

The Corruption Trap in Africa: Causes and Consequences

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The relationship between corruption and economic development remains controversial, with one strand of literature arguing that "corruption sands the wheels of economic development" and another that "corruption greases the wheels of development." This paper contributes to the literature on the corruption trap by assessing its causes and consequences using unbalanced panel data for 40 African countries during the 1995-2019 period. The empirical findings reveal evidence of the persistence of corruption in Africa. Granger Panel Causality tests highlight that development levels and economic freedom have bi-directional causality with corruption, while there is a unidirectional causality going from corruption to development assistance level, globalization, inequality levels, CO2 emissions, and the natural resources rents. Hence, the difficulty of changing the high corruption equilibrium in Africa and other developing regions is associated with its persistence on the one hand and its causes and consequences on the other, which must be incorporated to create effective anti-corruption policies.

Keywords: perceived corruption, economic development, grease or sand the wheel hypothesis; Trap, granger causality, panel data, Africa

Received October 10, 2022
Accepted August 24, 2023

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JEL: D73, O10, O11, O55

INTRODUCTION

Seldadyo & De Haan (2006) stated that corruption has different definitions in the literature as reflected in the measures designed to capture corruption or its perception. The definitions of corruption have different focuses, ranging from bureaucratic corruption to political corruption. De Graaf (2007) reviewed the corruption theories and stated that there were six theories that defined the corrupt act. For example, the theory of public choice states that corruption is a causal act in which the corrupt official opts for maximizing his own utility by calculating the expected gains and losses of being corrupt. Then, if the corrupt act has more advantages, it is rational to be corrupt. At the microeconomic level this type of "bounded rationality" is consistent with versions of behavioural economics (Simon, 1982 ; Ariely, 2013).

Furthermore, the bad apple theories suggest that the corrupt act is the result of character, which means the reason behind corruption is individual. On the contrary, the organizational culture theories related the corrupt acts to the cultural patterns of the organizations as discussed by Klitgaard (1988); Caiden & Dwivedi (2001). While, Kaptein (1998) and Kaptein & Wempe (2002) claimed that corrupt acts could also originate in society, as hypothesized by the clashing moral theories and the ethos of public administration theories. The societal reasons for corrupt acts are reflected in the norms, values, and perspectives of what is defined as a corrupt act (De Graaf, 2007).

Not only does corruption have many definitions, but it also has mixed results when considering the association between corruption and development. These mixed results support two hypotheses: "corruption greases the wheels of development" and "corruption sands the wheels of development" (Seldadyo & De Haan, 2006). The "corruption greases the wheels of development" hypothesis was introduced in the studies of Leff (1964) and Leys (1965). Leff (1964) showed that bureaucratic corruption could be beneficial for underdeveloped countries with inefficient institutions by increasing investments and hedging the effects of bad economic policies. For example, entrepreneurs in underdeveloped countries needed to buy favours and pay bribes to get licenses for business establishments. While Leys (1965) raised controversial questions about the nature of corruption and said that the moral consideration to oppose corruption is not the sole pillar in corruption analysis; he clarified that corruption is not always bad for growth and development.

Corruption as sand in the wheels of development

The hypothesis that "corruption sands the wheels of development" was supported by empirical studies like Mauro (1995) who provided evidence that corruption is detrimental to economic growth. However, Tanzi & Davoodi (1997) were skeptical about Mauro's evidence of the negative association between corruption and economic growth. They argued that corruption increased public investment but decreased productivity and had a negative effect on the quality of infrastructure. So, higher corruption increased overall public investment but decreased and altered government spending on productive activities, suggesting the effect of corruption on development is ambiguous.

Méon & Sekkat (2005) supported the "corruption sands the wheels of development" hypothesis by providing evidence on the negative relationship between corruption and growth using a sample of 63 to 71 countries between 1970 and 1998. This relationship also worsened when taking into consideration the quality of governance. The lower the governance quality is, the higher the negative impact of corruption on growth will be. The finding is consistent with Habibov et al. (2017) who studied the post-Soviet Union transitional countries and Mongolia. In that case, the research concluded that corruption did sand the wheels of development, and the negative effects of corruption were further deepened in environments where satisfaction with services in public institutions is low. To this perspective, Shabbir et al. (2016) added that there is partial support for the "sanding the wheel hypothesis" since it depends on political instability. The corruption impact was negative in the countries with low political instability, while it greased the wheels of development in the countries with high political instability, such as Nigeria and Pakistan.

With respect to Asia and Africa, two recent studies by Dwiputri et al. (2018) and Uslaner (2007) expanded the literature on the "sanding the wheels hypothesis" by introducing the concept of the "corruption inequality trap." The corruption-inequality trap refers to the bidirectional causality between corruption and inequality levels, which means that the change in corruption causes the change in inequality levels. Based on the findings of these two studies, there is a gap in investigating the corruption inequality trap, particularly in African countries. Uslaner (2007) referred only to Mali and Nigeria in his paper that analyzed data collected by surveys in 2002 and 2005. Because only two African countries were considered in these studies, the findings cannot be generalized to other African countries.

Corruption as grease in the wheels of development

Huang (2016) supported the "greasing the wheels of development hypothesis" in Asia by providing evidence that there is a significantly positive causality running from corruption to economic growth in South Korea and China. While it is an insignificant causality for the remaining ten countries included in the sample, Cho & Yoo (2020) on the contrary provided evidence that corruption sands the development wheels. The paper shows that whenever corruption decreased, economic growth improved in Asian countries. Spyromitros & Panagiotidis (2022) revisited the link between corruption and economic growth and confirmed the hypothesis that "corruption greases the wheels of development" in Latin America and the MENA countries. In addition, Tawiah et al. (2022)

investigated how corruption affects the trade and investment relationships of African countries with China. The results showed that the effect of corruption differed depending on the type of trade relationship. While higher corruption was associated with lower levels of FDI from China, it was also positively associated with trade volume and the construction industry. While on the one hand, this result is also supported by Pepinsky et al. (2022) in the cases of Malaysia and the Philippines, on the other hand, Mallik & Saha (2016) proposed that the relationship between corruption and growth was nonlinear, more specifically a cubic relationship. In the least corrupt countries, corruption hindered growth, while it greased growth in countries with intermediate levels of corruption, and, And at higher levels of corruption, it sanded the wheels of growth. So, the findings supported the "sanding the wheels of development" hypothesis except for the countries that had intermediate levels of corruption. There is lack of evidence about where most African countries fit in the hypothesis of corruption as grease in development or where they are on the corruption-growth cubic curve, which means that there is a gap that needs to be fulfilled. So, the aim of this paper is to thoroughly investigate this gap in African countries.

