our study.

To estimate the association between corruption and the control variables, this work uses the method of moments quantile regression developed by Machado and Santos Silva (2019). This method is adopted as our main estimator for three reasons. First, unlike the other estimators, such as the least squares method, this approach does not require data to be normally distributed (Umar and Safi, 2023). Second, in the

traditional panel data models, such as fixed effects and random effects, the variables' coefficients are estimated on the basis of the mean. Thus, they do not take into account the heterogeneity and conditional distribution impacts (An et al., 2021). The MMQREG can deal with these issues and is robust to outlier effects (Zheng et al. 2023). Third, this technique allows for asymmetries based on location and can provide robust results even in cases where conditional averages have no impacts or are statistically insignificant (Binder and Coad, 2011).

The general quantile regression model, as described by Buchinsky (1998) is

$$y_{it} = x_{it}\beta_{\theta} + \mu_{it} \dots \dots \dots (3.3.4)$$

Where β_{θ} is an unknown $k \times 1$ vector of regression parameters associated with the θ^{th} quantiles, β_{θ} is used here instead of β because β can be different depending on the value of θ , x_{it} is a $k \times 1$ vector of independent variables, y_{it} is the dependent variable of interest and μ_{it} is an unknown error term. Although many of the empirical quantile regression papers assume that the errors are independently and identically distributed (i.i.d), the only necessary assumption concerning μ_{it} is

$$Quart_{\theta}(\mu_{it}/x_{it}) = 0$$

That is, the conditional θ^{th} quantile of the error term is equal to zero. Thus, the quantile regression method involves allowing the marginal effects to change at different point in the conditional distribution by estimating β_{θ} using several different values of θ , $\theta \in (0, 1)$.

Thus, the quantile regression estimator for quantile θ can be found as the solution to the following minimization problem:

$$\hat{\beta}_{\theta} = \min \left(\sum_{i: y_i \geq x_i^T \beta} \theta |y_i - x_i^T \beta| \right) + \left(\sum_{i: y_i < x_i^T \beta} (1 - \theta) |y_i - x_i^T \beta| \right) \dots \dots \dots (3.3.9)$$

i.e by minimizing a weighted sum of the absolute errors, where the weights are symmetric for the median regression case ($\theta = 0.5$) and asymmetric otherwise.

4. Result and Discussion of Findings

4.1 Results

Descriptive statistics

Table 4.1: Descriptive Statistics

Variables	CPI	ROL	HC	GCE	NR	FDI	ODA
Mean	32.26706	-0.633883	60.10044	13.85030	10.41746	3.305762	6.885988
Median	29.00000	-0.616246	60.2365	13.61813	7.412418	2.621460	5.625602
Maximum	65.00000	1.023956	74.51463	36.14305	52.56077	27.65204	39.28212
Minimum	15.00000	-1.870021	44.76800	2.047121	0.002360	-11.19173	0.032440
Std. Dev.	11.14731	0.642264	5.24399	6.031462	9.354344	3.758738	6.391295
Skewness	0.845089	0.288836	- 0.00259	0.946021	1.593039	1.345119	1.902175
Kurtosis	2.891708	2.681458	3.68878	4.082280	5.305607	9.676429	7.598244
Jarque-Bera	61.31274	9.301820	10.1400	101.5559	330.6053	1107.483	761.3117
Probability	0.000000	0.009553	0.0063000	0.000000	0.000000	0.000000	0.000000

Table 4.1 shows a summary of the descriptive statistics of all variables of interest in this study.

The results show that the average value of score of CPI, ROL, HC, GCE, NR, FDI and ODA is 32.26706, – 0.633883, 60.1004, 13.85030, 10.41746, 3.305762 and 6.885988 respectively. Skewness measures the asymmetry of a probability distribution. Skewness values for all the variables except HC are positive, indicating a right – tailed distribution while HC is left-tailed. The kurtosis of CPI and ROL are platykurtic while HC, GCE, NR, FDI and ODA are leptokurtic. Hence all the variable under study do not follow the normal distribution. Furthermore, the Jarque and Bera (1987) normality test results reject the null hypothesis for all the variables. This also confirms that all the variables are non-normally distributed.

