ESSAYS ON THE NEXUS OF CORRUPTION, ECONOMIC GROWTH, AND HUMAN DEVELOPMENT IN SUB SAHARA AFRICA

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ABSTRACT

Corruption and the rising levels of external debt are public enemy number one in Sub Sahara Africa (SSA). Corruption robs SSA of its resources and potential, cheats its people out of billions of dollars annually and has contributed to state failures, instabilities, poverty and the eruption of civil wars over resources in several African countries. The importance of a profound understanding of corruption in SSA becomes even more clear when considering its incalculable costs – especially human costs. This thesis, therefore, aims to theoretically and empirically investigate the nexus of corruption, economic growth, and human development in SSA in an effort to better understand the causes and consequences of corruption on the economic growth and human development in SSA. To achieve this aim, the thesis contains three main independent chapters (essays) in addition to a unifying introductory chapter and a concluding chapter which highlights the major findings, draws inferences, and suggests some policy directions.

Numerous empirical studies have been devoted to the analyses of the causes and consequences of corruption with mixed results. Controversial results seem to be quite common when adopting different measures of corruption, different samples, or, more important, different conditioning sets.

Chapter 2 looks at the relationship between government size, the police, and corruption in SSA. There are two different views on the relationship between government size and corruption with remaining ambiguity in the empirical data. This chapter,

therefore, contributes to the literature by theoretically and empirically analyzing the impact of the executive branch of government and the police on corruption in SSA for the first time. By using a panel data set covering 40 SSA countries over the period 2005-2015 and the instrumental variable (IV) estimator, the study finds mixed results on the impact of government size and a statistically significant negative effect for the reliability of police. In sum, the results reveal that a 1 % increase in the reliability of police leads to a 0.11% decrease in corruption perception index. This study shows that the police, is not only a key determinant of corruption in SSA, but it also a very important force in the fight against corruption.

Chapter 3 examines the impact of government size, the judicial system, and corruption on economic growth in SSA. The chapter makes contribution to the literature on the impact of corruption on growth by examining the impact of the large executive branch of governments common in SSA and the role of the judicial system. By using a panel data set for a cross-section of 40 SSA countries over the 2005 - 2015 period and the Generalized Method of Moments (GMM) estimation technique, the study finds support for the sand the wheels hypothesis, i.e., corruption impedes economic growth in SSA. In addition, this study finds size of the executive branch of government also affects economic growth significantly and these associations are mostly robust. Chapter 4 investigates the impact of external debt and corruption, and Human Development Index (HDI). This study contributes to this literature by analyzing the theoretical and empirical impact of corruption and external debt on human development in the CFA franc zone

countries. By using a panel data set for a cross-section of 14 CFA franc zone countries over the 2005 to 2017 and the Generalized Method of Moments (GMM) estimation technique, the study shows that both corruption and external debt have a significant negative impact on the human development in the CFA franc region and the results are robust for various alternative specifications.

TABLE OF CONTENTS

ABATRACT ……ii

LIST OF TABLES ivii

LIST OF FIGURES iix

ACKNOWLEDGMENT ix

ABBREVATIONS ixi

CHAPTER 1: INTRODUCTION ……1

1.1. Defining Corruption ……2

1.2. Consequences of Corruption……3

1.3. Research Questions……4

1.4. Objective and Structure of Thesis……5

CHAPTER 2: GOVERNMENT SIZE, THE POLICE, AND CORRUPTION IN SUB-SAHARA AFRICA (SSA): A PANEL DATA ANALYSIS. ……9

2.1. Introduction ……10

2.2. Literature Review……17

2.3. Data and Econometric Methodology……26

2.3.1. Model Rationale……27

2.3.2. Variables and Data Sources……30

2.3.3. Estimation Methods……32

2.4. Main Empirical Results……..34

2.4.1. Robustness analysis……..32

2.5. Conclusion……..42

CHAPTER 3: ECONOMIC GROWTH, GOVERNMENT SIZE, JUDICIAL SYSTEM, AND CORRUPTION IN SUB-SAHARA AFRICA (SSA): A PANEL DATA ANALYSIS……54

3.1. Introduction……..55

3.2. Literature Review……60

3.3. Methodology, Data, and Estimation……66

3.3.1. Econometric Model ……66

3.3.2. Model Rationale, Variables and Data Sources ……68

3.3.3. Estimation Methods……80

3.4. Main Empirical Results……..86

3.4.1. Robustness analysis……90

3.5. Conclusion……..94

CHAPTER 4: EXTERNAL DEBT, CORRUPTION, AND HUMAN DEVELOPMENT INDEX (HDI) IN THE CFA FRANC ZONE COUNTRIES. ……..106

4.1. Introduction……107

4.1.1. CFA Franc zone countries……112

4.2. Literature Review……117

4.2.1. Defining Corruption and Human Development……117

4.2.2. External Debt and Human Development……..119

4.2.3. Corruption and Human Development……122

4.3. Methodology, Data, and Estimation……124

4.3.1. Econometric Model ……125

4.3.2. Model Rationale, Variables and Data Sources ……126

4.3.3. Estimation Methods……131

4.4. Main Empirical Results……135

4.4.1. Robustness analysis……141

4.5. Conclusion……142

CHAPTER 5: CONCLUSION 151

5.1. Summary of the findings.....152

5.2. Policy Implications……154

LIST OF TABLES

Table 2.1: Explanatory variables and their expected signs 30

Table 2.2: Descriptive Statistics for SSA Countries.....35

Table 2.3: Random Effects (RE) panel data estimation results.....36

Table 2.4: Instrumental variable (IV) panel data estimation results.....38

Table 2.5: Instrumental variable (IV) panel data estimation results.....41

Table 2.6: Instrumental variable (IV) panel data estimation results.....42

Table 2A1: Variables Description and Data Source.....49

Table 2A2: Correlation Matrix.....50

Table 2A3: List of SSA countries included in the study.....50

Table A24: Ten of SSA's longest serving presidents.....51

Table 2A5: 2018 Ranking of corruption levels in SSA.....52

Table 2A6: Corruption by Institutions.....53

Table 2A7: Bribery Rates by Service.....53

Table 3.1: Descriptive statistics of sample data.....83

Table 3.2: Correlation Matrix of Sample Data.....87

Table 3.3: GMM Panel Data Estimation results 88

Table 3.4: GMM Panel Data Estimation results 92

Table 3.5: GMM Panel Data Estimation results 93

Table 3A1: List of SSA countries included in the study.....101

Table 3A2: 2018 Ranking of corruption levels in SSA.....102

Table 3A3: Variables description and source of data……..103

Table 3A4: Corruption by Institutions……104

Table 3A5: Bribery Rates by Service……104

Table 3A6: GMM Panel Data Estimation results - Standardized coefficients……..104

Table 4.1: Data Description and Sources……..126

Table 4.2: Descriptive statistics for the 14 CFA franc zone countries……..127

Table 4.3: GMM Panel Data Estimation results ……..137

Table 4.4: GMM Panel Data Estimation results ……139

Table 4A1: CFA franc zone countries……..146

Table 4A2: Human Development Index Trends, 2000 – 2018……..147

Table 4A3: Ranking of corruption levels in CFA franc zone, 2005 – 2015……147

Table 4A4: GMM Panel Data Estimation results……148

Table 4A5: GMM Panel Data Estimation results……149

Table 4A6: Correlation Matrix……149

Table 4A7: GMM Panel Data Estimation results – Standardized coefficients……150

LIST OF FIGURES

Figure 1: Gross debt position across CFA franc zone countries, 2007-2016 (% of GDP)….108

Figure 2: External Debt ($ millions)……109

Figure 3: Debt Burden ($ millions)……109

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ABBREVATIONS

AUC	African Union Commission
CC	Control of Corruption
CEMAC	Central African Economic and Monetary Union and the
CFA	Communauté Financière d'Afrique, or Financial Community of Africa
CIA	Central Intelligence Agency
CPI	Corruption Perception Index
HIPC	Heavily indebted poor countries HIPC
IEA	International Energy Agency
IMF	International Monetary Fund
MPI	Multidimensional Poverty Index
ODA	Official Development Assistance
OECD	Organization of Economic Co-operation and Development
SDC	Swiss Agency for Development and Cooperation
SSA	Sub Sahara Africa
TI	Transparency International
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNODC	United Nations Office on Drugs and Crime
USAID	United States Agency for International Development
WAEMU	West African Economic and Monetary Community

WB	World Bank
WDI	Worldwide Development Indicators
WGI	Worldwide Governance Indicators
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

Corruption is a major concern and public enemy number one in Sub Sahara Africa (SSA). Corruption is widespread and endemic, and scandals have shaken most governments in this region: Shell's Complicity in Massive Oil Corruption Scandal in Nigeria (Foreign Policy 2017); West Africa Leaks (2018); Luanda leaks (2020); etc.

SSA is considered one of the worst performing regions in the world, a factor seen as contributing not only to the slow growth, but also to the limited progress in poverty reduction. Six of the ten most corrupt countries in the world (Transparency International, 2018) and four of the ten least democratic countries in the world (The Economist Intelligence Unit's Democracy Index, 2016) are in the SSA. A 2002 African Union study estimated that corruption cost the continent about 25% of the GDP of African countries a year (Hanson S, 2009). The African Union's panel on illicit financial flows also found that African countries lose over $50 billion a year due to tax evasion and other illicit practices and its 50-year losses top a trillion dollars (United Nations Economic Commission for Africa, 2018), an amount roughly equivalent to all of the official development assistance received by Africa during the same timeframe. These illicit outflows are of serious concern for this region, given inadequate economic growth with 81.8% of countries classified in the "low human development" category worldwide (Africa Human Development Report, 2016).

Corruption in SSA fuels injustice, inequality and depravation, and is a major catalyst for migration and terrorism (Anton du Plessis, 2016). Corruption has contributed to state

failure, instability, poverty and the eruption of civil wars over resources in several African countries. For example, East and Central Africa, are considered the deadliest war zone globally since World War II, while the conflict in the DRC has been the world's bloodiest since World War II (over 6 million have died as a result of the conflict since 1996). The high rate of corruption and neglect of citizen welfare in Nigeria is also considered a stimulant for the radicalization and recruitment of its youth into Boko Haram (Onuoha FC, 2014). Therefore, the importance of a profound understanding of corruption in SSA becomes even more clear when looking at the costs – especially human cost.

1.1. Defining Corruption

There is no single and clear definition of corruption. The UN Convention Against Corruption (UNCAC) does not prescribe a single definition for corruption. This is due to the fact that corruption exists in different forms involving different participants and its meaning shifts with the speaker according to Rose-Ackerman (2004). One of the simplest definitions according to United Nations Development Programme (UNDP, 2008), is the misuse of entrusted power for private gains.

The Swiss Agency for Development and Cooperation (SDC, 2016) considers corruption as a governance issue due to the failure of institutions and the inability to manage society by means of a framework of social, judicial, political and economic checks and balances. According to the United States Agency for International Development (USAID, 2002), no problem does more to alienate citizens and to undermine political stability and economic

development, than endemic corruption among the government, party leader, judges, and bureaucrats.

1.2. Consequences of Corruption

> "Every dollar that a corrupt official or a corrupt business-person puts in their pocket is a dollar stolen from a pregnant woman who needs health care; or from a girl or a boy who deserves an education; or from communities that need water, roads, and schools" (World Bank Group President Jim Yong Kim, 2013).

Numerous empirical studies have been devoted to the analyses of the consequences of corruption with mixed results. Controversial results seem to be quite common when adopting different measures of corruption, different samples, or, more important, different conditioning sets (Serra, 2006).

Corruption robs SSA of resources and potential, cheats its governments out of billions of dollars annually. Estimates show that the cost of corruption equals more than 25 % of GDP of the GDP of African countries a year (Hanson S, 2009). These loses have grave implications for Sub-Saharan Africa where 100 million more Africans live in extreme poverty today compared to the 1990s, and home to 81.8 % of countries classified in the "low human development" category worldwide (Human Development Report, 2016)

The consequences of corruption are enormous and devastating especially in SSA countries with weak political and economic institutions. Corruption reduces economic growth by lowering incentives to invest and the quality of public infrastructure and services. It decreases tax revenue and distorts the composition of government expenditure. Corruption reduces efficiency and increases inequality and is one of the major obstacles

to sustainable economic, political and social development for SSA countries. “Corruption is considered as being decisively responsible for political instability, economical underdevelopment, low administrative efficiency and poor governance structures around the world” (Ko & Samajdar, 2010: pp. 508-509).

1.3. Research Questions

This thesis aims to investigate theoretically and empirically the nexus of corruption, economic growth, and human development in SSA in an attempt to better understand the causes and impact of corruption. To achieve this aim, the thesis will address the following research questions in three main independent chapters.

Chapter 2 investigates the impact of government size, and the police on the perceived level of corruption in the SSA region by answering the following research questions: (1) Does larger governments especially including the executive branch of government in SSA lead to more corruption? (2) Does poor policing across SSA lead to more corruption?

In chapter 3, which examines whether the perceived level of corruption, government size, and weak judicial system in SSA countries have affected their growth rates over the 2005-2015 period addresses the following questions: (1) Does corruption impede economic growth in SSA? (2) Does the size of government including the executive branch of government, the judicial system, and the police impede economic growth?

Chapter 3 attempts to investigate empirically the impact of external debt and corruption on the human development indicators in the CFA Franc zone countries by answering the

following questions: (1) Does external debt affect HDI? If so, how? Can the very low levels of HDI in the CFA franc zone countries be attributed to the very high levels of debt, and vice versa? (2) Does corruption affect HDI? If so, how? Can the very low levels of HD in the CFA franc zone countries be attributed to the very high levels of corruption, and vice versa?

1.4. Objective and Structure of Thesis

The objective of this thesis is to investigates the nexus of corruption, economic growth, and human development in the Sub Sahara Africa (SSA) region in an attempt to better understand the causes and impact of corruption. In particular, the thesis theoretically and empirically investigates the link between the size of the executive branch of government, the police, and the high levels of corruption and how this impacts economic growth and human development. The thesis also investigates the link between external debt and corruption, and their impact on human development in the CFA franc zone region.

To achieve this aim, the thesis contains three main independent chapters (three essays) in addition to an introductory chapter and a concluding chapter. The second chapter examines some determinants of corruption specific to the SSA region. In particular, the second chapter examines the roles of both the police and the size of the executive branch of government in determining corruption levels. Chapter three investigates the impact of corruption, size of the executive branch of government, and the judicial system on economic growth. Chapter four examines the impact of corruption and external debt on human development in the CFA franc zone countries.

Second chapter is entitled *Government Size, the Police, and Corruption in Sub-Sahara Africa (SSA): A Panel Data Analysis.* There are two different views on the relationship between government size and corruption and in the empirical data this ambiguity still remains. Various surveys conducted by Transparency International and numerous evidences from Organized Crime and Corruption Reporting Project (OCCRP) indicates a positive relationship between the government size (especially political leadership) and corruption in SSA. In the second chapter, this study contributes to this literature by analyzing theoretically and empirically the impact of the executive branch of government and the police on corruption in SSA for the first time. By using a panel data set covering 40 SSA countries over the period 2005 -2015, and an instrumental variable (IV) estimator, this study shows that, the police is not only a key determinant of corruption in SSA, but a very important tool in the fight against corruption. The study also found mixed results for government size.

The third chapter is entitled *Economic Growth, Size of Government, Judicial System, and Corruption in Sub Sahara Africa (SSA): A Panel Data Analysis.* The exact relationship between corruption and economic growth is debatable with the "grease and the sand" hypotheses dominating the debate. Therefore, this paper makes contribution to the literature on the impact of corruption on growth by examining the impact of the large executive branch of governments common in SSA for the first time, and the role of the judicial system. By using panel data from 40 Sub-Saharan Africa (SSA) countries for the period 2005 – 2015, and the Arellano-Bover/Blundell-Bond General Moments Method

(GMM) dynamic estimator, this study finds support for the "sand the wheels" hypothesis that corruption impedes economic growth rates in SSA. The study also finds that the size of the executive branch of government has a negative and statistically significant effect on growth.

The fourth chapter is entitled *External Debt, Corruption, and Human Development Index (HDI) in the CFA Franc Zone Countries.* In the fourth chapter, this study contributes to this literature by analyzing theoretically and empirically the impact of corruption and external debt on human development in the CFA franc zone countries. By using a panel data set for a cross-section of 14 CFA franc zone countries over the 2005 – 2017, and the Generalized Method of Moments (GMM) estimation technique, this study shows that both corruption and external debt have a significant negative impact on the human development in the CFA franc region and the results are robust for various alternative specifications.

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CHAPTER 2: GOVERNMENT SIZE, THE POLICE, AND CORRUPTION IN SUB-SAHARA AFRICA (SSA): A PANEL DATA ANALYSIS.

ABSTRACT

Corruption in the Sub-Sahara African (SSA) region is principally a governance problem due to fragile political and economic institutions and the failure to effectively manage society. Hence, it is widespread in this region compared to other regions of the world, and its economic, social, and political impact more devastating. This study uses panel data from SSA for the period spanning from 2005-2015 and an instrumental variable (IV) estimator to examine key determinants of corruption. The empirical findings of this paper suggest that the police proxied by Fraser Institute reliability of police index is a key determinant of corruption in SSA and that, the police is a very important tool in the fight against corruption. Enhancing police reliability is very essential to curb the corruption level and the results are robust. On average, a 1% increase in the reliability of police (RP) leads to a 0.11% decrease in corruption.

Keywords: Government Size; The Police; Natural Resources; Corruption, Panel Data; Random Effect Estimation; Instrument Variable Estimation

JEL: P16, O40, D73

2.1. Introduction

> "Corruption creates and increases poverty and exclusion. While corrupt individuals with political power enjoy a lavish life, millions of Africans are deprived of their basic needs like food, health, education, housing, access to clean water and sanitation" (José Ugaz, Chair, Transparency International, 2015).

Corruption has become a major concern in the global press (Panama papers, 2015; Swiss Leaks, 2015, etc.). Corruption is everywhere, in both rich and poor countries and even in major international institutions. Scandals have shaken major international organizations like the international governing body of football or FIFA and the governing body of European soccer or UEFA (Football-Stadiums, 2018) and governments around the world: Operation Weak Flesh and Operation Car Wash in Brazil (Council on Foreign Relations, 2018), Shell's Complicity in Massive Oil Corruption Scandal in Nigeria (Foreign Policy, 2017), 1Malaysia Development Berhad (Human Rights Watch, 2016), etc.

"Corruption is the most neglected human rights violation of our time. It fuels injustice, inequality and depravation, and is a major catalyst for migration and terrorism" (Anton du Plessis, 2016). Corruption leads to embezzlement, kickbacks and over-invoicing, waste and misallocation of limited public funds and resources by government officials, degradation of public institutions and the rule of law and drives inequality, resentment and radicalization. The social and political consequences of corruption in Africa is enormous because it robs the continent of resources and potential, cheats its governments out of billions of dollars annually. "Estimates show that the cost of corruption equals more than 2% of global GDP with over US$ 1.5 trillion paid in bribes each year - 10 times the value of overseas development assistance" (World Bank, 2017).

The Secretary General of the United Nations, Ban Ki-moon, has estimated that 30% of all development funding is lost to corruption. According to a study by Kar Dev and Brian Leblanc (2013), the world's developing countries lost a total of $946.7 billion to corruption, trade misinvoicing and tax evasion in 2011 and the amount lost is growing larger with each passing year, with SSA faring the worst in terms of GDP percentages. For example, SSA countries lost an average 5.7% of total GDP each year from 2002 to 2011, while the global average was just 4%. These loses have grave implications for Sub-Saharan Africa, where 48.5% of the population lived on less than $1.25 a day in 2010.

This paper examines the impact of government size, and the police on the perceived level of corruption in the SSA region by answering the following research questions:

- Does larger governments in SSA lead to more corruption?
- Does poor policing across SSA lead to more corruption?

To answer these questions, the study uses panel data analytic model for a cross-section of 40 SSA countries over the 2005 - 2015 period (Table 2A3). The instrumental variable (IV) estimation technique is used to control for possible endogeneity biases due to the nature of the data used and the collinear nature of some of the regressors used.

I focus on SSA countries for the following reasons: First, there are few studies that focus exclusively on SSA countries and even these few tend to ignore the specificity and characteristics unique to SSA countries. Most empirical studies on corruption are based on the premise of “one size fits all”, that is, the believe that factors that contribute to

corruption in developed and less developed countries are the same. According to Husted (1999), the usefulness of these studies is limited to the countries in which they originated because the recommendations fail to take into account the variety of cultural contexts in which corrupt activities occur." Therefore, to understand corruption in SSA, we need to understand the political and social structure of this region, especially government size (the size of the executive branch of government), the role of the police, and tribalism. The executive branch of government, the police, and tribalism fuel corruption and economic stagnation in this region, which is supported by various surveys conducted by Transparency International (TI).

Government size (GS), especially the size of the executive branch of government is a major problem in SSA compared to other regions in the world. GS is a major source of grand (political) corruption and state capture. The executive branch, especially the president acts as judge, juror, and executioner of political, economic, and social well-being of these countries and the people. Most countries in the SSA region with smaller economies compared to developed countries are characterized by very large public sectors and even larger executive and legislative branches of government. For example, Uganda with a population of about 31 million and GDP of about $26 billion and ranks 151st in global corruption perception index (2018) has 84 cabinet members (including the President, the Vice President, and the Prime Minister) in its executive branch of government (CIA World Factbook, 2018) while Germany with a population of about 81 million and GDP about $4 trillion and ranks 10th in global corruption perception index has just 17 cabinet members.

The large size of the executive branch of governments common in most SSA countries impedes economic and social development because it creates conducive conditions for corruption, especially political corruption which is responsible for the large illicit financial outflow and the massive looting of resources from this region. For example, according to the World Banks' Stolen Asset Recovery Initiative (World Bank, 2007), former Nigerian president Sani Abacha (1993-1998) allegedly stole the equivalent of 1.5 to 3.7% of Nigerian GDP for every year he was in power, while Mobutu Sese Seko (1965–97) of the Democratic Republic of Congo (formally Zaire) allegedly stole the equivalent of 1.8% of Zaire's GDP for every year he was in power. These amounts are just a drop in the ocean compared to what the region actually losses through the bloated executive branch of governments. The true cost of corruption in this region far exceeds all the illicit outflows and the value of stolen assets by the leaders of these countries. According to the World Bank (2007), the collateral damage in terms of foregone growth and poverty alleviation will be proportional to the duration of the tenure of the corrupt leader. This is a major issue for SSA where most presidencies stretch for decades (Table 2A4).

The police across SSA are perceived as the most corrupt institution (Tables 2A6 and 2A7) and a hindrance to any meaningful social change or development because protecting ordinary people and their property through the enforcement of laws and regulations is not in their primary duty. The police in most cases are tools for the wealthy and powerful in society. Corruption in the public sector thrives when enforcement of the law is used as a device for furthering personal interests or the interest of a few rather than public interest. The police in most cases are lawbreakers rather than law enforcers

and a menace to civil liberties, economic freedom, the protection of property rights, and a major source of bureaucratic corruption in the SSA region. Throughout SSA, police roadblocks are a regular site, and are rife with corruption and extortion. These illegal roadblocks “sand” the wheels of the economy because they disrupt the smooth flow and distribution of goods and services, movement of people and labor, increase transportation cost, etc. For example, according to Stephen Evans (2010) a journey that would take five days in the US would take two to three weeks in West Africa and cost $4,800 compared with $650 in the US due to illegal roadblocks and extortion by the police. The true cost of police roadblocks to the economies of these countries is enormous.

“Tribalism reflects strong ethnic or cultural identities that separate members of one group from another, making them loyal to people like them and suspicious of outsiders, which undermines efforts to forge common cause across groups” (Rosabeth Moss Kanter, 2013). When people are unified in purpose, they can accomplish impossible feats. "If as one people speaking the same language, they have begun to do this, then nothing they plan to do will be impossible for them" (Genesis 11:6). Tribalism has and will always be a major issue in SSA because economic or political advancement and development of any region or people from a particular ethnic group depends on the political office held by that ethnic group. For example, in Cameroon, most powerful cabinet positions (Military, Economic, etc.) are held by people from the same ethnic group as the president. His thirty plus years in office are marked by high levels of nepotism and corruption, a similar problem faced by most SSA countries. Alesina et al. (2003) showed

that the multiplicity of religions, languages and ethnicities increases corruption because of their negative effect on the quality of government. They also showed that growth in GDP per capita is inversely related to ethnolinguistic fractionalization (ELF) and that much of Africa's growth failure is due to ethnic conflict. The 1994 Rwandan Genocide and Kenya's 2007 - 08 post-election violence are just a few reminders of its impact.