Other indirect effects of corruption on development

Corruption does not only sand the wheels of growth directly; it also has negative effects on the macroeconomic environment. For example, Serra (2006) tested the robustness of the previous studies on corruption determinants and concluded that there was a significant negative association between political stability and corruption. Huynh & Nguyen (2020); Bayar et al. (2018); and Baklouti & Boujelbene (2022) showed that there was a positive association between corruption, public debt, and the size of the shadow economy.

Ayodeji (2020) associated corruption with higher levels of inflation using a sample of the Economic Community of West African States (ECOWAS) between 1995 and 2019. Habib et al. (2020) suggested that the association between corruption and environmental quality was complicated and depended on the emissions levels in the country. For example, the effect of corruption on CO₂ emissions was negative in lower-CO₂ emission countries such as Burundi and Nigeria. On the other hand, countries with high levels of CO₂ emissions, such as Morocco and Egypt, found that corruption had an insignificant effect on CO₂ emissions.

Again, given this previous literature, our paper revisits the corruption trap in Africa, which we define as the abuse of entrusted power for private gain and measured by the Corruption Perception Index. The re-examination contributes to policy and further research, because African countries are ranked among the most corrupt countries and have the lowest levels of improvement, according to the 2022 report of Transparency International (henceforth, TI). Three of the five countries that scored the lowest values on the corruption perception index are African. Corruption is highly correlated with serious issues and traumatic events in African countries. For example, Equatorial Guinea and Somalia suffer from high political instability. South Sudan is dealing with food insecurity that is deepened by corruption, which diverted resources and even aid from other countries to benefit the networks of corrupt politicians. Also, forty-four of the forty-nine sub-Saharan African countries assessed still score below 50, which indicates having moderate to high levels of corruption. The situation raises many questions. Firstly, is corruption persistent in nature? Secondly, what are the characteristics, causes, and consequences of the corruption trap? To address these questions systematically, this paper uses a large panel of 40 African countries over the time 1995-2019 to re-examine the determinants of perceived levels of corruption. Our study uses panel data models and examines the time series properties of the variables included in the empirical analysis. Data is readily available to reach conclusive and generalizable evidence on the existence of the corruption trap and its causes and consequences. We find evidence of the persistence of corruption in Africa. Subsequent analysis also reveals a bi-directional causality from development levels and economic freedom to corruption, and a unidirectional causality from corruption to the other included variable as we discuss later in this paper. Hence, changing the high corruption equilibrium in Africa and other developing regions is associated with its persistence on the one hand and its causes

and consequences on the other, which must be incorporated to create effective anti-corruption policies.

The rest of the paper is organized as follows: The literature review in Section 2 discusses the nature of corruption in Africa, its causes and consequences, and the determinants of the corruption trap. Data and methodology are outlined in Section 3, followed by the findings and discussion in Section 4. Section 5 checks for the robustness of the results, and Section 6 provides conclusions and policy recommendations.

LITERATURE REVIEW

Previous literature employs cross-sectional and panel data. Scholars use three prominent measures of corruption: the corruption from the icrg (the international country risk guide), the measure from the World Bank and the CPI. Some researchers claim that the CPI measure is especially suitable for measuring corruption as this composite index measures the investment risk of corruption rather than the corruption per se (see for instance, Grundler, and Potrafhe, 2019; Qu et al., 2019, among others).

The previous studies report as the main determinants of corruption: income, public debt, foreign aid and political stability (see for example, Ahmad & Aziz, 2001; Asongu, 2013a ; Benfratello et al., 2015; Chong et al., 2009 and Masud & Yontcheva, 2005).

From a theoretical point of view, De Sardan (1999) broke down corruption propositions in Africa in a paper that concluded that corruption as a concept is complex and embedded in culture. The cultural embeddedness is reflected in the logic of negotiation, gift-giving, solidarity, predatory authority, and redistributive accumulation. The logic is part of the corruption complex, which needs to be considered when formulating effective anti-corruption policies. The logic of gift-giving is embedded in African culture and diverted from being an act of kindness to being part of the corrupt culture. Gift-giving has become a necessary condition for acquiring public service or facilitating business agreements.

As an example, Asongu (2013b) provided empirical evidence using panel data from 46 African countries that higher levels of development, more efforts to fight corruption, and democratization were associated with lower corruption levels. In the report issued by Transparency International (TI), Pring & Vrushni (2019) presented the findings of the Afrobarometer survey that analyzed the responses of more than 47,000 citizens of African countries. Citizens reported that corruption increased in the previous 12 months. Besides, 59 percent of the survey respondents rated government performance as bad and not enough to fight corruption. Another 39 percent of people surveyed thought that all officials were corrupt, which was reflected in the higher demand for bribery to access public services. From a broader perspective, Stephenson (2020) reviewed the reasons for corruption as a self-reinforcing phenomenon and whether incremental anticorruption reforms or the big push can be effective in breaking the high equilibrium corruption trap given that corruption has multiple equilibria such that the previous corruption equilibrium affects the current corruption equilibrium. This is the nature of the high equilibrium corruption trap, suggesting that it is hard to change the corruption equilibrium if the country has had high levels of corruption historically, which weakens any big-push efforts to fight corruption and allows the high-equilibrium corruption to persist in the short-term. Thus, the conception of the corruption trap raised the question of which policy is most effective in changing the high corruption equilibrium. Contrary to the widely accepted hypothesis that the big push is the most effective tool for handling corruption, as claimed by Collier (2006), Akerlof (2016), Bardhan (2006), and Kingston (2008), Stephenson (2020) concluded that incremental, sustainable reforms are more effective in breaking the corruption trap.

