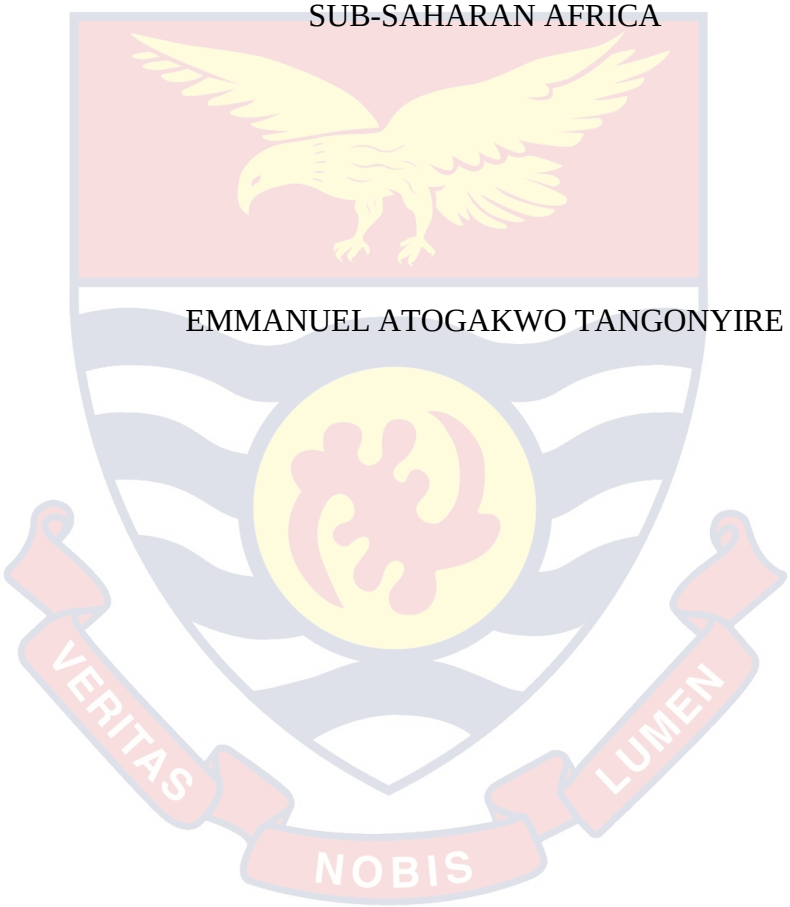
UNIVERSITY OF CAPE COAST

EFFECTS OF EDUCATION AND INSTITUTIONS ON CORRUPTION IN SUB-SAHARAN AFRICA



EMMANUEL ATOGAKWO TANGONYIRE

2020

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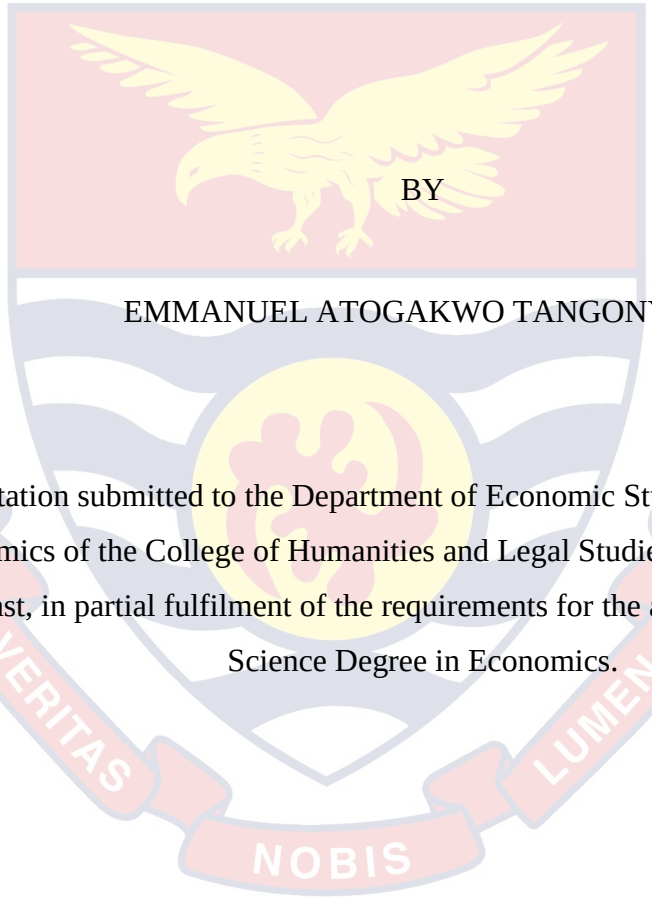