Ethnic conflict is an important determinant of political and economic decision-making in many nations and localities especially in SSA. Enrico Spolaore and Romain Wacziarg (2016) find that more closely related populations are more prone to engage in international conflict with each other due to the following two mechanisms:

- More closely related groups (tribes) share more similar preferences over rival goods (such as natural endowments or historic sites) and are thus more likely to fight over them.
- Rulers have stronger incentives to conquer populations more similar to their own (tribal politics in SSA), to minimize post conflict heterogeneity in preferences over government types and policies.

Secondly, most SSA countries are characterized by weak and bloated public institutions. Hence, corruption is endemic, widespread, and systematic in this region, where GDP per capita was around $1,600 in 2018, which is around one-seventh of the level worldwide (World Bank, 2019). Six of the ten most corrupt countries in the world (Transparency International, 2018) and four of the ten least democratic countries in the world (The Economist Intelligence Unit's Democracy Index, 2016) are in the SSA region.

The consequences and cost of corruption in this region are enormous, ranging from reduced economic growth to a distortion of public expenses, and are major obstacle in the development of this region. A 2002 African Union study estimated that corruption cost the continent about 25% of the GDP of African countries a year (Hanson S, 2009), an amount far greater than aid received from developed countries. For example, according to the Organization for Economic Cooperation and Development (OECD, 2008), net bilateral official development assistance from members of the OECD's Development Assistance Committee donors to SSA totaled USD 22.5 billion, of which USD 22.5 billion. The African Union's panel on illicit financial flows also found that African countries lose over $50 billion a year due to tax evasion and other illicit practices and its 50-year losses top a trillion dollars (United Nations Economic Commission for Africa, 2018), an amount roughly equivalent to all of the official development assistance received by Africa during the same timeframe. These illicit outflows are of serious concern for this region, given inadequate economic growth with over half a billion people without access to electricity (WDI, 2017), high levels of poverty with about half the population in extreme poverty and the highest maternal mortality ratio in the world (In Sierra Leone, 1 woman in 17 will die from a maternal cause compared to 1 woman in 23,700 in Greece). SSA also has the lowest access to improved water sources. "More than 660 million people still lack access to clean water, the majority of them in rural areas, predominantly in Sub-Saharan Africa" (WDI, 2017). 23% of the world's people will live in SSA by 2050, the population expanded the fastest up from 14 % in 2015 (WDI, 2017)

Finally, focusing on SSA will help me understand not only the major determinants of corruption, but why corruption is so pervasive and its economic, social, and political impact.

This paper makes contribution to the vast literature on the causes of corruption in three ways: First, it fills the gap in the empirical literature on corruption for countries in the SSA region. Second, paper uses the size of the executive branch of government compared to size of economy as a new proxy for government size for the first time. Third, this study examines the relationship between the police and corruption in SSA region for the first time. Apart from the 2013 survey from Transparency International, there are no studies in the empirical literature on the relationship between the police and corruption in SSA. To the best of my knowledge, this study is the first to investigate the impact of the police on corruption for countries in the SSA region.

The rest of the paper is organized as follows: Section 2.2 briefly reviews the literature on the economic consequences of corruption. Section 2.3 describes the theoretical framework, the data and methodology while Section 2.4 presents and discusses the statistical results. Section 2.5 concludes the paper.

2.2. Literature Review

2.2.1. Defining Corruption

"Corruption is one of the most dangerous social ills of any society. This is because corruption, like a deadly virus, attacks the vital structures that make for society's progressive functioning, thus putting its very existence into serious peril" (Gire, 1999). Defining corruption is, not only difficult, but subjective. According to United Nations

Development Programme (UNDP, 2008), one of the simplest definitions is the misuse of entrusted power for private gains. The Swiss Agency for Development and Cooperation (SDC, 2016) considers corruption as a governance issue due to the failure of institutions and the inability to manage society by means of a framework of social, judicial, political and economic checks and balances. When these formal and informal systems break down, it becomes difficult to implement and enforce laws and policies that ensure accountability and transparency, hence the entire process runs counter to the rule of law. According to the United States Agency for International Development (USAID, 2002), no problem does more to alienate citizens and to undermine political stability and economic development, than endemic corruption among the government, party leader, judges, and bureaucrats.

2.2.2. Forms of Corruption

Corruption arises in both political and bureaucratic offices and can be petty or grand, organized or disorganized according to the USAID (2002). The USAID further describes the various forms that corruption can assume: “It encompasses unilateral abuses by government officials such as embezzlement and nepotism, as well as abuses linking public and private actors such as bribery, extortion, influence peddling and fraud.” The UNDP (2008) also makes this distinction between grand and petty corruption. Grand corruption normally occurs at the policy level of government where laws can be created, changed, or overturn for the benefit of the most wealthy and powerful people and leaders in society. In developing countries, grand corruption often involves the direct or indirect diversion of large amounts of international funding intended for development. Petty

corruption normally occurs at the level of functionaries (mid and lower level public workers) who use their positions and administrative authority for personal gain for the provision of a public service. It is widespread in developing countries compared to advanced countries.

Tanzi (1998) classifies corruption in different categories: bureaucratic, or political; cost-reducing (to the briber) or benefit enhancing; briber-initiated, or bribee-initiated; coercive, or collusive; centralized or decentralized; predictable, or arbitrary; and involving cash payments, or not.

2.2.3. Determinants of Corruption

There are several studies regarding the causes of corruption and many variables have been suggested as the determinants of corruption. “Identifying the real causes of corruption has proven difficult because of limited data availability, lack of a unifying theoretical framework, and endogeneity concerns” (Jetter and Parmeter, 2016). According to existing literature on corruption, the determinants of corruption vary according to different studies. “However, controversial results seem to be quite common when adopting different measures of corruption, different samples, or, more important, different conditioning sets (Serra, 2006).”

Determinants of corruption are usually classified into three broad categories: economic, political, and cultural explanations. Eugen Dimant (2013) provides a comprehensive overview of the multifaceted determinants of corruption. Serra (2006) and Jetter and Parmeter (2016) provide tables of the main empirical studies on the determinants of corruption including types of dependent variables, number of control

variables, methodologies used and significant determinants. Economic factors (economic prosperity and development usually measured as per capita GDP; openness to international trade; state intervention in the economy; endowment of natural resources; etc.) are considered the major determinants of corruption. Lambsdorff (2006) provides nine possible causes of corruption which include the size of the public sector, the quality of regulation, and the degree of economic competition, etc. Tanzi (1998) further distinguishes factors contributing to corruption as direct and indirect. Direct factors (Regulations and Authorizations, Taxation, Spending Decisions, Provision for Goods and Services at Below-Market Prices, and Other Discretionary Decisions) are interrelated with activities carried out by the state, especially under the circumstances of monopoly and discretionary power exertion. Indirect Factors contributing to corruption are the quality of bureaucracy, level of public sector wages, the penalty system, the institutional controls and the transparency of laws. UNDP (2008) also provides the following as the 12 most cited causes of corruption: The absence of rules, regulations, policies and legislation; weak systems of enforcement; weak systems of oversight (i.e., the absence of a watchdog institution); lack of accountability; lack of transparency; lack of checks and balances in the system (e.g., institutional weaknesses in the legislative and judicial systems); lack of integrity; monopoly of power; high degree of discretion; low salaries; high rewards compared to risks; low detection rate.

2.2.4. Consequences of Corruption

Corruption reduces efficiency and increases inequality and is one of the major obstacles to sustainable economic, political and social development for developing,

emerging and developed economies alike. The consequences of corruption are enormous and devastating especially in countries with weak political and economic institutions. Corruption increases poverty and inequality because it reduces efficiency for social service delivery mechanisms for health, education, sanitation, and basic infrastructure programs which are vital for the poor and venerable populations. “Corruption is considered as being decisively responsible for political instability, economical underdevelopment, low administrative efficiency and poor governance structures around the world” (Ko & Samajdar, 2010: pp. 508-509). For example, the high rate of corruption and neglect of citizen welfare in Nigeria is considered a stimulant for the radicalization and recruitment of its youth into Boko Haram (Onuoha FC, 2014).

There is wide support in the literature for the view that corruption is bad for growth and the economy in general (Aidt et al., 2008; Gyimah-Brempong, 2002; Li, Xu and Zou, 2000; Mauro, 1995; Svensson, 2005; Tanzi, 2002; and Tanzi and Davoodi, 2001). Empirical evidence shows that countries with higher levels of corruption tend to grow more slowly and vice versa, because corruption tends to reduce growth by lowering the quality of public services and infrastructure, reduces tax revenue through tax evasion and other illicit practices, distorts the composition of government expenditure, encourages looting of resources, discourages private investments, etc. For example, using panel data from African countries, Gyimah-Brempong (2002) showed that a unit increase in corruption reduces the growth rates of GDP and per capita income by between 0.75 and 0.9 percentage points and between 0.39 and 0.41 percentage points per year respectively. Gupta et al., (1998) showed that a one standard deviation in the growth rate

of corruption (a deterioration of 0.78 percentage points) decreases income growth of the poor by 7.8 percentage points per year. Egger and Winner (2005) and Lambsdorff and Cornelius (2000) showed that increasing corruption has a negative effect on direct foreign investment (FDI).

2.2.5. Government Size (GS)

The impact of government size on corruption is debatable. On one hand, a large government is considered a major source of corruption because it provides more opportunity for political rent-seeking due to greater bureaucracy and red tape (Goel and Nelson, 1998; Rose-Ackerman, 1999). Another view uses Scandinavian countries as models to show that larger governments have better oversight and more resources to fight corruption (La Porta et al., 1999; Billger and Goel, 2009).

Using annual data from 82 countries from 1995 to 2008, Kotera et al. (2010), showed that in highly democratic countries, corruption decreases with an increase in government size and for less democratic countries, corruption increases with government size. SSA is one of the world's least democratic regions with only one full democratic country amongst its 46 members (The Economist Intelligence Unit, 2017). Hence the large government size common in this region is expected to foster corruption. Peev and Mueller (2012) showed that larger public sectors in the transition countries (former communist countries) are associated with slower economic growth due to corruption. They showed that once country fixed-effects (FE) are controlled for, a ten-percentage point increase in the size of the public sector reduces a country's annual growth by two percentage points.

Nelson and Singh (1998) also find that large public sector consumption is detrimental to growth in Least Developed Countries due to increased levels of corruption.

Measuring GS is subjective since the "size of government" can refer to several things: government intervention in economic activity, size of public sector, general government expenditure, tax revenue, public sector transfers as a percentage of GDP, etc. Measuring GS as total taxes or total expenditure relative to GDP or size of public sector makes sense for rich and developed countries with strong political and economic institutions. In SSA countries, it is often misleading using these indexes as a measure of government size for the following reasons:

- The general government final consumption expenditures in GDP which is commonly used in literature as a proxy for government size (Billger and Goel, 2009) is difficult to determine in SSA due to lack of transparency and accountability. Top political leaders and their families usually treat the state's coffers like their personal piggy bank, hence, the line between government expenditure and personal expenditure is blurred. For example, “Teodorin Obiang (the first son of the president of Equatorial Guinea) spends millions of dollars of state funds financing his lavish lifestyle which includes luxurious property in Malibu, a Gulfstream jet, Michael Jackson memorabilia and a car collection that could easily make billionaires go green with envy” (Mfonobong Nsehe, 2012). Another glaring example is the case of Paul Biya, Cameroon’s roaming president who spends over 15% of his time at the Intercontinental Hotel in Geneva

Switzerland with over a 50 man entourage at a daily cost of over $50,000 to the tax payers (not counting food, entertainment, and the rental of a private plane, etc.) according to the Organized Crime and Corruption Reporting Project (2018).

- Using size of public sector as a measure of GS is also misleading. It is extremely difficult to measure the actual size of the public sector in SSA due to the "ghost workers' phenomenon. The "ghost workers" phenomenon is a major problem and financial drain in most SSA countries. For example, according to Techpoint.africa (2018), over eighty thousand ghost police officers were discovered on the police force's payroll by the government of Nigeria. Ghost workers are believed to cost Cameroon $12 million every month (Voice of America News, 2017).
- Using general government gross debt as a measure of government size is also problematic. Most debts in this region are usually contracted to be repaid by future sales of mineral resources. With the proliferation of resource-for infrastructure deals under which loans are secured against the net present value of a future revenue from the sales of oil or mineral extraction, it is difficult to separate current government debt and interest payment on debt from general government debt.
- "Corruption is generally connected with the activities of the state and especially with the monopoly and discretionary power of the state" (Tanzi, 1998). Hence, the larger the government and the greater the extent of government intervention in the economy, the greater will be the fertile conditions in the economy for

corruption. While government intervention in the economic activities is sparingly used in developed countries to correct externalities, this is not the case in SSA countries where it is frequently used as a political tool. Hence, policies that stifle economic and business activities, reduce competition among firms, or waste resources are usually adopted. These policies and intervention not only increases government size (which tends to increase corruption through bureaucratic bottleneck), but also run up debts that divert resources into interest payments instead of productive economic activities. Hence, it is difficult to identify the amount of public spending useful for economy growth from the amount of public spending which harms economy growth.

Therefore, for SSA countries, it makes sense to use the size of the executive branch of government compared to the economy i.e., the GDP of a country as a reliable measure of the size of government since this can easily be verified.

2.2.6. The Police

The police are a major source of bureaucratic corruption in the SSA region. According to a 2018 survey conducted by Transparency International (TI), the police across SSA have regularly been rated as highly corrupt. Of 36 countries worldwide where police are seen as the most corrupt institution, 20 are in Africa. Out of five key public services, people who come into contact with the police are the most likely to have paid a bribe (Transparency International, 2018). According to the same report, 130 million citizens in the 35 countries surveyed are estimated to have paid a bribe in the past year – some to escape punishment by the police or courts, but many forced to pay to get access

to the basic services that they desperately need. Hence, petty or bureaucratic corruption is widespread in the SSA region compared to advanced countries and it normally occurs at the level of functionaries (mid and lower level public workers especially the police and in the courts) who use their positions and administrative authority for personal gain. For example, Zimbabwe under President Mugabe was losing over $1 billion annually to corruption, with police and local government officials the worst offenders (Reuters, 2016).

2.3. Data and Econometric Methodology

The main objective of this study is to investigate the effects of government size and the police on corruption in the SSA region. To achieve this purpose, the estimation equation is specified as:

$$CORR_{it} = \beta_{0i} + \beta_1 GS_{it} + \beta_2 POL_{it} + \delta_{it} \sum X_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

Where u is a standard error term. CORR is corruption; GS is government size; POL is the police proxied by reliability of police from Fraser Institute's economic freedom index; X is a set of control variables that may influence corruption – economic prosperity and development proxied by human development index (HDI), total natural resource rents (NR), economic freedom (EFH), trade openness (TO), and ethnolinguistic fractionalization (ELF). Descriptive statistics are reported in Table 2.2, while Table 2A1 reports a detailed explanation of the data and source. All variables are in natural logarithmic form.

2.3.1. Model Rationale

Although some consensus is observed regarding some of the determinants of corruption, the role of other determinants of corruption remains unclear (see Serra, 2006). This study will focus on government size and the police and their impact on corruption in SSA. In this paper, two alternative indices for government size are used, in order to discover the sensitivity of corruption towards government size: general government gross debt in GNI (GGCE) and size of the executive branch of government compared to the GDP of the country (SEB).

Economic Prosperity and Development:

The inclusion of economic prosperity and development as a component of X in the estimation equation is motivated by the fact that economic prosperity and development has been shown to have a significant influence on corruption in most previous studies (La Porta et al., 1999; Paldam, 2002; Treisman, 2000; Sims et al., 2012). Greater economic prosperity and development signify more literacy, greater prosperity, a longer life expectancy in a country. A well-educated population is aware of its rights and duties and less likely to engage in corrupt practices. “Greater prosperity lowers the discount rates of both bribes-takers and bribe-givers, making them less eager to jump queues via illegal means. Furthermore, the opportunity costs associated with punishment are greater for wealthier individuals and this might also act as a deterrent” (Goel and Nelson, 2008).

GDP per capita is commonly used as a proxy for economic prosperity and development. In this study, HDI is used. “HDI is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being

knowledgeable and have a decent standard of living. A country scores higher HDI when the lifespan is higher, the education level is higher, and the GDP per capita is higher. HDI is scored between zero and one, with one indicating a high level of economic development and zero a very low level. “Very high levels of human development are associated with low levels of corruption” (Rose-Ackerman, 2004). Sims et al. (2012) show that HDI has a significant effect on corruption. HDI and GDP per capita are highly correlated with a correlation coefficient of about 0.8576 (see Table 2A2).

Natural Resource Endowments (NR):

The influence of natural resources on corruption has been pointed by Bhattacharyya and Hodler, 2010; Soreide and Kolstad, 2009; and Petermann et al., 2007. The abundance of natural resources create opportunities for rent-seeking behavior and gives rise to corruption. SSA countries are endowed with enormous natural resources. These resources can either bring wealth and development to countries that use them effectively or they can also be a curse to countries that fail to use them effectively. According to United Nations Office on Drugs and Crime (2018), poorly managed natural wealth can lead to bad governance, corruption or even violent conflict. For most SSA, these resources are a curse because they fuel conflicts (Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Mali, Sudan, etc.), corruption, and environmental degradation (Niger Delta in Nigeria).

Economic Freedom (EFH):

The influence of economic freedom on corruption has been pointed by previous studies such as Chafuen and Guzman, 2000; Paldam, 2002; Rose-Ackermann, 1999; Saha

et al*.,* 2009. Corruption can develop when obstructions to economic freedom are imposed. “Economic freedom is the fundamental right of every human to control his or her own labor and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please” (Heritage Foundation, 2018). *“*Individuals have economic freedom when property they acquire without the use of force, fraud, or theft is protected from physical invasions by others and they are free to use, exchange, or give their property as long as their actions do not violate the identical rights of others. Individuals are free to choose, trade, and cooperate with others, and compete as they see fit. Protection of persons and their rightfully acquired property is a central element of economic freedom and a civil society” (Fraser Institute, 2018).

Trade Openness (TO):

The inclusion of trade openness in the estimation equation is motivated by De Jong & Bogmans (2011). Bandyopadhyay, Subhayu; and Roy, Suryadipta (2007) also showed that, costs of trades are very high in countries with high levels of corruption due to burdensome regulations which are exploited by dishonest officials to extract bribes from traders, thereby pushing up the costs of trade. Trade is expected to reduce corruption and positively stimulate the economy through the acquisition of advance technologies.

Ethnolinguistic fractionalization (ELF):

Empirical literature has stressed the negative role of ethnic fragmentation on corruption and thus on economic growth. Ethnolinguistic fractionalization appears to be responsible for a variety of corruption - related phenomena (Mauro, 1995). The

widespread corruption in most SSA countries is often attributed to the extensive ethnic diversity in many of these countries (Shen and Williamson, 2005). Ethnic conflict is an important determinant of political and economic decision-making in many nations and localities. Several studies suggest that ethnolinguistic fractionalization and conflict lead to political instability, badly designed economic policies, disappointing economic performance, and poor governance (Alesina et al., 2003; Mauro, 1995). The explanatory variables and their expected signs are indicated in Table 2.1 below.

Table 2.1: Explanatory variables and their expected signs

Variables	Symbol of Variable	Expected Sign (s)
Government Size	SEB	+
Reliability of Police	POL	-
Economic Prosperity and Development	HDI	-
Total Natural Resource Rents	NR	+
Trade Openness	TO	-
Economic Freedom	EFH	-
Ethnolinguistic Fractionalization	ELF	+

2.3.2. Variables and Data Sources

For this study, a balanced panel data of 40 African countries for the period 2005-2015 are used. The choice of these countries are selected based on data availability and data are not available for the same period of time for all countries. Data are drawn from different sources (Table 2A5): World Development Indicators (WDI, 2018) of the World Bank, International Monetary Fund (IMF, 2018), United Nations Development Programme

(UNDP, 2018), Transparency International (TI), Fraser Institute, Heritage Foundation, Philip G. Roeder (2001), and the CIA World Factbook (2018).

Data for corruption (CORR) are drawn from Corruption Perception Index (CPI) by TI. CPI is one of the most used corruption measures in the literature (Pellegrini and Gerlagh, 2004; Gyimah-Brempong, 2000; etc.). CPI has been published annually since 1995 and is a composite of various corruption indicators. Since 2012, the score has been rescaled from a 10-point scale to a 100-point scale (i.e., countries are now ranked on a zero to hundred scale, with a score of zero representing very high corruption and a score of hundred indicates an absence of corruption). Due to the rescaling of the CPI scores, year to year comparisons is only possible from 2012 onwards, i.e., scores were not comparable across countries and over time before 2012 (Grundler and Potrafke, 2019). In this study, the pre-2012 corruption index number are converted to the 2012 scale to ensure comparison across countries and time. The CPI number is also inverted by subtracting it from 100 to obtain an increasing scale of corruption. The clear majority of SSA countries assessed are perceived to be highly corrupt.

IMF provides information on general government gross debt (percent of GDP), while WDI of the World Bank provides information on trade openness (percent of GDP), per capita GDP, natural resource endowments (percent of GDP), land area, and population ages 0 -14 (percent of total). The CIA World Factbook provides information on size of the executive branch of government. HDI is extracted from UNDP. Data for Ethnolinguistic fractionalization (ELF) is from Philip G. Roeder (2001). Data for the reliability of police is extracted from Fraser Institute's economic freedom index which

includes a category called Legal System and Property Rights (the index runs from zero to ten, with ten being the maximum possible reliability of police). Data for economic freedom (EFH) is extracted from Heritage Foundation's Index of Economic Freedom which includes a category called Regulatory Efficiency constructed from three components: business, labor, and monetary freedoms. EFH is the average of these three components and measures the extent to which a country's regulatory system impede the efficient operation of businesses. The indexes run from zero to one hundred, with one hundred being the maximum possible economic freedom (or freest business environment).

2.3.3. Estimation Methods

Equations (1) is estimated with panel data from 40 SSA countries for the 2005 - 2015 period. Panel data models examine individual-specific effects, time effects, or both in order to deal with heterogeneity, or individual effects that may or may not be observed. Baltagi (2008) and Roodman (2009) list several benefits from using panel data which include controlling for individual heterogeneity and the ability to give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. Hence, panel data analysis gives more efficient estimates and allows empirical tests of a wide range of hypotheses.

Static panel data methodologies are employed in order to deal with the different types of econometric issues and ensure robust results. Static panel data are commonly analyzed using (pooled) OLS, fixed effect (FE) and random effect (RE) models. The difference between these models is the link between individual effects and regressors in the model. Pooled OLS assumes the nonexistence of individual effect, that is, all countries

in the study are homogeneous (assumes same slopes and same intercept regardless of time period) which is unlikely. FE model assumes that each country has its own intercept but shares the same slopes of the regression lines. FE cannot estimate the parameters of time-invariant regressors such as ELF, even if they are correlated with model error. In RE model, the individual specific error components are chosen at random from a population of possible intercepts. In the case of the absence of any correlation between observable and panel-specific error terms, the RE approach is preferred. One major advantage of RE is the inclusion of time-invariant regressors, which would disappear in FE.

For econometric analysis of the above model (equation 1) and to answer the research questions, six models have been constructed. In the first model, I estimate equation (1) including only SEB and POL as independent variables to show their direct impact on corruption. I use the first model as a base for the other models by adding different explanatory/control variables sequentially to see how they affect the variables of interest (SEB & POL) and the CPI in general. In the second model, I add HDI while in the third, fourth and fifth models, I add NR, TO, and EFH respectively. In the sixth (full) model, I add ELF. All explanatory variables in the model are considered exogenous except SEB.

RE estimation results are reported over (pooled) OLS based on a Breusch-Pagan Lagrange multiplier (LM) test for RE, where the null hypothesis is that variances across entities is zero. Since endogeneity problems lead to inconsistency of the (pooled) OLS and RE estimators, instrumental variable (IV) method is conducted to deal with this problem in order to obtain consistent parameter estimates. Government size (SEB) variable is considered endogenous to corruption because an unexpected increase in SEB can lead to

more corruption due to increased bureaucratic bottleneck, state capture, etc. SEB is instrumented with two factors: the share of population who are under age 15 (P15) and the land area (LA) both of which are considered to be determinants of SEB. The P15 variable is used following Kotera et al. (2010).