Pairwise correlation Matrix

A pairwise correlation analysis was conducted to examine the strength of relationships between the dependent variable and the independent variables and to check the potential of multicollinearity

issues, which can impact the reliability and interpretability of regression models (Gujarati and Porter, 2009; Pallant, 2020). Although some scholars use alternative classification systems, this work follows the guidelines provided by (Evans, 1996), which categorize correlation strength as follows: very weak (0.00 to 0.19), weak (0.20 to 0.39), moderate (0.40 to 0.59), strong (0.60 to 0.79), and very strong (0.80 to 1.00).

Table 4.2: Pairwise correlations

Variables	CPI	ROL	HC	GCE	NR	FDI	ODA
CPI	1.000						
ROL	0.865* (0.000)	1.000					
HC	0.531* (0.000)	0.593* (0.000)	1.000				
GCE	0.442* (0.000)	0.386* (0.000)	0.203* (0.000)	1.000			
NR	-0.490* (0.000)	-0.519* (0.000)	-0.315* (0.000)	-0.196* (0.000)	1.000		
FDI	0.074 (0.094)	0.112* (0.011)	0.112* (0.011)	-0.058 (0.192)	-0.062 (0.163)	1.000	
ODA	-0.326* (0.000)	-0.380* (0.000)	-0.340* (0.000)	-0.072 (0.104)	0.111* (0.012)	-0.050 (0.260)	1.000

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

As presented in table 4.2, there is a strong positive correlation between ROL and CPI. However, moderate positive correlation between GCE and CPI, moderate negative correlation between NR and CPI, very weak positive correlation between FDI and CPI and weak negative correlation between ODA and CPI. 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.

Test of Normality

To further check the normality of the variables included in our panel, we employ skewness and kurtosis test and Shapiro-Wilk W test. Based on table 4.4.1 results, there is adequate evidence to conclude that the variables are not normally distributed since their p – value is less than 0.05. These results give additional support for the Jarque - Bera test.

Table 4.4.1 Skewness and kurtosis tests for normality

----- Joint test -----

Variable	Obs.	Pr(skewness)	Pr(kurtosis)	Adj Chi2(2)	Prob>chi2
CPI	513	0.0000	0.7028	39.040	0.0000***
ROL	513	0.0079	0.1047	9.090	0.0106***
HC	513	0.9806	0.0086	6.790	0.0336***
GCE	513	0.0000	0.0003	55.570	0.0000***
NR	513	0.0000	0.0000	115.35	0.0000***
FDI	513	0.0000	0.0000	132.520	0.0000***
ODA	513	0.0000	0.0000	157.180	0.0000***

Table 4.4.2 incorporates the Shapiro – Wilk W test. The outcomes provide a similar outlook to what has been inferred from the results of the previous two tests, we reject the null hypothesis for all the variables. This also confirms that all the variables are non-normally distributed.

Table 4.4.2: Shapiro – Wilk W test for normal data

Variable	Obs	W	V	Z	Prob>z
CPI	513	0.925	25.752	7.818	0.000***
ROL	513	0.983	5.879	4.263	0.000***
HC	513	0.982	6.356	4.451	0.000***
GCE	513	0.940	20.518	7.271	0.000***
NR	513	0.834	57.156	9.737	0.000***
FDI	513	0.875	43.095	9.057	0.000***
ODA	513	0.826	59.961	9.852	0.000***

Test for Serial Correlation

Panel data integrate both time-series and cross-sectional data, where the same unit cross-section is measured at different points in time. One should check for a problem that often exists in time-series data, for example, the serial correlation of the disturbance terms. For this work, the serial correlation test, as conducted by Wooldridge (2002), is utilized.

Table 4.5.1: Wooldridge test for autocorrelation in panel data

H₀: No first order Serial correlation	
F (1, 26)	Prob.
40.399	0.0000***

Based on the result reported in Table 4.5.1, the null hypothesis of no first-order serial correlation is rejected at the 1% significant level. From the result the probability value is less than 0.01 percent. Thus, there is serial correlation problem in the panel.

4.5.2: Test for Heteroskedasticity

Heteroscedasticity can lead to wrong estimates of standard errors for coefficients and hence of their t – values. Table 4.5.2 depicts the results of the modified Wald test for group-wise heteroskedasticity. The results outline that the panel dataset is not homoscedastic at the 1 percent significant level. From the result, the probability value is less than 0.01%.