BY

EMMANUEL ATOGAKWO TANGONYIRE

Dissertation submitted to the Department of Economic Studies of the School of Economics of the College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Master of Science Degree in Economics.

DECEMBER 2020

DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: …….. Date: ……

Name: Emmanuel Atogakwo Tangonyire

Supervisors' Declaration

I hereby declare that the preparation and presentation of this dissertation were supervised in accordance with the guidance on supervision of dissertation laid down by the University of Cape Coast.

Principal Supervisor's Signature: ……Date: ……

Name: Mr. Jacob Nunoo

ABSTRACT

In the quest to fight against corruption, which has negatively affected development and peace in Sub-Saharan Africa, researchers have researched to ascertain the factors that influence corruption in the sub-region. Some works have explored the ways in which education affects corruption whiles others looked at the influence of institutions on corruption. This study was motivated by the limited literature that investigated the effects of both education and institutions on corruption. Using gross primary, secondary and tertiary school enrollments as proxies for education attainment, and rule of law, voice and accountability, control of corruption, regulatory quality, government effectiveness, political stability and economic freedom as proxies for institutions, the study investigated the effects education and institutions have on corruption. Sourcing data from WDI, WGI, HFI and TI from 2000-2017 for 41 Sub-Saharan African countries, the study employed fixed and random effect techniques. After the post-estimation test was done to cater for possible multicollinearity and Hausman test to select an appropriate technique – fixed effect model, the study revealed that while education has only positive effects on corruption, institutions have both positive and negative effects on corruption. In their conjoined form, education and institutions also show positive and negative effects. Given that educational attainment has positive effect on corruption, it is recommended that education policymakers of countries of Sub-Saharan Africa emphasize character formation as a key part of the education curriculum to educate populace that are not only competent but conscientious, compassionate and committed to the common good. Additionally, policy makers and anti-corruption institutions need to collaborate to put in place structures that will ensure that institutions work efficiently and effectively to improve their quality.

KEY WORDS

Corruption

Education

Effects

Institutions

Sub-Saharan Africa

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DEDICATION

To my parents and siblings

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ACRONYMS

GDP	Gross Domestic Product
HDI	Human Development Index
HFI	Heritage Foundation Index
OECD	Organisation of Economic Co-Orporation and Development
SSA	Sub-Sahara Africa
TI	Transparency International
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WDI	World Development Index
WGI	World Governance Indicators

CHAPTER ONE

INTRODUCTION

This correlational study investigates the relationship between education attainment and institutions in sub-Saharan Africa to ascertain whether or not they have any effect on corruption, and if they do what kind of effect. The study was inspired by a gap in existing corpus of literature on corruption research. Whereas a number of research works have explored the effects of education on corruption, very little is done on effects of institutions on corruption especially taking into consideration institutional variables including the rule of law, regulatory quality, governance effectiveness, and economic freedom. To the best of my knowledge based on search for research works on effects of both education and institutions on corruption, no study has been identified in Sub-Sahara Africa. Given that corruption continues to depress developmental efforts of countries in this region, the study aims to provide insights that can contribute to a deeper comprehension of the dynamics of corruption towards its mitigation.

