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DETERMINANTS OF CORRUPTION: THE CASE OF SUB-SAHARAN AFRICA *

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Abstract

Corruption has been an epidemic in Africa since the age of colonization. The average level of corruption in Sub-Saharan Africa has been on the rise since. The results support the theory of self-reinforcing corruption in the sense that past corruption levels become an important determinant of current corruption levels due to strategic complementarity. The gap between more corrupt and less corrupt countries stays the same as more corrupt countries stays as more corrupt and less corrupt countries stays as less corrupt, demonstrating that corruption is pervasive in Sub-Saharan Africa. For the institutional determinants, we found that increase in political stability, better regulatory quality and higher level of democracy decreases the level of corruption in Sub-Saharan Africa. For the economic determinants, we found that a higher level of development and higher trade integration decreases the level of corruption and higher government expenditure and higher level of natural resources increases the level of corruption in Sub-Saharan Africa. For the socio demographic determinants, we found that higher level of infrastructure decreases the level of corruption while higher share of women in labor force, higher level of population and higher level of urbanization increases corruption in Sub-Saharan Africa.

Keywords: Corruption, Democracy, Political stability, System GMM, Sub-Saharan Africa

Yozlaşmanın Belirleyicileri: Sahra Altı Afrika Üzerine

Öz

Yozlaşma Afrika'da sömürgecilik çağından bu yana salgın halini almıştır. O zamandan beri Sahra Altı Afrika'sında ortalama yozlaşma seviyesi artıştadır. Sonuçlar stratejik tamamlayıcılığa dayalı geçmiş yozlaşma seviyesinin şu anki yozlaşma seviyesinin önemli bir belirleyicisi olması anlamında kendi kendini güçlendiren yozlaşma teorisini desteklemektedir. Daha çok ve daha az yozlaşmış ülkeler arasındaki açığın aynı kalması, yani daha çok yozlaşmış ülkelerin zaman içerisinde daha fazla yozlaşmış kalması ve daha az yozlaşmış ülkelerin zaman içerisinde daha az yozlaşmış kalması, Sahra Altı Afrika'da yozlaşmanın yaygın olduğunu göstermektedir. Kurumsal belirleyiciler için politik istikrardaki artışın, daha iyi düzenleyici kalitenin ve daha yüksek demokrasi seviyesinin Sahra Altı Afrika'sında yozlaşma seviyesini düşürdüğünü bulduk. Ekonomik belirleyiciler için daha yüksek gelişmişlik seviyesi ve daha yüksek ticari entegrasyonun Sahra Altı Afrika'sında yozlaşma seviyesini düşürürken, daha yüksek hükümet harcaması ve daha yüksek doğal kaynaklar seviyesinin yozlaşma seviyesini artırdığını bulduk. Sosyo-demografik belirleyiciler için daha yüksek altyapı seviyesinin Sahra Altı Afrika'sında yozlaşma seviyesini düşürürken, daha yüksek kadın iş gücü oranının, daha yüksek nüfus oranının ve daha yüksek şehirleşme seviyesinin yozlaşma seviyesini artırdığını bulduk.

Anahtar Sözcükler: Yozlaşma, Demokrasi, Politik istikrar, Sistem GMM, Sahra Altı Afrika

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Determinants of Corruption: The Case of Sub-Saharan Africa

Introduction

Corruption is the most severe threat to the socio-economic development of countries (Elbahnasawy and Revier, 2012). Corruption distorts the rule of law as an aspect of governance and weakens the governance infrastructure on which economic growth and development depend. By undermining the good government and fundamentally distorting public policy, corruption leads to the misallocation of resources, impairs the private sector and its development, and finally hurts the poor (Seldadyo and Haan, 2005).

Main factors lying behind the corruption are institutional factors (economic freedom, level of democracy, freedom of press, political stability, rule of law, and regulatory quality), economic factos (development level, size of government, economic integration, natural resources, and inward foreign direct investment), and socio demographic factors (share of women in labor force and parliament, level of education, population, urbanization, and infrastructure).

Corruption has been an epidemic in Africa since the age of colonization. Even the concept of corruption is not known in African culture in the pre-colonial period. Pre-colonial Africa had been established on strong ethical values mainly targeting social justice and compliance (Aborisade and Aliyyu, 2018).

Colonialism is the source of pervasive grand scale systematic corruption in Sub-Saharan Africa. Colonialism corrupted the strong ethical values, indigenous standards, checks and balances and destabilized the existing pre-colonial bureaucratic machinery under the clandestine superimposition of Western civilization (Aborisade and Aliyyu, 2018).

The leadership in Sub-Saharan Africa was turned into an enterprise of corruption. Leaders in power held their trust for the colonial authorities instead of the people they rule. Institutions were used as a tool for extortion and coercion for citizens to forcefully obey the rule of the powerful elites. A culture is started to gradually develop where people perceive corruption as a primary tool to entitle basic rights or to avoid punishment (Aborisade and Aliyyu, 2018).

