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Does corruption hinder investment in Africa? Evidence from panel data analysis.

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Abstract: This paper examines the effects of corruption on investment in 53 African countries over the 2000-2019 period. Using fixed effects model and control of corruption as measure of the level of corruption, the empirical evidence revealed that there is a positive relationship between corruption and gross fixed capital formation during the study period, indicating that investment increases as the economies move from highly corrupt to very clean economies. Robustness check for these results are done using random effect hypothesis, pooled ordinary least squares as well as quantile regressions.Added to this determinant, other variables such as final consumption expenditure, GDP per capita, political stability and regulatory quality were found to have significant influences on investment in Africa.As such, our results provide important strategies for an increase in investment both internally and externally through good governance, improvement in GDP per head and the fight against corruption.

Keywords: Corruption, Investment, Africa, Panel data, Consumption expenditure
JEL classification: D73, D25, O55, C23, E21

I. Introduction

Gross fixed capital formation (GFCF), also called "investment", is defined as the acquisition of produced assets (including purchases of second-hand assets), including the production of such assets by producers for their own use, minus disposals. The term "produced assets" means that only those assets that come into existence as a result of a production process are included (OECD 2022). Investment is what keeps an economy on the move and it is of different types; investment in stocks, social investment, investment in housing and construction and investment in plant and equipment. It is influenced both directly and indirectly by many factors among which we have interest rates, business expectations, technological changes or innovation, taxes as well as the level of income. An important factor affecting the rate and level of investment and which is generally not taken into account by investors is corruption.

The history of corruption[1] predates the dawn of modern civilization. Noonan (1984) has documented nearly fourmillennia of history of bribes and corruption in many cultures. It has long been recognized as detrimental to economic growth (Mauro 1995; Blackburn et al. 2006; Aidt 2009). While corruption negatively affects growth in different ways, it is by far the most important channel of reduction in domestic investment as several studies show (Pellegrini 2011; Hodge et al. 2011). By creating uncertainty in investment outcomes and by reducing the expected returns, corruption discourages the investment activity of the businesses, which translates into forgone economic growth (Wei 2000).In modern era, corruption has become prevalent and entrenched in many parts of the world, particularly indeveloping countries.

Many studies show that corruption reduces the investment profits by acting as an additional cost to the investment. For example, Bray (2006) and Simmons & Simmons (2006) argue that companies fail to win

[1]Defined according to Transparency International as the abuse of entrusted power for private gainwhich can either be a financial ornon-financial gain**.**

contract or to gain new business because their competitor pays bribe. Also, Chêne (2014) and Sanyal & Samanta (2008) suggest that USA firms are less likely to invest in countries where corruption is widely spread. Overall, corruption discourages investment in host countries for the cases of foreign direct investment (FDI) and it has been considered to be a major cost to international business (Bray, 2006).

Corruption can also have some positive effects on investment. This counter argument is supported by Wei (1997) and Ohlsson (2007). According to Wei (1997), East Asia attracts more foreign investors regardless of its highest level of corruption. However, East Asia has a large market and has been growing faster than the world average. Besides,by paying bribes, most investors can reduce the time for bureaucratic paper work. It can also skip inspections, reduce taxes, or even receive government funding (Ohlsson, 2007). Furthermore, in some cases governments' bureaucrats receive a bribe and allow investors to charge an over price for public services, which in turn increases the return on investment (Ohlsson, 2007). In addition, while relying on static efficiency arguments, Leite & Weidmann (1999) view bribing as a type of coarsen bargaining process and so, it can play a positive role in the development process.

Notwithstanding the possible advantages of corruption to some investors, the uncertainty and the risk of dealing with corrupt government may be higher. In fact, Kaufmann & Wei (1999) show that within a country, firms which pay more bribe spend more time on average, negotiating with the officials. Thus, corruption remains a growing problem. Our central concern therefore is to examine the effect which corruption can have on gross fixed capital formation in Africa while controlling other factors such as political stability and regulatory quality.