Table 4.5.2: Wald test result

H₀: There is homoskedasticity	
$\chi^2(27)$	Prob.
3348.58	0.0000***

4.5.3: Test for Cross Sectional Dependency

Considering the importance of cross-sectional dependence among Sub Saharan African countries, we particularly focused on the result from Pesaran CD because of the characteristic of panel data such that $N > T$.

Table 4.5.3 Testing for weak cross-sectional dependence (CSD)

H₀: weak cross-section dependence

H₁: strong cross-section dependence

	CD	CDw	CDw+	CD*
INCPI	21.040 (0.000)	2.000 (0.046)	637.850 (0.000)	-1.400 (0.163)
ROL	-0.710 (0.479)	0.120 (0.904)	613.900 (0.000)	2.740 (0.006)
HC	78.850 (0.000)	5.890 (0.000)	1483.190 (0.000)	0.670 (0.503)
GCE	4.020 (0.000)	-1.600 (0.110)	502.150 (0.000)	4.230 (0.000)
NR	18.280 (0.000)	-1.780 (0.075)	533.280 (0.000)	-0.720 (0.469)
FDI	4.060 (0.000)	1.170 (0.240)	304.230 (0.000)	-0.490 (0.623)
ODA	9.010 (0.000)	-0.040 (0.970)	425.810 (0.000)	-1.280 (0.201)
FDI*ROL	0.890 (0.373)	-0.750 (0.455)	330.050 (0.000)	-0.730 (0.464)
ODA*ROL	2.650 (0.008)	0.700 (0.485)	413.770 (0.000)	0.610 (0.544)

The results of a CSD test are shown in table 4.5.3 propose that the error in the study is characterized by cross-sectional dependence, as the result shows evidence of a CSD for majority of the study variables as demonstrated by the p – values test probability. Hence, the shock felt in one SSA country would be felt across the whole panel.

Method of Moment Quantile Regression (MMQREG) Results

To estimate the association between corruption and the control variables, this work uses the method of moments quantile regression.

Table 4.6: MMQREG Results (Dep. Var. CPI)

Variables	Location	Scale	Lower Order		Medium Order	Upper Order	
			5 th	25 th	5 th	75 th	95 th

ROL	-14.90*** (0.748)	0.423 (0.461)	-15.81*** (1.305)	-15.29*** (0.900)	-14.90*** (0.748)	-14.54*** (0.809)	-14.08*** (1.100)
HC	-0.0613 (0.0578)	0.0554 (0.0356)	-0.181* (0.101)	-0.112 (0.0695)	-0.0607 (0.0578)	-0.0135 (0.0625)	0.0459 (0.0849)
GCE	-0.204*** (0.0458)	0.0256 (0.0282)	-0.259*** (0.0799)	-0.227*** (0.0551)	-0.203*** (0.0458)	-0.182*** (0.0495)	-0.154** (0.0674)
NR	0.0693*** (0.0253)	-0.0264* (0.0156)	0.126*** (0.0442)	0.0938*** (0.0305)	0.0690*** (0.0253)	0.0465* (0.0274)	0.0182 (0.0373)
FDI	0.0758 (0.104)	-0.180*** (0.0642)	0.463** (0.181)	0.242* (0.126)	0.0739 (0.104)	-0.0794 (0.113)	-0.272* (0.153)
ODA	0.301*** (0.110)	0.324*** (0.0677)	-0.397** (0.189)	0.00162 (0.133)	0.305*** (0.110)	0.581*** (0.120)	0.929*** (0.160)
FDI*ROL	0.0845 (0.100)	-0.0433 (0.0618)	0.178 (0.175)	0.125 (0.121)	0.0841 (0.100)	0.0471 (0.109)	0.000682 (0.148)
ODA*ROL	0.267*** (0.0724)	0.177*** (0.0446)	-0.115 (0.125)	0.103 (0.0876)	0.269*** (0.0726)	0.420*** (0.0788)	0.611*** (0.106)
Constant	63.48*** (3.810)	0.343 (2.346)	62.74*** (6.647)	63.16*** (4.581)	63.48*** (3.807)	63.77*** (4.119)	64.14*** (5.606)
Observations	513	513	513	513	513	513	513

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

Table 4.6. presents the baseline results of the MMQREG analysis and visualized in figure 1, in which five quantiles of the conditional distribution of CPI (the 5th, 25th, 50th, 75th, and 95th quantiles) are specified. To interpret the signs of the coefficients, one should note that smaller values of the dependent variable denote less corrupt while higher value denote more corrupt.