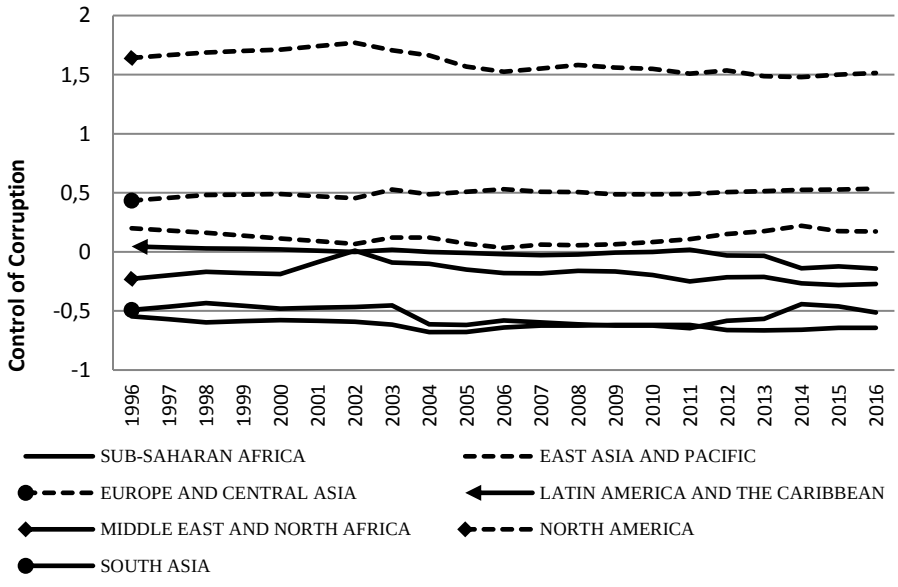
The epidemic corruption in Sub-Saharan Africa is an outcome of

dictatorial leaderships taking over colonial institutions after the end of colonial governments (Ayitey, 2012).

Most of the countries in Sub-Saharan Africa have low economic development, high unemployment and widespread poverty. Bad governance and particularly high levels of corruption are the main factors, which impair the economic development of the region. Corruption distorts the economies in Sub-Saharan Africa by hindering investment in the region. Since decision-makers always favor their personal gains in the expense of development priorities for their countries, corruption has an adverse effect on the society (Aborisade and Aliyyu, 2018). Several countries in Sub-Saharan Africa have formulated several reforms to tackle the issue of corruption, but only few countries have succeeded (Kimanyi ve Mbaku, 2011). Because, it requires significant and concentrated effort for African countries to tackle the menace of corruption (Aborisade and Aliyyu, 2018).

According to Figure 1, Sub-Saharan Africa is the worst performing region compared to others, even worse than South Asia. Corruption is prevalent in the globe. Although countries in Sub-Saharan Africa fully aware of its harms, their efforts to tackle the issue of corruption are in varying degrees from less effective policies to more effective policies (Aborisade and Aliyyu, 2018). The questions have been raised on the effectiveness of these policies.

Figure 1. Corruption by Region

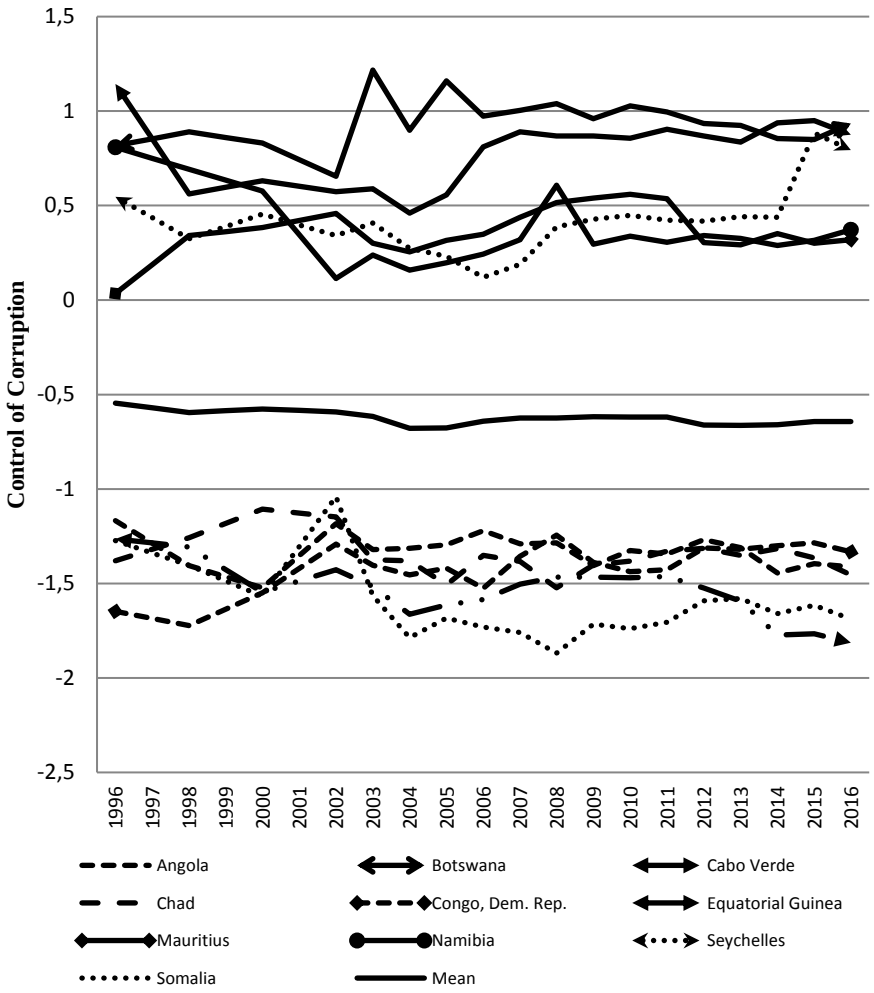


Source: Author's own calculations based on WGI (2018).

Figure 2 presents the mean score of the region and the performance of the countries that are one standard deviation above or below the mean. Figure 2 is drawn fort he levels of control of corruption, hence the reverse case should be considered for the level of corruption.