To the best of our knowledge, only the works of Zakharov (2018) looks at the relationship between corruption and fixed capitalinvestment in the context of Russian regions. Most of the studies conducted on this topic mostly focus on the impact of corruption on a specific type of investment which is FDI (Drabek and Payne, 2001; Caetano and Caleiro 2005; Epaphra andMassawe, 2017). To this effect, our study intend shed light on this existing relationship in the African context given that Africa is greatly made up of developing countries and hence more affected by this phenomenon as earlier mentioned.

As social implication, our paper contribute to the growing literature that studies corruption within developing countries characterized by high levels of corruption. We empirically show that investment increases as economies move from highly corrupt to very clean economies, therefore suggesting corruption eradication policies in order to promote investment and contribute to economic growth. Furthermore, this study reveals the 'grabbing hand' nature of corruption in Africa since it creates uncertainty and financial distortions which are a barrier to investment.Additionally, we put forward that, apart from the standard corruption variable, other variables both macroeconomic (consumption and per capita GDP) and institutional variables (political stability and regulatory quality) potentially influence the relationship between investment and corruption.

The paper is organized as follows: following the introduction, Section 2 reviews the literature on the impact of corruption on investment; Section 3; presents the methodology subdivided into variable presentation, data, model specification and estimation procedure. Section 4 analyzes the main empirical results of the study while Section 5 concludes and outlines the relevant policy implications

II. Literature review

Most existing literatures on the topic examines the relationship existing between corruption and foreign direct investment (FDI) which is an investment made to acquire a lasting management interest (normally 10% of voting stock) in a business enterprise operating in an agreed framework and existing in thecountry other than that of the investor defined according to residency. This is different from gross fixed capital formation which consist of outlays on addition to the fixed assets of the economy.

Studies report that the relationship between corruption and capital flows is complex and unclear. One strand of the literature argues that corruption acts as a 'grabbing hand' because paying bribes creates a range of financial distortions[2]. In contrast, the second strand counters that corruption acts as a 'helping hand' because paying bribes may speed up the bureaucratic processes (Wheeler & Mody, 1992; Bardhan, 1997; Egger & Winner, 2005) and facilitate access to publicly funded projects (Tanzi & Davoodi, 2000; Cheung, Rau, & Stouraitis, 2012) in environments with weak institutions. Thus, if the investment revenues outweigh the costs of corruption, then corruption may increase rather than decrease capital inflows (Woo, 2010).

Looking at the first stand where corruption acts as a grabbing hand, Zakharov (2018) investigates the relationship between corruption and fixed capitalinvestment in the setting of a corrupt country using different measures ofcorruption. He finds a negative relationship between investment andcorruption. Addressing the

[2]These include a reduction in the profits arising from the investment (Glass & Wu, 2002; Demirbag et al, 2007), resource-wasting activities (Murphy et al, 1991; Shleifer & Vishny, 1993), bearing higher contract-related risks (Boycko et al, 1995; Saha & Thampy, 2006), lowering the incentive to invest (Wei, 2000; Voyer & Beamish, 2004), and changing the investment method (Javorcik & Wei, 2009).

problem of endogeneity of corruption using aninstrumental variables approach, the results reveal a bigger negative effect.Disaggregating investment by ownership-type shows that only private investment isaffected by corruption, but not investment made by state-owned companies. Thenegative effect is larger for companies with full or partial foreign ownership.

In the same light, Epaphra andMassawe (2017)examines the effects of corruption on FDI inflows by incorporating an econometric method based on panel data from 5 East African countries over the 1996-2015 period using fixed effects model and two measures of corruption; corruption perception index and control of corruption. The results show that the corruption level in the host country has an adverse effect on FDI inflows when eliminating GDP per capita in the regression. Nonetheless, the results show that the GDP per capita as a proxy for market size and country's quality of institutions are more important than the level of corruption in encouraging FDI inflows into the country.