Dwiputri et al. (2018) broadened the corruption trap concept by investigating the link between corruption and income inequality. The findings proved that there was a bidirectional causality between corruption and inequality levels using panel data from 14 Asian countries and different models, including the OLS, Tobit, and 2SLS models. These findings confirmed the existence of the corruption-income inequality trap in Asia; the change in corruption levels affected the change in inequality levels, and vice versa.

Furthermore, by using data from Mali and Nigeria between 2002 and 2003, Uslander (2007) introduced the corruption and inequality trap in Africa. The two cases were examples of the link between corruption and inequality as perceived by the respondents to the surveys in both countries. Besides, the author highlighted that despite the democratization efforts in many African countries, most of the countries were still suffering from weak institutions and high levels of inequality, which deepened the effect of the inequality and corruption trap on the economies that are specifically in the transition phase towards development, such as Botswana. This argument was supported by the results of You & Khagram (2005) on the vicious cycle of corruption and inequality using a panel of 129 countries.

The corruption-inequality nexus was further investigated by Andres & Ramlogan-Dobson (2011). The findings suggested that there was an inverse relationship between corruption and inequality in Latin America. This result was supported by Sulemana & Kpienbaareh (2018), who used a panel of 48 African countries. On the other hand, this conclusion contradicted Gupta et al. (2002), who provided evidence for the positive association between corruption and inequality levels.

Similarly, Policardo & Carrera (2018) showed that higher levels of income inequality caused corruption levels to rise using a panel of 50 developed countries. While the other way around was not statistically consistent, higher levels of corruption did not cause higher levels of inequality. So, the causality between corruption and inequality is unidirectional. On the contrary, Apergis et al. (2010) suggested that there was bi-directional causality as well as a long-run relationship between corruption and inequality in the US. This was also investigated using dynamic and linear models by Chong & Gradstein (2007), who reached the conclusion that there was a bi-directional causality between inequality and institutional quality that can be proxied by corruption.

From a complementary perspective, Sassi & Ali (2017) studied whether the usage of technology affected the persistence of corruption in Africa given that the African countries exhibited high equilibrium corruption traps. The findings showed that technology adoption could enhance anti-corruption fighting on the condition that a certain threshold of law enforcement was reached. They provided evidence that law enforcement is the strongest factor in reducing corruption in Africa. Although economic growth turned out to be the weakest factor in affecting the corruption level in Africa, when economic growth increases, corruption levels decrease. Also, trade openness was associated with higher levels of corruption.

Moreover, Elbahnasawy & Revier (2012) pointed to strong law enforcement as one of the determinants of reducing corruption, as well as the existence of voice and accountability freedoms, which were associated with lower levels of corruption. These findings were a reflection on the effectiveness of anti-corruption efforts since the paper considered different potential determinants of corruption to study the variations across countries in different time periods while using two indexes of corruption for results robustness. Similarly, by extension, Andrimihaja et al. (2011) highlighted that corruption is one of the causes of the fragility trap, which provides an explanation of why African countries are underdeveloped. The causes of the fragility trap are instability, insecurity, and corruption. The authors constructed their models based on the fact that 22 African countries are fragile states. Corruption is part of institutional failure. The institutional failure consisted of instability and high levels of violence, insecurity of property rights, and institutional corruption. These factors lead to low levels of investment, decreasing foreign aid since donors are discouraged from giving aid when there is weak governance. Hence, these countries are stuck in a low growth and high corruption equilibrium with a low potential to break the fragility trap.

The previous literature on the corruption trap in Africa has left a gap unexplored since the results of the most recent study by Uslander (2007) used data from Mali and Nigeria only and pointed to the trap as a bidirectional causality between corruption and inequality levels. Although corruption was associated with different economic, social, political, legal, and environmental determinants, the link between the corruption determinants and the concept of the corruption trap was not explored comprehensively in the African previous literature. To close the existing gap, this paper will investigate the following research questions using panel data from African countries:

1. What are the characteristics of the corruption trap?
2. What are the causes of the corruption trap?
3. What is the correlation between the corruption level and its determinants?

DATA AND METHODOLOGY

Sample, Data, and Data sources

An unbalanced panel of 40 African countries over the period 1995-2019 for which data is available is selected for the empirical analysis and is listed in Table 3A in the Appendix. The explanatory variables included in the model are based on previous empirical findings in the literature and data availability. For instance, the corruption level is measured using the Corruption Perception Index (CPI). As determinants of corruption, we include the following control variables. The potential causes of corruption are: the Freedom Index (FRI), GDP per capita growth rate (GDPC), Official Development Assistance as a percentage of GDP (ODA), Natural Resources Rents as a percentage of GDP (NRR), Population Density (PD), Population Size (POP), CO₂ per capita (CO₂C), Human Development Index (HDI), KOF Globalization Index (KOFI), and Gini Coefficient (GINI). Variable sources, descriptions, and descriptive statistics are provided in Table 1A and Table 2A in the Appendix.

The African countries that are included in the sample have high levels of corruption, as Figure 1 shows. Referring to the descriptive statistics of individual countries in Table 3A in the Appendix, Chad has the lowest average CPI, which equals 18 (a highly corrupt country), Ethiopia has an average CPI of 29 (a corrupt country), and Botswana has the highest mean value of CPI, which equals 60 (a moderate level of corruption). The correlations between corruption and its potential determinants are all significant except for the correlation with the growth rate of GDP (see Table 5A). Besides, the strength of the significant correlations is low to moderate.

Methodology

Our methodology starts with testing the stationarity of the variables through conventional panel unit-root tests. Then, pairwise Granger causality tests are conducted to provide evidence about the causes of the corruption trap in Africa. Lastly, fixed effects models are estimated to empirically assess the determinants of corruption. Our model specification follows Sulemana & Kpienbaareh (2018), Elbahnasawy & Revier (2012), and Shabbir & Anwar (2007), but we add more control variables and use the CPI as a measure of corruption.