According to the figure, corruption is more pervasive in Angola, Chad, Congo Democratic Republic, Equatorial Guine, Somalia, and less pervasive in Bostwana, Cabo Verde, Mauritus, Namibia and Seychelles.

Figure 2. Corruption in SSA Countries



Source: Author's own calculations based on WGI (2018).

The paper contributes to the literate in the following ways. First, the paper classifies the determinants of corruption as institutional, economic and socio-demographic factors in a theoretical perspective other than the studies in the literature. Second, the paper analyzes the determinants of corruption in Sub-Saharan Africa by taking into account of variation accross countries and over time as opposed to studies analyzing the determinants of corruption in a cross sectional setup. Third, as opposed to the static panel data studies in the literature, the paper considers the possibility of self-reinforcing corruption by employing dynamic panel data analysis, since corruption is a rooted epidemic. Finally, different from the studies in the literature employing cross section or panel data analysis, the paper uses System GMM technique to ovecome endogeneity problem stemming from the reverse causality running from the corruption to the determinants of corruption.

Next section presents literature review. Section 2 presents determinants of corruption. Section 3 presents empirical analysis and last section presents conclusion.

1. Literature Review

Since the paper does not specifically analyze the effect of a single factor on corruption, it is harder to classify papers on the determinants of corruption. A possible classification method is to categorize the findings of studies according to our own categorization of determinants of corruption.

The first category includes studies finding significant effect of institutional factors on corruption.

Ali and Isse (2003), Ata and Arvas (2011), Ghaniy and Hastadi (2017), Shabbir and Anwar (2007), and Park (2003) found that economic freedom have negative significant effect on corruption. Their findings support the argument that economic freedom lowers the rents from economic activities, hence it lessens the motivation of public officials to act corrupt behavior by grasping reduced amount of rents (Shabbir and Anwar, 2007).

While Elbahnasawy and Revier (2012) found that voice and accountability has negative significant effect on corruption, Fréchette (2006) found that greater political freedom decreases corruption, and Ghaniy and Hastadi (2017) found that democracy have negative significant impact both in developed and developing countries, Serra (2006) found that uninterrupted democracy have negative significant effect on corruption, and Treisman (2000) found that long experience of democracy lowers corruption. Their findings support the argument that democracy enhances transparency and establishes checks and balances in the political system, which increases the ability of the public to monitor politicians

and to limit them to engage in corrupt act (Seldadyo and Haan, 2005).

Park (2003) found that socio political stability has negative significant effect on corruption, Ghaniy and Hastadi (2017) found that political stability has negative significant impact on corruption and Serra (2006) found that political instability has positive significant effect on corruption. Their findings support the argument that political stability increases the likelihood of public official to remain in the office, which increases the perceived cost of corrupt behavior.

Elbahnasawy and Revier (2012) found that rule of law have negative significant effect on corruption, Ali and Isse (2003) found that judicial efficiency has negative significant effect on corruption, and Park (2003) found that the legitimacy of legal system has negative significant effect on corruption. Their findings support the argument that better rule of law increases the likelihood of detection and punishment of illicit rent seeking behavior and a perception of strong rule of law decreases the incentives of corrupt acts (Elbahnasawy and Revier, 2012).

The second category includes studies finding significant effect of economic factors on corruption.

Ata and Arvas (2011), Elbahnasawy and Revier (2012), Ghaniy and Hastadi (2017), Serra (2006), Shabbir and Anwar (2007), and Treisman (2000) found that economic development has negative significant effect on corruption, Fréchette (2006) found that higher income increases corruption. Except Fréchette (2006), their findings support the arguments that money paid to public officials as an act of corruption has more marginal value in poor economies for the material wellbeing of the public officials and public officials are well paid in rich countries in contrast to poor countries where public officials receive low wages to encourage corrupt behavior.

Ali and Isse (2003) found that government size have positive significant effect on corruption. Their finding support the argument that larger the size of the public sector, greater the probability of corrupt behavior due to increased number of public officials and higher amount of possible rents (Seldadyo and Haan, 2005).

The third category includes studies finding significant effect of socio demographic factors on corruption.

Seldadyo and Haan (2005) found that portion of female in labor force have negative significant effect on corruption. Their finding support the argument that women generally feel that there is a greater likelihood of being caught in a corrupt act since they are more risk averse compared to men and they are generally brought up to be more honest than men to be role model for their future children.

Ghaniy and Hastadi (2017), and Shabbir and Anwar (2007) found positive significant effect of education on corruption, Fréchette (2006) found that increase

in schooling increases corruption, Seldadyo and Haan (2005) found that illiteracy rate has negative significant effect and primary school enrollment have positive significant effect on corruption, while Ali and Isse (2003) found that level of education has negative significant effect on corruption. Except Ali and Isse (2003), their findings do not support the argument that the increased level of education and literacy, namely a higher human capital increases the probability that a corrupt act will be detected and punished (Elbahnasawy and Revier, 2012). But their findings do support the argument that education increases potential rents due to better jobs, which increases the likelihood of corrupt behavior.

2. Theoretical Perspective on the Determinants of Corruption

In the literature, there is no theoretical model to base our empirical model for the determinants of corruption (Alt and Lassen, 2003). But there are numerous empirical studies incorporated various explanatory variables to explain corruption by finding significant determinants of corruption. The main problem in these specifications is that a significant variable turns into insignificant when other variables are added to the regression. So, any claim of finding true determinants of corruption and its robustness are conditional (Seldadyo and Haan, 2005).