The study shows a significant negative impact of rule of law on corruption perception across all quantiles and this effect decreases within the 5th to 95th quantiles. Similarly, HC demonstrates a negative impact on corruption perception in SSA across all quantile. rule This means that the impact of ROL on CPI decrease as we move from lower to higher quantiles, this connotes that in corrupt SSA countries improvement in rule of law have relatively small impact on corruption while in SSA countries that are less corrupt. Human capital help to reduce corruption in SSA. However, the findings are insignificant across the distribution except at 5th quantile. This finding is consistent with study of Maria et al (2021) which examined G20

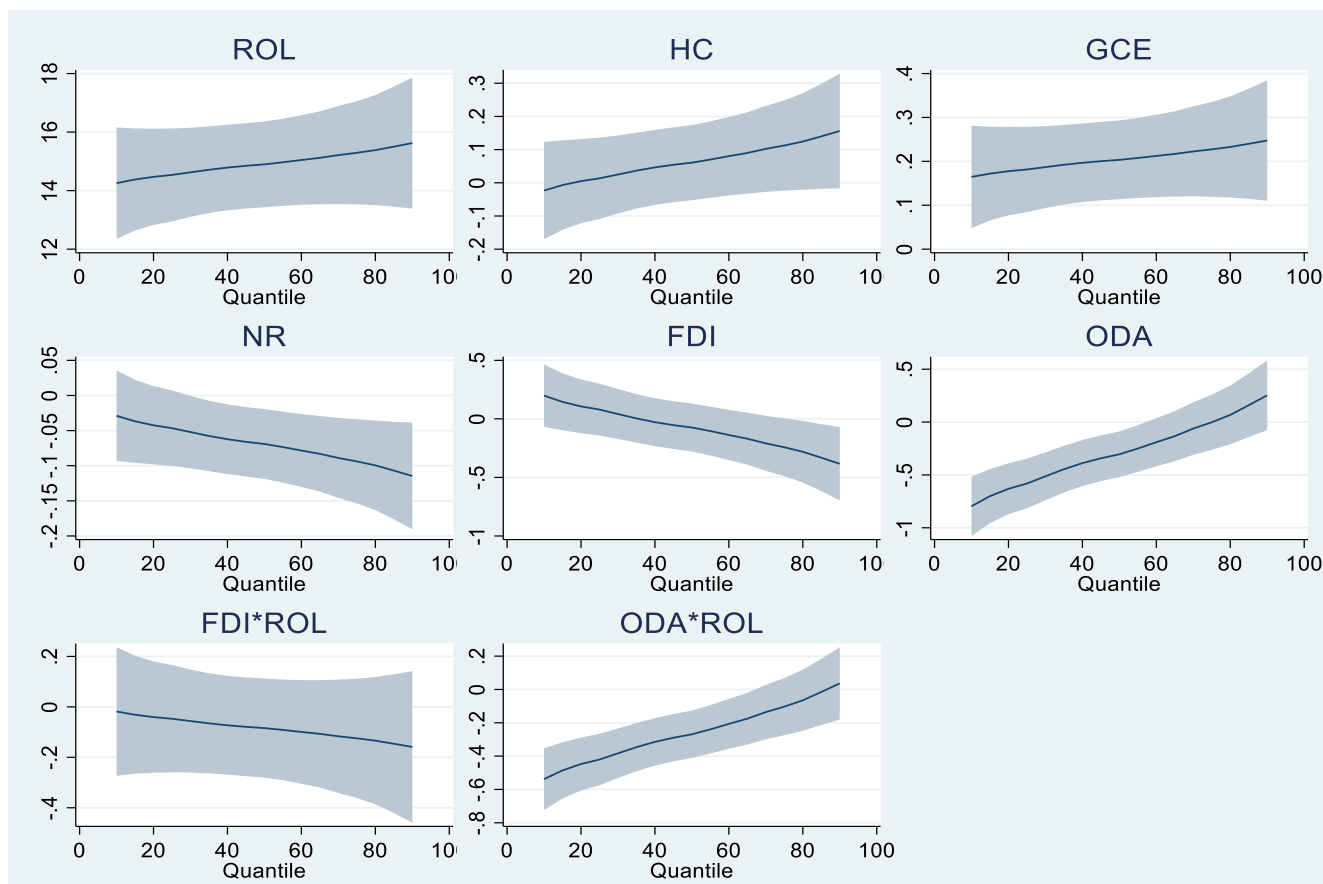
countries and found that primary school enrolment did not significantly influence the level of corruption. Furthermore, we note that the value of the GCE coefficient is negatively significant and are following a declining trajectory across corruption perception conditional distributions (0.5 to 0.95) which indicates that corruption might actually decrease in SSA with increase in government size.