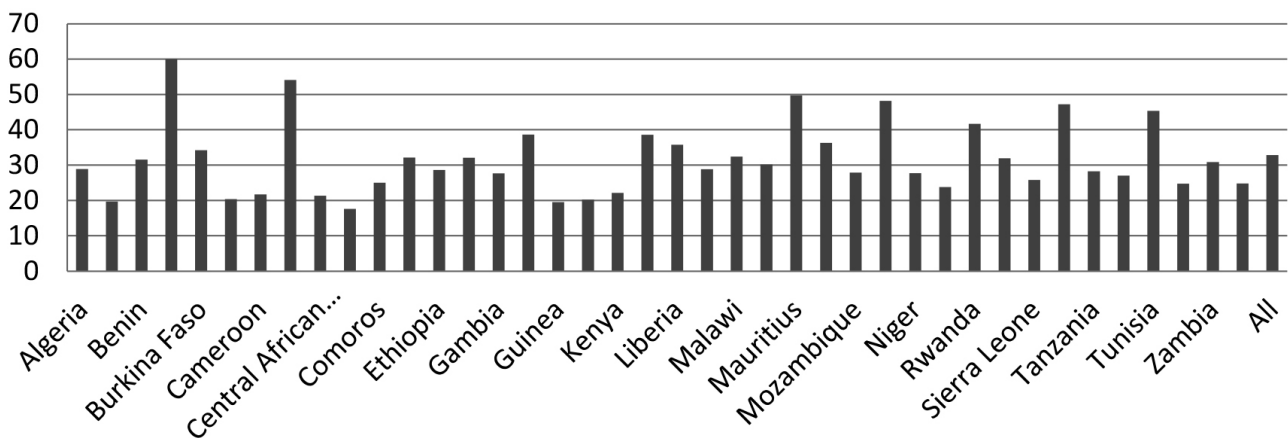


Fig. 1. The Corruption Perception Index (CPI) mean values in the African countries

Our baseline model is as follows:

$$CPI_{it} = \beta_0 + \beta_1 GDPC_{it} + C_{it} + u_{it}, \quad (1)$$

where the subscripts *i* and *t* represent country and time period; CPI is the measure of corruption, GDPC is the growth rate of real per-capita GDP, *C_{it}* is the set of represents other control variables according to previous empirical literature; and *u* is the classical error term. Furthermore, the relationship between corruption and the Gini coefficient, as well as HDI is further investigated as a robustness check and to check the existence of the non-linear relationship between corruption and inequality levels using the following forms:

$$CPI_{it} = \beta_0 + \beta_1 GINI_{it} + u_{it}, \quad (2)$$

$$CPI_{it} = \beta_0 + \beta_1 GINI_{it} + \beta_2 GINI_{it}^2 + u_{it}, \quad (3)$$

$$CPI_{it} = \beta_0 + \beta_1 HDI_{it} + u_{it}, \quad (4)$$

where GINI and HDI are as designated in Table 1A, and β_i are coefficients to be estimated.

FINDINGS AND DISCUSSION

The results of the unit root tests for the variables included in the empirical model are presented in Table 1. These results show that all variables are stationary at all levels assuming the common unit root process except for population density (PD) and population size (POP), which accepted the hypothesis of the existence of the common unit root process. The common unit process assumes that persistence parameters are common across cross-sections according to Levin et al. (2002). Alternatively, the unit root test proposed by Im et al. (2003) allows the autoregressive coefficients to vary across the cross sections by estimating separate ADF regressions, and then the reported t-statistic is calculated as an average of these regressions. The findings of this test provide evidence that the stationary variables containing individual unit roots are the CPI, Freedom Index, Growth Rate of GDP, Official Development Assistance, and KOF Index.

Table 1. Panel unit root tests' results

Variable	Null: Unit root (assumes common unit root process) Levin, Lin & Chu t*			Null: Unit root (assumes individual unit root process) Im, Pesaran and Shin W-stat		
	Statistic	Prob.	Conclusion	Statistic	Prob.	Conclusion
CPI	-6.02394	0.0000	Reject	-2.11043	0.0174	Reject
FRI	-4.25876	0.0000	Reject	-1.69820	0.0447	Reject
GDPC	-22.3411	0.0000	Reject	-8.13035	0.0000	Reject
ODA	-2.92228	0.0017	Reject	-1.31022	0.0951	Reject
NRR	-5.08045	0.0000	Reject	-1.20196	0.1147	Accept
PD	8.66554	1.0000	Accept	13.7682	1.0000	Accept
POP	9.54449	1.0000	Accept	13.3079	1.0000	Accept
KOFI	-9.91384	0.0000	Reject	-1.95022	0.0256	Reject
GINI	-3.51875	0.0002	Reject	2.19312	0.9859	Accept
CO2	-2.41961	0.0078	Reject	1.85518	0.9682	Accept
HDI	-4.61160	0.0000	Reject	2.35453	0.9907	Accept

*Variables Description and Abbreviations is in Table 1A in the Appendix

Based on the results of the unit root tests in Table 1, there is evidence of the persistence of corruption in Africa. This suggests that the high levels of corruption are not easily affected by shocks or reform efforts, and the previous values of corruption affect the current levels, formulating a vicious cycle of corruption that needs to be analyzed in terms of its causes and consequences.

Since the causality test is applied to the stationary variables, the causality is checked between CPI and the stationary potential causes, which are HDI, official development assistance, GDP per capita growth rate, Freedom Index, natural resource rents, KOF Globalization Index, Gini Coefficient, and CO2 per capita. Hence, we turned to Granger (1969) who investigated how to estimate the causality between variables by providing feedback that separates the causality into two causal relations. The panel causality test used in this paper assumes that all coefficients are the same across all cross-sections. The findings of the Granger Panel Causality Tests presented in Table 2 below indicate that there is bidirectional causality between CPI (corruption level) and Freedom Index, as well as HDI, implying that a change in corruption causes a change in economic freedom and development levels, and vice versa. This finding proposes that there is a vicious cycle or trap between corruption, economic freedom, and development.

Moreover, there is a unidirectional causality going from the corruption index to the official development assistance, the KOF Globalization Index, the Gini coefficient, CO2 per capita, and the natural resources rents. While there is a unidirectional causality going from GDP per capita growth rate to CPI, and hence corruption complicates inequality or increases debt levels, economic growth appears to play a role in fighting corruption and perhaps thereby avoiding the corruption trap.