Background of the Study

When Adam and Eve, our foremost parents fell short of God's favour in the Garden of Eden because of disobedience (Genesis 3:11-23), humanity has never been the same. We have lost our pristine nature, and become disobedient, greedy, selfish, and corrupt. Corruption has become part of the human story down the ages. This realization may have inspired Pope (2000), a former head of Transparency International to remark that corruption has been in existence since the inception of

humankind. Using Ancient India as an example, Kaufman and Wei (1999) recall of Kautilya, the King's Chief Minister referring to corruption as early as about 300 B.C. This implies that corruption has been there with us since the beginning of human civilization, especially with the creation of governments and institutions (Shabbir & Anwar, 2007). Today, after several millennia of human existence and civilization, corruption remains a household word across the globe despite that many people have died and others jailed because of corruption. Put differently, corruption is a universal multifaceted phenomenon from which no country is immune. Its common consequence is that it hinders human development and the common good.

However, the effects, magnitude and severity of corruption vary from country to country. As Šumah (2018) states, corruption is more prevalent in developing countries or countries in transition. Šumah identifies economically poorer countries, those with closed economies, with repressed media freedoms and a relatively low level of education, and countries that are experiencing some form of instability, as generally more susceptible to corrupt practices. Although the term corruption will be analyzed in detail in chapter two, it is important to clarify briefly that it denotes the use or abuse of public office for private gains (Gyimah-Brempong, 2002; & Odemba, 2012).

In sub-Sahara Africa, the stench of corruption lingers on almost every facet of life with Hope (2000) describing it as having reached cancerous proportions that are destroying the future of many societies in the region. According to Amundsen (1999), corruption is like a virus that infects almost all aspects of society and

destroys the functioning of vital organs, including cultural, political and economic structures of society. This means corruption symbolizes a deterioration in ethical and moral values in government structures and organisations, social norms, and human actions (African Development Bank, 2013). Nevertheless, despite the well-documented knowledge of these detrimental effects of corruption, it remains ubiquitous in human society. The study argues that corruption benefits the privileged and powerful few to the disadvantage of the majority in society. In other words, corruption benefits a small proportion of people in society and silently kills the masses. It is a great obstacle to the common good of all, and its widespread in society is not for good reasons. No wonder at the 20th anniversary of the Ghana Integrity Initiative's (GII), one of Ghana's anti-corruption bodies, Ron Strikker, The Netherlands' Ambassador to Ghana once charged the GII to pursue a "Ghana beyond corruption" (Bledge, 2019, p. 1).

Some of the ways countries have tried to check corruption are to collaborate with international anti-corruption watchdogs such as Transparency international and the World Bank; initiate country-based initiatives or actions to curb corruption. For example, Nwabuzor (2005) notes that when Obasanjo became president of Nigeria in 1998, besides setting up agencies such as the Independent Corrupt Practices Commission to help stamp out corruption, he also sacked one of his cabinet ministers as a deterrent to those who practise corruption. Similarly, in Ghana local state agencies including Economic and Organised Crime Office (EOCO), Audit Service, and most recently, the Special Prosecutor's Office were established to champion fight against corruption. The Ghana Integrity Initiative

(GII), and Tiger Eye PI are some non-state anti-corruption agencies or organisations which contribute to the fight against corruption. Although these agencies continue to fight corruption, it still remains a big challenge because corruption is deeply entrenched or institutionalised in Africa including Ghana. Thus, a remedy as well as a preventive measure some countries have embraced to address the problem is to equip their people with competence and moral solidity through education, and functioning institutions.

Education is a complex concept to unpack because of its link to every facet of life – economics, governance, finance, society, morality, justice, psychology, science and technology, just to cite a few. Nonetheless, the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 1974) presents education as the culture of lifelong learning and development of occupational skills and attitudes for the conscious development of individuals and nations. Education is about creating holistic and sustainable growth in human excellence, exemplified in peoples' ability to learn to know, to do, to be, and to live together (Tawil & Cougoureux, 2013) peacefully. It is about knowledge and value acquisition to help human beings pursue wholeness. Thus, the goals of education have cognitive, psychomotor, economic, and citizenship or character dimensions. It is in this sense of conceptualizing education as a tool to attain these goals at primary, secondary and tertiary education that the study reflects on its relationship with corruption. That is to say, the ways educational attainment can reduce or increase corruption.