The consistency of the IV estimator depends on the validity of the instruments. Hence, a test for the endogeneity of the regressors (C test or GMM distance test) is implemented which tests the null hypothesis that SEB is properly exogenous in the model. The test statistic has a p-value of 0.0000, suggesting that the data overwhelmingly reject the use of OLS in favor of IV. The J statistic (with a p-value of 0.0972) also indicates that the overidentifying restrictions are not rejected, i.e., instruments are valid, hence uncorrelated with the error term. The Durbin–Wu–Hausman test of the endogeneity of regressors and a second test of overidentifying restrictions are also implemented and both confirm the above test results.

2.4. Main Empirical Results

Tables 2.2 and 2A2 show the descriptive statistics and correlation matrix for all variables respectively. Table 2.2 indicates that the average HDI level in the SSA region is relatively low, while the average level of corruption is very high.

Table 2.2: Descriptive Statistics for SSA Countries
Dependent Variable: CPI

Variables	Observations	Mean	Stan. Dev.	Minimum	Maximum
Corruption (CORR):					
Log (CPI)	439	4.224925	0.1705867	3.555348	4.60517
Log (CC)	440	1.110935	0.226011	0.292719	1.395864
Government Size (GS):					
Log (SEB)	440	-19.45244	1.327775	-23.69809	-16.8447
Log (GGD)	437	3.624538	0.698377	1.37801	6.461946
Log (POL)	322	1.481787	0.3173055	0.48242	2.204972
Log (HDI)	440	-0.7586058	0.2010966	-1.251763	-0.2471801
Log (NR)	440	2.162017	1.53122	-6.770129	4.096363
Log (TO)	421	4.28242	0.3945988	3.050426	5.740935
Log (EFH)	425	4.086715	0.17885	2.914161	4.384108
Log (ELF)	440	-0.421839	0.3870055	-1.52326	-0.0812101
Log (P15)	440	-0.8686102	0.1475814	-1.639883	-0.6886908
Log (LA)	440	12.28796	1.701815	7.615791	14.63399

Note:
1. *All variables are in natural logarithmic form.*
2. *All corruption indices are inverted to obtain an increasing scale of corruption*

The correlation matrix suggests that a moderate level of collinearity exists between our variables of interest, while high correlations exist between the corruption index and HDI *(r = 0.6275)* and corruption and POL *(r=0.5347).* Based on the variance inflation factor (VIF) test (Table 2.3), multicollinearity should have a minimal impact on the reliability of the results

Table 2.3 presents the RE estimation results when the corruption perception index released by the TI is used as a dependent variable and the size of the executive branch of government compared to the GDP is used as the proxy for government size (SEB). The Wald tests for all six RE models are highly significant ($p < 0.0000$) indicating that all models

fit the data well at the 0.05 significance level. In column (1), the impact of SEB on CPI is significantly positive while the impact of the POL is statistically significant and negative, meaning police reliability reduces corruption, all other factors held constant. Columns (2-6) show the results when other variables are added sequentially.

Table 2.3: Random Effects (RE) panel data estimation results
Dependent Variable: CPI

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**VIF**
Log (SEB)	0.0631***	-0.00909	-0.00714	0.0091	0.0133	0.0223	2.03
	(0.0107)	(0.0120)	(0.0121)	(0.0132)	(0.0135)	(0.0146)	
Log (POL)	-0.076***	-0.08***	-0.0745*	-0.07***	-0.07***	-0.07***	1.24
	(0.0209)	(0.0200)	(0.0200)	(0.0201)	(0.0201)	(0.0200)	
Log (HDI)		-0.45***	-0.51***	-0.38***	-0.41***	-0.38***	2.49
		(0.0690)	(0.0726)	(0.0819)	(0.0842)	(0.0866)	
Log (NR)			0.0112	0.0232*	0.0221*	0.0206*	1.61
			(0.0087)	(0.0095)	(0.0096)	(0.0096)	
Log (TO)				-0.09***	-0.09***	-0.09***	1.59
				(0.0276)	(0.0275)	(0.0154)	
Log (EFH)					-0.0329*	-0.0330*	1.09
					(0154)	(0.0154)	
Log (ELF)						0.0826	1.45
						(0.0521)	
Constant	5.557***	3.738***	3.825***	4.233***	4.423***	4.658***	
	(0.215)	(0.275)	(0.283)	(0.312)	(0.329)	(0.359)	
N	322	322	322	310	304	304	
Adjusted R^2	0.014	0.536	0.548	0.514	0.511	0.529	
Wald -test	47***	107***	110***	109***	120***	122***	
Rho	0.82	0.72	0.71	0.73	0.75	0.76	
RMSE	0.067	0.065	0.065	0.065	0.064	0.063	
LM Test for RE:	0.000	0.000	0.000	0.000	0.000	0.000	

Note: Standard errors in parentheses

** p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001; Mean VIF = 1.64*

The results suggest that the reliability of the police (POL) variable has a significant and statistically significant negative effect on CPI in line with the 2018 survey conducted by TI in which the police force is ranked the most corrupt institution in SSA. The findings also show that the impact of SEB are mixed, i.e. negative in columns 2 and 3, but positive in columns 4 – 6 in line with literature.

Since the endogeneity problems lead to the inconsistency of the RE estimator, the instrumental variable (IV) method is conducted to deal with the endogeneity problem using land area and the share of population under age 15 in the total population as instruments for government size (SEB). Though these two variables are important determinants of government size in SSA, they may not have a direct effect on corruption.

Table 2.4 presents the IV estimation results when the CPI is used as a proxy for the corruption variable and the SEB is used as the proxy for government size. All the coefficients have the expected signs, except SEB (negative in columns 2 - 5 but positive in column 6). The validity of the instruments and endogeneity of the regressor are confirmed from the econometric tests as explained above. All models fit the data well at the 0.05 significance level based on the Wald tests ($p < 0.0000$).

In column (1), the impact of the SEB and the POL on corruption are significantly positive and negative, respectively. Columns (2-6) show the results when other variables are added sequentially. The results suggest that the reliability of police (POL) still has a statistically significant negative effect on corruption and is robust to all specifications. The impact of SEB is, however, mixed. The results also show that total natural resource rents (NR) and ethnolinguistic fractionalization (ELF) have a positive significant effect on

corruption as expected. The human development indicator (HDI) and trade openness (TO) have a statistically significant negative impact on corruption in SSA. Adjusted R^2 of 0.569 means that about 57 % of the total variation in corruption is explained by the collective variation of the regressors.

Table 2.4: Instrumental variable (IV) panel data estimation results
Dependent Variable: CPI

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Log (SEB)	0.0814***	0.0367***	-0.0174	-0.0108	-0.0111	0.0105
	(0.0202)	(0.0110)	(0.0093)	(0.0133)	(0.0145)	(0.0186)
Log (POL)	-0.078***	-0.109***	-0.166***	-0.117***	-0.102***	-0.104***
	(0.0211)	(0.0216)	(0.0255)	(0.0222)	(0.0219)	(0.0219)
Log (HDI)		-0.622***	-0.504***	-0.444***	-0.468***	-0.395***
		(0.0518)	(0.0527)	(0.0758)	(0.0807)	(0.0904)
Log (NR)			0.0155**	0.0203*	0.0186*	0.0202**
			(0.0055)	(0.0070)	(0.0076)	(0.0096)
Log (TO)				-0.0550	-0.0569	-0.0688*
				(0.0286)	(0.0293)	(0.0297)
Log (EFH)					-0.0354*	-0.0376*
					(0180)	(0.0179)
Log (ELF)						0.0688*
						(0.0343)
Constant	5.918***	2.185***	3.774***	3.869***	3.964***	4.485***
	(0.400)	(0.250)	(0.228)	(0.319)	(0.362)	(0.459)
N	322	322	322	310	304	304
Adjusted R^2	0.008	0.566	0.583	0.567	0.567	0.569
Wald-test	28.2***	224***	431***	234***	210***	211***
Rho	0.814	0.270	0.000	0.240	0.323	0.338
F-test:	0.000	0.000	0.000	0.000	0.000	0.000

Note: Standard errors in parentheses
** p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

The estimated regression equation is,

$$ln(CPI) = 4.485 + 0.011\,ln(SEB) - 0.104\,ln(POL) - 0.395\,ln(HDI) + 0.020\,ln(NR) - 0.069\,ln(TO) - 0.038\,ln(EFH) + 0.069ln(ELF) \quad (2)$$

And the respective effects of the regressors on corruption are:

- A 1% percent increase in the goevernment size (SEB) is expected to increase corruption by 0.01 %, holding all other variables constant (p >.05).
- A 1 % increase in police reliability (POL) is expected to decrease corruption by 0.10 %, holding all other variables constant (p <.0000).
- A 1 % increases in HDI is expected to decrease corruption by 0.395 %, holding all other variables constant (p < 0.0000).
- A 1 % increase in NR, is expected to increase corruption by 0.02 %, holding all other variables constant (p < 0.01).
- A 1 % increase in TO, is expected to decrease corruption by 0.069 %, holding all other variables constant (p < 0.05).
- A 1 % increase in EFH, is expected to decrease corruption by 0.03 %, holding all other variables constant (p < 0.05).
- A 1 % increase in ELF, is expected to increase corruption by 0.069 %, holding all other variables constant (p < 0.0000).

2.4.1 Robustness Analysis

The robustness of the main empirical results is checked in two ways. First, the model is estimated with a different proxy for corruption (Control of Corruption) extracted from WGI. According to the WGI, the index for Control of Corruption (CC) captures

perceptions of the extent to which the public power is exercised for private gain, including both petty and grand forms of corruption, as well as the capture of the state by elites and private interests. Countries are rated on a scale of -2.5 (weak) to 2.5 (strong). Hence, a low score implies more corruption since the public power is used for private gain, creating favorable conditions for corruption. In this study, CC is also rescaled by subtracting it from 2.5 to obtain an increasing scale of corruption. Second, the general government gross debt (GGD) in GNI (commonly used in literature) is used as a proxy for government size. Negative GGD values for three countries are dropped due to log – log transformation.

Table 2.5 presents the estimation results when CC is used as the dependent variable. The specifications and the instruments are the same as those in Table 3. In columns (1) through (6), the signs of the estimated coefficients for POL, HDI, NR, EFH, and ELF are similar to those in Tables 2.2 & 2.3. The significance of POL, HDI, and EFH are also similar. Hence, coefficient estimates for most of the empirical results (POL, HDI, NR, EFH, and ELF) are robust for the corruption indices.

Table 2.6 presents the estimation results when the general government gross debt (GGD) in GNI is used as a proxy for government size. The specifications and the instruments are the same as those in Tables 2- 4. In columns (1) through (6), the signs of the estimated coefficients for POL, HDI, EFH, and Elf are similar to those in Tables 2- 4. The significance of POL, HDI, and EFH are also similar. Hence, coefficient estimates for most of the empirical results are robust for the government size proxies.

Table 2.5: Instrumental variable (IV) panel data estimation results
Dependent Variable: CC

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Log (SEB)	-0.0344	-0.0717***	-0.0291*	-0.0253	-0.0421*	-0.0086
	(0.0191)	(0.0161)	(0.0132)	(0.0169)	(0.0197)	(0.0251)
Log (POL)	-0.0941***	-0.122***	-0.173***	-0.146***	-0.118***	-0.119***
	(0.0163)	(0.0198)	(0.0243)	(0.0224)	(0.0189)	(0.0189)
Log (HDI)		-0.488***	-0.419***	-0.315***	-0.307**	-0.1750
		(0.0734)	(0.0697)	(0.0910)	(0.0996)	(0.117)
Log (NR)			0.0341***	0.0370***	0.0270**	0.0275**
			(0.0076)	(0.0087)	(0.0090)	(0.0091)
Log (TO)				-0.0197	0.0040	-0.0061
				(0.0311)	(0.0279)	(0.0286)
Log (EFH)					-0.0527***	-0.0541***
					(0.0146)	(0.0146)
Log (ELF)						0.1420**
						(0.0516)
Constant	0.555	-0.499	0.549	0.660	0.492	1.314*
	(0.271)	(0.364)	(0.313)	(0.399)	(0.469)	(0.402)
N	322	322	322	310	304	304
Adjusted R^2	0.149	0.474	0.547	0.526	0.524	0.532
Wald-test	37.68***	96.01***	232.9***	154.8***	107.3***	114.8***
Rho	0.931	0.626	0.260	0.436	0.691	0.699
F-test:	0.000	0.000	0.000	0.000	0.000	0.000

Note: Standard errors in parentheses
** p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

The empirical results indicate that POL, HDI, EFH, and ELF are robust, even if a different corruption index and a different proxy for government size are used. The results suggest that, greater police reliability greatly decreases corruption, while the impact of the executive is mixed.

Table 2.6: Instrumental variable (IV) panel data estimation results
Dependent Variable: CPI

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Log (GGD)	-0.156**	-0.2640**	-0.256**	-0.283	-0.244	-0.1180
	(0.0536)	(0.0865)	(0.0900)	(0.149)	(0.148)	(0.0803)
Log (POL)	-0.32***	-0.0889**	-0.0998**	-0.0866**	-0.0957**	-0.0908***
	(0.0345)	(0.0303)	(0.0306)	(0.0321)	(0.0306)	(0.0232)
Log (HDI)		-0.652***	-0.640***	-0.612***	-0.596***	-0.526***
		(0.0867)	(0.0975)	(0.1390)	(0.1240)	(0.0825)
log (NR)			0.0011	-0.0004	0.001	0.0079
			(0.0123)	(0.0174)	(0.0165)	(0.0111)
Log (TO)				0.0104	0.0033	-0.0259
				(0.0621)	(0.0608)	(0.0397)
Log (EFH)					-0.0597*	-0.0470*
					(0.0278)	(0.0200)
Log (ELF)						0.0689
						(0.0371)
Constant	4.502***	3.561***	3.598***	2.564***	3.876***	4.049***
	(0.064)	(0.150)	(0.178)	(0.274)	(0.214)	(0.133)
N	322	322	322	310	304	304
Adjusted R^2	0.129	0.213	0.226	0.163	0.223	0.440
Wald-test	77.88***	69.68***	80.75***	59.44***	76.51***	138.2***
Rho	0.000	0.551	0.469	0.570	0.574	0.524

Note: Standard errors in parentheses
** p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

2.5. Conclusion

Apart from the 2018 survey from Transparency International, there are no studies in the empirical literature on the relationship between the police and corruption in SSA. To the best of my knowledge, this study is the first to investigate the impact of police reliability on corruption for countries in the SSA region. It is difficult to win the fight against corruption in this region without understanding this relationship because most SSA countries can be considered as police states and, hence, corruption and the police

force go hand in hand. The estimation results indicate that an increase in police reliability decreases corruption and the results are robust even if different indices of corruption and government size are used.

As explained previously, the size of the executive branch of government (SEB) is and will always be a major problem in SSA compared to other regions in the world if unaddressed because it is the major source of grand corruption and state capture, responsible for the massive looting of wealth from the SSA region. The executive branch determines the political, economic, and social well-being of these countries and the people.

Previous studies (Alesina et al., 2003; Mauro, 1995) have stressed the negative role of ethnic fragmentation (a measure of tribalism) on corruption. This study also confirms the negative role of tribalism on corruption. The estimation results indicate that highly tribal countries are more corrupt than less tribal countries and the results are robust even if different indices of corruption and a different proxy for government size are used.

These findings have important implications for policymakers, non-governmental organizations and international organizations focused on fighting to reduce corruption in SSA countries. The fight against corruption in this region of the world should start with governance. Accountability, the rule of law, well-trained and disciplined police can be an effective tool in the fight against corruption. To minimize the effect of tribalism on corruption in the SSA region, we must support the decentralization of power, i.e., delegate power to local governments. Enforcement of the forest and the natural

resources certification in the SSA region can help combat the massive looting and poor management of the resources which can help curb corruption and spur growth.

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APPENDIX

Table 2A1: Variables Description and Data Source

Variables	Description	Source
Government Size ***(SEB)***	Size of executive / GDP	CIA World Factbook (2018)
Government size ***(GGD)***	*General government gross debt (% of GNI)*	*WDI*
Corruption ***(CPI)***	Corruption Perception Index ranges from 0 (highly corrupt) to 100 (very clean).	Transparency International (2018)
Corruption ***(CC)***	*Control of Corruption ranges from -2.5 (highly corrupt) to 2.5 (very clean)*	WGI (2018)
Reliability of Police (POL)	Index runs from zero to ten, with 10 being the maximum possible reliability	Fraser Institute (2018)
Economic Prosperity and Development (HDI)	HDI is scored between zero and one, with one indicating a high level of economic development and zero a very low level	UNDP (2018)
Total Natural Resource Rents (NR)	Total natural resources rents (% of GDP) = the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	WDI (2018)
Trade Openness (TO)	Trade is the sum of exports and imports of goods and services (% of GDP)	WDI (2018)
Economic Freedom (EFH)	Proxied by Regulatory Efficiency *(average of business, labor, and monetary freedoms).* Index runs from zero to one hundred, with 100 being the maximum possible economic freedom	Heritage Foundation (2018)
Ethnolinguistic Fractionalization (ELF)	Ethnolinguistic Fractionalization: measures the degree of ethnic, linguistic and religious heterogeneity in various countries	Roeder, P. G (2001)
Population ages 0 – 14 (P15)	Population ages 0-14 (% of total population)	WDI (2018)
Land Area (LA)	LA (square km) is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones	WDI (2018)

Table 2A2: Correlation Matrix

	CPI	SEB	POL	HDI	NR	TO	EFH	ELF	PCGDP
CPI	1.0000								
SEB	-0.0327	1.0000							
POL	0.5342	-0.0721	1.0000						
HDI	0.6275	0.0641	0.2548	1.0000					
NR	-0.3826	0.1407	-0.3593	-0.1696	1.0000				
TO	0.0821	-0.0609	-0.0060	0.3027	0.3426	1.0000			
EFH	0.4896	0.0551	0.3600	0.4447	-0.3628	0.0415	1.0000		
ELF	-0.2911	0.2301	-0.1719	-0.1338	0.1615	-0.2133	-0.1285	1.0000	
PCGDP	-0.5486	-0.4099	0.1882	0.8576	-0.3988	0.3848	0.1524	-0.102	1.0000

Table 2A3: List of SSA countries included in the study

List of SSA countries included in the study	
Angola	Lesotho
Benin	Liberia
Botswana	Madagascar
Burkina Faso	Malawi
Burundi	Mali
Cabo Verde	Mauritania
Cameroon	Mauritius
Central African Republic	Mozambique
Chad	Namibia
Congo, Dem. Rep.	Niger
Congo, Rep.	Nigeria
Cote d'Ivoire	Rwanda
Eswatini	Senegal
Ethiopia	Sierra Leone
Gabon	South Africa
Gambia, The	Tanzania
Ghana	Togo
Guinea	Uganda
Guinea-Bissau	Zambia
Kenya	Zimbabwe

Table 2A4: Ten of SSA's longest serving presidents

Country	Length of Presidency in 2015 (number of years)
Angola	37
Zimbabwe	36
Cameroon	34
Congo, Rep.	32
Uganda	31
Eswatini	30
Chad	26
Lesotho	26
Gambia, The	22
Rwanda	16

Table 2A5: 2018 Ranking of corruption levels in SSA

Country	2018 CPI Score	2018 Rank
Botswana	61	34
Cabo Verde	57	45
Rwanda	56	48
Namibia	53	52
Mauritius	51	56
Senegal	45	67
South Africa	43	73
Burkina Faso	41	78
Ghana	41	78
Lesotho	41	78
Benin	40	85
Eswatini	38	89
Gambia	37	93
Tanzania	36	99
Cote d'Ivoire	35	105
Zambia	35	105
Ethiopia	34	114
Niger	34	114
Liberia	32	120
Malawi	32	120
Mali	32	120
Gabon	31	124
Sierra Leone	30	129
Togo	30	129
Guinea	28	138
Kenya	27	144
Mauritania	27	144
Nigeria	27	144
Central African Republic	26	149
Uganda	26	149
Cameroon	25	152
Madagascar	25	152
Mozambique	23	158
Zimbabwe	22	160
Congo, Dem. Rep.	20	161
Angola	19	165
Chad	19	165
Congo, Rep.	19	165
Burundi	17	170
Guinea Bissau	16	172

Source: Transparency International (2018)
https://www.transparency.org/cpi2018

Table 2A6: Corruption by Institutions

Institution	People (%)
Police	47
Government Official	39
Members of Parliament	36
Business Executives	36
President / Prime Minister's Office	34
Judges and Magistrates	34
Local government Officials	33
Traditional Leaders	22
NGOs	20
Religious Leaders	16

Note: Percentage of people who think most or all people in the following institutions are corrupt
Source: Transparency International (2019)

Table 2A7: Bribery Rates by Service

Service	People (%)
Police	28
Utilities	23
IDs	21
Schools	16
Public Clinics and Health Centers	14

Note: Percentage of people who used these services and paid a bribe in the previous 12 months
Source: Transparency International (2019)

CHAPTER 3: ECONOMIC GROWTH, GOVERNMENT SIZE, JUDICIAL SYSTEM, AND CORRUPTION IN SUB-SAHARA AFRICA (SSA): A PANEL DATA ANALYSIS.

ABSTRACT

This study uses panel data from 40 Sub-Saharan Africa (SSA) countries for the period 2005 – 2015 and the Arellano-Bover/Blundell-Bond General Moments Method (GMM) dynamic estimator to analyze whether the perceived level of corruption, the size of government, and the judicial system in SSA countries have impact on the economic growth rates of African countries over the period of the study. The study finds support for the "sand the wheels" hypothesis that corruption impedes economic growth rates in SSA. The study also finds that the size of the executive branch of government, political instability, and ethnolinguistic fractionalization have a negative and statistically significant effect, while that past levels of growth have a positive and statistically significant impact on growth rate of the countries in the sample. The results not only broaden our understanding of the role corruption plays in impeding economic growth, but they also provide important policy implications for the growth promoting efforts of donors and other international organizations in devising anticorruption strategies.

Keywords: Government Size; Judiciary System; Economic Growth; Corruption, Panel Data, System GMM Estimation, and Sub Saharan Africa (SSA).

JEL: D72, D73, O43,

3.1. Introduction

> "Corruption hurts the poor disproportionately by diverting funds intended for development, undermining a government's ability to provide basic services, feeding inequality and injustice and discouraging foreign investment and aid" (Kofi Annan, former United Nations Secretary-Genera, 2003)

Between 2000 and 2017, Sub Saharan Africa (SSA) ranked second behind Asia as the world's fastest-growing regions with average annual growth in gross domestic product (GDP) of 4.7% (AUC / OECD 2018). Unfortunately, this growth rate has had less of an impact on the lives of the majority of its people than elsewhere in the world with respect to job creation, poverty alleviation, inequality reduction, and in improving their general well-being. A growing economy should at least be able to provide greater opportunities (decent jobs, better education, and health care, etc.), but this has not been the case in the majority of SSA countries. Ndikumana (2007) attributes the high levels of corruption in this region as one of the factors that can explain, not only the slow growth, but also the limited progress in poverty reduction. Scully (1988) also believes that a region's institutional framework has a significant negative effect on the efficiency and the rate of growth of their economies. Hence, poor institutional frameworks and high levels of corruption are two key factors which may explain the inconsistency in the economic growth levels and the lack of fundamental changes in socioeconomic development of the region. The 2018 AUC/OECD report also indicates that government action is key to overcoming challenges related to growth, jobs and inequalities in SSA. But overcoming

these challenges will be difficult for most Sub Sahara African countries due to poor and weak institutional frameworks coupled with widespread and systematic corruption.

Economic growth in SSA has not made any significant improvements in the levels of human development. The SSA region still has the lowest average levels of human and socioeconomic development compared to other regions in the world. In the 2016, 36 of the 44 (81.8%) countries classified in the "low human development" category worldwide are in Africa, holding the bottom 19 places out of the lowest 20 rankings in human development (Human Development Report-HDR, 2016). According to the 2017 Global Multidimensional Poverty Index (MPI), 282 million (almost 40%) of the 706 million people globally destitute are in SSA. Multidimensional poverty (which encompasses the various deprivations experienced by poor people in their daily lives) also affects 60.1% of the population of SSA, i.e., 36% of the 1.45 billion people globally who are multidimensionally poor (for example, over 90% of the rural population in Niger is MPI poor, while about 60% of the urban population is MPI poor). Over half a billion people in the SSA region are without access to electricity according to the International Energy Agency's (IEA) (World Energy Outlook Special Report, 2014) and the region has the lowest access to improved water sources with "more than 660 million people still lacking access to clean water, the majority of them in rural areas, predominantly in Sub-Saharan Africa" (World Health Organization, 2015).