2.1. Definition of Corruption

Corruption is defined as the misuse of entrusted public power for private gain either by elected politicians or appointed civil servants (Senturia, 1931). Three conditions are required for the existence of corruption. First, in order to design or administer regulations and policies, the public official must have discretionary power and authority. Second, the discretionary power of the public official must allow extraction of existing rents or creation of new rents. Finally, the institutions must be weak to allow public officials to extract or create rents by exploiting their discretionary power (Aidt, 2003).

Teksöz (2006) defines two types of corruption as political (grand) and bureaucratic (petty) corruption. Political corruption is observed at higher levels of political authority involving the corruptness of the decision-making segments of society (Teksöz, 2006). Politicians exploit their positions for their own private gain either by receiving kickbacks from the contracts that the state hands out, or by the embezzlement of large sums from the public source (Teksöz, 2006). Bureaucratic corruption is observed at lower levels of public administration that a typical citizen experiences in daily life; when they have to bribe to public

servants in order to receive a service or to escape from punishment (Teksöz, 2006). While bureaucratic corruption is a deviation from written rules or implicit codes of conduct, political corruption exceeds it by covering abusing, sidestepping, ignoring or tailoring laws and regulations (Teksöz, 2006).

According to Aidt (2003), four alternative approaches to corruption have been developed in the literature. First, the efficient corruption, which states that corruption allows agents in the private sector to correct pre-existing government failures leading to increase in allocative efficiency and beneficial trade between agents. Second, corruption with a benevolent principal, which states that corruption arises when a benevolent principal transfer his/her entrusted public power to a non-benevolent agent. The level of corruption depends on the costs and benefits of designing optimal institutions including bureaucracy and it is determined by how well the design of these institutions. Third, corruption with a non-benevolent principal, which asserts the absence of benevolent principal in the design of optimal institutions and policies since all agents are corruptible. Implementation of inefficient policies by non-benevolent government officials in order to extract rents leads to corruption and the incentives in existing institutions determines the level of corruption. Last, self-reinforcing corruption, which states that the current level of corruption is not determined by the incentives in existing institutions, but depends on the history. Past corruption level is an important determinant of current corruption level due to strategic complementarity.

While numerous authors have defined several categorizations, we identify three broad categories for the determinants of corruption as (1) institutional factors, (2) economic factors and (3) socio demographic factors.

2.2. Institutional Factors

Since institutions shape the interaction between citizens and public officials, they may have an effect on the occurrence of corruption (Lederman et al., 2005). Institutions set the incentives for public officials to be honest and to oversee and punish misconduct (Lederman et al., 2005).

2.2.1. Economic Freedom

Corruption generally involves the extraction of rent by public official who is endowed with some sort of public power. The provision of public goods, which are determined in the market structure by political structure, determines the extent of rent extraction by public officials (Lederman et al., 2005). Economic freedom lowers the rents from economic activities, hence it lessens the motivation of public officials to act corrupt behavior by grasping reduced amount of rents (Shabbir and Anwar, 2007). Higher personal economic freedom results

in reduced political control over economic resources of a country, which lessens the perceived level of corruption (Shabbir and Anwar, 2007). When a service is provided by more than one government agencies, citizens have a freedom to choose where to buy it, hence, corruption is declined due to the reduced amount of rents based on competition among government agencies (Lederman at al., 2005). In countries with suppressed economic freedom, individual economic success depends on the ability of the citizen to influence the public official in charge (Shabbir and Anwar, 2007).

Hypothesis 1: Higher economic freedom results in lower corruption.

2.2.2. Democracy

In democratic societies, the public officials use their entrusted public power to serve the public (Shabbir and Anwar, 2007). In non-democratic societies, public officials use their power to serve their own interests, which causes corruption since they misuse entrusted public power for private gain. Fair elections in democratic societies guarantee that politicians can be held responsible for the actions they have taken in public office. The possibility of loss of elections or being overthrown may require politicians to align their own interest with the interest of the public (Lederman et al., 2005). The electoral competition in a democratic country may result in corruption since politicians abuse their power to raise campaign funds for the private benefit of a party instead of the benefit of the public (Shabbir and Anwar, 2007). Also, in the form of political liberty, democracy enhances transparency and establishes checks and balances in the political system (Seldadyo and Haan, 2005). Hence democracy increases the ability of the public to monitor politicians and to limit them to engage in corrupt act. Separation of powers provide checks and balances, which may prevent politicians to abuse their authority through the mechanism that different government bodies disciplines each other in favor of citizens (Lederman et al., 2005).

Hypothesis 2: Higher democracy results in lower corruption.

2.2.3. Freedom of Press

The freedom of speech and the freedom of press in democratic countries allow citizens to ask questions, demand inquiries, uncover information and broadcast their findings with the public (Shabbir and Anwar, 2007). Hence asking for bribe as an act of corruption and in becomes more risky and less prevalence in bureaucracy and also the probability of the misuse of political authority for the personal gain in non-democratic societies becomes less pervasive due to the chance of being discovered by press. Also, in a country with

strong freedom of speech and freedom of press, a public official is always under the pressure that a corrupt behavior will be rapidly discovered and punished (Elbahnasawy and Revier, 2012). Freedom of press decreases the asymmetry of information between citizens and government officials by publicizing the right and wrong doings of the government (Lederman et al., 2005).

Hypothesis 3: Higher freedom of press results in lower corruption.

2.2.4. Political Stability

In the literature, two controversial arguments exist for the effect of political stability on corruption. First, political stability increases the likelihood of public official to remain in the office. Hence it increases the perceived cost of corrupt behavior. From another perspective, the political instability decreases the perceived cost of corrupt behavior since it decreases the probability of public official to remain in the office more than a short period. The potential loss of the job may not be crucial since it will end in a short period. Hence it leads the public official to act more opportunistically. For both argument, political stability reduces corruption and political instability increases corruption. Second, the extended tenure of the public official due to political stability may give opportunity to him to build long lasting relationship with potential suppliers of bribe (Elbahnasawy and Revier, 2012).