The effect of corruption on investment depends on both the size of the corruption and the nature of the corruption (Ravi, 2015). To support this argument, Ravi (2015) show that corruption in India has a detrimental effect on investment, whereas China has the opposite effect because corruption in China is low while in India is very high. A similar explanation is that predictable corruption[3] cannot necessarily adversely affect investor's ability to predict future activities while unpredictable corruption creates insecurity and uncertainty business environment

Similarly with the above findings, Wu (2006) expects cross-border investment to decline with corruption distance (difference of the corruption perception index (CPI) value between the investor country and the receptor). He sustains that as most OECD countries have lower levels of corruption than non-OECD countries, the latter should reduce their corruption levels in order to attract more investment from OECD countries. In the same line of reasoning, Drabek and Payne's (2001) empirical analysis shows that the degree of non-transparency is an important factor in a country's ability to attract investment. Specifically, they show that high levels of non-transparency decrease FDI inflows. In this vein, increasing transparency levels will have a positive effect on FDI.

Caetano and Caleiro (2005) studied FDI inflows to 97 countries and concluded that corruption significantly reduced FDI in high-corruption countries, but the impact is weak in low-corruption countries. Cuervo-Cazurra (2006) concluded that investors from relatively more corrupt home countries are more likely to invest in host countries that are also corrupt. Houston (2007) found that corruption reduced economic growth in countries with strong legal and regulatory institutions, but the opposite was found in countries with weak institutions.

Concerning the second stand which stipulates that corruption acts as a helping hand, Quazi et al (2014) analyzes the impact of corruption on investment inflows in 53 countries in Africa over the 1995–2012 period using the dynamic System Generalized Method of Moments modeling framework. The study finds support for the helping handhypothesis, i.e., corruption facilitates investment inflows in Africa. It is likely that the overall regulatory environment in Africa is weak, which helps explain the context in which the helping handhypothesis can be validated. In addition, the study finds that past levels of investment, market size, government effectiveness, infrastructure, and economic freedom also affect investment significantly.

Heba E. Helmy (2013)investigates the link between corruption and FDI flows to the Middle East and North Africa (MENA) and assesses whether or not corruption has more importance than other FDI determinants. By employing several panel settings with various econometric specifications on 21 MENA countries over the period 2003 to 2009, it is demonstrated that FDI varies positively with corruption. Additionally, FDI in MENA was found to vary positively with per capita income, openness, freedom and security of investments and negatively with the tax and homicide rates

III. Methodology

3.1 Presentation of variables

Our study intend to examine the relationship between corruption and investment in Africa. For that, we make use of a dependent variable, independent variables, as well as a set of control variables respectively.

3.1.1 Dependent variable

The dependent variable used for this study is Gross fixed capital formation(formerly gross domestic fixed investment) regarded here as investment.Thisincludes land improvements, plant, machinery, equipment purchases, the construction of roads, railways, as well as the construction and establishment of schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.

3.1.2 Independent variables

[3]It exists when bribes are paid and goods or services are delivered, and the bribe payer feels assured ofdeliverance. For example corruption is very predictable where costs of services is easily estimated and clientsfeels guaranteed.

The main independent variable in this paper is control of corruption.This variable 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. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, ie ranging from approximately -2.5 to 2.5 with -2.5 indicating highly corrupt and 2.5 very clean.

3.1.3 Control variables

Control variables are those variables which are not of interest to the study's aim but influence the outcomes. As such, this paper makes use of a set of these variables, among which we have: political stability, Rule of law, Regulatory quality, Final consumption expenditure, GDP per capita and Industrial value added.Political Stability measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society. Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Final consumption expenditure is the sum of household final consumption expenditure (private consumption) and general government final consumption expenditure. GDP per capita is the sum of gross value added by all resident producers in the economy divided by midyear population.Finally, Industry value added is the net output of the industrial sector after adding up all outputs and subtracting intermediate inputs. It comprises value added in mining, manufacturing, construction, electricity, water, and gas.