SSA also ranks at the bottom of all developing regions in practically all dimensions of infrastructure performance with the lowest density of road and rail (World Bank, 2017). The enormous resource needs for infrastructure projects with an annual financing gap in

the range of $68–$108 billion (African Economic Outlook, 2018) is a major hindrance to any meaningful infrastructure development.

The main objective of this paper is to analyze whether the perceived level of corruption, government size, and weak judicial system in SSA countries have affected their growth rates over the 2005-2015 period by answering the following research questions:

- Does corruption impede economic growth in SSA?
- Does the size of government including the executive branch of government, the judicial system, and the police impede economic growth?

To answer these questions, the study uses panel data analytic model for a cross-section of 40 SSA countries (Table 3A1) over the 2005 - 2015 period. The Generalized Method of Moments (GMM) estimation technique is used to control for possible endogeneity biases due to the nature of the data used and the collinear nature of some of the regressors used in the study.

I focus on SSA countries for the following reasons. First, there are very few studies on the impact of corruption on economic growth that exclusively focus on African countries. Most empirical studies on economic growth appear to follow the premise of "one size fits all," ignoring the unique characteristics of this region and, in most cases, limiting usefulness of these studies by failing to consider the cultural contexts in which corrupt activities occur in other places, especially in SSA. Therefore, to understand the impact of corruption on growth in the SSA region, we need to understand the social and

institutional framework of this region (top political leadership, judicial system, especially the courts and police) as it is mired in tribalism.

Tribalism has always been a major issue in SSA. “Tribalism reflects strong ethnic, or cultural identities that separate members of one group from another, making them loyal to people like them and suspicious of outsiders, undermining efforts to forge common cause across groups,” (Rosabeth Moss Kanter, 2013). Alesina et al. (2003) showed that growth in GDP per capita was inversely related to ethnolinguistic fractionalization (a measure of cultural, linguistic, and religious diversity, or tribalism) and that much of Africa’s growth failure is due to ethnic conflict.

Across SSA, both the judiciary and police have regularly been rated as highly corrupt by a survey conducted by Transparency International (TI) in 2018. According to the report, the police are perceived as the most corrupt institution (47%), while members of the judiciary (34%) are ranked sixth (Tables 3A4 and 3A5). Of 36 countries worldwide where the police is seen as the most corrupt institution, 20 are in Africa. Out of five key public services, people who come into contact with the police are the most likely to have paid a bribe (Transparency International, 2019). According to the same report, 130 million citizens (about 25%) in the 35 countries surveyed are estimated to have paid a bribe in the past year – some to escape punishment by the police, or courts, but many were forced to pay to get access to the basic services that they desperately needed. Hence, petty, or bureaucratic corruption is widespread in SSA countries compared to advanced countries and it normally occurs at the level of the functionaries (mid and lower level public workers, especially the police and in the courts) who use their positions and

administrative authority for personal gains. For example, Zimbabwe was losing over $1 billion annually to corruption under President Mugabe, the police and local government officials were the worst offenders (Reuters, 2016).

Secondly, countries in this region are characterized by very weak institutions (both political and economic). Hence, corruption is widespread in this region and is according to TI one of the worst performing regions in the world with an average score of 32 on the TI scale (TI uses a scale of 0 to 100, where 0 is highly corrupt and 100 is very clean). Four of the ten least democratic countries in the world are in the SSA region and 23 countries of its 46 members have authoritarian regimes (The Economist Intelligence Unit's Democracy Index, 2017). Most presidencies in the SSA region stretch for decades with the five longest presidencies stretching between 29 and 36 years. Their addiction to power is costly to this region because there exists a strong correlation between SSA's entrenched leadership and developmental and security challenges, including conflict, or instability, stagnancy, or declining economies, and democratic backsliding" (Council on Foreign Relations, 2017).

Finally, focusing on SSA will help our understanding of the socioeconomic impact of corruption and the role played by top political leaders and the judiciary.

This study finds that past levels of growth, size of the executive branch of government, political instability, and ethnolinguistic fractionalization, and economic freedom affect growth significantly. The size of the executive branch of government and political instability in this region have a negative and statistically significant effect on economic growth in SSA countries and are robust.

This paper makes contribution to the literature on the impact of corruption on growth by examining the impact of the large executive branches of government, common in SSA and the role of the judiciary, especially the police. The executive branch of government in the SSA region fosters political, or grand corruption, while the judiciary including the police fosters bureaucratic corruption.

The rest of the paper is organized as follows. Section 3.2 briefly reviews the literature on the economic consequences of corruption and the conventional sources of economic growth as control variables. Section 3.3 provides the econometric model, estimation techniques, data description and sources to achieve the main objective of this study. Section 3.4 presents and discusses the empirical results. Section 3.5 concludes the paper.

3.2. Literature Review

While there is vast theoretical and empirical literature on the impact of corruption on economic growth in relevant literature, only a few of these studies are specifically on SSA. This section reviews pertinent literature which deals with the impact of corruption on the economic growth Sub-Sahara African countries.

3.2.1. Defining Corruption

Defining corruption is, not only difficult, but also subjective. Corruption is defined differently in different regions of the world. One of the simplest definitions is the misuse of entrusted power for private gains according to UNDP (2008). But corruption is more than just the abuse of power, it is one of the most dangerous social ills of any society because, like a deadly virus, it attacks the vital structures that make for society's

progressive functioning, thus putting its very existence into serious peril according to Gire (1999). This is particularly true for SSA countries where limited but valuable funds and resources initially earmarked for socioeconomic developments are either out rightly embezzled, misappropriated, or otherwise severely depleted through kickbacks and over-invoicing by agents of government.

"Corruption is principally a governance problem that translates into a failure of institutions and a lack of capacity to manage society by means of a framework of social, judicial, political, and economic checks and balances" (SDC, 2016). Hence, implementing and enforcing laws and policies that ensure accountability and transparency becomes harder when these formal and informal systems break down - the entire process runs counter to the rule of law.

"No problem does more to alienate citizens and to undermine political stability and economic development than endemic corruption among the government, party leaders, judges, & bureaucrats" (USAID, 2002). "Corruption is considered as being decisively responsible for political instability, economical underdevelopment, low administrative efficiency and poor governance structures around the world" (Ko & Samajdar 2010: 508-509).

Corruption reduces efficiency (both political and economic), increases poverty and income inequality, and is one of the main barriers to sustainable economic, political, and social development in the SSA region. The World Bank (2017) estimates that cost of corruption equals more than 5% of global GDP with over US$ 1.5 trillion paid in bribes each year - 10 times the value of overseas development assistance. 2002 African Union

study estimated that corruption costs the continent roughly $150 billion, or about 25% of the GDP of African countries a year (Hanson, 2009), which is far greater than all aid received from developed countries. For example, according to the Organization for Economic Cooperation and Development (OECD, 2008), net bilateral official development assistance (ODA) from members of the OECD's Development Assistance Committee donors to Africa totaled USD 26 billion, of which USD 22.5 billion went to SSA. The AU's panel on illicit financial flows headed by the former South African president Thabo Mbeki also found that African countries lose over $50 billion a year due to tax evasion and other illicit practices and its 50-year losses top trillion dollars (UNECA, 2018), an amount roughly equivalent to all the ODA received by Africa during the same time frame.

Another study by the World Banks' Stolen Asset Recovery Initiative (World Bank, 2007) shows that the vast amount of assets frequently stolen by corrupt African leaders. For example, Sani Abacha (1993-1998) allegedly stole the equivalent of 1.5 to 3.7% of Nigerian GDP for every year he was in power (i.e., USD 2-5 billion), while Mobutu Sese Seko (1965–97) of Zaire allegedly stole the equivalent of 1.8% of Zaire's GDP for every year he was in office (i.e., USD 5 billion). These illicit outflows are of serious concern for this region, given anemic economic growth and resource needs for infrastructures. The true cost of corruption in this region including the degradation of public institutions, the weakening of the private investment climate, and the corruption of social service delivery mechanisms for basic health and education programs, with a particularly adverse impact on the poor) far exceeds all the illicit outflows and the value of stolen assets by the leaders of these countries. The collateral damage in terms of foregone growth and poverty

alleviation will be proportional to the duration of the tenure of the corrupt leaders (World Bank, 2007). This is a major issue for the African region where most presidencies stretch their term of office for decades.

3.2.2. Corruption and Growth

The exact relationship between corruption and economic growth is debatable with the “grease and the sand” hypotheses dominating the debate. The “sanders” believe that corruption sands the wheels of development and hence hinders economic growth and development, while the “greasers” on the other hand believe that corruption greases the wheels of progress and, thus, help foster economic growth. Using a dynamic panel data estimator from Eight Muslim Developing (D-8) countries, Ghulam Shabbir (2017) finds that corruption greases the wheels of administration and, thereby, promotes growth in countries having poor democratic norms and sands the wheels in countries having higher degree of democracy.

Aidt (2009) also finds that corruption can grease and sand the wheels of the economy. It greases the wheels in a very narrow sense by speeding things up (e.g., the acquisition of identification cards, business licenses and passports, bypassing complex and cumbersome regulations, . . .) and, thus, helping businesses and entrepreneurs getting on with jobs and wealth creation, but generally and in a broader sense, corruption sands the wheels of economic development and must be considered a major obstacle to socioeconomic development.

There is a wide support in the literature for the "sand the wheels" hypothesis i.e., corruption is bad for growth (Grundler and Potrafke, 2019; Aidt et al., 2008; Gyimah-

Brempong, 2002; Li, Xu and Zou, 2000; Mauro, 1995). Empirical evidence shows that countries with higher levels of corruption tend to grow more slowly, and vice versa. According to Peev and Mueller (2012), "Countries with low levels of corruption, strong property rights, independent judiciaries, and other institutions that underpin market systems grow faster." For example, employing a new data for 175 countries over the period 2012-2018 and the reversed CPI, Grundler and Potrafke (2019) find that, the cumulative long-run effect of corruption on growth is that it decreases real per capita GDP by around 17% for a one standard deviation increase in the CPI . The effect on economic growth is especially pronounced in autocracies and countries with low government effectiveness and rule of law.

Using a dynamic panel data estimator and panel data from 21 African countries, Gyimah-Brempong (2002) shows that a 1% increase in corruption reduces the growth rates of GDP and per capita income between 0.75 and 0.9 percentage points and between 0.39 and 0.41 percentage points per year, respectively.

Meon and Sekkat (2005) assess the relationship between the impact of corruption on growth and investment and governance quality in a sample of 63 to 71 countries between 1970 to 1998 and find that corruption has a negative impact on growth independently from its impact on investment, but this impact depends on the quality of governance and tends to worsen when the quality of governance deteriorates. Dreher & Herzfeld (2005) find that an increase of corruption by about one index point reduces GDP growth by 0.13 percentage points and GDP per capita by 425 US$. Mauro (1995) finds that corruption tends to lower private investment, hence reducing economic growth,

even in highly regulated bureaucracies, and also finds that a reduction in the corruption index (Business International Indices of Corruption) by one standard deviation raises the growth rate of GDP per capita by 0.8 percentage points annually, and that an improvement of the corruption index from 6 to 8 (on a scale of 1 to 10 where 10 indicates the lowest corruption) raises growth by 0.5 percentage points.

Studying the effect of corruption on economic growth and its impact on investment, schooling, trade openness, and political instability, Pellegrini and Gerlagh (2004) find that corruption slows down economic growth, mainly through its effect on investments and trade policies. Their findings also indicate that a one standard deviation increase in the corruption index (as measured by Corruption Perception Index by Transparency International) is associated with a decrease in investments of 2.46 percentage points, which in turn decreases economic growth by 0.34% per year (a one standard deviation increase in the corruption index is associated with a decrease of the openness index by 0.19 resulting in a 0.30% decrease in economic growth annually. The study also finds that the transmission channels jointly explain 81% of the effect of corruption on growth and that a decline in the corruption index by one standard deviation increases economic growth by 0.20 percentage points.

Baliamoune-Lutz and Ndikumana (2007) find that corruption affects economic growth in African countries directly and through its impact on investment. They find that corruption affects public and private investment differently (i.e., it has a negative and significant effect on domestic investment while it has a positive effect on public investment).

Using OLS estimations, Mo (2001) finds that a 1% increase in the corruption level reduces the economic growth rate by about 0.72%, or expressed differently, a one-unit increase in the corruption index reduces the growth rate by 0.55 percentage points and political instability (which accounts for about 53% of the total effect) is the most important channel through which corruption affects economic growth.

Using panel data from 61 countries at different stages of their economic development over a 20-year period, Gyimah-Brempong et al. (2006) find that there is a statistically significant regional difference in the growth and distributional impacts of corruption i.e., a 10% decrease in corruption increases the growth rate of income by about 1.7% in OECD and Asian countries, 2.6% in Latin American countries, and by 2.8% in African countries. All the above findings contradict the "grease the wheels" hypothesis. Hence, evidence supporting the "grease the wheels" hypothesis is very weak.

3.3. Methodology, Data, and Estimation

This section provides in detail the econometric model, estimation techniques, data description and sources employed to achieve the main objective of this study. A detailed description of sources and variables is presented in Table 3A3.

3.3.1. Econometric Model

The main objective of this paper is to study the impact of corruption, the size of government proxied by the size of the executive branch (percent of population), and the judicial system on economic growth in SSA countries. Many variables have been suggested in the empirical literature as the channels through which corruption reduces

economic growth (see Mauro, 1995; Pellegrini and Gerlagh, 2004; and Ndikumana, 2007). In line with the empirical literature, the growth equation in this study is specified in a linear form as follow (where subscript i refers to countries and t refers to time):

$$\boldsymbol{Y_{it}} = \boldsymbol{\beta_i} \sum \boldsymbol{I_{it}} + \boldsymbol{\lambda_{it}} \sum \boldsymbol{X_{it}} + \boldsymbol{\mu_i} + \boldsymbol{\varepsilon_{it}} \qquad (1)$$

Y is the annual growth rate of per-capita GDP (PCGDP), I is a vector of institutional variables (including corruption, judicial system, government size and reliability of police), X the vector of control variables that affect economic growth (including economic freedom, total natural resource rents, political stability, and ethnolinguistic fractionalization), and β (= 0, 1…, and n) and λ (= 0,1, …, n) are parameters to be estimated. μ_i represents country-specific effects that are assumed to be independent and identically distributed over the countries, and ε_{it} is also independent and identically distributed.

Many economic relationships including the growth model are dynamic in nature (i.e. the present value of the dependent variable is affected by its past values) and, hence, are characterized by autocorrelation due to the correlation of the error term of the previous period with the error term of the current period and individual effects characterizing the heterogeneity among the individuals. Since growth models use the lags of the dependent variable as explanatory variables, equations (1) can be rewritten as follows:

$$\boldsymbol{Y_{it}} = \boldsymbol{\rho Y_{i,t-1}} + \boldsymbol{\beta_i} \sum \boldsymbol{I_{it}} + \boldsymbol{\lambda_{it}} \sum \boldsymbol{X_{it}} + \boldsymbol{\mu_i} + \boldsymbol{\varepsilon_{it}} \qquad (2)$$

$Y_{i,t-1}$ is the lag of Y. ρ, β, and λ are parameters to be estimated. Equation (2) is a simple AR (1) model with individual specific effects which also include endogenous variables as regressors.

3.3.2. Model Rationale, Variables and Data Sources

For this study, a balanced panel data 40 African countries during the 2005-2015 period. These countries are selected based on data availability and data are not available for the same period for all countries. Data are drawn from different sources: World Development Indicators (WDI) of the World Bank, the Fraser Institute, Heritage Foundation, World Bank Worldwide Governance Indicators (WGI), Philip G. Roeder (2001), and the CIA World Factbook.

3.3.2.1. Annual growth rate of per capita GDP (PCGDP):

Annual growth rate of per capita GDP is the dependent variable and a proxy for economic growth. PCGDP is typically measured as the change in the monetary value of all goods and services produced within a country. Per capita GDP growth rate is commonly used as the dependent variable in the empirical literature (Mauro 1995; Li et al., 2000; Gyimah-Brempong, 2002; Dreher & Herzfeld, 2005) on impact of corruption on growth because it accounts for population size and growth and allows for the comparison of economic growth between countries and over time. The econometric model also includes lagged values of the dependent variable (PCGDP) as regressors due to the dynamic nature of the growth model. Data for the growth rate of per capita GDP is extracted from WDI.

3.3.2.2. Corruption (CORR):

The main objective of this study is to analyze the impact of corruption on economic growth in the SSA region. Data on corruption are extracted from the Corruption Perception Index (CPI) compiled by Transparency International (TI). CPI is one of the most used corruption measures in the literature (Pellegrini and Gerlagh, 2004; Gyimah-Brempong 2002), CPI has been published annually since 1995 and is a composite of various corruption indicators, i.e., it is an average of the different surveys of perceptions of corruption in a country in a year. Since 2012, the score has been rescaled from a 10-point scale to a 100-point scale (i.e., countries are now ranked on a zero to hundred scale, with a score of zero representing very high corruption and a score of hundred indicates an absence of corruption). According to Grundler and Potrafke (2019), year to year comparisons is only possible from 2012 onwards due to the rescaling of the CPI scores. Therefore, the pre-2012 corruption index number were converted to the 2012 scale to ensure comparison across countries and time. The CPI number is also rescaled by subtracting it from 100 to obtain an increasing scale of corruption in this study. The clear majority of SSA countries assessed achieves a score less than 30 (Table 3A2) with an average level of 31 (Table 3.1) on the TI corruption index, indicating that SSA countries are perceived to be highly corrupt.

3.3.2.3. Government Size (GS):

The impact of government size on corruption is debatable. This relation is sensitive to the definition of government size, which can be attributed to several things: level of

government intervention in the economic activities, public sector consumption, the size of the public sector, etc. Two points of view on this relationship prevail in empirical literature. One view uses Scandinavian countries as models to show that larger governments have better oversight and resources to fight corruption (La Porta et al., 1999; Billger and Goel, 2009), while the second view considers large governments as major sources of corruption because they provide more opportunity for political rent-seeking (Goel and Nelson, 1998; Rose-Ackerman, 1999).

Peev and Mueller (2012) showed that larger public sectors in transition countries (former communist countries) are associated with slower economic growth. They showed that once country fixed-effects (FE) are controlled for, a ten-percentage point increase in the size of the public sector reduces a country's annual economic growth by two percentage points. Nelson and Singh (1998) also find that large public sector consumption is detrimental to growth in Least Developed Countries. For most SSA countries, larger governments can be associated with the slower economic growth seen in this region because of the following reasons:

- Large public sector:

  Most countries in the SSA region are characterized by very large public sectors rife with "ghost workers" and even large executive and legislative branches of government which leads to large public spending and creates favorable conditions for political and bureaucratic corruption. For example, Uganda with a population of about 31 million and GDP of about $26 billion ranks

151st on global corruption perception index has 84 cabinet members in its executive branch of government (CIA World Factbook, 2018) while Germany with a population of about 81 million and GDP of about $4 trillion ranks 10th in global corruption perception index has just 21 cabinet members.

The “Ghost workers” phenomena which is another consequence of corruption is a major threat to the national security and financial drain of these countries. For example, according to Techpoint.africa (2018), 80,115 ghost police officers were discovered on the police force’s payroll by the Government of Nigeria. “Ghost workers" are also believed to cost Cameroon $12 million every month (Voice of America News, 2017).

- Inefficient Resource Allocation:

Though the amount of public spending (percent GDP) is large in most of these countries, the amount of spending useful for economic growth is far smaller due to resource allocation inefficiency, common in most of these countries. Top political leaders and their families treat the state's coffers as their personal ATM. For example, “Teodorin Obiang, the first son of the president of Equatorial Guinea, spends millions of dollars of state funds financing his lavish lifestyle which includes luxurious property in Malibu, a Gulfstream jet, Michael Jackson memorabilia, and a car collection that could easily make billionaires go green with envy” (Mfonobong Nsehe, 2012). Another glaring example is the case of Paul Biya, Cameroon’s Roaming President who spends over 15% of his time at the

Intercontinental Hotel in Geneva Switzerland with over a 50 man entourage at a daily cost of over $50,000 to the taxpayer (not counting food, entertainment, and the rental of a private plane, etc.) according to the Organized Crime and Corruption Reporting Project (2018).

- Government intervention:

  Government intervention in the economic activities which is frequently needed is often used as a political tool for the proliferation of political "pet projects" rather than as a means for promoting economic growth. Since "corruption is generally connected with the activities of the state and especially with the monopoly and discretionary power of the state," policies that sand the wheels of economic and business activities, reduce competition among firms, or waste resources ('bridge to nowhere,' or white elephant projects) are usually adopted. These policies and interventions not only create fertile conditions for corruption but run up debts that channel limited and vital resources into interest payments instead of productive activity.

In this study, government size is proxied by the size of the executive branch of government which is divided by the total population of each country (SEB1) to allow for the comparison among countries. Using SEB1 as a proxy for government size makes sense for SSA countries because:

- It can easily be verified compared to other measures of government size. African development statistics data are considered unreliable and potentially seriously misleading (Jerven, M., 2013).
- Grand, or political corruption which is responsible for the massive looting of public resources in Africa is usually carried out by top government officials (see, World Bank, 2007 and UNECA, 2018). In SSA countries, grand corruption often involves the direct, or indirect diversion of large amounts of international funding intended for economic development. According to the UNDP (2008), political corruption normally occurs at the policy level of government where laws can be created, changed, or overturned for the benefit of political leaders and the most powerful people in society.

The CIA World Factbook provides information on the size of the executive branch of government, while total population is extracted from WDI.

3.3.2.4. Judicial System (RL):

"Corruption is principally a governance issue, a challenge to democratic functioning. It is a failure of both institutions and the larger framework of social, judicial, political and economic checks and balances needed to govern effectively" (UNDP, 2008). A strong and effective judicial system is generally considered a major facilitator of economic growth because it ensures the enforcement of contracts and the protection of property rights. The protection of property rights is a vital ingredient for economic development because it tends to encourage private investment that is crucial for

economic development. Countries with strict laws and efficient judicial systems tend to be less corrupt, and, vice versa. In a review on the legal obstacles to economic growth in Pakistan, Hasan Lubna (2011) finds that a weak judiciary has a negative effect on the socioeconomic development which leads to lower per capita income, higher poverty rates, lower private economic activity, poorer public infrastructure, and higher crime rates, and more industrial riots.

In his study of the impact of institutions on the efficiency levels and growth rates of the world's 155 market economies over the period 1960-80, Scully (1988) finds that societies that embrace the rule of law grew at a 2.75% rate compared to a 1.23% rate for societies where rule of law is not embraced, and societies that embrace private property rights and a market allocation of resources grew at a 2.76% rate compared to a 1.10% rate in societies where private property rights are ignored and the state intervenes in resource allocation.

Mo (2001) also finds that corruption reduces growth and is most common where inefficiency in public institutions are present, especially weak legislative and judicial systems. MacDonald and Majeed (2011) also find that a one-standard-deviation increase in the legal strengths is associated with a decrease in corruption of 0.26 points, 26% of a standard deviation in the corruption index.

In this study, the judicial system is proxied by the Rule of Law (RL) index extracted from the World Governance Indicator (WGI, 2018) and measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality

of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimates give a country's score on the aggregate indicator in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5 with the higher scores corresponding to better outcomes.

3.3.2.5. Reliability of police (POL):

Across SSA, the police are perceived as the most corrupt institution (Tables 3A4 and 3A5) and a hindrance to any meaningful social change, or development because protecting people and property through the enforcement of laws and regulations is not in their best interest, or their primary duty. I consider the police in most cases as a menace to civil liberties, economic freedom, and protection of property rights. Throughout SSA, police roadblocks are a regular site and are rife with corruption and extortion. These illegal roadblocks “sand” the wheels of the economy because they disrupt the smooth flow and distribution of goods and services, movement of people and labor, increase transportation cost, etc. For example, according to Stephen Evans (2010) a journey that would take five days in the US would take two to three weeks in West Africa and cost $4,800 compared with $650 in the US due to illegal roadblocks and police extortion. The true cost of police roadblocks to the economies of these countries is hefty.