The relationship between education and corruption has been a subject of much discussion in the scholarly and policymaking circles. Scholars like Mauro

(1995); Acemoglu, Johnson and Robinson (2004); Treisman (2000); Treux (2011); Cheung and Chan (2008); and Dimant and Shulte (2016) concur that education is an instrument that reduces or negatively influences corruption. This position is premised on the argument that education embeds in people tolerance, modesty, and social responsibility that make them aware and compliant with the moral code of their societies. In developed societies like the United States of America, Glaeser and Saks (2006) note that well educated people are less corrupt. Asongu and Nwachukwu (2015), who sought to determine the incremental effect of education on corruption in 53 Africa countries using secondary data from the World Bank from 1996-2010 have found that education is a powerful tool that negatively affects corruption. This is because it empowers people intellectually and economically and promotes their social mobility. In Poor countries like Niger or South Sudan where there is high level of illiteracy, people have not only little opportunities for socio-economic mobility from vicious cycle of poverty to virtuous cycle of wealth but as Rose-Ackerman (1999) notes, they lack the basic understanding of governmental operations. For such people, it is often not clear as to what they should expect from a legitimate government (Graeff & Mehlkop, 2003). In situations like this, corruption is more entrenched because people believe they ought to present a gift of gratitude for favourable decision (Pasuk & Sangsit, 1994) on otherwise, something that is their fundamental right.

However, looking at the nature of corruption from interdisciplinary perspective, Dimant and Schulte (2016) argue that higher educational attainment actually can promote corruption. Because highly educated people are more

productive and efficient, the skills and the socio-economic and political status they enjoy generate higher output and rents, which have the propensity to expose them more to corruption. Analyzing corruption in Africa, it is a well-documented fact that the mega corruption scandals the continent has experienced are caused by well-educated political figures. Zaire, now the Democratic Republic of Congo's Mobutu Sese Seko (Svensson, 2005), Nigeria's Sani Abacha (Pallister & Capella, 2000), and South Africa's Jackie Selebi (Schwella, 2013) are few cases in point. Mobutu for example, milked his country of its wealth amounting to US$ 5 billion (Svensson, 2005). The enculturation and replication of corrupt individuals in Africa in all spheres of society is a painful reality. A careful analysis of the Transparency International's annual Corruption Perception Index from 2000-2017 showed a trend of African countries being consistently ranked among the most corrupt countries in the world. According to the 2018 Corruption Perception Index by Transparency International, out of the ten most corrupt countries in the world, five are in Africa, and they are: Somalia, South Sudan, Sudan, Guinea Bissau, and Burundi (Desjardins, 2019). Only a few Sub-Sahara African (SSA) countries like Botswana, Cape Verde, South Africa, Mauritius, and Namibia can be cited as exceptions to this trend in corruption given that they have been consistently ranked among the first 50 countries with low levels of corruption globally.

Ahrend (2002), who explores the relationship between corruption and human capital and the monitoring capacities of civil society, concludes that the impact of education on corruption can be a double-edge reality. If education develops the capabilities of civil society to offer over-sight to government officials,

it can decrease petty corruption but such a development can also increase corruption because some enlightened members of civil society can connive and manipulate the system. These discussions clearly show that education can affect corruption positively, negatively or both.

Do institutions also affect corruption? The word 'institutions' has sociological, ethical, and legal connotations because of its role in human interaction. Institutions are humanly constructed rules or norms of behavior that constrain as well as shape behaviour of and interaction between people (North, 1991). The quality of institutions is defined by the quality of rule of law, regulatory quality, governance effectiveness, control of corruption, political stability, voice and accountability, and economic freedom. These variables will be explained in Chapter Three where the study considers the research methods. Interest in corruption research traces its origins to the emergence of institutional economics in social sciences in the early 1990s that stressed that being able to create a certain type of rules and regulations determines the well-being of the society (Acemoglu & Robinson, 2012).