3.2 Data

This paper employs panel data for 53 African countries (see Table 8Appendix) over the 2000-2019 period.The time frame and sample is determined by the availability of data especially for institutional variables. The paper usesgross fixed capital formation (investment) as the dependent variable and data on this variableis gotten from the World development indicator (WDI 2022). Data on control variables, that is final consumption expenditure (FCE), gross domestic product per capita (GDP) and industrial value added (industryVA) were equally collected from the same source. As for institutional variables, we have control of corruption which is our main independent variable, gotten from the World Governance indicator (WGI 2022). Other institutional variables which are used in the study as control variables are political stability,Rule of law and regulatory quality also from the same source. Definitions and corresponding sources of the above mentioned variables are contained in table 7 in appendix.

3.3 Model specification

Various studies suggest that corruption influence investment negatively(Habib & Zurawicki, 2002; Caetano & Caleiro, 2005; Ravi, 2015). In view of these arguments, this paper applies a panel data analysis to examine the relationship between corruption and investment in Africa.Following Al-Sadig (2009) and Quazi et al. (2014), we develop our estimation model as:

$$Investment_{it} = \alpha_0 + \alpha_1 Corruption_{it} + \alpha_j X_{it} + \eta_i + \varepsilon_{it} \quad (1)$$

Where i is the country subscript (i= 1,…, 53), t is the time subscript (t= 2000,…,2019), αs are unknown parameters to be estimated, X represent a vector of control variables, η is the unobserved country-specific effects and ε is the usual random disturbance term.

The key regressors is control of corruption in line with Belgibayeva & Plekhanov, (2015) and Daude & Stein, (2004). Since corruption is illegal, it is very hard to find good statistics on the level of corruption (Ohlsson, 2007). In most cases it is done in secret, so only some cases are discovered and therefore, the amount of cases discovered is not a good measure of the actual corruption, because that also depends on other factors, as the judicial system (Ohlsson, 2007).

The choice of the control variables is motivated by the previous empiricalstudies on investment determinant, Dunning (1988); Bénassy-Quéré et al (2007) andon the availability of data.

3.4 Estimation procedure

Based on the above configuration, this study uses ordinary least square fixed effect analysis in order to gain anunderstanding of the empirical relationships between corruption and investment in 53 African countries over the period of 2000–2019[4]. To check for the robustness of our results, we start by adding successive control variables to the model. We then proceed in changing the estimation technique from fixed effect to random effect analysis, and further to pooled ordinary least square. Given that our study uses panel data, the nature of the relationship between corruption and investment might exists only for a few countries and not for the majority in the sample. As such, quantile regression is then adopted as another robustness for our results.

[4]The countries included in the sample are listed in Appendix

4 IV. Results and discussion

4.1 Descriptive statistics

Descriptive analysis are employed to ascertain the statistical properties of the variables used in the empirical analysis. **Table 1** present the descriptive analysis of the variables included in the models. The summary statistics show the data for the 53 countries over the 2000-2019 period, giving rise to 1060 observations. The values of the standard deviations, suggest that the variables are worth including in the regressions. On average, the mean gross fixed capital formation for our sample is 22.48 while the mean corruption indicator is -0.631 materializing an average presence of corruption in the region. In a general sense, the statistics suggest that there are no outliers since the mean of each variable is relatively close to its mean as shown in the table below.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Investment	1000	22.48	9.715	1.097	81.021
Corruption	1060	-.631	.615	-1.869	1.23
PoliticalStability	1060	-.566	.9	-3.315	1.282
RuleofLaw	1060	-.694	.643	-2.606	1.077
FCE	1000	84.244	20.715	4.152	153.601
LnGDP	1060	11.665	2.228	6.122	16.094
IndustryVA	1040	26.413	15.152	3.243	92.308
RegulatoryQuality	1060	-.709	.63	-2.645	1.127