In addition, the coefficients of NR are positive and only significant for lower quantiles (5th to 50th). The coefficient size gradually becomes less positive from lower to higher quantiles. Since in the quantile regression the ascending data are organized according to the conditional distribution of the dependent variable, this implies that the presence of natural resources rent increases corruption in SSA countries. Similarly, the result show that the effect of FDI on corruption perception varies. At lower quantiles it is positive and significant in less corrupt countries (5th and 25th quantiles) meaning that FDI inflow worsen corruption in SSA region. Additionally, we note that at upper quantiles FDI has a negative effect on corruption meaning that FDI inflow are negatively correlated to increase in corruption. The coefficient of ODA is negative at the lower quantiles and positive at the upper quantiles. At the lower quantile (5th), it is less significant meaning that increase in ODA mitigates corruption in corrupt SSA. Similarly, at the upper quantiles (25th to 95th) it is highly significant with a rising trajectory implying that foreign aid inflow into the region fuel corruption.

The interaction term FDI*ROL has a positive but insignificant effect on corruption.

Finally, ODA*ROL has a positive significant effect on corruption across the upper quantile (50th to 95th) which means that weak adherence to rule of law in SSA amplified the worsen effect of ODA on corruption.

Figure 2: MMQREG coefficient at various quantile levels. The shaded area corresponds to 95 percent confidence interval



Graphical representation of MMQREG Results

Robustness check

Using other estimators

As a robustness check, two robust regression models were employed, namely, the Panel Corrected Standard Error (PCSE) and Driscoll-Kraay Standard error (DKSE) with fixed effect. Panel Corrected Standard Error and Driscoll-Kraay Standard error are econometrics estimation technique used to address the problem of serial correlation, heteroscedasticity and cross – sectional dependence within panel data. Table 4.7.2 presents the robustness analysis results.

Table 4.7.1: PCSE & DKSE regression result

Variables	PCSE	DKSE
ROL	-10.86*** (1.031)	-7.564*** (1.085)
HC	-0.225* (0.117)	-0.678*** (0.0805)
GCE	-0.138** (0.0580)	0.0855 (0.0698)
NR	0.0374 (0.0340)	-0.110** (0.0458)
FDI	-0.0945 (0.0693)	-0.239** (0.0964)
ODA	0.158 (0.108)	-0.00791 (0.124)
FDI*ROL	-0.0864 (0.0654)	-0.184* (0.0905)
ODA*ROL	0.0919 (0.0684)	0.0323 (0.0724)
Constant	75.48*** (7.347)	104.3*** (5.019)
Observations	513	513

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In the two estimated model, the estimated coefficient of ROL suggests a negative relationship between rule of law and corruption. This relationship is highly statistically significant and align with the result obtain using MMQREG. Similarly, the coefficient of HC has a significant negative effect on corruption aligning with the result obtained from MMQREG thus implying that on the average human capital development is consistently associated with a reduction in corruption. Furthermore, the coefficient of GCE align with the result obtain using MMQREG, it has a negative and significant at 5%.

Concerning FDI, the coefficient is negative and statistically significant at 10%, which align with upper quantile result obtain using MMQREG. Furthermore, ODA has an insignificant impact on corruption.

Concerning the interaction term, $FDI*ROL$ has a negative effect on corruption similar to the result obtained using MMQRE. However, the effect is significant at 10% suggesting less significant effect on corruption. Finally, $ODA*ROL$ has an insignificant effect on corruption and align with the lower quantile (25th). The effect of ROL , HC and GCE on corruption is highly significant and negative. Accordingly, the implications of our findings from the baseline model as well as those of the PCSE and DKSE models are similar. Our overall conclusion from the robustness check is that the outcomes of the baseline model, reported in table 4.7.2, are quite robust, and henceforth, we can use them to make the final conclusions and deduce some policy recommendations.