Analysis of research literature on institutions and corruption shows that more work has been done on the effects of corruption on institutional quality as exemplified in the rule of law, governance, and voice and accountability, just to mention a few. For example, in *Corruption, Inequality and Rule of Law* (Uslaner, 2007) and 'Corruption and Development: New Initiatives in Economic Openness and Strengthened Rule of Law' (Nwabuzor, 2005), both authors agree that corruption negatively affects the rule of law. Research to gauge the effect of

institutions especially when it is considered from the variables outlined above, is scanty. One known work is Drehel, Kotsogiannis and McCorriston's (2015) article, 'How Do Institutions Affect Corruption and the Shadow Economy? that concludes that institutions affect corruption. They did not specify exactly what the nature of the effect is. However, Drehel et al. also studied institutional quality through the institutional variables of the rule of law index and government effectiveness in the Organization for Economic Co-operation and Development (OECD) countries. They conclude that strong and effective institutions mitigate the impact of corruption. Capturing the same view in a different way, Treisman (2000) had earlier observed that state intervention could positively influence corruption. In other words, weak institutions could be a major cause for corruption.

Statement of the Problem

The negative impact corruption has on the developmental efforts of nations is a known fact and as anti-corruption bodies like Transparency International (2018) reveal, Sub-Sahara Africa (SSA) receives its fair share of the effects of corruption. Desjardins (2019) describes SSA as one of the most corrupt regions in the world citing five of the ten most corrupt countries in the world as coming from Africa. They are Somalia, South Sudan, Sudan, Guinea Bissau, and Burundi. This challenge needs a solution. Therefore, is makes sense that there is increasing interest in corruption research and researchers have made some progress in defining corruption and its relationship with education, institutions, governance, and development (Dreher et al., 2009). Studies including works of Mauro (1995), Cheung and Chan (2008), Asongu and Nwachukwu (2015), and Dimant and Shulte

(2016) which have examined the effect of education on corruption conclude that education reduces corruption.

However, a challenge with the above claims or conclusions is that the authors assume that educational systems are of quality and are able to deliver their mandate of producing highly competent, conscientious and morally upright graduates who prioritise the common good. For example, from analysis of the public choice theory (Rose-Ackerman, 1978; De Graaf, 2007), it is argued that some educated individuals are able to manipulate professional spaces in a corrupt manner to maximize their personal benefits. Similarly, education may enlighten people to have a scorn for corruption but pressure from an existing institutional corrupt culture or clash of moral values, can make some of them succumb to corrupt practices.

Works of Nwabuzor (2005) and Dreher et al., (2009) that focused on the relationship between institutions and corruption concluded that strong institutions can mitigate corruption. A strength of these studies that have considered education and institutions separately in relation to corruption is that they have contributed to the understanding of corruption. Nonetheless, a shortfall of these studies is that none of them has explored the joint effect education and institutions can have on corruption. One thing that can be deduced from these studies is that education and institutions affect corruption in different ways. Given the detrimental influence of corruption on socio-economic and political development of nations, it is important that any study that can contribute to further the understanding of how education and institutions jointly influence corruption can be beneficial to a better understanding

of corruption and its control. Thus, this dissertation seeks to investigate the effects education and institutions can jointly have on corruption.

Objectives of the Study

The central objective of this study is to determine whether or not education and institutions have effect on corruption, and if so, what kind of effect. Specifically, the study:

- Examines the effect of education on corruption.
- Assesses the effect of institutions on corruption.
- Examine the joint effects of education and institutions on corruption

Hypotheses of the study

1. H_0: Education (TSE) do not have any effect on corruption.

   H_1: Education (TSE) have an effect on corruption.

2. H_0: Institutions (RL, RQ, VA, PolS and ECO) do not have any effect on corruption.

   H_1: Institutions (RL, RQ, VA, PolS and ECO) have an effect on corruption.

3. H_0: Education (TSE) and institutions do not have joint effect on corruption.

   H_1: Education (TSE) and institutions jointly have effect on corruption.