Hypothesis 4: Higher political stability results in lower corruption.

Hypothesis 5: Higher political stability results in higher corruption.

2.2.5. Rule of Law

Better rule of law increases the likelihood of detection and punishment of illicit rent seeking behavior and a perception of strong rule of law decreases the incentives of corrupt acts (Elbahnasawy and Revier, 2012).

Hypothesis 6: Higher rule of law results in lower corruption.

2.2.6. Regulatory Quality

Regulatory mechanism develops adequate checks and balances and well-functioning regulatory mechanism reduces the asymmetry of information, which reduces the incidence of corruption. The rent extraction and the information asymmetry depend mostly on the institutional design, namely regulatory quality (Lederman et al., 2005).

Hypothesis 7: Higher regulatory quality results in lower corruption.

2.3. Economic Factors

2.3.1. Development Level

The development level of a country, which is proxied by income per capita, has three possible effects on corruption. First, the countries with low level of income create less wealth compared to countries with high level of income. In poor countries, the marginal income has a significant effect on the living conditions of citizens. In other words, the marginal value of money is greater in poor economies (Shabbir and Anwar, 2007). Hence the money paid to public officials as an act of corruption has more marginal value in poor economies for the material wellbeing of the public officials. Second, public officials are well paid in rich countries in contrast to poor countries where public officials receive low wages to encourage corrupt behavior (Seldadyo and Haan, 2005). It is highly possible that bureaucrats in rich countries do not accept bribes as a form of corruption due to the fact that the gain from the bribe is low compared to the outcome of being caught. When public officials are paid low, they use their entrusted public power to seek rent (Kraay and Van Rijckeghem, 1995). Lastly, poor countries have lack of well-established institutions to detect and prevent corrupt acts (Seldadyo and Haan, 2005). Rich countries should devote more resources to detect and prevent corrupt acts (Elbahnasawy and Revier, 2012). Due to these three facts, corruption is more pervasive in poor countries.

Hypothesis 8: Higher level of development results in lower corruption.

2.3.2. Size of Government

In the literature there are two arguments leading to same conclusion for the effect of government size on corruption. First; if countries exploit economies of scale in the sector of public services then the ratio of public service outlets per capita will be low and the citizens are tempted to bribe public officials to get ahead of the queue (Seldadyo and Haan, 2005). Second; large government sector may create opportunities for corruption due to increased number of public officials and higher amount of possible rents. Hence, larger the size of the public sector, greater the probability of corrupt behavior (Seldadyo and Haan, 2005).

Hypothesis 9: Bigger size of government results in higher corruption.

2.3.3. Economic Integration

Restrictions on foreign trade, foreign investment and capital market stimulate corruption since such restrictions create rents-related corruption by offering an opportunity to bribe. The mechanism is that greater barriers of entry and exit create greater distortions in competitive environment, and the result is

more widespread corruption (Seldadyo and Haan, 2005). Quata licences and permits are administrative commodities under the control of public officials. Greater foreign competition reduces potential economic rents and the potential gain from bribes (Elbahnasawy and Revier, 2012). Therefore, a freer trade regime would reduce the control of public officials and thus corruption (Shabbir and Anwar, 2007).

Hypothesis 10: Higher economic integration results in lower corruption.

2.3.4. Natural Resources

The abundance of natural resources is a significant determinant of corruption since it creates opportunities for public officials to extract rent (Elbahnasawy and Revier, 2012).

Hypothesis 11: Higher extent of natural resources results in higher corruption.

2.3.5. Foreign Direct Investment

Foreign firms and multinationals pay bribes to obtain government contracts, to receive trade licenses, to evade red tape and to forestall bureaucratic complications (Hines, 1995). Multinationals and foreign investors may spread a culture of corruption in poor countries with weak statutory and legal protections (Ahmad, 2008).

Hypothesis 12: Higher inward foreign direct investment results in higher corruption.

2.4. Socio Demographic Factors

2.4.1. Share of Women in Labor Force and in Parliament

More influence of women results in less corruption due to four arguments of Swamy et al (2001). First, women generally feel that there is a greater likelihood of being caught in a corrupt act since they are more risk averse compared to men and they are generally brought up to be more honest than men. Second, in order to teach right values and honesty to their children, women involved in raising children feel that they have to be honest first as a role model for their children. Third, men are the physically stronger sex compared to women. So, compared to men, women may feel more willing to follow rules since they exist to protect them. Lastly, the propensity of women to indulge in criminal behavior is less than men since girls generally have higher level of self-control than boys.

Hypothesis 13: Higher share of women in labor force and parliament results in lower corruption.

2.4.2. Education

The increased level of education and literacy, namely a higher human capital increases the probability that a corrupt act will be detected and punished (Elbahnasawy and Revier, 2012).

Hypothesis 14: Higher level of education results in lower corruption.

2.4.3. Population

In large countries the ratio of government officials is lower. So that, it is more likely that citizens bribe public officials for public services to avoid the longer queues. On the contrary, in small countries it is more likely that public officials and citizens have family ties or relations which makes bribes and corrupt acts costlier. Since everybody knows everybody in small countries, there is a higher social censure in small countries (Elbahnasawy and Revier, 2012).

Hypothesis 15: Higher amount of population results in higher corruption.