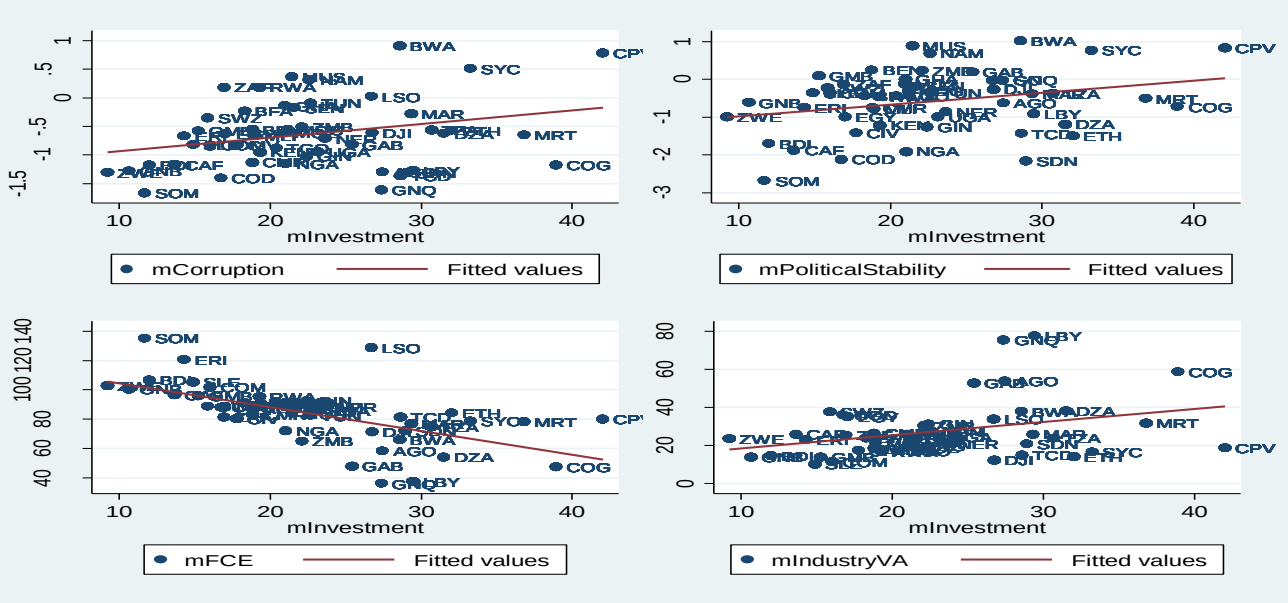
Source: *Authors computations from Stata*

4.2 Relationship between Investment and explanatory variables

Figure 1below display four relationships with respect to investment. The first 2 graphs are shows the two-way scatter plot between investment and institutional variables (control of corruption and political stability respectively). They both indicate a positive trend implying that a shift from highly corrupt economy to very clean economy (from negative axe to positive) boost investment. Similarly, movement from less politically stable economy to more stable will naturally draw more investment everything being equal.

The 2 other plots shows the relationship with macroeconomic variables (final consumption expenditure and industrial value added respectively).The first graph suggest a negative relationship between investment and consumption. This is because income is either consumed or saved and thus, an increase in consumption will lead to a fall in investment while and increase in investment reduces income for final consumption. The last plot reveal a positive trend when investment is placed with industrial value added. This is to say that an increase in gross fixed capital formation brings about an increase in the output of industrial sector.