Data for RP are also extracted from the Legal System and Property Rights category (the index runs from zero to ten, with 10 being the maximum possible reliability of police) in the Fraser Institute’s economic freedom index.

3.3.2.6. Economic Freedom (EFF):

"Economic freedom is the fundamental right of every human to control his, or her own labor and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please" (Heritage Foundation). According to Fraser Institute, a person has economic freedom when the property he or she acquires without the use of force, fraud, or theft is protected from physical invasions by others and he, or she has the freedom and rights to use, exchange, or give the property away if their actions do not violate the identical rights of others. A person is free to choose, trade, and cooperate with others, and compete as they see fit. Hence, the "protection of persons and their rightfully acquired property is a central element of economic freedom and a civil society" (Fraser Institute, 2019). Economic freedom is a deterrent to corruption; hence, corruption can develop when obstructions to economic freedom are imposed according to Rose-Ackermann (1999).

Most empirical studies on the relationship between economic freedom and economic growth have generally found a positive impact of economic freedom on economic growth (See, Nelson and Singh, 1998; Gwartney et al., 2004; Peev and Mueller, 2012). Using the Fraser Institute's Economic Freedom of the World data, Gwartney et al. (2004) find that a one-percent increase in the long-term economic freedom rating is associated with a 2.16 percentage point increase in investment as a share of GDP and a 1.24 percentage point increase in the annual growth of capital per worker. This implies that, countries with better institutions (i.e., institutions and policies more consistent with

economic freedom) grow more rapidly and achieve higher income levels through increases in the amount of investment and productivity of resource use.

Data for economic freedom (EFF) are extracted from Fraser Institute's Economic Freedom of the World index which measures the degree of economic freedom present in five major areas: Size of Government, Legal System and Security of Property Rights, Sound Money, Freedom to Trade Internationally, and Regulation. The EFF index runs from zero to ten, with 10 being the maximum possible economic freedom (or freest business environment).

3.3.2.7. Total Natural Resource Rents (NR):

The influence of natural resources on corruption has been studied by Bhattacharyya and Hodler (2010). The abundance of natural resources creates opportunities for a rent-seeking behavior and gives rise to corruption. "In general, natural resources such as oil, gas, diamonds, and other precious minerals breed corruption because governments can live off of their export earnings without having to "compromise" with their own societies. The natural resources are, therefore, not only a target of corruption, but are also an instrument of holding power. Sachs (2005) argues that many foreign companies' intent on cashing in fuel the pathology of corrupt regimes by peddling in bribes and political protection.

A wealth of valuable natural resources can be a blessing, or a curse for economic growth, depending on the institutional and social capability of managing resource

revenues (Vittorio, 2011). Poorly managed natural wealth can lead to bad governance, corruption, or even violent conflict according to the United Nations Office on Drugs and Crime (UNODC, 2018). SSA countries are endowed with enormous natural resources, but these resources have always been a curse to these countries because they fuel conflicts as in the Democratic Republic of Congo, Central African Republic, Chad, Sudan, etc. and corruption and environmental degradation as in the Niger Delta in Nigeria due to the failure to use them effectively. Corruption and environmental destruction go hand in hand (TI). WDI of the World Bank provides information on NR (% of GDP).

3.3.2.8. Political Stability (PS):

Most empirical studies on the relationship between political stability (PS) and economic growth have generally found a positive impact of political stability on economic growth (See Mo, 2001; Pellegrini and Gerlagh, 2004). Mo finds that the most important channel through which corruption affects economic growth is through political instability which accounts for about 53% of the total effect. Political instability hinders economic growth because it creates uncertainty, thereby, discouraging private investment.

Political instability is a common sight in SSA (Cameroon, DRC, CAR, Chad, Mali, Sudan, etc.) due to institutional failures. Since the years of independence, this region has experienced more than 200 military coups, counting both successful and failed coup attempts (Barka & Ncube, 2012) with heavy financial consequences. Majeed and MacDonald (2010) showed that a one standard deviation increase in the military interference in the rule of law and politics leads to a 0.22-unit increase in corruption index

PS is proxied by political stability and absence of violence/terrorism index which is extracted from the World Governance Indicators (WGI, 2018) and measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. Estimates give a country's score on the aggregate indicator in units of standard normal distribution, i.e. ranging from approximately -2.5 to 2.5 with the higher scores corresponding to better outcomes, i.e., less political instability.

3.3.2.9. Ethnolinguistic Fractionalization (ELF):

The empirical literature has stressed the negative role of ethnic fragmentation (a measure of tribalism and/or ethnic diversity) on economic growth. Several studies suggest that ethnolinguistic fractionalization and conflict lead to political instability, badly designed economic policies, disappointing economic performance, and poor governance (Alesina et al., 2003; Mauro, 1995). Ethnolinguistic fractionalization appears to be responsible for a variety of corruption related phenomena (Mauro, 1995).

Ethnic conflict is an important determinant of political and economic decision-making in many nations and localities, especially in SSA. Spolaore and Wacziarg (2016) find that more closely related populations are more prone to engage in conflict with each other due to the following two reasons:

- More closely related groups (tribes) share more similar preferences over rival goods (such as natural endowments or historic sites) and are, thus, more likely to fight over them.

- Rulers have stronger incentives to conquer populations more similar to their own (tribal politics in SSA) to minimize post conflict heterogeneity in preferences over government types and policies.

Data for ELF was compiled by Roeder (2001) which measures the degree of ethnic, linguistic, and religious heterogeneity in various countries.

3.3.3. Estimation Methods

Equation (2) above is the growth equation that will be estimated with panel data from 40 SSA countries. In panel data, variables have been measured for the same country (N) at multiple points in time (T). In this study, the observation period is from 2005 - 2015. Panel data models examine individual-specific effects(fixed-effects), time effects(random-effects), or both in order to deal with heterogeneity or individual effect that may or may not be observed. Baltagi (2008) and Roodman (2009) list several benefits from using panel data which include controlling for individual heterogeneity using the fixed-effects estimation (panel data suggest that individual countries in this study are heterogeneous) and the ability to give more informative data, more variability, less collinearity among the variables (less endogeneity), more degrees of freedom, and more efficiency.

With panel data, two types of models can be estimated: Static panel data (SPD) and Dynamic panel data (DPD). SPD techniques do not incorporate lags of the dependent variable as explanatory variables, while DPD uses the lags of the dependent variable as

explanatory variables to capture the effect of history and, hence, controlling for the dynamics of the process.

3.3.3.1. Dynamic Panel Data (DPD) Model:

In this study, the Generalized Methods of Moments (GMM) (dynamic panel) estimator is used over the SPD model because (common in growth model estimations) all pooled OLS, Fixed-Effects (FE), and Random Effects (RE) estimators become inconsistent in the presence of lagged dependent variables(Roodman, 2009). Inclusion of the lagged dependent variable introduces endogeneity with respect to this variable. GMM estimators are strategies to resolve this endogeneity problem by correcting for the unobserved country heterogeneity, omitted variables bias, measurement error, and the endogeneity problems that may arise in the estimation. GMM dynamic panel estimators are designed for situations with:

- Short panel, or panel dataset having fewer time periods (T) and many individual units (N) in order to avoid overidentification and have adequate degree of freedom. According to Roodman (2009), the number of instruments in GMM tends to explode with T and for small N, the cluster–robust standard errors and the Arellano–Bond (AB) autocorrelation tests may be unreliable. There is no general classification in the empirical literature on what constitutes a short, or long panel based on T (time period), or N (cross-section of countries) (see, Baltagi, 2008 and Roodman, 2009). The panel data set in this study has a short time dimension (T =10) and a larger country dimension (N = 40).

- Endogenous variables (where explanatory variables may be affected by the dependent variable) which may be correlated with the error term (endogeneity problem). Corruption (CORR) and political stability (PS) are assumed to be endogenous in this study. Because causality may run in both directions from corruption and political instability to growth, and vice versa, these regressors may be correlated with the error term. Unless the endogeneity problem is resolved, the results of the estimates will be biased.
- Time-invariant country characteristics (fixed-effects) which may be correlated with the explanatory variables. The fixed-effects are contained in the error term in equation (1) and (2), which consist of the unobserved country-specific time-invariant effects, , and the observation-specific errors, (has zero mean, constant variance, and is uncorrelated across time and individuals, or countries).

The Arellano-Bond (1991) difference and Arellano-Bover (1995) system GMM dynamic panel estimators are two ways to deal with the endogeneity problem. Both estimators according to Roodman (2009) are designed for short, wide panels, and to fit linear models with one dynamic dependent variable, additional controls, and fixed-effects. A key aspect of its strategy is the assumption that the necessary instruments are 'internal' that is, based on lagged values of the instrumented variable(s), but also allows for the inclusion of external instruments as well.

System GMM estimation method uses instruments (lags of endogenous variables) in levels and differences. Using system GMM increases efficiency compared to the

difference GMM because it uses more instruments and since the lagged levels of the regressors are occasionally poor instruments for the first-differenced regressors. With system GMM, we can work with panel data having fewer time periods (T) and, hence, a small number of instruments. Another advantage of the system GMM is the inclusion of time-invariant regressors which would disappear in difference GMM. Since the difference GMM estimators remove time-invariant variables such as ELF, the system GMM estimators are used in this study for model analysis with the two-step option. The literature indicates that the two steps estimators are more efficient than the one-step estimators because they use the heteroscedastic weight matrix for the estimation. In the two-step estimation, the standard covariance matrix is robust to panel-specific autocorrelation and heteroskedasticity, but the standard errors are downward biased. The "robust" option can be added the to get the finite-sample corrected two-step covariance matrix.

Dynamic Panel Data (DPD) estimators are instrumental variables methods, hence, two major issues with their application are the proliferation of instruments (the number of instruments increases quadratically with number of periods in model which leads to overidentification) and serial autocorrelation of errors (DPD require that errors cannot be serially correlated). In the presence of these two issues, GMM becomes inconsistent. Though there is no clear rule in the empirical literature on the number of instruments to use, Roodman (2009) suggests using a smaller number of instruments compared to the number of the individual units in the panel (number of instruments ≤ number of panel

units). The literature suggests some common strategies to deal with the issue of overidentification: restricting the lags of the dependent variable used as regressor of the model, limit the use of lags to generate instruments of endogenous independent variables, and avoid using equations in levels and differences simultaneously.

The consistency of the DPD estimator depends on the validity of the instruments. Hence, two specification tests are used to check if the number of instruments is adequate and it does not produce overidentification: Hansen test of over-identifying restrictions which tests for overall validity of the instruments (the null hypothesis is that all instruments as a group are exogenous) and the A-B tests of autocorrelation of order one AR(1) and two AR(2) to examine the hypotheses of no second-order and no first-order serial autocorrelations in the error term of the difference to exclude the individual FE.

3.3.3.2. Growth Equation Estimation:

For an econometric analysis of the above growth model (equation 2) and to answer the research questions, I have constructed six models. In the first model, I estimate equation (2) including only the first lag of per capita GDP growth rate (PCGDP) and corruption (CPI) as independent variables to show the direct effect of corruption on growth. In the second model, I add SEB1 (in log), RL and POL which are measures of institutional quality to estimate the impacts of the executive branch of government, the courts, and the police on growth. I use the second model as a base for the other models by adding different explanatory/control variables sequentially to see how they affect the variables of interest (CPI, SEB1, and RL) and growth in general. In the third model, I add

EFF while in the fourth and fifth models, I add NR and PS, respectively. In the sixth model (full), I add ELF. Corruption, political instability, and the lagged economic growth rate are considered endogenous in the model as explained above.

A System GMM estimator is implemented using Roodman's xtabond2 for the analysis. Two-step options is implemented. The two-steps results are reported for each GMM estimation and used for an econometric analysis for the model because they are more efficient than the one step. To limit the number of instruments generated in the system GMM, I collapsed the instruments. The Arellano-Bond serial correlation test (of order 2 in difference) and Hansen tests were performed to ascertain the validity of the instruments. The Hansen tests state a null hypothesis that "the instruments as a group are exogenous," while the Arellano – Bond test for autocorrelation makes a null hypothesis of no autocorrelation. The validity of the Hansen tests is accepted if the p-values fall in the recommended range of $0.05 \leq P(x2) \leq 0.8$ (Labra, Romilio & Torrecillas, Celia. (2018)), indicating that the instruments used in the estimation are valid (overidentification does not exit). For the validity of the AR (2) test to be accepted (i.e., there is no serial autocorrelation in the errors), the p-values must be greater than 0.05.

Since the regression coefficients ρ, β, and λ are in different measurement units, direct comparison is difficult. Therefore, the standardized regression coefficients are used in order to eliminate this problem by expressing the coefficients in terms of a single, common set of statistically acceptable units (metric-free units) so that variables can be easily compared to each other.

3.4. Main Empirical Results

Table 3.1 show the descriptive statistics, while table 3.2 shows the correlation matrix for all the variables. Table 3.1 also indicates that the average per capita GDP growth rate in the SSA region is relatively low, about 2.4% annually with a wide gap between the minimum and maximum.

Table 3.1: Descriptive statistics of sample data

Variables	Observations	Mean	Stan. Dev.	Minimum	Maximum
PCGDP (%)	440	2.422829	4.194534	-36.20319	18.06597
Log (SEB1)	440	-12.56226	1.295637	-15.64772	-9.22001
CPI	428	69.21635	10.39537	35	85
RL	440	-0.6465106	0.6174477	-1.852296	1.02916
POL	322	4.612174	1.354825	1.62	9.07
EFF	408	6.034387	0.8280798	2.93	8.15
NR (%)	440	14.31813	12.29218	0.00113	59.61957
PS	440	-0.4930528	0.8522599	-2.699193	1.104041
ELF	440	0.6975847	0.2050754	0.218	0.922

Note: Corruption index is inverted to obtain an increasing scale of corruption

The correlation matrix suggests that a moderate level of collinearity exists between our variables of interest, while a high negative correlation exist between CPI and RL (r = -0.8676) and between RL and PS (r = 0.7540). Based on the variance inflation factor (VIF) test (Table 3.3), multicollinearity should have a minimal impact on the reliability of the results.

Table 3.2: Correlation Matrix of Sample Data

	PCGDP	SEB1	RL	CPI	POL	NR	EFF	PS	ELF
PCGDP	1.0000								
SEB1	-0.0971	1.0000							
RL	0.0747	0.4409	1.0000						
CPI	-0.0487	-0.4953	-0.8676	1.0000					
POL	0.1425	0.2297	0.5710	-0.5497	1.0000				
NR	0.0063	-0.1168	-0.5112	0.4347	-0.3619	1.0000			
EFF	0.0916	0.1747	0.6810	-0.5565	0.5198	-0.4246	1.0000		
PS	0.0242	0.5723	0.7540	-0.6915	0.4763	-0.3818	0.4272	1.0000	
ELF	-0.0188	-0.5608	-0.1725	0.2838	-0.1659	0.0593	0.0404	-0.248	1.0000

The Two-step system GMM estimation results are presented in Table 3.3, while Table 3A6 presents standardized coefficients of the results. Standardized coefficients are only used for interpreting the model. The impact of past per capita GDP growth rate on the current per capita GDP growth rate is positive and significant indicating the presence of positive autocorrelation. Hence, the effect of history on current growth is important, even in SSA, i.e., past economic growth can trigger future growth. In all six models, the first lag of per capita GDP growth rate is significant at the 0.1% level, and since the coefficients are far from unity, we do not have unit root and weak instrument problems. The lagged dependent variable suggests that the current level of growth will be over 25% of the previous year 10 level of growth irrespective of the current value of the independent variables.

Table 3.3: GMM Panel Data Estimation results
Dependent Variable: Annual growth rate of per capita GDP (PCGDP)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	VIF
CPI	-0.042	-0.141*	-0.142*	-0.139*	-0.22***	-0.18***	4.53
	(0.034)	(0.065)	(0.065)	(0.065)	(0.033)	(0.040)	
Log (SEB1)		-0.473*	-0.487*	-0.475*	-1.44***	-1.54***	2.18
		(0.195)	(0.192)	(0.201)	(0.128)	(0.124)	
RL		-1.170	-1.458	-1.420	-7.83***	-6.22***	6.90
		(1.125)	(1.127)	(1.124)	(0.671)	(1.153)	
POL		-0.014	0.005	-0.008	-0.119	0.016	1.67
		(0.130)	(0.129)	(0.125)	(0.138)	(0.165)	
NR			-0.025	-0.027	-0.008	-0.010	1.41
			(0.0154)	(0.016)	(0.0290	(0.021)	
EFF				0.014	0.386	0.180	2.17
				(0.258)	(0.417)	(0.431)	
PS					5.416***	4.415***	2.90
					(0.419)	(0.774)	
ELF						-1.89***	1.59
						(0.493)	
L.PCGDP	0.255***	0.391***	0.390***	0.395***	0.406***	0.388***	
	(0.038)	(0.043)	(0.044)	(0.046)	(0.024)	(0.026)	
Constant	4.641*	4.350	4.360	4.349	-6.205	-7.432*	
	(2.290)	(3.256)	(3.386)	(3.549)	(3.505)	(3.285)	
No. of observations	394	298	298	294	294	294	
No. of Groups	40	37	37	37	37	37	
No. of Instruments	22	25	26	27	38	39	
Wald-Test	0.000	0.000	0.000	0.000	0.000	0.000	
J-Test	0.286	0.123	0.094	0.126	0.329	0.471	
AR (2)-Test	0.510	0.746	0.778	0.802	0.880	0.875	

Note:

*1. Standard Errors in Parentheses; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

2. L.pcGDP: real GDP per capita growth on t-1.

Corruption (CPI), the size of government (SEB1), political stability (PS), total natural resource rents (NR), and ethnolinguistic fractionalization (ELF) have the expected signs in all models. SEB1 and ELF have negative and significant effect on growth while PS has positive and significant effect. Reliability of police (POL) has mixed results while the judicial system (RL) has a negative sign. The main result is that CPI and SEB1 have a

negative impact on economic growth. SEB1 has a negative and significant impact on growth. In two of these models, the coefficient of SEB1 is significant at 0.001 level and in three other models, it is significant at 0.05 level.

CPI has a negative and statistically significant impact on growth in all models, except model 1 (at least at $p \leq 0.1$ level). The first model shows the direct impact of corruption on growth, as only CPI was estimated with the exclusion of other determinants of PCGDP. According to the results of model 6, a one standard deviation increase in CPI will result in an expected decrease in PCGDP by 0.45 of its standard deviation; a one percent increase in SEB1 will result in an expected decrease in PCGDP of 0.02 units; a one standard deviation increase in the level of PS will result in an expected increase in PCGDP of 0.898 of its standard deviation; if ELF increases by one standard deviation, PCGDP will decrease by 0.092 of its standard deviation; a one standard deviation increase in the effectiveness and quality of RL index will result in an expected decrease in PCGDP of 0.916 of its standard deviation, holding other factors constant. This is an unexpected result because a strong and effective judicial system holds the government accountable for any illegal action and is generally considered a major facilitator of economic growth as it ensures the enforcement of contracts and the protection of property rights (Hasan Lubna, 2011; Scully, 1988). One possible explanation may be the poor institutional framework in this region.

Table 3.3 also provides diagnostic test results for all the estimated models: the Wald $\chi 2$ test, the Hansen OID test, and the Arellano-Bond serial correlation test. Wald $\chi 2$

test measures the overall applicability of the model and tests the null hypothesis that all coefficients of the model are simultaneously equal to zero. The null hypothesis of the Wald $\chi 2$ test is conclusively rejected in all the six models, indicating the validity of these models. Hansen OID test checks for over-identification (OID) in GMM models. The null hypothesis of valid OID restrictions is not rejected for any model, supporting the validity of these models. The null hypothesis of the Arellano-Bond serial correlation test is that moment conditions used in the model are valid. The null hypothesis of the Arellano-Bond test is not rejected for any model, which indicates no serial autocorrelation in the errors and, therefore, moment conditions used in the model are valid.

3.4.1. Robustness Tests

The robustness of the main findings is checked in two ways: First by using a different proxy for the judicial system and economic freedom index (Table 3.4). Judicial system is proxied by Legal System and Property Rights (LSPR) extracted from the Fraser Institute's economic freedom index. LSPR is calculated as the average of the following three components in LSPRs: Judicial independence, Impartial courts, and Integrity of the legal system. Data for economic freedom index are extracted from Heritage Foundation's Index of Economic Freedom (EFH) which include a category called Regulatory Efficiency constructed from three components: business, labor, and monetary freedoms. EFH is the average of these three components and measures the extent to which a country's regulatory system impede the efficient operation of businesses. The EFH index runs from zero to one hundred, with 100 being the maximum possible economic freedom (or freest

business environment). Second, by using the two-step system GMM with random sets of instruments (Table 3.5).

Tables 3.4 and 3.5 provide the estimation results and the diagnostic test results for all the estimated models, respectively. The results in Table 3.4 confirm our main hypothesis with some minor exceptions. For example, NR has mixed results. LSPR is positive in all models and significant in models 3 and 4. Economic Freedom index (EFH) has a significant and negative impact on growth and is robust. This might not be surprising for two reasons:

- EFH and institutional weaknesses especially in the legislative and judicial systems go together. Countries with effective institutions (i.e., institutions and policies more consistent with economic freedom) grow more rapidly (Gwartney et al., 2004). Economic freedom for the majority of SSA people is a pipe dream because they have no control of their own labor and property due to the very weak institutional structures (corruption, weak property rights, restrictive regulatory institutions, weak institutions for macroeconomic stabilization …).
- Economic freedom index (especially business and monetary freedom) in most countries in this region apply to the most powerful and multinational corporations leading to the massive capital flight, tax evasion, and other illicit financial outflows, plaguing this region.

The coefficient of CPI is negative and statistically significant in models 4-6 at least at $p \leq 0.1$. The reliability of the police (POL) has the expected sign and is highly significant in two

models. NR is also positive and significant in all models at the 0.1% level. The validity of all the models is confirmed by the diagnostic test statistics.

Table 3.4: GMM Panel Data Estimation results
Dependent Variable: Annual growth rate of per capita GDP (PCGDP)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	VIF
CPI	-0.042	-0.063	-0.074*	-0.092*	-0.07***	-0.07***	
	(0.029)	(0.035)	(0.036)	(0.037)	(0.014)	(0.012)	
Log (SEB1)		-0.4245*	-0.4181*	-0.5038*	-0.90***	-1.16***	2.22
		(0.209)	(0.207)	(0.212)	(0.251)	(0.215)	
LSPR		0.343	0.562**	0.511*	0.054	0.110	2.61
		(0.234)	(0.194)	(0.204)	(0.244)	(0.257)	
POL		-0.100	-0.133	-0.131	-0.134	-0.151	1.78
		(0.092)	(0.077)	(0.086)	(0.049)	(0.051)	
EFH			-0.06***	-0.06***	-0.05***	-0.05***	1.48
			(0.015)	(0.014)	(0.008)	(0.008)	
NR				-0.0004	0.020	0.023	1.31
				(0.017)	(0.019)	(0.018)	
PS					1.440*	1.500*	2.56
					(0.648)	(0.671)	
ELF						-2.317***	1.50
						(0.492)	
L.PCGDP	0.285***	0.414***	0.398***	0.381***	0.378***	0.370***	
	(0.035)	(0.048)	(0.051)	(0.050)	(0.023)	(0.028)	
Constant	4.513*	1.101	4.646	5.778*	2.908	2.181	
	(2.049)	(2.239)	(2.524)	(2.534)	(1.707)	(1.669)	
No. of observations	394	298	293	293	288	288	
No. of Groups	40	37	37	37	36	36	
No. of Instruments	21	24	25	26	37	37	
Wald-Test	0.000	0.000	0.000	0.000	0.000	0.000	
J-Test	0.102	0.155	0.141	0.120	0.357	0.369	
AR (2)-Test	0.437	0.879	0.878	0.823	0.973	0.949	

*Note: Standard Errors in Parentheses; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

The results in Table 3.5 also confirm our main hypothesis (model 6 in Table 3.3), with some minor exceptions. The coefficients of CPI and SEB1 are is negative. CPI is significant at the 0.1% level only in one model (with higher number of instruments), while

SEB1 is significant in four models. RL is still negative and significant in all the models, while EFF is positive but not significant in all models. PS and ELF have the expected signs, while the results for POL and NR are mixed. These minor changes might be due to changes in the number of instruments used.