2.4.4. Urbanization

It is more likely that urban population have more knowledge and are better informed about political affairs and the bureaucracy, so that they approach more critically when encountered with questionable behavior by public officials. Hence, the greater the ratio of the rural population, the more likely that corrupt acts will occur (Elbahnasawy and Revier, 2012).

Hypothesis 16: Higher urbanization results in lower corruption.

2.4.5. Infrastructure

In a country with inadequate infrastructure, corruption is pervasive and a daily event since the citizens have to bribe even to access electricity and water. Infrastructure projects are allocated not by efficient market projects but to the contractors who pay the greater bribe to extract rents.

Hypothesis 17: Higher infrastructure results in lower corruption.

3. Empirical Analysis

The empirical analysis covers 42 countries in Sub-Saharan Africa for the period of 1996-2016. N=40 for Models 1 and 2, N=42 for Model 3, and T=21 for

all models. Originally, less than 5 % of the data was filled with missing observations. Data is turned into a balanced panel by taking simple averages for interpollation and by taking moving averages for extrapollation. None of the variables are dummy nor categorical variables, they are all continuous variables. Since we have used System GMM technique, which instruments by lags, we have no instrumental variables. Summary statistics of the variables presented below. See Appendix 1 for the countries analyzed and see Appendix 2 for the source of the data.

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Coc	882	-0.589	0.607	-1.723	1.217
pols	840	-0.482	0.876	-2.845	1.219
regq	840	-0.587	0.577	-2.298	1.127
rol	840	-0.652	0.648	-2.13	1.077
va	840	-0.555	0.708	-2	1.016
ecof	840	53.792	8.502	21.4	77
fop	840	43.32	18.037	7	83
gdppc	840	2190.502	3232.614	122.856	20333.94
fdi	840	5.001	10.936	-82.892	161.824
natr	840	14.328	14.741	0.001	89.166
gov	840	15.483	7.19	2.047	69.543
trop	840	77.709	49.169	17.859	531.737
urban	882	36.43	15.94	7.412	87.366
pop	882	9796973	14200000	64265	98900000
feml	882	44.718	6.152	24.385	55.905
seat	882	15.247	10.906	0	63.8
infra	882	26.982	11.59	7.13	70.761
educ	882	46.871	14.255	12.115	89.138

3.1. System GMM Model

The following model is estimated with System GMM (Roodman, 2009);

(1) $y_{it} = \alpha\, y_{i,t-1} + x'_{it}\beta + \varepsilon_{it}$

(2) $\varepsilon_{it} = \mu_i + \nu_{it}$

(3) $E(\mu_i) = E(\nu_{it}) = E(\mu_i \nu_{it}) = 0$

The disturbance term ε_{it} has two components: (1) the fixed effects, μ_i, (2) idiosyncratic shocks, ν_{it}, which are orthogonal to each other.

(4) $\Delta y_{it} = (\alpha - 1)\, \Delta y_{i,t-1} + \Delta x'_{it}\beta + \Delta \nu_{it}$

(5) $E[\Delta w_{it} \mu_i] = 0$

The System GMM estimator, which is developed by Arellano and Bover (1995) and Blundell and Bond (1998), augments the Difference GMM estimator, which is developed by Arellano and Bond (1991). They made an additional assumption that the first differences of instrumental variables are uncorrelated with the fixed effects (5), which allows the employment of more instruments. Hence it improves the efficiency by building a system of two equations; one is the original equation (1), the other is the transformed equation (4). While Arellano and Bond (1991) instrument differences with levels in difference GMM, Blundell and Bond (1998) instrument levels with differences in system GMM (Roodman, 2009).

Since, one-step standard errors are always asymptotically inefficient in the system GMM estimator, we used two-step standard errors by making Windmeijer (2005) finite-sample correction to the reported standard errors in two-step estimation, without which those standard errors tend to be severely downward biased (Roodman, 2009).

Validity depends on the assumption that the v_{it} is not serially correlated. But if the v_{it} is serially correlated of order 1 then, for instance, $y_{i,t-2}$ is endogenous to the $v_{i,t-1}$ in the error term in differences, $\Delta\varepsilon_{it} = v_{it} - v_{i,t-1}$, making it a potentially invalid instrument. The researcher would need to restrict the instrument set starting with third lag or longer. If the researchers find second order correlation, they would need to start with even longer lags (Roodman, 2009).

Reduced Form Equations;

Equation for Institutional Determinants

(6) $coc_{it} = \alpha\, coc_{i,t-1} + \beta_1\, pols_{it} + \beta_2\, regq_{it} + \beta_3\, rol_{it} + \beta_4\, va_{it} + \beta_5\, ecof_{it} + \beta_6\, fop_{it} + \varepsilon_{it}$

Equation for Economic Determinants

(7) $coc_{it} = \alpha\, coc_{i,t-1} + \beta_1\, gdppc_{it} + \beta_2\, fdi_{it} + \beta_3\, natr_{it} + \beta_4\, gov_{it} + \beta_5\, trop_{it} + \varepsilon_{it}$

Equation for Socio Demographic Determinants

(8) $coc_{it} = \alpha\ coc_{i,t-1} + \beta_1\ urban_{it} + \beta_2\ pop_{it} + \beta_3\ feml_{it} + \beta_4\ seat_{it} + \beta_5\ infra_{it} + \beta_6\ educ_{it} + \varepsilon_{it}$

3.2. Estimation Results

According to Table 2, the lag of control of corruption has positive significant impact on the current level of control of corruption. The finding supports the theory of self-reinforcing corruption in the sense that past corruption levels become significant determinant of current corruption level due to strategic complementarity. Another argument based on the result is that the coefficient for the lag of control of corruption is between 0.8388 and 0.9377, which states that countries in Sub-Saharan Africa converges to their own steady-state very slowly. This means that the gap between more corrupt and less corrupt countries stays the same as more corrupt countries turning into more corrupt and less corrupt countries turning into less corrupt, demonstrating that corruption is pervasive in Sub-Saharan Africa.