The specification of the regressions passes through consecutive steps. Firstly, the Hausman test is checked to determine whether the random or fixed effects are suitable for the panel. However, it is preferred to use the fixed effects since the independent variables are expected to be correlated with the unobserved individual effects, and most of the variables have low variations across time. So, fixed effects are specified and reported. Secondly, the regression is adjusted to account for the problems of residual cross-section dependence and heteroskedasticity.

The empirical results obtained from the panel regression models are displayed in Table 3. From the analysis of

Table 2. Granger panel causality tests

Null Hypothesis:	F-Stat.	Prob.	Decision
FRI does not Granger cause CPI	7.79440	0.0049	Reject
CPI does not Granger cause FRI	14.5945	0.0001	Reject
GDPC does not Granger cause CPI	3.26009	0.0716	Reject
CPI does not Granger cause GDPC	0.00535	0.9417	Accept
ODA does not Granger cause CPI	1.09105	0.2967	Accept
CPI does not Granger cause ODA	3.30711	0.0696	Reject
NRR does not Granger cause CPI	1.55905	0.2124	Accept
CPI does not Granger cause NRR	5.33105	0.0213	Reject
KOFI does not Granger cause CPI	2.69360	0.1014	Accept
CPI does not Granger cause KOFI	9.87841	0.0018	Reject
GINI does not Granger cause CPI	0.67464	0.4118	Accept
CPI does not Granger cause GINI	4.04464	0.0448	Reject
CO2 does not Granger cause CPI	0.09077	0.7633	Accept
CPI does not Granger cause CO2	5.25347	0.0223	Reject
HDI does not Granger cause CPI	7.56894	0.0061	Reject
CPI does not Granger cause HDI	8.98003	0.0029	Reject

*Variables Description and Abbreviations is in Table 1A in the Appendix

the results presented in Table 3 emerges that the Gini coefficient, freedom index, HDI, KOF globalization index, and natural resource rents have significant coefficients with the expected signs. This result seems to be robust to the inclusion of other control variables, with slight changes in the coefficient magnitudes. Take a few examples: when the corruption index increases by 1, the GINI coefficient increases by 1.12 in model 1, and the magnitude varies slightly in the other models when adding or removing control variables. When the corruption index increases by 1, the freedom index increases by approximately 0.45 in models 5 and 6. This magnitude varies slightly to 0.52 when adding and removing control variables in models 7, 8, and 9. When the corruption index increases by 1, HDI increases by 0.61 in model 3. This magnitude decreases to 0.35 when adding control variables. When the corruption index increases by 1, the KOF Globalization Index increases by 0.32 in model 5. This magnitude is slightly decreased to 0.29 in model 6 when adding and removing control variables. Finally, when the corruption index increases by 1, natural resource rents increase by 0.08 as a percentage of the GDP.

The implication of these findings is that if a country has higher levels of development, more freedoms, and more rents from its natural resources, it will be cleaner and have higher corruption perception index values. Also, there is evidence that higher levels of inequality are associated with higher levels of CPI (which indicates a cleaner country). These results are interesting in another way. The classical Kuznets hypothesis stated that there is a turning point that changes the relationship between economic growth and inequality, and this turning point was determined by the shift from an agriculture-dominated economy to an industrialized economy (Kuznets, 1955). Our paper uses the Kuznets framework to detect if there is non-linearity in the corruption-inequality relationship. The findings

Table 3. Fixed effects regression models

Dependent variable: CPI									
Variable	1	2	3	4	5	6	7	8	9
GINI	1.12 (0.317525)***	3.38 (1.288735)**			1.015 (0.239692)***	0.84 (0.209736)***	0.95 (0.275719)***	0.95 (0.277822)***	0.98 (0.057877)***
GINI^2		-0.026 (0.011908)**							
FRI					0.465 (0.059331)***	0.45 (0.060858)***	0.52 (0.055879)***	0.52 (0.054664)***	0.52 (0.057877)***
HDI			0.61 (0.140968)***			0.35 (0.161072)**			
GDPC				0.016 (-0.48559)	0.06 (-0.045136)		0.072 (-0.045668)	0.07 (-0.044693)	0.06 (-0.045811)
KOFI					0.32 (0.115814)**	0.29 (0.125864)**			
ODA							-0.005 (-0.030071)		
CO2								0.19 (-0.937248)	
NRR									0.08 (0.030472)**
Constant	-17.82 (-14.32559)	-66.5 (34.35359)*	1.57 (-7.188659)	32.7 (0.075368)***	-55.26 (10.65556)***	-62.6 (12.28379)***	-39.59 (13.91742)***	-39.64 (13.87553)***	-41.8 (12.91587)***
Unbalanced Panel N = 564, Countries = 40	R ² = 0.901203 F statistic = 71.12093 Prob (F-statistic) = (0.0000)***	R ² = 0.901547 statistic = 70.15808 Prob (F-statistic) = (0.0000)***	R ² = 0.901938 F statistic = 71.71242 Prob (F-statistic) = (0.0000)***	R ² = 0.897932 F statistic = 68.59203 Prob (F-statistic) = (0.0000)***	R ² = 0.917478 F statistic = 82.14068 Prob (F-statistic) = (0.0000)***	R ² = 0.918320 F statistic = 83.06323 Prob (F-statistic) = (0.0000)***	R ² = 0.915417 F statistic = 79.95925 Prob (F-statistic) = (0.0000)***	R ² = 0.9154123 F statistic = 79.96533 Prob (F-statistic) = (0.0000)***	R ² = 0.916385 F statistic = 80.97043 Prob (F-statistic) = (0.0000)***

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

show that there is a non-linear relationship between corruption and inequality. The Gini has a positive significant coefficient, and the Gini squared has a negative significant coefficient. Our findings suggest that there is a turning point that changes the relationship between corruption and inequality levels from a positive to a negative one.