Significance of the Study

As mentioned earlier, the study investigates the effect of both education and institutions on corruption in Sub-Sahara Africa. Studying the dynamic of corruption through the lenses of its relationship with both education and institutions could

provide additional insights into a better understanding of the different ways' corruption is nurtured and perpetuated. These insights could be shared with policymakers to help design anti-corruption policies into educational and institutional programmes. The findings could add to the pool of knowledge on education, institutions and corruption. Overall, conducting this study provides a great opportunity to explore, think, and rethink what corruption mean and the intricate ways the tools of education and institutions curb or perpetuate it. Filling this research gap with meaningful data about the relationship between education and institutions and corruption was the underlying motivation for undertaking this study.

Delimitation

The scope of this study was limited to Sub-Sahara Africa where as Transparency International's 2018 report shows five of the most corrupt countries from the world come from. Given the detrimental role corruption plays in offsetting development efforts in Africa, studies focusing on corruption in this region remain crucial to help understand and formulate policies to address it.

Limitations of the study

One of the limitations of this study is measurement error, which arises from several sources of definition of corruption that result in different bases of analysis. Additionally, linking the level of educational attainment as well as institutions to the rate of corruption in a given country is difficult to measure since corruption is often a covert activity. Perpetrators will usually not want to disclose information

concerning the act. Thus, this study cannot claim to have adequately captured corruption in totality. Another limitation to this study is the unavailability of complete data from the various countries in terms of both the independent variables and dependent variable. Some countries have gaps in their data concerning various years and this makes the estimations and interpretation of the data quite difficult and may affect the accuracy of the results. To address this problem, the data was extrapolated to fill some of the gaps. Despite all these limitations, the study is worth the pain because it can contribute to the growing knowledge on the subject matter and can serve as a platform for future studies.

Organisation of the Study

The dissertation is divided into five chapters, of which this chapter is the first. Chapter Two is the literature review which analyses the concept of corruption in depth, looking at its manifestation in Sub-Saharan Africa, and its relationship with education and institutions. The research methods are considered in chapter three where the research design, data sources, and the variables are explained. Chapter Four represents the results and discussion that affirm or disaffirm the hypotheses, and finally, in chapter five, the summary, conclusions and recommendations are provided

CHAPTER TWO

LITERATURE REVIEW

Introduction

As clarified in Chapter One, the study determines the relationship between education and institutions, and corruption to gauge if they have any effect – positive or negative on corruption. This chapter reviews economic and social theories of corruption, analyses and synthesizes literature that relate to corruption especially what it means and its manifestation in Sub-Sahara Africa, and education and institutions.

Theoretical review

Scholars have identified different economic and social theories to study the dynamics of corruption in human society. De Graaf (2007) outlines some of the theories as public choice theory, principal agent theory, bad apple theory, organizational culture theory, and clashing moral values theory.

Public choice theory

Rose-Ackerman (1978), Klitgaard (1988) and De Graaf (2007) claim that at the core of the public choice theory are individual corrupt officials who volitionally and rationally manipulate professional spaces in a corrupt manner to maximise their private benefit. Individuals who indulge in corrupt activities believe that the potential benefits will outweigh the potential costs (Rose-Ackerman, 1978). Such corruption activities can occur in both micro and macro contexts. A strength of the public choice theory is that it is concentrates on a specific context of a corrupt

individual (Schinkel, 2004). However, by concentrating on individual corrupt officials, it implies that it fails to take into account the larger social context (De Graaf, 2007). Nevertheless, De Graaf credits the public choice theory for its ability to inspire discourses that point to the potential high costs of corruption including stern punishments. For example, surveillance, information gathering and auditing can help to uncover corruption to facilitate the meting out of punishments to the perpetrators (Anechiarico & Jacobs, 1996). There is the likelihood that awareness in such potential measures and punishments can dissuade individuals from corruption.

Principal agent theory

The principal agent theory is anchored on the belief that civil servants' primary responsibility is to promote the public good and so corruption occurs when such servants reverse the norm and promote private or personal benefits (Rose-Ackerman, 1978). This author adds that the theory acknowledges a relationship between citizens, civil servants, and clients that can be a conduit for corruption. The background to this study points out that corruption does not happen in a vacuum but through the media of institutions and education where people including citizens of a country like civil servants and clients manifest it. Thus, the acknowledgement by this theory of a relationship between citizens and corruption is apt. However, the theory's assumption that people are rational and good, and will prioritise the common good over private benefit is problematic.