Table 3.5: GMM Panel Data Estimation results
Dependent Variable: Annual growth rate of per capita GDP (PCGDP)

Variables	(1)	(2)	(3)	(4)	(5)
CPI	-0.135	-0.157	-0.132	-0.034	-0.089***
	(0.135)	(0.128)	(0.107)	(0.034)	(0.020)
Log (SEB1)	-2.186**	-2.158**	-2.152**	-1.001***	-0.186
	(0.771)	(0.698)	(0.680)	(0.224)	(0.427)
RL	-7.203*	-7.003*	-7.979**1	-1.867*	-1.991**
	(3.534)	(3.081)	(2.697)	(0.769)	(0.644)
POL	-0.095	-0.0421	-0.045	0.049	0.160
	(0.329)	(0.289)	(0.274)	(0.126)	(0.098)
EFF	0.265	0.208	0.132	0.236	0.005
	(1.000)	(0.796)	(0.643)	(0.399)	(0.307)
NR	0.015	0.012	-0.011	-0.004	-0.030
	(0.042)	(0.037)	(0.035)	(0.010)	(0.018)
PS	7.053**	6.490***	7.201***	2.324***	0.612
	(2.319)	(1.971)	(1.863)	(0.353)	(0.698)
ELF	-3.171	-2.884	-4.234*	-2.450***	-0.961
	(2.362)	(2.095)	(1.897)	(0.734)	(2.533)
L.PCGDP	0.242	0.230	0.297**	0.280***	0.223***
	(0.160)	(0.138)	(0.110)	(0.023)	(0.036)
Constant	-17.102	-15.407	-16.098*	-8.729	4.972
	(9.615)	(8.572)	(7.637)	(4.839)	(6.022)
No. of observations	294	294	294	294	294
No. of Groups	37	37	37	37	37
No. of Instruments	13	16	22	62	87
Wald-Test (p-value)	0.000	0.000	0.000	0.000	0.000
J-Test (p-value)	0.168	0.461	0.270	0.983	1.000
AR (2)-Test (-value)	0.490	0.453	0.743	0.691	0.431

*Note: Standard Errors in Parentheses; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

3.5. Conclusions

This study uses panel data from 40 SSA countries for the period 2010 – 2015 and a dynamic panel data estimator to analyze whether the perceived level of corruption, large government size, and weak judicial system in SSA countries have had affected their economic growth rates over the study period. The study finds support for the "sand the wheels" hypothesis using the dynamic System GMM estimator, i.e., corruption impedes economic growth in SSA.

Furthermore, the study finds that past rate of growth and political stability has a positive and statistically significant effect on the current rate of growth rates of Sub-Sahara African countries. The size of the executive branch of government and ethnolinguistic fractionalization are found to a negative and statistically significant impact on the growth rate of countries in the sample. significantly and these associations are mostly robust. More specifically, a one standard deviation increase in the level of corruption (CPI) decreases the annual per capita GDP growth rate (PCGDP) of countries in the study by 0.45 standard deviation; a one percent increase in the size of executive branch of government (SEB1) is found to decrease the annual per capita GDP growth rate (PCGDP) by 0.02 units; a one standard deviation increase in the level of political stability (PS) increases the annual per capita GDP growth rate (PCGDP) by 0.90 standard deviation; an increase in the ethnolinguistic fractionalization (ELF) by one standard deviation is found to decrease the growth rate of countries by 0.09 standard deviation (See, Model 6 in Table 3.3).

These results provide an empirical support to the perception that corruption is one of the major causes of economic stagnation and underdevelopment in the SSA region. According Hanson (2009), African countries lose about 25% of their GDP yearly to corruption (an amount far greater than foreign aid received from developed countries) while begging for more foreign aid. An obvious policy implication of the study is that the reduction of corruption in SSA countries, not only propels the growth rate of countries in the African continent but may also wane their persistent dependence on foreign aid. Since corruption in SSA is a governance issue, the fight against it may start with good governance in the region rather than the reliance on measures normally recommended by major international organizations like the IMF and World Bank, or the OECD. Political corruption in Africa is responsible for all the illicit financial outflows and looting of resources from this region as is the large size of the political leadership, impeding the economic growth rate of the African continent. International organizations, donors, and other interested bodies, hence, may consider linking their decisions to disburse development funds based on the quality of the political leadership and institutions in order to control corruption which is inimical to the economic progress of the continent.

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APPENDIX A

Table 3A1: List of SSA countries included in the study

List of SSA countries included in the study	
Angola	Lesotho
Benin	Liberia
Botswana	Madagascar
Burkina Faso	Malawi
Burundi	Mali
Cabo Verde	Mauritania
Cameroon	Mauritius
Central African Republic	Mozambique
Chad	Namibia
Congo, Dem. Rep.	Niger
Congo, Rep.	Nigeria
Cote d'Ivoire	Rwanda
Eswatini	Senegal
Ethiopia	Sierra Leone
Gabon	South Africa
Gambia, The	Tanzania
Ghana	Togo
Guinea	Uganda
Guinea-Bissau	Zambia
Kenya	Zimbabwe

Table 3A2: 2018 Ranking of corruption levels in SSA

Country	2018 CPI Score	2018 Rank
Botswana	61	34
Cabo Verde	57	45
Rwanda	56	48
Namibia	53	52
Mauritius	51	56
Senegal	45	67
South Africa	43	73
Burkina Faso	41	78
Ghana	41	78
Lesotho	41	78
Benin	40	85
Eswatini	38	89
Gambia	37	93
Tanzania	36	99
Cote d'Ivoire	35	105
Zambia	35	105
Ethiopia	34	114
Niger	34	114
Liberia	32	120
Malawi	32	120
Mali	32	120
Gabon	31	124
Sierra Leone	30	129
Togo	30	129
Guinea	28	138
Kenya	27	144
Mauritania	27	144
Nigeria	27	144
Central African Republic	26	149
Uganda	26	149
Cameroon	25	152
Madagascar	25	152
Mozambique	23	158
Zimbabwe	22	160
Congo, Dem. Rep.	20	161
Angola	19	165
Chad	19	165
Congo, Rep.	19	165
Burundi	17	170
Guinea Bissau	16	172

Source: Transparency International (2018)
https://www.transparency.org/cpi2018

Table 3A3: Variables description and source of data

Variable	Description / Source of data
pcGDP	GDP per capita growth (annual %): Annual percentage growth rate of GDP per capita based on constant local currency. *Source: WDI*
CORR	Corruption: Corruption Perception Index *(ranked on a zero to hundred scale, with a score of hundred representing very high corruption and a score of zero indicates an absence of corruption in this study)* *Source: Transparency International*
GS	Size of government: proxied by size of the executive branch of government as a percent of the total population of a country *Source: CIA World Factbook*
JS	Judicial system: proxied by WGI's Rule of Law (RL) index ranging from approximately -2.5 to 2.5 with the higher scores corresponding to better outcomes *Source: WGI*
RP	Reliability of Police: To what extent can police services be relied upon to enforce law and order in a country *(the index runs from zero to ten, with 10 being the maximum possible reliability).* *Source: Fraser Institute's Economic Freedom Index*
NR	Total natural resources rents (% of GDP) = the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. *Source: WDI*
EFF	Economic Freedom: proxied by Fraser Institute's Economic Freedom of the World index. Index runs from zero to one ten, with 10 being the maximum possible economic freedom. *Source: Fraser Institute's Index of Economic Freedom*
PS	Political Stability: proxied by political stability and absence of violence / terrorism index and measures perceptions of the likelihood of political instability. Index runs from -2.5 to 2.5 with higher scores corresponding to less political instability. *Source: WGI*
ELF	Ethnolinguistic Fractionalization: measures the degree of ethnic, linguistic and religious heterogeneity in various countries. *Source: Roeder, P. G (2001)*

Table 3A4: Corruption by Institutions

Institution	People (%)
Police	47
Government Official	39
Members of Parliament	36
Business Executives	36
President / Prime Minister's Office	34
Judges and Magistrates	34
Local government Officials	33
Traditional Leaders	22
NGOs	20
Religious Leaders	16

Note: Percentage of people who think most or all people in the following institutions are corrupt
Source: Transparency International (2019)

Table 3A5: Bribery Rates by Service

Service	People (%)
Police	28
Utilities	23
IDs	21
Schools	16
Public Clinics and Health Centers	14

Note: Percentage of people who used these services and paid a bribe in the previous 12 months
Source: Transparency International (2019)

Table 3A6: GMM Panel Data Estimation results - Standardized coefficients
Dependent Variable: Annual growth rate of per capita GDP (PCGDP)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
CPI	-0.104	-0.349*	-0.352*	-0.344*	-0.545***	-0.446***
RL		-0.173	-0.215	-0.209	-1.153***	-0.916***
POL		-0.005	0.002	-0.003	-0.038	0.005
NR			-0.073	-0.079	-0.023	-0.029
EFF				0.003	0.076	0.036
PS					1.100***	0.898***
ELF						-0.092***

Note:
*1. Standardized Coefficients; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

APPENDIX B

The estimators are available in Stata: xtabond, xtdpd, xtdpdsys. David Roodman's xtabond2 is an alternative to Stata's built-in commands for the econometric analysis of the above growth model. Xtabond2 provides additional features such as the forward orthogonal deviations (FOD) transformation, not available in official Stata commands. It gives us the possibility to work separately the endogeneity of the dependent, or independent variables. Hence, xtabond2 is better for short panels (panels with limited periods of time), given that it incorporates the instruments in levels, reducing the losses of information. xtabond2 doesn't require the post-estimation for the Sargan and Hansen tests because these tests are reported directly. Unlike Stata's build-in commands, there is no menu for xtabond2 – one must write the program code which becomes a major drawback for most people.

CHAPTER 4: EXTERNAL DEBT, CORRUPTION, AND HUMAN DEVELOPMENT INDEX (HDI) IN THE CFA FRANC ZONE COUNTRIES.

ABSTRACT

High levels of corruption can push countries into debt distress and the risk of default even when the national debt is below the optimal threshold of the external debt. This paper examines the impact of corruption and external debt on the human development index for a cross-section of 14 CFA franc zone countries over the 2005 to 2017 period using the dynamic panel system of the generalized method of moments (GMM). The empirical results show that both corruption and external debt have a significant negative impact on the human development index in the CFA franc region and the results are robust for various alternative specifications.

Keywords: External Debt, Corruption, Human Development Index, Government Size; Judiciary System, Natural Resources, Corruption, Political Instability Panel Data, and Generalized Method of Moments (GMM).

JEL: E26, F15, H63, O40, O43, O47, O55, P16

4.1. Introduction

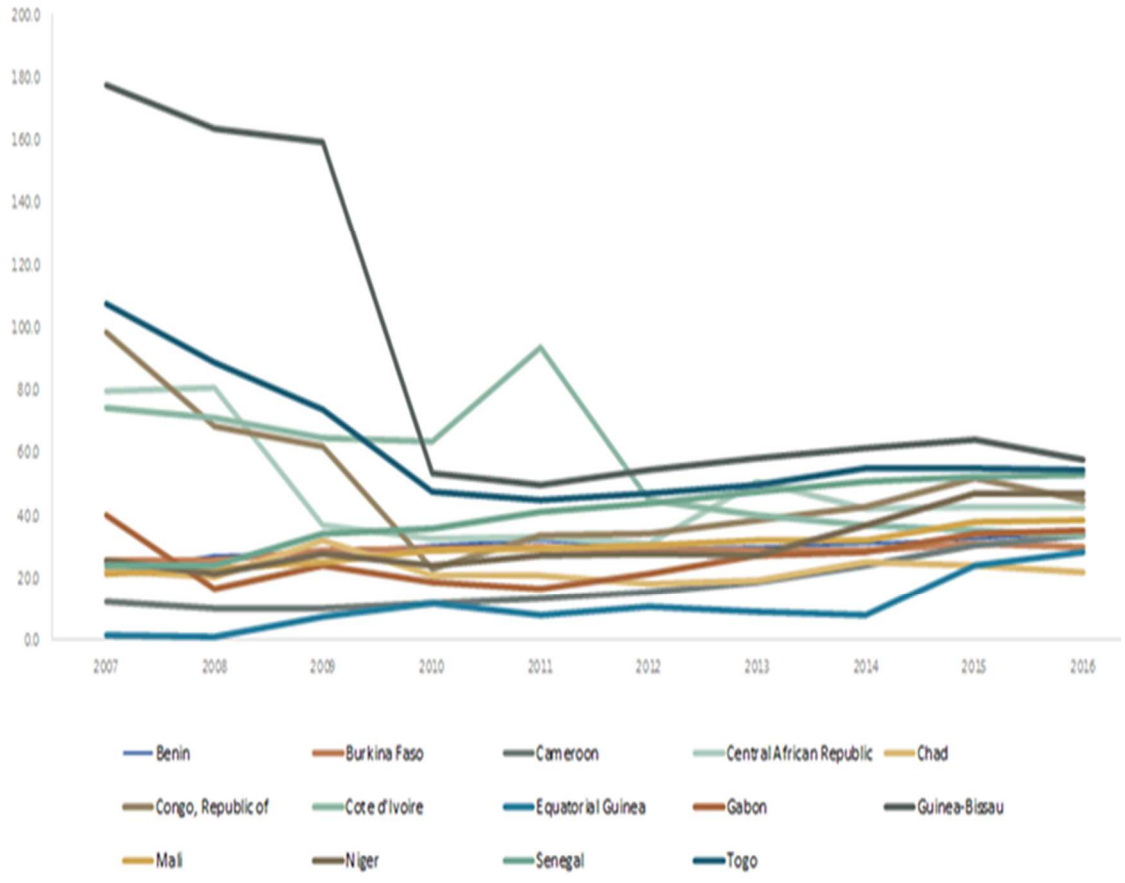
> "We had no connections with this debt. Therefore, we cannot pay for it. The debt is still neo-colonialism, in which colonizers transformed themselves into 'technical assistants'. We should better say 'technical assassins.' It is they who presented us with financing" (Thomas Sankara, former President of Burkina Faso - Addis Ababa, 1987).

High levels of external debt and systematic corruption are major obstacles to the socio-economic development of Sub-Saharan African (SSA) countries, especially those in the CFA franc zone (Communauté Financière d'Afrique, or Financial Community of Africa). Although rich in natural resources, many SSA countries including the 14 countries of the CFA franc zone (see Table 4A1) are drowning in debt. According to the World Bank (2018), 33 of the 39 countries classified worldwide as "Heavily indebted poor countries (HIPC)" are in the SSA region, which also includes 12 of the 14 countries of the CFA franc zone. Fifteen other countries in the SSA region are also classified as having a high risk of debt distress (Burundi, Cameroon, Cabo Verde, Central African Republic, Ethiopia, The Gambia, Ghana, São Tomé and Príncipe, Zambia), or in debt distress (Chad, Republic of Congo, Eritrea, Mozambique, South Sudan, Zimbabwe) according to the International Monetary Fund (IMF, 2018).

Since the 2007-2009 global financial crises, external debt stocks and the debt burden in the CFA franc zone countries has been rising at an alarming rate (Figure 1). Between 2009 and 2017, external debt increased by almost a 100% (Figure 2), while the debt burden increased by 132 % (Figure 3), with private creditors holding much of the

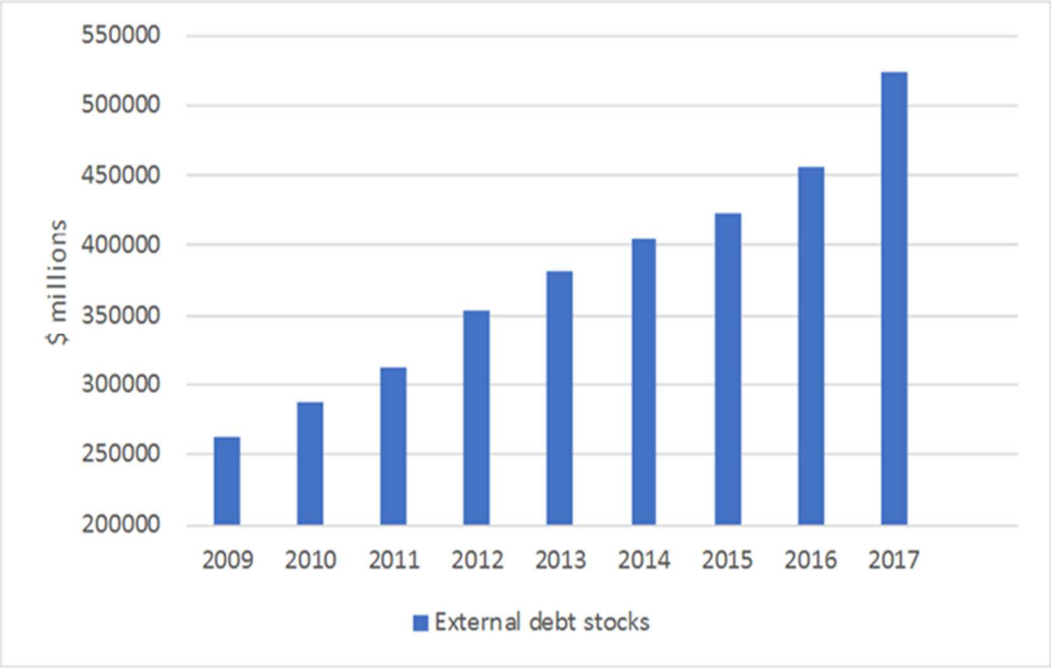
debt which are usually contracted to be repaid by future sales of crude oil, or other available valuable mineral resources.

Figure 1. Gross debt position across CFA franc zone countries, 2007-2016 (% of GDP)



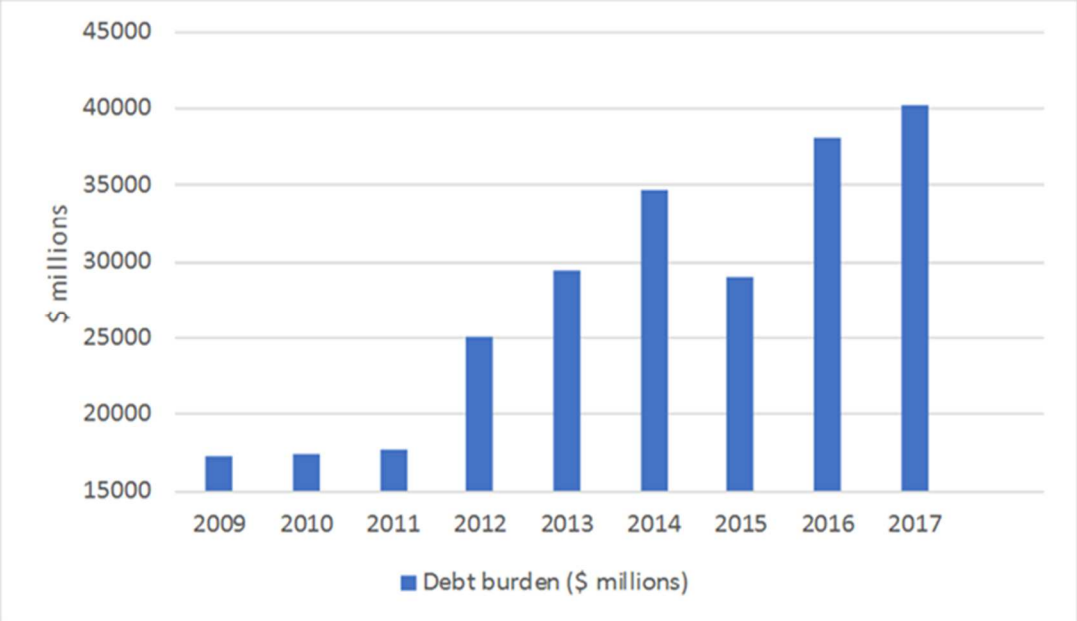
Source: SSA Regional Economic Outlook(IMF 2016)

Figure 2. External Debt ($ millions)



Source: World Bank International Debt Statistics (2019).

Figure 3. Debt Burden ($ millions)



Source: World Bank International Debt Statistics (2019).

About 70% of the external long-term public and publicly guaranteed debt in this region is denominated in the three major foreign currencies (U.S. dollars, Euros, and Japanese yen), with the bulk in U.S. dollars causing exchange rate depreciation and the worsening of the terms of trade we see across the SSA region. For these countries and other developing countries, Zaghdoudi (2018) recommends an optimal threshold of external debt (equals to 41.8% of GDP) above which these countries may enter debt distress and risk default.

The accumulation of foreign debt coupled with high levels of corruption poses a major threat to this region with devastating effects on the lives of millions of its citizens who are already crushed by the weight of poverty, underdevelopment, and conflicts. Despite the cancellation of billions of dollars of debt through the HIPC Initiative and related Multilateral Debt Relief Initiative (MDRI) launched by the IMF and the World Bank and the discovery of large reserves of oil, gas, and other mineral resources across this region, SSA and the CFA franc zone countries, in particular, have not made any significant improvements in the levels of human development indicators (HDI) over the past decade (Table 4A2). This region still has the lowest average levels of human and socio-economic development compared to other regions in the world. In the 2016 human development report (Africa Human Development Report, 2016), 36 of the 44 countries classified worldwide in the “low human development” category are in Africa, holding the bottom 19th place out of the 20 lowest ranking countries in HDI. The CFA franc zone is the region in SSA with the poorest showing in HDI. Out of 188 countries globally, the bottom four

countries are from the CFA franc zone. As of December 2018, nine of the 14 CFA franc zone countries are also classified as Least Developed Countries (LDCs) by United Nations Conference on Trade and Development (UNCTAD, 2018).

Today, 100 million more Africans live in extreme poverty compared to the 1990s (Transparency International, 2019). According to the Global Multidimensional Poverty Index (MPI, 2017), multidimensional poverty affects over 60% of the population of SSA, i.e., 36% of the 1.45 billion people globally who are multidimensionally poor (for example, over 90% of the rural population are in Niger, a CFA franc zone country which is MPI poor, while about 60% of the urban population is MPI poor). Over half a billion people in the SSA region are without access to electricity according to the International Energy Agency's (IEA) World Energy Outlook Special Report (2014) and the region has the lowest access to improved water sources (World Health Organization 2015). SSA also ranks at the bottom of all developing regions in practically all dimensions of infrastructure performance with the lowest density of road and rail in the entire developing world (World Bank, 2017). The enormous resource needs for infrastructure with an annual financing gap in the range of $68–$108 billion (African Economic Outlook, 2018) is a hindrance to any meaningful infrastructure development.

One question in the minds of most Africans is, why can Africa not finance its own development, or why should Africa rely on foreign assistance and continue the accumulation of external debt when the value of illicit financial flows, tax evasion, trade misinvoicing, and commodity extraction greatly exceed their foreign aid and external debt

combined. Collectively, SSA countries are net creditors to the rest of the world (Global Justice Now, 2017), implying that much more wealth is leaving this region than is entering it (most of the wealth entering this region is mainly in the form of loans). A 2002 African Union study estimated that corruption costs the continent about 25% of the GDP of African countries a year (Hanson, 2009), an amount far greater than foreign aid received from developed countries. For example, according to the Organization for Economic Cooperation and Development (OECD, 2008), net bilateral official development assistance from the members of the OECD's Development Assistance Committee donors to SSA totaled USD 22.5 billion. The African Union's panel on illicit financial flows also found that African countries lose over $50 billion a year due to tax evasion and other illicit practices and its 50-year losses top trillion dollars (United Nations Economic Commission for Africa-UNECA, 2018). As President Paul Kagame of Rwanda (African Leadership Forum, Kigali 2018) puts it:

> "Africa can finance its own development, at least a big part of it. There is no doubt about it. We know this because Africa finances other people's development, and always has," arguing that Africa needs to mobilize the right mindsets rather than more funding, take responsibility and step to address rising illicit financial flows, tax evasion, and the misallocation of resources.

4.1.1. CFA Franc zone countries

The CFA franc zone is made up of the Central African Economic and Monetary Union (CEMAC) and the West African Economic and Monetary Community (WAEMU).

CEMAC has six members while WAEMU has eight members (Table 4A1). According to the IMF (2018), both regional financial alliances account for 14 percent of Africa's population and 12 percent of its gross domestic product (GDP). CFA franc zone countries are members of francafrique (Francophone), countries tied to France in a sort of colonizer-colony relationship.