3.2.1. Results for Institutional Determinants

The estimation result of the negative significant effect of political stability on the level of corruption supports Hypothesis 4 and rejects Hypothesis 5. Hence political stability decreases the level of corruption since remaining in the office secured by politically stable environment increases the perceived cost of corrupt behavior for the countries in Sub-Saharan Africa. The result supports Seldadyo and Haan (2005), which found ethnic conflict increases corruption, which is a type of political instability.

The estimation result found for the regulatory quality supports Hypothesis 7 that regulatory quality has a negative significant effect on the level of corruption. Because well-functioning regulatory mechanism reduces the asymmetry of information and rent extraction related to the provision of public goods, which reduces the incidence of corruption for the countries in Sub-Saharan Africa. The result supports Seldadyo and Haan (2005).

The results support Hypothesis 2. Because, the possibility of a loss of elections or being overthrown may require politicians to align their own interest with the interest of the public. Also, democracy increases the ability of the public to monitor politicians and to limit them to engage in the corrupt act. Hence a higher level of democracy decreases the level of corruption for the countries in Sub-Saharan Africa. The result supports Lederman et al. (2005), Shabbir and Anwar (2007), and Elbahnasawy and Revier (2012).

We could not find evidence to support hypothesis 1, 3 and 6, hence the rule of law, economic freedom and freedom of the press are insignificant determinants of corruption for the countries in Sub-Saharan Africa. The results do not support the negative significant effect of press freedom on corruption, which is found by Lederman et al. (2005). The result found for economic freedom does not support Shabbir and Anwar (2007), which found negative significant effect for developing countries. The result does not support Elbahnasawy and Revier (2012), which found rule of law has negative significant effect on corruption.

3.2.2. Results for Economic Determinants

We found that GDP per capita has a negative significant impact on corruption. Because, the money paid to public officials as an act of corruption has more marginal value in poor economies. Also, public officials are well paid in rich countries in contrast to poor countries where public officials receive low wages to encourage corrupt behavior. Finally, **r**ich countries should be able to devote more resources to the detection and prevention of corruption. Since higher income is the product of a higher level of development, our finding supports Hypothesis 8 that a higher level of economic development reduces corruption for the countries in Sub-Saharan Africa. The result supports Elbahnasawy and Revier (2012).

We found that government expenditure has significant positive impact on corruption in favor of Hypothesis 9. Because, citizens who demand the public services are tempted to bribe in order to get ahead of the queue due to the economies of scale in the provision of public services. Also, a larger government sector may create opportunities for more corruption due to higher rents in the public sector. Hence the bigger size of government increases the likelihood of corruption. The result supports Lederman et al. (2005). The result does not support Elbahnasawy and Revier (2012), which found insignificant effect.

The estimation result we obtained for trade openness supports Hypothesis 10 that higher the level of economic integration, lower the corruption for countries in Sub-Saharan Africa. Because greater the restrictions on foreign trade and barriers to entry and exit, greater the economic rents; higher the potential gain from corruption and more widespread the corruption. The result supports Shabbir and Anwar (2007), which used globalization index for economic integration. The result also supports Elbahnasawy and Revier (2012). The result does not support Lederman et al. (2005), which found that openness has no significant effect on corruption.

We found a significant negative coefficient for natural resources in favor of Hypothesis 11. The higher extent of natural resources increases the level of

corruption for countries in Sub-Saharan Africa since natural resources create opportunities for rent-seeking behavior. The result does not support Elbahnasawy and Revier (2012), which found insignificant effect.

We could not find evidence to support Hypothesis 12 that foreign direct investment is an insignificant determinant of corruption for the countries in Sub-Saharan Africa.

3.2.3. Results for Socio-Demographic Determinants

According to estimation results share of women in labor force has positive significant impact on corruption and share of women in the parliament has no significant impact on corruption. This result does not support Hypothesis 13. It may be the case that women in the countries of Sub-Saharan Africa may need to bribe in order to work since women are regarded as inferior being in most of the countries in the region. The result does not support Seldadyo and Haan (2005), which found that portion of female in labor force has negative significant effect on corruption. The result for the share of women in the parliament supports Elbahnasawy and Revier (2012). The results do not support Swamy et al (2001), which found that share of women in labor force and in the parliament have negative significant effect on corruption.

We could not find a significant result for the effect of education on corruption. Hence our result does not support Hypothesis 14. The result does not support Shabbir and Anwar (2007), which found a positive significant effect of education on corruption for developing countries. The result does not support Seldadyo and Haan (2005), which found primary enrollmen rate has positive signficant effect on corruption.

We found that the population has a significant positive impact on corruption. Our result supports Hypothesis 15 in the sense that the ratio of government officials is lower in larger countries. Hence citizens are tempted to bribe public officials to get ahead of the queue. Hence the increasing population increases the level of corruption in Sub-Saharan Africa.

We found result contrary to Hypothesis 16. The reason may be that the citizens living in rural areas contact public officials rarely, not common as citizens living in urban areas. Citizens living in urban areas contact public official frequently even when they pay their bills or taxes. So, it becomes ordinary to offer or to witness someone else to offer a bribe to a public official to buy their way for most of the countries in Sub-Saharan Africa.