Our findings are consistent with the strand of literature that supported the hypothesis that "corruption sands the wheels of development." It is compatible with the fact that most African countries are least developed and developing according to the statistics of HDI in 2021. While the relationship with the natural resources rents is inconsistent with the resource curse literature, For example, Sachs & Warner (1995) suggested that the abundance of natural resources decreases economic growth when the country exhibits poor governance and higher corruption levels.

As discussed in the literature, You & Khagram (2005) and Stephenson (2020) described the corruption trap as having high equilibrium corruption that was hard to change by big-push anti-corruption strategies since the previous high values of corruption affected the current levels of corruption. Dwiputri et al. (2018) and Uslaner (2007) concluded that inequality and corruption formed a vicious cycle in which high levels of corruption led to high levels of inequality and vice versa.

Moreover, Aborisade & Aliyyu (2018) stated in their book about the development of Africa that corruption is a pressing issue in Africa. Corruption diverts resources that could be utilized to implement development plans. Also, it affects the attraction of investments to the continent, which leads to being stuck in a low growth and development equilibrium, as confirmed by Andrimihaja et al. (2011).

Also, Bonga & Mahuni (2018) studied the effect of ease of doing business and corruption on economic growth in the Africa Free Trade Zone. The findings highlighted that corruption can have a negative impact on economic growth when it leads to leakages of resources in the economy. This is confirmed by Zallé (2019), who highlighted that corruption minimized economic activity levels.

Furthermore, Efobi et al. (2019) studied the effect of foreign aid on corruption control in Africa based on the direction of the aid. They found that the effect is different based on how the aid is directed. The aid directed at the development of economic infrastructure, multi-sector assistance, and program assistance is positively related to corruption control, unlike the aid directed at social infrastructure and debt relief.

Thus, the evidence from the literature pointed out that corruption could have bidirectional causality with many variables, which formulated the vicious cycle of corruption. This paper contributes to the corruption literature by redefining the corruption trap to add more characteristics that are obtained by using the available data on a large

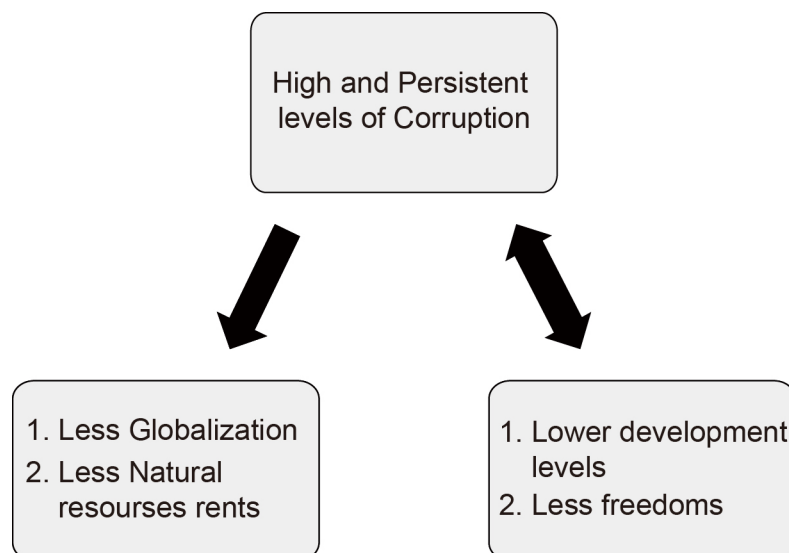


Fig. 2. The corruption trap in Africa

sample of African countries and specifying that corruption has many potential causes.

Based on the findings, there was evidence of corruption's persistence at first. Secondly, there is a bi-directional causality between corruption on one- side and development levels and economic freedoms on the other. There is also a unidirectional causality going from the corruption index to the official development assistance, the KOF Globalization Index, the Gini coefficient, CO2 per capita, and the natural resources' rents. Thirdly, there is a significant positive relationship between corruption as a dependent variable and the Gini coefficient, freedom index, HDI, KOF globalization index, and natural resource rents. These three main findings are the adjusted characteristics of the corruption trap, as summarized in Figure 2.

ROBUSTNESS CHECKS

As a measure of robustness, countries that have high levels of development based on HDI are removed from the panel, and the fixed effects regressions are re-estimated. The removed countries are South Africa, Gabon, Egypt, Algeria, Tunisia, Botswana, and Mauritius. The findings reported in Table 4 show that the coefficients are not different in sign or significance compared to the previous findings. The only difference is that there is no support for the non-linear relationship between inequality and corruption. The Gini coefficient and the squared Gini coefficient have different signs and are insignificant.

Besides, adding and removing control variables does not change the significance of the coefficients, as shown in

Table 4. Fixed effects regression models (robustness)

Dependent variable: CPI									
Variable	1	2	3	4	5	6	7	8	9
GINI	1.24 (0.349547)***	-2.23 (2.556230)			1.15 (0.318752)***	1.19 (0.330685)***	1.09 (0.323799)***	1.05 (0.319954)***	1.08 (0.319434)***
GINI ²		0.04 (0.030175)							
FRI					0.47 (0.074125)***	0.46 (0.072888)***	0.55 (0.071417)***	0.54 (0.070559)***	0.54 (0.070528)***
HDI			0.43 (0.186012)**			-0.06 (0.168034)			
GDP				-0.01 (0.046150)	0.04 (0.043343)		0.056 (0.043932)	0.05 (0.044218)	0.03 (0.043655)
KOFI					0.43 (0.123339)**	0.44 (0.121980)***			
ODA							0.05 (0.044187)		
CO2								1.02 (2.136968)	
NRR									0.1 (0.038305)***
Constant	-25.83 (15.63260)*	-66.5 (34.35359)*	9.84 (8.660791)	29.76 (0.208961)***	-67.41 (15.76291)***	-66.66 (15.80936)***	-49.63 (14.50121)***	-46.91 (13.87553)***	-48.79 (14.53)***
Unbalanced Panel N = 443, Countries = 33	R ² = 0.855774 F statistic = 42.63381 Prob (F-statistic) = (0.0000)***	R ² = 0.856628 statistic = 42.04134 Prob (F-statistic) = (0.0000)***	R ² = 0.852565 F statistic = 41.54944 Prob (F-statistic) = (0.0000)***	R ² = 0.849704 F statistic = 40.62173 Prob (F-statistic) = (0.0000)***	R ² = 0.882447 F statistic = 50.70393 Prob (F-statistic) = (0.0000)***	R ² = 0.882270 F statistic = 50.61744 Prob (F-statistic) = (0.0000)***	R ² = 0.878506 F statistic = 48.83995 Prob (F-statistic) = (0.0000)***	R ² = 0.878168 F statistic = 48.68577 Prob (F-statistic) = (0.0000)***	R ² = 0.880140 F statistic = 49.59802 Prob (F-statistic) = (0.0000)***

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

Table 3. Therefore, our results findings are robust to adding and removing control variables, as well as dropping or adding countries.