Figure 1: Two-way scatter graph of Investment and explanatory variables



Source: *Authors construction*

4.3 The effect of Corruption on Gross Fixed Capital Formation

Table 2 reports the results of the fixed effects regressions that examine the impact of corruption and other control variables on gross fixed capital formation. In all 7 regressions, the dependent variable is investment. The corruption coefficients from model 1 to model 7 respectively are statistically significant with positive signs. This shows a positive relationship between corruption and gross fixed capital formation, suggesting that investment increases as the economies move from highly corrupt to very clean. Specifically, our results suggest that a 2.62 unit eradication of corruption will boost investment by 1 unit. Also, a politically unstable economy tend to drop investment level by 1.21.Similarly, the investment level will increase by 1.3 with the investors having a positive perceptions or agents having confidence in and abide by the rules of society. In addition, we notice that consumption and investment evaluate in opposite sense. A 1 unit increase in investment will lead to a 0.123 fall in consumption. This proportion tend to increase with successive addition of control variables (model 4-7). This evidence can be supported by the Keynesian theory which clearly demonstrate the adverse relationship between consumption and investment or savings.Overall, these results suggest a negative impact of corruption on investment in Africa.

These results are coherent with those of Habib & Zurawicki, 2002; Caetano & Caleiro, 2005; Ravi, 2015 who noticed that high levels of corruption discourages investors and consequently affect investment negatively.Just of recent,Epaphra andMassawe (2017)and Zakharov (2018) conducted studies on East African countries and Russian regions respectively. Their results obtained were similar to those realized in this study which postulates an adverse effect of corruption on investment in Africa.

Table 2: Baseline results with independent and control variables

VARIABLES	Dependent variable : Investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corruption	2.616**	3.301***	2.754**	2.922**	3.017**	2.868**	3.368**
	(1.119)	(1.157)	(1.336)	(1.324)	(1.295)	(1.296)	(1.360)
PoliticalStability		-1.210**	-1.442**	-1.272**	-1.577***	-1.737***	-1.574***
		(0.538)	(0.608)	(0.604)	(0.593)	(0.594)	(0.609)
RuleofLaw			1.300	1.071	1.119	0.734	1.147
			(1.580)	(1.567)	(1.533)	(1.531)	(1.568)
FCE				-0.123***	-0.147***	-0.165***	-0.165***
				(0.0290)	(0.0286)	(0.0334)	(0.0333)
GDP					3.20e-06***	6.23e-06***	6.26e-06***
					(4.83e-07)	(7.83e-07)	(7.84e-07)
IndustryVA						-0.135**	-0.134**
						(0.0528)	(0.0528)
RegulatoryQuality							-1.602
							(1.320)
Constant	24.15***	23.88***	24.30***	34.71***	34.50***	37.89***	37.40***
	(0.744)	(0.752)	(0.909)	(2.611)	(2.554)	(3.862)	(3.882)
Observations	1,000	1,000	1,000	1,000	1,000	980	980
R-squared	0.060	0.110	0.201	0.311	0.436	0.489	0.645
Number of id	50	50	50	50	50	49	49

Source: *Authors computations from Stata. NOTE:* Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

4.4 Robustness of the results

A useful tool for checking the robustness of the results is to change the estimation technique and see whether or not the sign of themain explanatory variable has changed. To this effect, we adopt random effect hypothesis with the same variables used in baseline as indicated in table 3. The sign of the corruption variable did not changewith the change in estimation technique.

Table 3: Sensitivity analysis with independent control variables under random effects hypothesis

VARIABLES	Dependent variable: Investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corruption	2.878***	3.568***	2.677**	3.342***	3.798***	3.932***	4.661***
	(0.930)	(0.999)	(1.253)	(1.208)	(1.196)	(1.209)	(1.246)
PoliticalStability		-0.980*	-1.301**	-1.162**	-1.501***	-1.636***	-1.459**
		(0.514)	(0.581)	(0.561)	(0.557)	(0.566)	(0.569)
RuleofLaw			1.693	1.039	1.750	1.254	2.313
			(1.438)	(1.367)	(1.358)	(1.384)	(1.465)
FCE				-0.163***	-0.171***	-0.188***	-0.192***
				(0.0235)	(0.0234)	(0.0298)	(0.0296)
GDP					2.16e-06***	3.44e-06***	3.37e-06***
					(3.83e-07)	(5.64e-07)	(5.54e-07)
IndustryVA						-0.105**	-0.109**
						(0.0438)	(0.0434)
RegulatoryQuality							-2.505**
							(1.190)
Constant	24.32***	24.18***	24.60***	38.40***	38.18***	41.59***	41.67***
	(1.162)	(1.169)	(1.226)	(2.202)	(2.193)	(3.433)	(3.391)
Observations	1,000	1,000	1,000	1,000	1,000	980	980
Number of id	50	50	50	50	50	49	49