Bad Apple Theory

This theory drives from the sociological dynamics of human interactions where deviants of norms that govern such interactions at family, community or national level gain the label of being 'bad nuts' or 'bad apples', often from moral point of view. From this perspective, the bad apple theory states that people with defective moral character exemplified by weaknesses such as greed and selfishness are susceptible to corrupt activities (De Graaf, 2007). This assumption makes lack of moral values the determinant of peoples' involvement in corruption (Tangonyire & Achal, 2012). This implies that education that equips them with strong moral values can avert corruption (Naim, 1995). A challenge with this assumption is that people may be morally sound but because of the drive for social mobility or standing and excitement, they can engage in corruption (Nelen & Nieuwendijk, 2003). However, it is hard to imagine that morally upright persons can relinquish moral values such as fairness, prudence, generosity, just to cite a few and engage in corruption for the sake of excitement or attaining higher social status.

Organisatonal culture theory

Punch (2000) states that the organisational theory looks at the macro culture and the structure of the organization within which the people work as the basis of corruption. The theory's basic assumption is that the system or group culture disposes people mentally towards corrupt behaviour. Thus, for organisational culture theory, it is the corrupt systems in the organization and not the defective moral character, which leads public officials to corrupt practices (Caiden & Dwivedi, 2001). This means that people who associate themselves with a corrupt

organizational culture or country run the risk of becoming corrupt because any attempt to resist the prevailing culture can mean betraying the group (Jackall, 1988; Punch, 2000). Therefore, discourses that aim to control corruption must target the transformation of the culture of the organization (Treviño et al., 2000). The tenets of this theory resonate with this study, which considers the effects of corruption in the macro contexts of national systems in sub-Sahara Africa especially through the lens of educational and institutional systems. The culture of a system or country or an institution plays a pivotal role in determining how corrupt or not people are because if corruption is a defining mark of an institution or a system, it becomes difficult for individuals who work in such contexts to be exempted from the temptations of corruption. Thus, this theory has a relevant relationship to this study which looks at the effects of education and institutions on corruption in sub-Sahara Africa.

Clashing moral values theory

The clashing moral values theory emphasises the dynamics between the public role and private obligation of corrupt officials. Rose-Ackerman (1999) explains that the causal chain of this theory starts with certain values and norms of the society that directly influence the values and norms of individuals and makes them corrupt. As Rose-Ackerman elucidates there is no such thing as distinction between private and public roles in some societies. Thus, in such societies, private appropriation of the benefits of public office does not constitute a corrupt practice because it is morally acceptable. The theory assumes that values determine behaviour and because of clashes of values connected to people's private and public

roles, they have to make choices. Because of the importance of loyalty to and pressure, friends or family, old-boy networks, alumni networks, and fraternities, public officials can succumb to act of corruption to maintain these bonds (Perkin, 1996). Politicians such as Members of Parliament or Ministers can be a good example of people whose experiences confirm the clashing values theory. For example, in Ghana, once people occupy political positions, society, family and friends believe they have solutions to all their financial, unemployment and other problems without consideration of the limitation of the politicians' income and authority. They assume that occupying such positions implies that the politicians have all the financial muscle and any failure to meet such demands can earn them bad labels that can cost their political ambitions. Thus to live up to such pressures, state officials feel compelled to abuse the power given to them by indulging in corruption (De Graaf, 2007). Communitarian spirit is common in sub-Sahara Africa. Thus, the central claims of the clashing values moral theory resonate with this study because the institutions and educational systems operate within such a context. As a result people have to deal with the difficult tension between allegiances to the public good and private and family good, and sometimes, against their will, they indulge in corruption to avert the immediate and direct pressure from family and friends.

In reflecting on these theories, one can deduce that as human formulations, none of them as a standalone theory is sufficient to enable us to have a complete grasp of the dynamic and complicated concept of corruption. However, elements

from each of them complement each other to allow for considerable understanding of corruption and the ways people, education and institutions nurture it.