CONCLUSION AND POLICY RECOMMENDATIONS

Most African countries have high levels of corruption, which affects development efforts, hinders the best utilization of resources, and forms a trap that was previously named the corruption inequality trap. This paper explores the corruption trap in Africa using the available data on 40 African countries and distinguishes the main factors that contribute to the trap.

The findings of the causality tests provide evidence that there is bi-directional causality between the CPI and the Economic Freedom Index, as well as the HDI. While there is evidence of unidirectional causality going from the CPI to official development assistance, the KOF Globalization Index, the Gini coefficient, CO2 per capita, and the natural resources rents, which are considered corruption consequences, Taking into consideration that CPI is a persistent variable, its causes and consequences are part of the trap in African countries. Thus, this paper contributes to the literature by confirming the existence of the corruption trap in Africa as well as determining its causes and consequences along with their correlation with corruption levels.

Moreover, the findings conform to Andres & Ramlogan-Dobson (2011) and Sulemana & Kpienbaareh (2018), which examined the corruption-inequality relationship in Latin America and Africa, respectively, and reached the conclusion that they are inversely related, which means the higher the inequality, the lower the corruption. Referring to the regression results in Table 3, this paper provides evidence that inequality, represented by the Gini Coefficient, has a significant positive effect on the corruption level. That means that the higher the inequality, the lower the corruption since corruption is measured by the corruption perception index. On the other hand, this finding is not consistent with Gupta et al. (2002) and Policardo & Carrera (2018), who suggested that corruption and inequality were positively correlated using samples from developed countries.

Besides, the inequality-corruption causality test presented in Table 2 provides evidence that conforms to the findings of Policardo & Carrera (2018) on the unidirectional causality from corruption to inequality. On the other hand, it is not in line with Apergis et al. (2010) and Chong & Gradstein (2007), who investigated the existence of bi-directional causality between corruption and inequality.

It is claimed that the differences between studies are due to the heterogeneous samples and different methodologies they used. Policardo & Carrera (2018) studied developed countries, and Apergis et al. (2010) investigated the US. Both used quantitative methods. On the other hand, Chong & Gradstein (2007) analyzed household surveys for 111 countries and used the qualitative method. That means the inequality-corruption causality is affected by the choice of sample and methodology.

Thus, policymakers in African countries need to reconsider their anti-corruption strategies. Firstly, an effective anti-corruption strategy should incorporate the significant causes of corruption to have an integrated policy that breaks the trap. Secondly, fighting corruption should align with the nature of corruption as being persistent, which means it is not easily affected by shocks or the big push anti-corruption strategy. Using the big push strategy will not be effective in the long term, as corruption will get back to its levels, which are high and moderate in the case of Africa. The more effective strategy is to articulate incremental, sustainable, small reforms, as suggested by Stephenson (2020), to change the structure of public institutions in the short and long run. Finally, the negative effects of corruption on development, economic freedom, globalization, and natural resources need to be considered with caution when formulating an anti-corruption strategy to account for the possible spillovers between the variables.

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Appendix 1. Variables, data, and data sources

Variable name	Abbreviation	Description	Source
Corruption perception Index	CPI	Composite index, ranges from 0 (highly corrupt) to 100 (very clean)	Transparency International organization database https://www.transparency.org/en/cpi/2021
Economic Freedom Index	FRI	Composite index, ranges from 0 (highly repressed) to 100 (free)	Heritage Foundation database https://www.heritage.org/index/explore
GDP per capita growth rate	GDPC	Annual percentage growth rate of GDP per capita based on constant local currency	World Bank Database https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG
Official development assistance (% of GDP)	ODA	It consists of disbursements of loans, grants by official agencies to promote economic development	World Bank Database https://data.worldbank.org/indicator/DT.ODA.ODAT.GN.ZS
Natural resources rents (% of GDP)	NRR	Rents are calculated as the difference between the price of a commodity and the average cost of producing it.	World Bank Database https://data.worldbank.org/indicator/NY.GDP.TOTL.RT.ZS
Population density	PD	People per sq. km of land area	World Bank Database https://data.worldbank.org/indicator/EN.POP.DNST
Population size	POP	Mid-year estimates of all citizens	World Bank Database https://data.worldbank.org/indicator/SP.POP.TOTL
CO2 per capita	CO2	Annual production-based emissions of carbon dioxide (CO2), measured in tonnes per person.	Global carbon project dataset supported by Foundation of BNP PARIBAS https://www.icos-cp.eu/science-and-impact/global-carbon-budget/2021
Human Development Index	HDI	Composite index, average of three development dimensions: a long and healthy life, knowledge and a decent standard of living.	United Nations Database https://hdr.undp.org/data-center/human-development-index#/indicies/HDI
KOF Globalization Index	KOFI	Composite Index ranges from 1 to 100. The sub-indices (social, economic and political globalization) are aggregated to higher ranked indices using equal weights.	Gygli, Savina, Florian Haelg, Niklas Potrafke and Jan-Egbert Sturm (2019): The KOF Globalisation Index – Revisited, Review of International Organizations, 14(3), 543-574
Gini Coefficient	GINI	It measures the inequality among values of a frequency distribution of the levels of disposable income. It ranges from 0 (perfect equality) to 1 or 100% (perfect inequality)	Solt, F. (2020). "Measuring Income Inequality Across Countries and Over Time: The Standardized World Income Inequality Database." Social Science Quarterly 101(3):1183-1199. SWIID Version 9.3, June 2022.