Source: *Authors computations from Stata. NOTE:* Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

A further change of the estimation technique (see Table 4) by adopting pooled ordinary least square (OLS) still give us positive and significant coefficient for corruption from model 1-7. Similarly, political stability which measures the perceptions of political instability and/or politically-motivated violence suggest again that this variable is negatively and significantly correlated with Investment. This is because investors will shy away from politically unstable economies due to the fear of making losses. As from model 4 with the successive addition of control variables, the sign and significance of consumption coefficient remain unchanged throughout till model 7. This concur with our previous results stipulating that an increase in investment brings about a fall in final consumption and vice versa.

Table 4: Effect of corruption on investment under Pooled OLS

VARIABLES	Dependent variable : Investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corruption	3.389***	2.939***	0.683	5.812***	6.139***	6.150***	5.993***
	(0.480)	(0.654)	(1.056)	(0.973)	(0.971)	(1.002)	(0.983)
PoliticalStability		0.456	-0.0928	-1.297***	-1.547***	-1.473***	-1.693***
		(0.450)	(0.492)	(0.437)	(0.440)	(0.459)	(0.452)
RuleofLaw			3.004***	-0.840	-0.324	-0.536	4.532***
			(1.106)	(0.995)	(1.000)	(1.030)	(1.298)
FCE				-0.233***	-0.233***	-0.249***	-0.265***
				(0.0135)	(0.0134)	(0.0190)	(0.0188)
GDP					7.44e-07***	6.92e-07**	9.70e-07***
					(2.07e-07)	(2.75e-07)	(2.73e-07)
IndustryVA						-0.0283	-0.0670***
						(0.0249)	(0.0252)
RegulatoryQuality							-5.590***
							(0.898)
Constant	24.64***	24.62***	24.96***	44.49***	44.37***	46.45***	48.10***
	(0.429)	(0.429)	(0.445)	(1.195)	(1.189)	(2.082)	(2.060)
Observations	1,000	1,000	1,000	1,000	1,000	980	980
R-squared	0.048	0.149	0.256	0.474	0.683	0.767	0.795

Source: *Authors computations from Stata. NOTE:* Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table 5: Quantile Regressions

VARIABLES	Dependent variable: Investment				
	10th quantile	25th quantile	50th quantile	75th quantile	90th quantile
Corruption	3.173***	4.080***	3.136***	8.801***	10.51***
	(0.968)	(0.803)	(1.079)	(1.576)	(1.776)
PoliticalStability	-2.270***	-1.602***	-2.075***	-2.539***	0.523
	(0.444)	(0.369)	(0.496)	(0.724)	(0.816)
RuleofLaw	5.897***	4.825***	6.971***	5.452***	3.239
	(1.277)	(1.059)	(1.424)	(2.079)	(2.343)
FCE	-0.240***	-0.313***	-0.349***	-0.304***	-0.273***
	(0.0185)	(0.0154)	(0.0207)	(0.0302)	(0.0340)
GDP	1.68e-06***	1.01e-06***	9.59e-07***	1.16e-06***	7.05e-07
	(2.69e-07)	(2.23e-07)	(3.00e-07)	(4.38e-07)	(4.93e-07)
IndustryVA	-0.145***	-0.167***	-0.145***	-0.0625	-0.00921
	(0.0248)	(0.0206)	(0.0277)	(0.0404)	(0.0456)
RegulatoryQuality	-2.714***	-3.985***	-5.558***	-9.704***	-10.61***
	(0.883)	(0.733)	(0.985)	(1.439)	(1.621)
Constant	40.38***	49.76***	55.49***	54.07***	56.62***
	(2.027)	(1.682)	(2.261)	(3.301)	(3.720)
Observations	980	980	980	980	980