4.2 Discussion of the Findings

The MMQREG, PSCE and DKSE results reveal that improvements in rule of law are associated with more significant reduction in corruption. This result highlights the importance of strengthening institutions in combating corruption. In particular, strengthening this governance indicator can produce a more transparent and accountable environment, reducing the likelihood that trade-related activities lead to corrupt practices (Luna and Montes, 2017; Cengiz 2021; Beju et al., 2024). Similarly, human capital development is consistently associated with a reduction in corruption. Furthermore, GCE coefficient is negatively correlated with corruption. A larger government might be associated with decrease in corruption. This result is consistent with the theoretical expectation of the effect of government expenditure on corruption and is similar to the findings of Cengiz (2021) for Turkey and MENA countries. Thus, a larger government size contributes to bureaucracy and consequently can increase corruption (Rose-Ackerman, 1999) on the other hand, a larger government size might be connected with stronger checks and balances (i.e. better oversight) and in this case corruption might actually decrease with government size and/or that higher public wages induce bureaucrats not to accept bribes (La Porta et al., 1999; Acemoglu and Verdier, 2000).

In addition, the coefficients of NR are positive and only significant for lower quantiles (5th to 50th). This result confirms the resource curse hypothesis in SSA and agrees with the findings of Chandan and Ritesh (2022) and Nemeckova et al (2024) that derived a positive effect of corruption on economic activity. FDI has a negative effect on corruption, suggesting that increase in FDI inflow to SSA countries might help to reduce corruption in the region. However, this relationship is moderately statistically significant suggesting a less robust result. This finding aligned with the discovery of Brazys et al (2020) and Albani et al., (2021). Finally, at lower quantile (5th to 50th) the coefficient of foreign aid (ODA) is negative and significant suggesting that increase in ODA mitigates corruption in less corrupt SSA economies. Similarly, at the upper quantile (95th) the coefficient of ODA is positive and moderately statistically. This finding is aligned with the conclusions of Mohamed et al., (2015) for SSA economies, Uchenna et al., (2019) for Africa countries

and Suleiman et al., (2021), for EAC member countries. Along the same line, our results are inconsistent with Donaubauer et al. (2018), Ann-Sofie et al (2018), Muhammad et al (2019) Watkins (2021) Pavlik et al (2021) and Cha Sujin (2024).

5. Conclusion and Recommendation

5.1 conclusion

This current study has aim to investigate whether foreign capital fuels or mitigates corruption in Sub-Saharan African countries using annual data from 2005 to 2023.

The study shows that stricter rule of law is linked to a reduction of corruption in SSA. Government consumption expenditure and human capital discourage rent-seeking practices and create institutions that help mitigate corruption in SSA. In contrast, our findings are consistent with the pessimistic view that natural resources rent, foreign direct investment inflow, and foreign aid induce corruption. The inducements to engage in corruption increase with the availability of rents connected with the exploitation of natural resources and economic integration with foreign capital. This finding does not essentially rule out the essence of natural resources exploration and foreign capital from a developing region perspective; it reflects that natural resources exploration, or foreign capital alone, are unable to arrest the corruption that stems from complicated and hierarchical bureaucracy. High regional-level corruption linked to natural resources exploration and economic integration originated from bureaucratic or red tape controls.

5.2 Recommendations

Based on the findings of this study, the following recommendations are proposed to enhance SSA economic growth while managing foreign capital inflow:

Managing Foreign Capital to Reduce Corruption

To mitigate the corrupting effects of foreign aid and FDI inflows in Sub-Saharan Africa, countries should strengthen whistleblower systems, enhance public participation in governance, and ensure that foreign capital is allocated with transparency and accountability. This approach will help align foreign inflows with developmental goals while minimizing corruption.

Strengthening Institutional and Macroeconomic Factors

Governments should focus on improving institutional quality and macroeconomic management by promoting the rule of law, efficient public expenditure, human capital development, and economic diversification. These measures will help shape the relationship between foreign capital and corruption, reducing rent-seeking behavior and enhancing the positive impact of foreign inflows on sustainable economic growth.

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