The CFA franc is the name of the two currencies (the West African CFA franc used in the WAEMU zone and the Central African CFA franc used in the CEMAC zone). Both currencies are pegged to the Euro (i.e., their value is not determined by the market) and guaranteed by the French treasury. Along with French military presence, the CFA franc is a powerful symbol and fundamental tool of the French neocolonial and imperial power in this region. It is essentially a one-sided currency union between these countries and France, where France is at the center with veto power. According to Economic Questions (2018), France is able to control the money supply, monetary, and financial regulations, banking activities, credit allocation, and budgetary, and economic policies of these nations through the CFA franc. In addition, France breeds corruption and illegal diversion of public aid between itself and its former colonies. These countries are obligated by France to deposit a large portion of their foreign exchange reserve into the French Central Bank under the control of the French Ministry of Finance (as well as a portion to cover financial liabilities). These deposits in the French treasury earn little, or no interest for the franc zone countries (Economic Questions, 2018).

Various accords/agreements signed by these countries with France have given France leverage over their political and economic well-being. The military agreement gives France the power to intervene militarily to protect the French interests (Economic Questions, 2018). The French military has always intervened to protect leaders loyal to France and those who protect the French interest at the expense of their nations and people. Hence, this region is one of the least democratic part of the world. Four of the ten least democratic countries in the world are in the CFA franc zone region and nine countries of the fourteen members have authoritarian regimes (The Economist Intelligence Unit's Democracy Index, 2018). Most presidencies in this region stretch for decades with the four longest presidencies stretching between 28 and 39 years. Their addiction to power backed by the French military is costly to this region because a strong correlation exists between this region's entrenched leadership and developmental and security challenges, including conflict, or instability, stagnant, or declining economies, and democratic backsliding (Council on Foreign Relations, 2017). Any CFA franc zone president, or political elite opposing French colonization and oppression faces dire consequences. Sixty-one percent of the coups that occurred in SSA during the last 50 years were in Francophone Africa (Ernestine Adja, 2017).

The economic accords on the other hand require these countries to open up their economies to privatization and their markets to unfair competition with France, export their raw materials and minerals to France while importing industrial goods and services

primarily from France. These countries also give priority to French companies in public procurement and public bidding even if better offers are on the table.

CFA franc zone countries have propelled France economically and financially and have made France a major global power at their expense through various agreements with France. "Without these countries, France will slide down into the rank of a third world power" (former French President Jacques Chirac, 2008). It can be argued that these countries would have been the "14 African Tigers" without France.

This study attempts to investigate empirically the impact of external debt and corruption on the human development indicators in the CFA Franc zone countries by answering the following research questions:

- Does external debt affect HDI? If so, how? Can the very low levels of HDI in the CFA franc zone countries be attributed to the very high levels of debt, and vice versa?
- Does corruption affect HDI? If so, how? Can the very low levels of HD in the CFA franc zone countries be attributed to the very high levels of corruption, and vice versa?

To answer these questions, the study uses panel data analytic model for a cross-section of 14 CFA franc zone countries (Table 4A1) over the 2005 - 2017 period. The Generalized Method of Moments (GMM) estimation technique is used to control for possible endogeneity biases due to the possible feed-back effect between the dependent variable

(HDI) and some of the explanatory variables and the collinear nature of some of the regressors used in the study. The study finds that external debt and corruption affect human development significantly. The high levels of debt and corruption in this region are found to have a negative and statistically significant effect on HDI.

The empirical literature is replete with studies that consider the relationship between debt and HDI and overwhelmingly show mixed results i.e. the impact of the external debt on HDI may be beneficial, detrimental, or null. Apart from Kim et al. (2017) who examined the role of corruption on the relationship between public debt and economic growth for a sample of 77 countries, studies that consider the joint effect of debt and corruption on the HDI are scarce. Hence, addressing the nexus of corruption and external debt on human development indicators for countries in the SSA region (especially the CFA franc zone) is timely and relevant. This paper seeks to fill that gap by investigating the effect of debt and corruption on HDI using the Generalized Method of Moments (GMM) estimation technique on panel data of the 14 CFA Franc zone countries over the period 2005 – 2017. A variety of other estimation methodologies are also considered including pooled ordinary least squares (POLS), fixed effects (FE) model for static panels, and GMM estimators for the dynamic panels.

The rest of the paper is organized as follows. Section 4.2 provides a review relevant literature. Model specification, choice of variables, and data sources are covered in Section 4.3. The estimation results are discussed in Section 4.4. Section 4.5 presents the robustness of results. The last section presents some policy implications.

4.2. Literature Review

4.2.1. Defining Corruption and Human Development

4.2.1.1. Corruption

"Corruption is one of the most dangerous social ills of any society. This is because corruption, like a deadly virus, attacks the vital structures that ensure society's progressive functioning, thus, putting its very existence into serious peril" (Gire, 1999). Defining corruption is subjective because it is described differently in different regions of the world. One of the simplest and most commonly used definitions is the misuse of entrusted public power for private gains (UNDP, 2008). Corruption is severe in some countries more than others. It is now widely accepted that corruption is not restricted to specific regions, or levels of economic development. The Swiss Agency for Development and Cooperation (SDC, 2016) considers corruption as a governance issue that translates into a failure of institutions and a lack of capacity to manage society by means of a framework of social, judicial, political, and economic checks and balances. When these formal and informal systems break down, it becomes harder to implement and enforce laws and policies that ensure accountability and transparency. The entire process runs counter to the rule of law.

The United States Agency for International Development (USAID) Handbook for Fighting Corruption (1999: 5) describes the various forms that corruption can assume:

> It encompasses unilateral abuses by government officials such as embezzlement and nepotism, as well as abuses linking public and private actors such as bribery, extortion, influence peddling, and fraud. Corruption arises in both the political and bureaucratic offices and can be petty, or grand, organized, or disorganized.

"No problem does more to alienate citizens and undermine political stability and economic development than endemic corruption within the government, party leader, judges, and bureaucrats" (USAID, 2002).

4.2.1.2. Human Development

The United Nations Development Programme (UNDP) Human Development Report (2010: 2) defines human development as:

> "The expansion of people's freedoms to live long, healthy and creative lives to advance other goals they have reason to value, and to engage actively in shaping development equitably and sustainably on a shared planet. People are both the beneficiaries and the drivers of human development as individuals and in groups."

Hence, HDI is about enlarging people's capabilities and providing them with opportunities they can use on their own volition. "Three foundations for HDI are: to live a healthy and creative life, to be knowledgeable, and to have access to resources needed for a decent standard of living" (UNDP, 2010).

Human Development is measured by the Human Development Index (HDI) published by UNDP (1990). HDI is a summary measure of average achievement in key

dimensions of HD: a long and healthy life (life expectancy), being knowledgeable (literacy rate) and have a decent standard of living (income). The HDI is the geometric mean of normalized indices for each of the three dimensions. The HDI is based on three indicators, all of which are given equal weight (UNDP, 1990):

- The health dimension is assessed by life expectancy at birth
- The education dimension is measured by mean of years of schooling for adults aged 25 years and more and expected years of schooling for children of school entering age.
- The standard of living dimension is measured by gross national income per capita.

HDI highlights the importance of the individual in the development of a country. Unlike per capital GDP, HDI is the most relevant indicator for understanding the socio-economic progress of a country. A country scores higher HDI when the lifespan is higher, the education level is higher, and the GNI per capita is higher (HDI ranges between zero and one, with one indicating the high level of economic development and zero, the lowest level of development). HDI and GDP per capita are highly correlated with a correlation coefficient of about 0.6945 (see, Table 4A6).

4.2.2. External Debt and Human Development

Does external debt affect HDI? If so, how? Can the very low levels of HDI in the CFA franc zone countries be attributed to the very high levels of debt? Zaghdoudi (2018) examined the direct relationship between external debt and HDI for a panel data set of

95 developing countries between 2002 – 2015 using panel smooth threshold regression model and showed that the relationship is non-linear and is characterized by the presence of an optimal threshold of external debt-to-GDP ratio (equals to 41.9%) below which debt has a positive effect on HDI, and vice versa. A one percent increase in the external debt ratio below the threshold induces an increase in the HDI of 0.02%, while a one percent increase in the external debt ratio above the debt threshold becomes detrimental to human development since HDI decreases by 0.015.

There are a couple of reasons why external debt may affect HDI in the CFA franc zone countries and these reasons are tied to its impact on the three major components of HDI: health, education and living standards. Hence, most empirical studies tend to answer the above questions by separately examining the impact of external debt on the three main components of the HDI: health and education (Fosu, 2007; Lora and Olivera, 2007; Stephens, 2001; Shabbir and Yasin, 2015) and living standards measured by gross national income per capita (Gupta et al., 2002). For example, using panel data for 24 African HIPCs, Stephens (2001) finds that the increase in debt servicing adversely affects expenditure on both education and health, but with a larger impact on the latter. Fosu (2007) also finds similar results using panel data for 35 African countries for the period 1975 - 94 and seemingly unrelated regression (SUR) model. Lora and Olivera (2007) also find similar results using a sample of 50 Latin American countries for the period 1985–2003.

Shabbir and Yasin (2015) analyzed the impact of public external debt on social sector spending (education and health) of seven developing Asian countries between 1980 - 2010 using GMM and find that outstanding external debt and its servicing liability have an adverse impact on public spending, particularly on social sector spending.

Though works that study the direct effect of external debt on HDI are very scarce, there is wide support in the empirical literature for the view that debt is bad for economic growth, but that it adversely impacts growth only after a certain threshold of debt-to-GDP ratio is reached (Reinhart and Rogoff, 2010; Caner et al., 2010; Kumar and Woo, 2010; Checherita and Rother, 2010; Cecchetti et al., 2011). Reinhart and Rogoff (2010) studied 44 advanced and emerging countries over a 200-year period and found that public debt adversely affects economic growth only beyond a debt-to-GDP ratio of 90% and that the threshold for public debt is similar in advanced and emerging economies. They also found a threshold of debt-to-GDP ratio of 60% for emerging markets and that, when external debt (which is usually denominated in a foreign currency) reaches 60% of GDP, annual economic growth declines by about two percent and for higher levels, growth rates are roughly cut in half.

Caner et al. (2010) found a threshold of 77% public debt-to-GDP ratio for 101 developing and developed economies spanning the period from 1980 to 2008. Each additional percentage of debt above this threshold reduces annual real growth by 0.02 percentage points. They also found a threshold of debt-to-GDP ratio of 64% for emerging

markets and for these countries, the loss in annual real growth with each additional percentage point in public debt amounts to 0.02 percentage points.

Using a dataset that includes the level of government, non-financial corporate and household debt in 18 OECD countries from 1980 to 2010, Cecchetti et al. (2011) found a threshold for government debt at 85% of GDP above which debt becomes a drag on growth. They also found similar effects on both corporate (threshold of about 90% of GDP) and household debts (threshold of about 85% of GDP).

The empirical literature also suggests an inverse relationship between initial debt and subsequent growth. Kumar and Woo (2010) found that, on average, a 10-percentage point increase in the initial debt-to-GDP ratio is associated with a slowdown in annual real per capita GDP growth of around 0.2 percentage points per year, with the impact being somewhat smaller in advanced economies.

4.2.3. Corruption and Human Development

"Corruption is considered as being decisively responsible for political instability, economic underdevelopment, low administrative efficiency, and poor governance structures around the world" (Ko & Samajdar, 2010: 508-509). There is wide support in the literature for the view that corruption is bad for economic growth which is one of the major indicators of HDI (Aidt et al., 2008; Gyimah-Brempong, 2002; Mauro, 1995). But, does corruption affect HDI? Can the very low levels of HDI in the CFA franc zone countries be attributed to the very high levels of corruption exists in this region? According to Rose-

Ackerman (2004), very high levels of human development are associated with low levels of corruption.

There are reasons why corruption may affect HD in the CFA franc zone countries and which are also tied to its impact on the three major components of HDI: health, education and living standards. Most empirical studies tend to answer the above questions by separately examining the impact of corruption on the three main components of the HDI: health (Reza Davoodi et al., 2000), education (Mauro, 1998; Dridi, 2014), and living standards (Gupta et al., 2002).

Empirical evidence shows that countries with higher levels of corruption tend to experience lower levels of HDI, and vice versa because corruption tends to reduce the HDI by lowering the quality of public services and infrastructure and distorts the composition of government expenditure on health, education, and other social services and infrastructure programs which are vital for the poor and vulnerable populations. These reductions and distortions to government expenditure on health and other social services can have devastating effects on the poor and vulnerable populations. “Empirical analysis shows that child mortality rates in countries with high corruption are about one-third higher than in countries with low corruption; infant mortality rates and the percent of low-birthweight babies are almost twice as high, and school dropout rates are five times as high” (Arvind K. Jain, 2002: 132). Dridi (2014) also finds that high and rising corruption significantly decreases access to schooling and that a one percent increase in corruption reduces enrollment rates by almost 10 percentage points.

Akçay (2006) directly explores the relationship between the corruption indices and human development in a sample of 63 countries and finds that there is a statistically significant negative relationship between them, implying that highly corrupt countries tend to have low levels of human development. For example, a one percentage point increase in the corruption index reduces HD by 0.02 – 0.04 percentage point.

Corruption is also a serious threat to global health outcomes, leading to financial waste, compromised health security, and adverse health consequences. According to US Department of Justice (2017), over $56 billion has been recovered in health care fraud in the US since 1986. Corruption also affects the efficiency of educational expenditure, especially in the developing countries (Mauro, 1998; Sahnoun and Abdennadher, 2018).

Gupta et al., (2002) show that high and rising corruption increases income inequality and poverty (i.e. an increase of one standard deviation in corruption increases the Gini coefficient of income inequality by about 11 percentage points and decreases income growth of the poor by about 5 percentage points per year). Hence, any adverse impact of corruption on economic growth and development will also impact HDI adversely.

4.3. Methodology, Data, and Estimation

This section provides the estimation techniques, data description, and sources employed to achieve the main objective of this study. A detailed description of sources and variables used in this study is presented in Table 4.1. Table 4.2 presents the

descriptive statistics of variables used for modeling for the 14 CFA franc zone countries, while Table 4A6 presents the correlation matrix of the variables.

4.3.1. Econometric Model

The main objective of this study is to analyze the impact of corruption and external debt on HD in the CFA franc zone. This relationship is estimated using a dynamic panel data model based on Balcerzak and Pietrzak (2015) with some modifications to fit the data used. The model explores the linear relationship between HD, external debt, corruption, and other relevant control variables selected from the vast empirical literature. The basic estimation equation is expressed as follows:

$$Y_{it} = \rho_{it} Y_{i,t-1} + \beta_1 Debt_{it} + \beta_2 CORR_{it} + \lambda_{it} \sum X_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

Where: *i* = 1..., N (N = the number of countries); *t* = 1…, T (T = the number of time periods). Y_{it} is a measure HD of country *i* at time *t*, $Debt_{it}$ is external debt of country *i* at period *t* (percent of GNI), and $CORR_{it}$ is a measure of the level of corruption in country *i* at time *t*. X_{it} is the vector of control variables of country *i* at time *t* that affect HD (foreign direct investment, gross capital formation, government size, trade openness, total natural resource rent, and political instability), and ρ, β and λ are parameters to be estimated. μ_i represents country-specific effects that are assumed to be independent and identically distributed over the countries and ε_{it} is also independent and identically distributed.

4.3.2. Model Rationale, Variables, and Data Sources

For this study, balanced panel data from 14 CFA franc zone countries for the period 2005 - 2017 are used. Data are drawn from different sources: World Development Indicators (WDI) of the World Bank, World Bank Worldwide Governance Indicators (WGI), IMF World Economic Outlook (WEO), Transparency International (TI), and the United Nations Development Programme (UNDP).

Table 4.1: Data Description and Sources

Variable abbrev.	Variable name/description	Source
Debt	External debt stocks (% of GNI)	WDI / IMF
HDI	Human development index (measure of human development: 0 = low HD and 1 = high HD)	UNDP
CPI	Corruption perception index: 2012 and beyond ranges from approximately 0 (high) to 100 (absence), while pre-2012 ranges from 0 (high) to 10 (absence)	TI
FDI	Foreign direct investment, net inflows (% of GDP)	WDI
INV	Gross capital formation (% of GDP)	WDI
GGCE	GGCE is general government consumption expenditure (% of GDP)	WDI
TO	Trade (% of GDP): sum of exports and imports of goods and services measured as a share of GDP	WDI
NR	Total natural resources rents (% of GDP): sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	WGI
PI	Political Stability and Absence of Violence/Terrorism: ranges from approximately -2.5 (weak) to 2.5 (strong)	WGI
CC	Control of Corruption: ranges from approximately -2.5 (weak) to 2.5 (strong)	
$HDI_{i,t-1}$	Lagged dependent variable (measure of human development)	

Note:

1. *Pre-2012 CPI number were converted to the 2012 scale*
2. *The CPI number is inverted by subtracting it from 100 to obtain an increasing scale of corruption*
3. *PI and CC are inverted by subtracting them from 2.5 to obtain an increasing scale of PI and CC*

HDI, which measures a country's achievements in health, education, and standard of living (as explained above) is the dependent variable. For the CFA franc zone countries as a group, the mean HDI is about 0.46 which is far below the 2017 global average of 0.728 (UNDP, 2019). HDI is extracted from various years of the Human Development Report of the UNDP.

External debt and corruption are the main variables of interest in this study. Data for the external debt which measure a country's general government gross debt as a percent of GNI are extracted from both the IMF and WDI. Table 4.2 shows the mean debt to GDP ratio of about 37% with a wide gap between the minimum (0.081%) and the maximum (179%).

Table 4.2: Descriptive statistics for the 14 CFA franc zone countries

Variable	Obs.	Mean	Std. Dev.	Min	Max
HDI	182	0.4610879	0.0977133	0.283	0.702
Debt (%)	182	36.86988	29.85624	0.81	178.6556
CPI	178	73.05618	6.899373	55	84
FDI (%)	182	3.8399	5.4837	-4.85228	50.01802
GGCE (%)	181	13.19255	4.41963	2.73606	26.0415
INV (%)	182	22.57007	7.72584	4.70372	41.3
TO (%)	182	72.87721	29.7421	33.43125	165.6459
NR (%)	182	17.86424	14.09659	1.91792	59.61957
PI	182	-0.6354496	0.7217991	-2.699193	0.5470105
CC	182	3.4215	0.4062596	0.67426	2.43907

Note: CPI and CC values are the inverted values

Data for corruption are drawn from Corruption Perception Index (CPI) by Transparency International (TI). CPI is one of the most widely used measure of corruption in the literature. CPI has been published annually since 1995 and is a composite of various corruption indicators, i.e., it is an average of different surveys of perceptions of corruption in a country during the year. Since 2012, the score has been rescaled from a 10-point scale to a 100-point scale (i.e., countries are now ranked on a zero to hundred scale, with a score of zero representing very high corruption and a score of hundred indicates an absence of corruption). Due to the rescaling of the CPI scores, year to year comparisons is only possible from 2012 onwards, i.e., scores were not comparable across countries and over time before 2012 (Grundler and Potrafke, 2019). In this study, the pre-2012 corruption index numbers were converted to the 2012 scale to ensure comparison across countries and time. The clear majority of CFA franc zone countries assessed achieved a score less than 40 (Table 4A3) with an average level of about 27 (see Table 4.2) on the TI corruption index, indicating that these countries are perceived to be highly corrupt. In this study, the CPI number is inverted by subtracting it from 100 to obtain an increasing scale of corruption.

Other explanatory variables are also included as control variables based on the literature on the relationship between HD and the control variables. These include public investment measured by the gross fixed capital formation as a percent of GDP (INV), the foreign direct investment as a percent of GDP (FDI), total natural resource rents as a percent of GDP (NR), trade openness as a percent of GDP (TO), government size (GGCE)

is proxied by general government consumption expenditure as a percent of GDP, and political instability (PI).

The inclusion of government size is motivated by Peev and Mueller (2012) who find that large GGCE, or large public sector is detrimental for growth and, therefore, HDI. CFA franc zone countries are characterized by bloated public sector rife with corruption and ghost workers which leads to large public spending and run-up public debts that channel limited and vital resources into interest payments instead of productive activity that can boost growth and human development. GGCE is drawn from WGI.

Political Instability (PI) is a common occurrence across SSA and the CFA franc zone, and in particular, Cameroon, Central African Republic, Chad, Republic of Congo, Mali, and Niger due to institutional failures. Inclusion of political instability is motivated by Mo (2001) who finds that the most important channel through which corruption affects economic growth (hence HDI) is political instability which accounts for about 53% of the total effect. (PI) hinders economic growth and HD because it creates an uncertainty, thereby, discouraging private investment. PI is proxied by political stability or the absence of violence/terrorism and is extracted from the WGI and measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism. An Estimate gives the country's score on the aggregate indicator in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5 with higher scores corresponding to better outcomes, i.e., less political instability. For the CFA franc zone countries, the mean score is about -0.64 indicating a high perception of the likelihood of

political instability. In this study, PI is also inverted by subtracting it from 2.5 to obtain an increasing scale of political instability (or decreasing scale of political stability).

The inclusion of NR is motivated by the fact that the rising debt crises across CFA franc zone countries can be attributed to the abundance of natural resources in this region because most external debts are usually contracted to be repaid by the future sales of crude oil, or other valuable mineral resources (NR data are extracted from WDI). External debts in this region are usually contracted based on high commodity prices and with the hope that these prices will remain high and stable. But fluctuating commodity prices have rendered these loans unpayable and propelled many countries in the CFA franc zone and others into loan default. For example, Ghana is losing 30% of its government revenue servicing loans it contracted based on high commodity prices, while on the other hand, Mozambique is paying £21 for every £1 of loan it contracted for the building of an aluminum smelter (Nick Dearden, 2017). Resource-for Infrastructure deals with loans secured against the net present value of a future revenue from the sales of oil, or mineral extraction are now common in the SSA region (the multi-billion-dollar Congo's Sicomines Agreement with China is a prime example).

A wealth of valuable natural resources can be a blessing, or a curse for economic growth depending on the institutional and social capability of managing resource revenues (Daniele, 2011). Poorly managed natural wealth can lead to bad governance, corruption, or even violent conflict according to the United Nations Office on Drugs and Crime (UNODC ,2018). As Jeffrey D. Sachs (2005) puts it:

> In general, natural resources such as oil, gas, diamonds, and other precious minerals breed corruption because governments can live off of their export earnings without having to "compromise" with their own societies. Natural resources are, therefore, not only a target of corruption, but are also an instrument of holding power. Many foreign companies, intent on cashing in, fuel the pathology of corrupt regimes by peddling in bribes and political protection.

The inclusion of gross fixed capital formation as a percent of GDP (INV), trade openness (TO) and foreign direct investment (FDI) is motivated by Zaghdoudi (2018) who considers these variables as major indicators for HDI in developing countries. TO is defined as the sum of exports and imports as a percent of GDP. More open economies experience higher growth through the acquisition of advance technologies and transfer of knowledge which increase productivity, growth, and HDI. FDI is defined by the foreign direct investment net inflows as percent of GDP. According to Zaghdoudi (2018), FDI can limit the external debt and reduce its adverse effects on human development if certain conditions are met by the host country. INV, TO, and FDI are extracted from WDI. A priori expectations of parameters: Debt and CPI are negative, while lag of HDI is positive.

4.3.3. Estimation Methods

Equation (1) above is estimated using panel data from 14 CFA franc zone countries and panel data models for the period 2005-2017 to examine individual-specific effects, time effects, or both in order to deal with heterogeneity, or individual effects that may, or may not be observed. Baltagi (2008) and Roodman (2009) list several benefits from using panel data for controlling individual heterogeneity and the ability to give more

informative data, more variability, less collinearity among the variables, more degrees of freedom, and more efficiency. Woo and Kumar (2010), on the other hand, list a number of sources of biases that can cause inconsistent estimates of the coefficients of the panel data estimations which include omitted-variables bias (heterogeneity bias), endogeneity problem (due to correlation between the regressors, and the error term), and measurement errors (in variables) of the independent variables.

Both static panel data (SPD) and dynamic panel data (DPD) methodologies are employed in order to deal with the different types of econometric issues and ensure robust results. Each methodology has its own advantages and disadvantages. DPD models offer some advantages compared to the SPD models including the possibility to address the heterogeneity of the individual states in the sample, estimation of models with endogenous variables (including lagged variables), and the use of several instrumental variables in order to deal with the endogeneity problem.