Source: *Authors computations from Stata*. *NOTE:* Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

However, as the study employs panel data analysis on a number of countries it might be questioned that the positive relationship between investment and corruption exists only for a few countries and not for the majority in the sample, given that the relationship remains debatable. To identify whether the relationship existed for the minority or the majority of our sample, we run quantile regressions for the 10th, 25th, 50th, 75th, and 90th quantile respectively. Once more, the results are consistent with those obtained in the baseline for the variables of interest as well as control variables (table 5)

V. Conclusion

It is widely accepted that investments are the pillars for economic growth especially to low income economies. However, there are many factors that could affect investment with the level of corruption being one of the important determining factors. In fact, the effects of corruption on gross fixed capital formation havereceived attention in socio-economic literature. Interestingly, some empiricalstudies provide evidence of a negative relationship while others fail to find such a relationship. Also, a matter of great concern is that some empirical works reveal positive and statistically significant association between the two variables. The central concern of this paper was to examine the effects of corruption on investment in Africa. The paper used control of corruption as measure or indicator of the level of corruption. Besides, economic factors such as final consumption expenditure, GDP per capita and industrial value added and non-economic factors such as political stability, rule of law and regulatory quality the quality of institutions were considered in the analysis as determinants of investment. For analysis, the paper employed fixed effects as a preferable model and it used data for 53 countries over the 2000-2019 period. The empirical evidence revealed that there is a positive relationship between corruption and gross fixed capital formation during the study period, suggesting that investment increases as the economies move from highly corrupt to very clean economies.

These results provide an important strategy for an increase in investment both internally and externally. Economies may achieve or attract more investments if they take effective measures to combat corruption, increase GDP per capita and improve the quality of institutions.

Sample Data Availability Statement

The data underlying this article will be shared on request.

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Conflicts of Interest

The authors declare no conflict of interest.

Authors' contributions

Arsene Mouongue Kelly conceptualized the study, performed the statistical analysis and wrote the first draft of the manuscript.

Romaine Doline Ngo Nguéda conducted the literature searches and proofreading.

Isaac Ketu wrote the protocol and formal analysis
All authors read and approved the final manuscript.

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Appendix

Table 6: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Investment	1.000							
(2) Corruption	0.189	1.000						
(3) PoliticalStabi~y	0.128	0.657	1.000					
(4) RuleofLaw	0.194	0.889	0.709	1.000				
(5) FCE	-0.435	0.143	-0.053	0.033	1.000			
(6) LnGDP	0.042	-0.115	0.040	-0.066	-0.161	1.000		
(7) IndustryVA	0.242	-0.222	0.026	-0.160	-0.679	0.023	1.000	
(8) RegulatoryQual~y	0.095	0.756	0.582	0.865	0.027	0.112	-0.220	1.000

Source: *Authors computations from Stata*

Table 7: Definition and sources of variables

Variable	Definition	Source
Investment	Gross fixed capital formation (% of GDP)and includes land improvements, plant, machinery, equipment purchases etc	WDI database 2022
Corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain	WGI database 2022
Political stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence.	WGI database 2022

Rule of law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society	WGI database 2022
FCE	Final consumption expenditure (% of GDP)is the sum of household final consumption expenditure and general government final consumption expenditure	WDI database 2022
GDP	gross domestic product divided by midyear population	WDI database 2022
Industry VA	Industry (including construction), value added (% of GDP)	WDI database 2022
Regulatory quality	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	WGI database 2022

Source: *Authors computations*

Table 8: List of Countries used in the study

Algeria, Angola,Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo Dem. Rep., Congo Rep., Cote d'Ivoire, Djibouti, Egypt, Arab Rep., Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe

Source: *Authors*