We found infrastructure has a negative significant impact on corruption, so our result supports Hypothesis 17. Since most of the countries in Sub-Saharan Africa are endowed with inadequate infrastructure, citizens have to bribe even

their basic rights such as access to electricity and water. The forthcoming infrastructure projects with great rents are not allocated to the highest bidder as in free-market economy but to a contractor who offers the highest bribe. Hence increase in the level of infrastructure decreases the level of corruption in countries of Sub-Saharan Africa.

Table 2. System GMM Results

Dependent Variable: coc			
Variables	Institutional	Economic	Socio Demographic
l.coc	0.8388***	0.9377***	0.9292***
	(0.0612)	(0.0247)	(0.028)
Pols	0.0379*		
	(0.0204)		
Regq	0.0649*		
	(0.0351)		
Rol	0.0004		
	(0.067)		
Va	0.0767*		
	(0.0382)		
Ecof	0.0001		
	(0.0014)		
Fop	-0.0009		
	(0.0011)		
Gdppc		5.74e-06*	
		(3.25E-06)	
Fdi		-0.0015	
		(0.0018)	
Natr		-0.0019**	
		(0.0009)	
Gov		-0.0043**	
		(0.0019)	
Trop		0.0004**	
		(0.0002)	

Table 2. Continued

Dependent Variable: coc			
Variables	Institutional	Economic	Socio Demographic
Urban			-0.0017*
			(0.0009)
Pop			-5.07e-10*
			(2.82E-10)
Feml			-0.0015*
			(0.0008)
Seat			-0.0003
			(0.001)
Infra			0.0032*
			(0.0016)
Educ			0.0001
			(0.0009)
Prob>F	0	0	0
Countries	40	40	42
Instruments	37	36	36
Hansen	0.606	0.315	0.604
AR(2)	0.865	0.864	0.948

Source: Author's Own Calculations

Notes: The values in brackets are robust standard errors. ***, ** and * denote significance levels at % 1, % 5 and % 10 respectively. AR(2) is test for second-order serial correlation in the second-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. All variables are treated endogenously except pop and urban. Second and deeper lags are instrumented according to AR(2) test of serial correlation. The p-values are reported for the Hansen and AR(2) tests.

Conclusion

Sub-Saharan Africa is the worst-performing region compared to others since corruption is an epidemic inherited from colonial regimes. The average level of corruption is on the rise in Sub-Saharan Africa since 1996. An apparent disparity exists between strong and weak performing countries with regard to

control of corruption. Based on this disparity, tackling the issue of corruption is possible in Sub-Saharan Africa and most African countries have failed to tackle the menace of corruption.

The results support the theory of self-reinforcing corruption in the sense that past levels of corruption become an important determinant of the current level of corruption due to strategic complementarity. Countries in Sub-Saharan Africa converge to their own steady state of corruption very slowly. This means that the gap between more corrupt and less corrupt countries stays the same as more corrupt countries stays as more corrupt and less corrupt countries stays as less corrupt, demonstrating that corruption is pervasive in Sub-Saharan Africa.

For the institutional determinants, we found that increase in political stability, better regulatory quality and higher level of democracy decreases the level of corruption in Sub-Saharan Africa. For the economic determinants, we found that a higher level of development and higher trade integration decreases the level of corruption and higher government expenditure and higher level of natural resources increases the level of corruption in Sub-Saharan Africa. For the socio-demographic determinants, we found that higher level of infrastructure decreases the level of corruption while higher share of women in labor force, higher level of population and higher level of urbanization increases corruption in Sub-Saharan Africa.

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Appendix 1. List of Countries Analyzed

Angola	Ethiopia	Namibia
Benin	Gabon	Niger
Botswana	Gambia, The	Nigeria
Burkina Faso	Ghana	Rwanda
Burundi	Guinea	Sao Tome and Principe
Cabo Verde	Kenya	Senegal
Cameroon	Lesotho	Sierra Leone
Central African Republic	Liberia	South Africa
Chad	Madagascar	Sudan
Comoros	Malawi	Swaziland
Congo, Dem. Rep.	Mali	Tanzania
Congo, Rep.	Mauritania	Togo
Cote d'Ivoire	Mauritius	Uganda
Eritrea	Mozambique	Zimbabwe

Appendix 2. Data Source

Variable	Description	Source
coc	Control of Corruption	WGI (2018)
pols	Political Stability and Absence of Violence/Terrorism	WGI (2018)
regq	Regulatory Quality	WGI (2018)
rol	Rule of Law	WGI (2018)
va	Voice and Accountability	WGI (2018)
ecof	Economic Freedom	HF (2018)
fop	Freedom of the Press	FRH (2018)
gdppc	GDP per capita (constant 2010 US$)	WDI (2018)
fdi	Foreign direct investment, net inflows (% of GDP)	WDI (2018)
natr	Total natural resources rents (% of GDP)	WDI (2018)
gov	General government final consumption expenditure (% of GDP)	WDI (2018)
trop	Trade (% of GDP)	WDI (2018)
urban	Urban population (% of total)	WDI (2018)
pop	Population ages 15-64, total	WDI (2018)
feml	Labor force, female (% of total labor force)	WDI (2018)
seat	Proportion of seats held by women in national parliaments (%)	WDI (2018)
infra	Infrastructure Index	Average
	Improved water source (% of population with access)	WDI (2018)
	Access to electricity (% of population)	WDI (2018)
	Fixed telephone subscriptions (per 100 people)	WDI (2018)
	Individuals using the Internet (% of population)	WDI (2018)
educ	Education Index	Average
	School enrollment, primary (% gross)	WDI (2018)
	School enrollment, secondary (% gross)	WDI (2018)
	School enrollment, tertiary (% gross)	WDI (2018)