Equation (1) is initially estimated as an SPD regression model which normally assumes a fixed temporal effect and ignores possible endogenous relationships in the model. SPD models are also commonly analyzed using (pooled) OLS, fixed-effect (FE), and random-effect (RE) models. Parameter estimates for the SPD model will likely be biased and inconsistent due to the various sources of bias listed above, coupled with the dynamic nature of the model, but are included for comparison. To deal with these short comings of the SPD model and correct for potential endogeneity and the bias introduced by the lagged HDI, the equation is also estimated using the Generalized Method of Moments

(GMM) which is a dynamic panel data model instrumented with appropriate lags. The GMM estimator involves the joint estimation of equation (1) in levels and first differences. The instruments used in the level equation are the lagged first differences of the variables suspected to be endogenous, while the instruments for the differenced equation are the lagged levels of the variables. The proliferation of instruments (causing overidentification) and serial autocorrelation of errors are some difficulties faced in the application of the DPD models. To deal we this problem, two approaches to instrument containment (collapsing instruments and limiting lag depth) are used in constructing the GMM instruments.

For the econometric analysis and to answer the research question, two models are used to see whether corruption affects HDI directly, or indirectly through the external debt channel. In the first model, the corruption index is included while it is excluded in the second model.

Since there are no accepted rules of thumb, or an exact guidance on what a relatively safe number of instruments is, Roodman (2009) recommends testing the robustness of the GMM results for reductions in the instrument set (i.e., by repeatedly selecting random subsets from potential instruments and investigating how the key results such as the coefficients of interest and the p-value of the J-statistic vary with the number of instruments). Robustness is also tested by using the World Bank's Worldwide Governance Indicators (WGI) Control of Corruption (CC) index as a different proxy for corruption.

WGI control of corruption has been published annually since 1996 and measure the quality of governance for over 200 countries and territories based on different data sources produced by a large number of organizations worldwide and are annually updated since 2002 (for example, in the 2009 edition, the Control of Corruption indicator refers to 25 sources with 40 indicators). CC captures the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as the "capture" of the state by elites and private interests. WGI control of corruption index similar to the CPI by Transparency International are both aggregate indicators which combine information from multiple sources (CC indicator uses all data sources from the CPI as well as others not used in the CPI). Unlike the CPI which only measures corruption in the public sector, the WGI control of corruption index measures corruption in both the public and private sectors, hence, goes beyond the commonly accepted definition of corruption. Another major advantage of the WGI control of corruption index over the CPI is its comparability across countries and over time. Estimates give the country's score on the aggregate indicators in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5 with higher scores corresponding to better outcomes, i.e., less corruption. For the CFA franc zone countries, the mean score is about -0.92 indicating that these countries are perceived to be highly corrupt. In this study, CC is also rescaled by subtracting it from 2.5 to obtain an increasing scale of the perception of corruption.

In this study, all explanatory variables, are taken as the "IV-style" instruments, entering the Z matrix as a single column, except the lagged dependent variable and corruption. The lagged dependent variable and corruption are specified as a "GMM-style" instrument, where collapsing the instruments is used as an approach to contain the proliferation of instruments.

Since the regression coefficients ρ, β, and λ are in different measurement units, direct comparison is difficult. Therefore, the standardized regression coefficients are used in order to eliminate this problem by expressing the coefficients in terms of a single, common set of statistically acceptable units (metric-free units) so that variables can be easily compared to each other.

4.4. Main Empirical Results

Table 4.3 below presents the estimation results when corruption is included as one of the explanatory variables for the 14 CFA franc zone countries. Table 4A7 presents standardized coefficients of the results. Standardized coefficients are only used for interpreting the model. Columns 1 and 2 show the pooled OLS and FE estimation results, respectively, while column 3 shows the GMM estimation results. Estimates for all models yield similar results with few deviations. This study focuses only on the GMM estimation results since pooled OLS and FE coefficient estimation results are likely to be biased as stated above and are only included for comparison.

External debt and corruption are expected to have a negative effect on HD, regardless of the model used. Debt and CPI coefficients are of the expected signs and

statistically significant at the 0.05 and 0.01 levels for the GMM, respectively. These results confirm that, external debt and corruption have a negative impact on HDI in CFA franc zone countries. If the Debt ratio increases by one standard deviation, the HDI decreases by about 0.053 standard deviation. On the other hand, a one standard deviation increase in the CPI level leads to an expected HDI decrease of 0.184 of its standard deviation. Both debt and corruption do HDI through their impact on health, education, and living standards. The impact of corruption levels on HDI is more severe than the impact of debt on HDI.

The coefficients on GGCE, TO and PI in the GMM model are statistically significant at the 0.01 level and are as expected. GGCE and PI have a negative effect on HDI in the CFA franc region due to poor governance and weak political and economic institutions. On average, if GGCE increases by one standard deviation, HDI decreases by about 0.097 of its standard deviation, while a one standard deviation increase in PI reduces HDI by 0.293 of its standard deviation.

The coefficients of INV and NR in the GMM model are also statistically significant at the 0.01 level but are not of the expected signs. Results suggest that gross fixed capital formation (INV) has a negative and statistically significant impact on HDI and that a one standard deviation increase in INV will result in an expected HDI decrease of 0.127 of its standard deviation.

Table 4.3: GMM Panel Data Estimation results
Dependent Variable: HDI

Variables	(1) Pooled OLS	(2) Fixed Effect	(3) GMM
Debt	-0.0545*	-0.0561***	-0.0176**
	(0.0239)	(0.0109)	(0.0054)
CPI	-0.0031**	-0.0041***	-0.0026***
	(0.0010)	(0.0007)	(0.0005)
FDI	0.0565	0.0056	0.0259
	(0.1200)	(0.0560)	(0.0249)
GGCE	-0.2170	0.2210	-0.2140***
	(0.1500)	(0.1130)	(0.0438)
INV	-0.2870**	0.0112	-0.1600***
	(0.0954)	(0.0658)	(0.0086)
TO	0.1770***	0.0415	0.1060***
	(0.0297)	(0.0288)	(0.0086)
NR	0.0385	-0.1920***	0.0701***
	(0.0583)	(0.0445)	(0.0134)
PI	-0.0623***	-0.0068***	-0.0396***
	(0.0083)	(0.0058)	(0.0334)
L.HDI			0.3740***
			(0.0334)
Constant	0.8550***	0.7710***	0.5870***
	(0.0956)	(0.0689)	(0.0493)
N	177	177	166
Instruments			14
AR2 (p-value)			0.382
Hansen-J (p-value)			-

*Note: Standard errors in parentheses; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

The unexpected sign of the coefficient of investment (INV) may be due to the diversion of resources from investment in human capital (health and education) to physical capital such non-productive investments such as the proliferation of political “pet projects” and other white elephant projects which are a common occurrence in most CFA franc zone countries with no benefits to the ordinary citizen. Another possible

explanation of this result may also be due the politicization of government investments in these countries.

The results also suggest that natural resource rent (NR) has a positive impact on HDI and that if NR increases by one standard deviation, HDI will increase by 0.101 of its standard deviation. This is also unexpected because most conflicts and high levels of corruption are typically linked to the abundance of NR reflecting the backlash of "resource-curse." Another possible explanation of the positive impact of NR on HD may be due to the proliferation of Resource-for Infrastructure (RFI) deals and their possible positive spillover effects.

Table 4.4 below presents the estimation results when corruption is excluded from the models. Columns 1 and 2 show pooled OLS and FE estimation results, respectively, while column 3 shows the GMM estimation results. Estimates for all models yield results similar to those in Table 4.3 with few exceptions for the GMM results, where the coefficient of FDI is negative, but not statistically significant. This may be due to the difference in the number of instruments (14 vs. 11) used in the two models.

In all models, the external debt has a negative impact on HDI and is statistically significant at the 0.01 level. Comparing the OLS and the FE results in both models (with and without corruption), we can conclude that the impact of debt on HDI greatly depends on corruption, i.e., HDI will likely increase as corruption levels decrease. Without using corruption as an explanatory variable, on average, if the external debt ratio increases by one standard deviation, the HDI decreases by about 0.08 of its standard deviation. The

impact of past HDI levels on current HDI level is positive and significant indicating significant positive autocorrelation. Hence, even in the CFA zone, the effect of history on human development is important, i.e., CFA franc zone countries which start with past HD have the potential to improve their HDI in the future. In both models, the first lag of HDI is significant at the 0.1 level, and since the coefficients are far from unity, we do not have unit root (model is stationary) and weak instrument problems.

Table 4.4: GMM Panel Data Estimation results
Dependent Variable: HDI

Variables	(1) Pooled OLS	(2) Fixed Effect	(3) GMM
Debt	-0.0211	-0.0219	-0.0246***
	(0.0209)	(0.0119)	(0.0042)
FDI	0.0015	-0.0400	-0.0015
	(0.1230)	(0.0704)	(0.0218)
GGCE	-0.0361	0.5410***	-0.0474
	(0.1380)	(0.1340)	(0.0248)
INV	-0.1770	0.2440***	-0.1080***
	(0.0924)	(0.0718)	(0.0169)
TO	0.1490***	0.0021	0.1140***
	(0.0293)	(0.0354)	(0.0067)
NR	0.0229	-0.0897	0.0360**
	(0.0587)	(0.0531)	(0.0110)
PI)	-0.0694***	-0.0159*	-0.0483***
	(0.0083)	(0.0064)	(0.0023)
L.HDI			0.2650***
			(0.0271)
Constant	0.6190***	0.4090***	0.4450***
	(0.0475)	(0.0360)	(0.0182)
N	181	181	167
Instruments			11
AR2 (p-value)			0.237
Hansen-J (p-value)			-

*Note: Standard errors in parentheses; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

The lagged dependent variable suggests that the current level of HDI will be higher compared to the previous year 13 level of HDI irrespective of the current value of the independent variables.

The consistency of the GMM estimator depends on the validity of the instruments. Tables 4.3 and 4.4 also provide diagnostic test results for the estimated GMM models: Wald χ2 test, Hansen OID test, and Arellano-Bond serial correlation test. Wald χ2 test measures the overall applicability of the model and tests the null hypothesis that all coefficients of the model are simultaneously equal to zero. The null hypothesis of the Wald χ2 test is conclusively rejected for all the two models, indicating the validity of these models. Hansen's test checks for over-identification (OID) in GMM models and tests the null hypothesis that OID restrictions are valid. Though the null hypothesis of valid OID restrictions is rejected (at p-value of 0.05), neither model suffers from OID since the number of instruments in both cases is less than or equal to the number of groups (Roodman, 2009). The Arellano-Bond serial correlation test checks for no serial autocorrelation in the errors. The null hypothesis of the Arellano-Bond serial correlation test is that the moment conditions used in the model are valid. The null hypothesis of the Arellano-Bond test is not rejected for any model, which indicates no serial autocorrelation in the errors and, therefore, moment conditions used in the model are valid. This implies that the applied GMM estimator is consistent and efficient. In all SPD models, the F-tests reject the null hypothesis of a common intercept term across countries, and the Hausman test (at p-value equals to 0.003) consistently rejects RE in favor of FE.

4.5. Robustness of Results

In this section, the robustness of the GMM estimation results is investigated in two ways: first by changing the number of instruments and second by using WGI control of corruption (CC) index as a different proxy for corruption. The results show that our main results are robust. In Table 4A4 and Table 4A5, all coefficients of interest have the expected signs, but not all of the variables of interest are statistically significant.

Table 4A4 presents the estimation results when the number of GMM type instruments are changed. As can be easily seen, the results are identical to those in Table 4.3. However, the magnitude of the estimated parameters depends on the number of instruments used. As the number of instruments increase, magnitude of estimated parameters decrease in value, except for the coefficient of the lagged HDI which increases in value and appears to be quite sensitive to the choice of instruments used. Also noticeable is the decrease in significance of external debt as the number of instruments increases.

Table 4A5 shows the estimation results when the model is re-estimated with the control of corruption (CC) of WGI for the robustness of the results. As seen in the appendices, there are no big differences in the results, especially in the estimates of debt and corruption. The major difference lies in the magnitudes of their estimated coefficients which is a bit higher when CC is used. This might be due to the difference in the scale of the two indicators of corruption.

4.6. Conclusion and Policy Implications

This paper examines the relationship between corruption, external debt, and human development for a panel data set of 14 CFA franc zone countries during the period 2005 – 2017 using system GMM. The results show that both corruption and external debt have a negative and significant impact on human development in the CFA franc region. This negative effect on HD can be explained by the adverse impact of both the external debt and corruption on the three major components of the HDI: health, education and living standards (as explained above).

These findings have important implications for policymakers and government officials, non-governmental organizations (NGOs), and international organizations focusing to improve HDI in this region. The negative impact of corruption and external debt on the socioeconomic development of this region can be mitigated if political and business leaders can mobilize the right mindsets rather than more funding, take responsibility and steps to address rising illicit financial flows, tax evasion, and the misallocation of resources. Improvements in HDI in the CFA franc region may start with effective governance, accountability, and the rule of law. An Effective management of the natural resources (forest and natural resources certification) in this region can also curb corruption and spur economic growth.

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APPENDIX

Table 4A1: CFA franc zone countries

CEMAC	**WAEMU**
Cameroon	Benin
Central African Republic	Burkina Faso
Chad	Côte d'Ivoire
Congo	Gabon
Equatorial Guinea	Mali
Guinea-Bissau	Niger
	Senegal
	Togo

Table 4A2: Human Development Index Trends, 2000 – 2018

HDI Rank	Country	Average annual HDI growth (%)			
		1990 – 2000	2000 – 2010	2010 – 2018	1990 - 2018
115	Gabon	0.13	0.48	0.81	0.45
138	Congo	-0.71	1.19	1.12	0.49
144	Equatorial Guinea	..	1.09	0.18	...
150	Cameroon	-0.15	0.71	2.26	0.84
163	Benin	1.36	1.74	1.19	1.45
165	Côte d'Ivoire	0.40	1.09	1.61	0.99
166	Senegal	0.36	1.84	1.17	1.12
167	Togo	0.50	0.94	1.16	0.85
178	Guinea-Bissau	..	..	1.01	...
182	Burkina Faso	..	2.74	1.84	...
184	Mali	2.92	2.72	0.72	2.22
187	Chad	..	2.29	0.89	...
188	Central African Republic	-0.41	1.44	0.89	0.62
189	Niger	1.75	2.34	2.09	2.06
	CFA Countries	0.61	1.59	1.21	1.11
	SSA	0.50	1.65	1.03	1.06
	World	0.71	0.84	0.60	0.72

Source: UNDP (*http://hdr.undp.org/en/content/table-2-human-development-index-trends-1990%E2%80%932018)*

Note: HDI trends for CFA franc zone countries between 1990 – 2018 indicates an average drop of 24 percent between the periods 2000-2010 and 2010 -2018

Table 4A3: Ranking of corruption levels in CFA franc zone, 2005 – 2015

CPI Rank	Country	CPI (Inverted)
9	Senegal	65
10	Burkina Faso	66
13	Gabon	68
15	Benin	68
19	Mali	70
20	Niger	71
26	Togo	73
29	Côte d'Ivoire	76
30	Cameroon	76
32	Central African Republic	77
33	Congo	78
37	Guinea-Bissau	80
40	Chad	81
41	Equatorial Guinea	81

Note:

1. *CPI values are based on the average values for the period 2005 – 2015*
2. *Inverted CPI values range from 0 (corruption free) to 100 (most corrupt)*

Table 4A4: GMM Panel Data Estimation results
Dependent Variable: HDI

Variables	(1)	(2)	(3)	(4)
Debt	-0.0176**	-0.0177	-0.0172	-0.0013
	(0.0054)	(0.0191)	(0.0190)	(0.0135)
CPI	-0.0036***	-0.0030**	-0.0029**	-0.0008*
	(0.0005)	(0.0011)	(0.0011)	(0.0003)
FDI	0.0295	0.0364	0.0357	0.0279
	(0.0249)	(0.0642)	(0.0633)	(0.0223)
GGCE	-0.214***	-0.2410	-0.2350	-0.0952
	(0.0438)	(0.2300)	(0.2300)	(0.0741)
INV	-0.1600***	-0.1680*	-0.1640*	-0.0351
	(0.0252)	(0.0792)	(0.0788)	(0.0345)
TO	0.106***	0.1020*	0.1000*	0.0249
	(0.0086)	(0.0424)	(0.0418)	(0.0154)
NR	0.0701***	0.0757	0.0750	0.0628**
	(0.0134)	(0.0610)	(0.0587)	(0.0230)
PI	-0.0396***	-0.0369***	-0.0365***	-0.0145**
	(0.0027)	(0.0101)	(0.0101)	(0.0049)
L.HDI	0.3740***	0.4100***	0.4190***	0.8190***
	(0.0334)	(0.1030)	(0.1010)	(0.0550)
Constant	0.5870***	0.6000***	0.5880***	0.1860***
	(0.0493)	(0.1370)	(0.1390)	(0.0389)
N	166	166	166	166
Instruments	14	18	20	114
AR2 (p-value)	0.382	0.143	0.140	0.143
Hansen-J (p-value)	-	0.701	0.886	1.000

Note: Standard errors in parentheses

** p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

Table 4A5: GMM Panel Data Estimation results
Dependent Variable: HDI

Variables	(1) Pooled OLS	(2) Fixed Effect	(3) GMM
Debt	-0.0162	-0.0217	-0.0240***
	(0.0208)	(0.0121)	(0.0043)
CC	0.0434*	0.0018	0.0054
	(0.180)	(0.0160)	(0.0084)
FDI	-0.0070	-0.0405	-0.0017
	(0.1210)	(0.0708)	(0.0216)
GGCE	0.0907	0.5410***	-0.0295
	(0.1460)	(0.0135)	(0.0366)
INV	-0.1120	0.2470**	-0.1010***
	(0.0950)	(0.0787)	(0.0192)
TO	0.1380***	0.0015	0.1110***
	(0.0293)	(0.0360)	(0.0068)
NR	-0.0221	-0.0890	0.0308*
	(0.0609)	(0.0537)	(0.0136)
PI	-0.0720***	-0.0160*	-0.0485***
	(0.0082)	(0.0066)	(0.0026)
L.HDI			0.2690***
			(0.0281)
Constant	0.4620***	0.4030***	0.4230***
	(0.0800)	(0.0668)	(0.0303)
N	181	181	167
Instruments			14
AR2 (p-value)			0.221
Hansen-J (p-value)			-

Note: Standard errors in parentheses
** p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

Table 4A6: Correlation Matrix

	Debt	CPI	FDI	GGCE	INV	TO	NR	HDI	PI
Debt	1.0000								
CPI	-0.2528	1.0000							
FDI	0.0500	-0.0954	1.0000						
GGCE	-0.0360	0.5482	-0.0329	1.0000					
INV	-0.3496	0.2560	0.5264	0.1231	1.0000				
TO	0.1451	-0.3165	0.4853	-0.0982	0.3591	1.0000			
NR	-0.2079	0.3048	-0.0239	0.2893	-0.0204	0.0148	1.0000		
HDI	-0.0369	0.0649	0.1305	0.1026	0.1682	0.4845	-0.0864	1.0000	
PI	-0.0990	0.3133	-0.0413	0.3558	0.1798	0.0190	0.0207	0.4434	1.0000

Table 4A7: GMM Panel Data Estimation results - Standardized coefficients
Dependent Variable: HDI

Variables	(1) Pooled OLS	(2) Fixed Effect	(3) GMM
Debt	-0.167*	-0.171***	-0.053**
CPI	-0.229**	-0.289***	-0.184***
FDI	0.032	0.003	0.015
GGCE	-0.098	0.100	-0.097***
INV	-0.227**	0.009	-0.127***
TO	0.539***	0.126	0.323***
NR	0.056	-0.277***	0.101***
PI	-0.460***	-0.050***	-0.293***

*Note: Standardized Coefficients; * p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001.*

CHAPTER 5: CONCLUSION

Corruption is public enemy number one in SSA because the social and political consequences of corruption in this region is enormous. In particular, SSA is still getting progressively poorer, with 100 million more Africans living in extreme poverty today compared to the 1990s. Endemic corruption denies many Africans access to education, food, medicines, energy and water. Corruption has contributed to state failure, instability, poverty and the eruption of civil wars over resources in several SSA countries.

Anti-corruption policies and initiatives proposed by major international organizations and governments in SSA cannot stymie corruption if the root causes are ignored. According to the Global Corruption Barometer for Africa (2019), the majority of Africans think corruption is getting worse in this region and that their governments are doing a bad job in tackling it. Corruption in this region is a symptom of governance failure. "All political systems need to mediate the relationship between private wealth and public power. Those that fail risk a dysfunctional government captured by wealthy interests" (Rose-Ackerman, 2004).

This thesis contributes to our understanding of the determinants and consequences of corruption by identifying key determinants of corruption specific to the SSA region, namely the size of the executive branch of government and the reliability of police. According to various surveys conducted by Transparency International, most Africans think the police and political leaders are the most corrupt. Political leaders are also responsible for the massive looting of Africa. Political leaders in Africa seek reelection

at all cost because holding public office gives them access to the state's coffers, as well as immunity from prosecution (Council on Foreign Relations, 2009). Therefore, to understand the impact of corruption in SSA, it is extremely important for researchers to look at these determinants or sources of corruption. This study is unique because it analyzes the relationship between the executive branch of government, the police and corruption and their impact on economic growth for the first time.

Finally, this study contributes to this literature by analyzing the theoretical and empirical impact of corruption and external debt on human development in the CFA franc zone countries. "Debt is a two-edged sword. Used wisely and in moderation, it clearly improves welfare. But, when it is used imprudently and in excess, the result can be disaster" (Cecchetti et al., 2011). Debt couple with corruption is devasting to these countries if we consider the very high interest rates faced by these countries on borrowing and the smaller public revenue collection. These countries therefore have more difficulties coping with higher debt levels.

5.1. Summary of the findings

The main results of this thesis can be summarized as follows:

Chapter 2 shows that the impact of the size of the executive branch of government and the reliability of police on corruption are significantly positive and negative respectively. In particular, the results indicate that a 1% increase in the size of the executive branch of government is expected to increase corruption by 0.01 %. This is expected in this region

because large size of government creates conducive conditions for rent seeking behavior, resource misallocation, and more importantly the massive looting of public funds. The results also show that a 1% increase in police reliability is expected to decrease corruption by 0.10 %. A more reliable police force can protect ordinary people and their property through the enforcement of laws and regulations. Without the enforcement of laws, corruption in the public sector thrives.

Chapter 3 indicates that corruption and the size of the executive branch of government have a negative impact on economic growth. Corruption has a negative and statistically significant impact on growth. According to the results, a one standard deviation increase in the corruption level will result in an expected decrease in per capita GDP growth rate by 0.45 of its standard deviation. The result also indicate that a one percent increase in the size of the executive branch of government will result in an expected decrease in per capita GDP growth rate of 0.02 units. Finally, the results show that a one standard deviation increase in the effectiveness and quality of the rule of law index will result in an expected decrease in per capita GDP growth rate of 0.916 of its standard deviation. This result is unexpected. A strong and effective judicial system is generally considered a major facilitator of economic growth as it ensures the enforcement of contracts and the protection of property rights (Hasan Lubna, 2011; Scully, 1988). One possible explanation may be the poor institutional framework common in this region.

Chapter 4 shows that both corruption and external debt have a significant negative impact on the human development index in the CFA franc region. If the Debt

ratio increases by one standard deviation, the HDI decreases by about 0.053 standard deviation. On the other hand, a one standard deviation increase in the CPI level leads to an expected HDI decrease of 0.184 of its standard deviation. Both debt and corruption can impact HDI negatively through their impact on health, education, and living standards.

5.2. Policy Implications

The analysis and the findings of this thesis suggest a number of policy implications for the SSA region, which are as follows:

- The results reported in Chapter 2 suggest that the larger size of the executive branch of government common in most SSA and the police foster corruption. These finding can help African governments, international organizations, and non-governmental organizations (NGOs) to devise policies which can help mitigate corruption in this region.
- Results in chapter 3 not only broaden our understanding of the role the size of the executive branch of government, the judicial system, and corruption play in impeding economic growth, but they also provide important policy implications for the growth promoting efforts of donors and other international organizations in devising anticorruption strategies that focus on the size of the political leadership and the judiciary.
- Finally, the results in chapter 4 not only broaden our understanding of the role external debt and corruption play in impeding human development in the CFA

franc zone, but they also have important implications for policymakers and government officials, NGOs, and international organizations focusing to improve HDI in this region. The negative impact of corruption and external debt on the socioeconomic development of this region can be mitigated if political and business leaders can mobilize the right mindsets rather than more funding, take responsibility and steps to address rising illicit financial flows, tax evasion, and the misallocation of resources. Improvements in HDI in the CFA franc region may start with effective governance, accountability, and the rule of law. An Effective management of the natural resources (forest and natural resources certification) in this region can also curb corruption and spur economic growth.

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