Appendix 2. Descriptive statistics (NT = 564). Time-period: 1995-2019

Variable	Mean	Min.	Max	Standard deviation
CPI	32.71	19	65	11.14
FRI	56.07	21.4	77	7.47
GDPC	2.24	-22.31	28.68	3.9
NRR	10.52	0.001	56.61	9.54
HDI	50.97	0.285	0.797	0.11
CO2	1.12	0.02	9.95	1.83
ODA	7.58	0.25	77.87	7.79
GINI	45.13	32.2	65.2	7.28
KOFI	50.07	29.9	72.04	8.69
POP	24,498,693	475,060	196,000,000	3,1496,496
PD	96	2.1	622.96	126.64

Total Number of Observations = 564, Unbalanced panel (1995-2019)

Total Number of Countries = 40

Source: Own elaboration

Appendix 3. List of countries, period covered, and descriptive statistics of Corruption Perception Index (CPI): 1995-2019

#	Country	Years available	Number of observations	Mean	Max	Min.	Standard deviation
1	Algeria	2003-2011	9	28.89	32	26	1.9
2	Angola	2006-2018	13	19.69	23	15	2.14
3	Benin	2004-2015	12	31.58	39	25	4.44
4	Botswana	1998-2015	18	60	65	54	3.11
5	Burkina Faso	2005-2014	10	34.2	38	29	3.33
6	Burundi	2006-2013	8	20.38	25	18	2.72
7	Cameroon	1998-2014	17	21.71	27	14	3.55
8	Cape Verde	2007-2015	9	54.11	60	49	3.79
9	Central African Republic	2006-2008	3	21.33	24	20	2.31
10	Chad	2004-2011	8	17.63	20	16	1.6
11	Comoros	2009-2014	6	25	28	21	2.83
12	Egypt	1998-2017	20	32.15	37	28	2.64
13	Ethiopia	2000-2015	16	28.63	35	22	4.5
14	Gabon	2005-2017	13	32.08	37	28	2.81
15	Gambia	2003-2016	14	27.71	35	19	4.21
16	Ghana	1998-2016	19	38.68	48	33	5.07
17	Guinea	2006-2012	7	19.57	24	16	2.51
18	Guinea-Bissau	2007-2010	4	20.25	22	19	1.5
19	Kenya	1998-2015	18	22.17	27	19	2.53
20	Lesotho	2005-2017	13	38.62	49	32	6.42
21	Liberia	2009-2016	8	35.75	41	31	3.41
22	Madagascar	2002-2012	11	28.82	34	17	4.64
23	Malawi	1998-2016	19	32.42	41	27	4.86
24	Mali	2003-2019	17	30.18	35	27	2.43
25	Mauritius	1998-2017	20	49.75	57	41	4.6
26	Morocco	1998-2014	17	36.29	47	32	4.1
27	Mozambique	1999-2015	17	27.88	35	22	3.08
28	Namibia	1998-2016	19	48.21	57	41	4.87
29	Niger	2004-2014	11	27.73	35	22	4.52
30	Nigeria	2003-2018	16	23.81	28	14	4.2
31	Rwanda	2005-2016	12	41.67	54	25	11.59
32	Senegal	1998-2011	14	31.93	36	29	2.34
33	Sierra Leone	2003-2018	16	25.81	31	19	4.18
34	South Africa	1995-2017	23	47.22	57	41	4.2
35	Tanzania	1998-2017	20	28.25	36	19	4.67
36	Togo	2006-2015	10	27	32	23	3.09
37	Tunisia	1998-2015	18	45.33	53	38	4.89
38	Uganda	1998-2016	19	24.74	29	19	2.45
39	Zambia	1998-2015	18	30.89	38	25	4.98
40	Zimbabwe	1998-2019	22	24.77	42	18	6.11
	Total Sample	1995-2019	564	32.87	65	14	10.9

Source: Own elaboration. Source: Corruption Perception Index (CPI). Published by Corruption index ranges from 0 to 100 ()

Appendix 4. Pearson's correlation Matrix (NT = 564)

	CPI	FRI	GDP	NRR	HDI	CO2	ODA	GINI	KOFI	POP	PD
CPI	1										
FRI	0.65 (20.15954)***	1									
GDP	0.06 (1.334828)	0.05 (1.093418)	1								
NRR	-0.39 (-10.04323)***	-0.36 (-9.159923)	0.08 (1.962397)**	1							
HDI	0.59 (17.23360)***	0.46 (12.36882)***	-0.03 (-0.648282)	-0.18 (-4.359857)***	1						
CO2	0.48 (12.95140)***	0.34 (8.509739)***	-0.05 (-1.304252)	-0.11 (-2.712259)***	0.64 (19.67346)***	1					
ODA	-0.24 (-5.863398)***	-0.25 (-6.090247)***	0.03 (0.596771)	0.17 (4.047456)***	-0.57 (-16.60325)***	-0.44 (-11.50974)***	1				
GINI	0.39 (10.14513)***	0.21 (5.131733)***	-0.05 (-1.070808)	-0.29 (-7.172784)***	0.23 (5.566817)***	0.43 (11.13182)***	-0.21 (-5.203955)***	1			
KOFI	0.52 (14.30282)***	0.45 (12.04838)***	0.02 (0.476418)	-0.26 (-6.437915)***	0.8 (32.20464)***	0.59 (17.32561)	-0.54 (-15.08785)***	0.17 (3.988029)***	1		
POP	-0.19 (-4.460836)***	-0.03 (-0.727355)	0.07 (1.686561)*	0.08 (1.788967)*	0.04 (1.143363)	0.13 (2.990897)***	-0.22 (-5.309464)***	-0.14 (-3.286340)***	0.2 (4.944738)***	1	
PD	0.18 (4.288907)***	0.27 (6.538418)***	0.08 (1.861351)*	-0.2 (-4.957839)***	0.24 (5.926289)***	0.004 (0.105886)	0.06 (1.469019)	-0.21 (-5.092321)***	0.16 (3.929325)	-0.02 (-0.582058)	1

T statistic is in between parentheses, *** p<0.01, ** p<0.05, * p<0.1