Dissecting the Concept of Corruption

Corruption is a multidimensional, both in its nature and in the sets of reasons that people give for engaging in them (Dimant & Schulte, 2016). Corruption involves many different forms including bribery, embezzlement, fraud, and misappropriation of public resources, kickbacks, nepotism, and extortion, influence peddling, rigging of elections, tribalism, and favouritism. As such, people understand corruption differently in different contextual ways. The complexity of corruption and its susceptibility to contextual interpretations make it difficult to have one universally agreed definition. Khan (1995) defines corruption as an act that deviates from the formal rules of conduct governing someone's actions in a public authority position due to private motives such as wealth, power or status.

A year or two later, the World Bank (1997) and Robinson (1998) take up the task of defining corruption in a way that is coincidentally or deliberately similar. While the World Bank refers to corruption as the abuse of public office for private gain, Robinson sees it as an abuse of public roles or resources for private benefit. These two definitions are substantially the same referring to the abuse or misuse of authority or privilege positions by individuals to 'rob' and bulldoze public resources that are for the common good of all. These two definitions buttress equally the social, moral and economic aspects of corruption unlike Khan's definition. In choosing to emphasize the word 'deviate' as key word in his

definition, Khan seems to pay more attention to the moral element of corruption on which the social and economic dimensions rest. Fundamentally, however, all these three definitions convey the same meaning bringing out the reality of greed and power asymmetry as the basis for corruption. The strength of these definitions is on their ability to articulate the basis of corruption and the dimensions through which it can manifest itself.

A shortfall of these definitions, however, is that they overemphasize the role of the powerful abuser to the complete neglect of the role of those who are not in privilege positions but practice corruption because of their own ignorance, moral decadence or poor conscience. In other words, corruption links to abuse of public office for private gain but it also includes abuse of personal gifts or talents as well as application of morally decadent state for private gain. Therefore, for the purposes of this dissertation, corruption denotes the abuse or misuse of privilege position as well as personal talents by morally decadent individuals to rob public resources for selfish gains. Narcissism is the driving force for corruption.

Classification of Corruption

Corruption can be broadly classified as grand/political corruption, state capture, and administrative or petty corruption (Atuobi, 2007). Grand corruption typically takes place at the public sphere's top tiers and within the highest levels in business. Grand corruption always involves huge sums of money, and often involves actors like politicians and business executives who make rules, policies and executive decisions. Because of the influential people involved, grand

corruption may include kickbacks to win huge public procurement, irregularities to public finances, embezzlement of public funds, clientelism and political patronage. It can also manifest itself when multinational corporations pay millions of dollars to government or politicians to obtain contracts. This corruption is often referred to as political corruption, placing more emphasis on the negative effects of money in political process, campaigns and political parties (Tanzi & Davoodi, 1998).

According to Transparency International (2005) state capture corruption is the situation where economic elites develop relationship with political officials through whom they exert undue influence over them and over public policy for their own personal gains. Tax evasion and exemption usually are consequences of the state capture corruption. It also describes administrative or petty corruption as the everyday abuse of power entrusted by public officials in their daily interactions with ordinary citizens who are trying to access basic goods and services in places like hospitals, schools, police departments and other government agencies. In practicing this kind of corruption, the public officials do not only abuse their power by extorting bribes but force ordinary citizens to participate in corruption since it is the only way they can get the basic services they seek.

Determinants, manifestations and effects of corruption in sub- Saharan Africa

There is a consensus that the ubiquity of corruption is a global phenomenon (Everhart et al., 2009) and no country is impervious to it. There is empirical evidence that links most of the world's unpleasant human experiences or reactions

to corruption. For example Anderson (2011) and Aidt (2003) attribute the Arab Spring, India's poverty, Syrian Civil War, The sale of parliamentary seats in the 'rotten boroughs' of Great Britain before the Great Reform, and 'machine politics' in the immigrant cities in the United States in the 19th century, and some of the global economic scandals to corruption. This means that like the current Covid-19 pandemic, every country suffers from corruption, which Transparency International (2013) says is responsible for the destruction of lives and underdevelopment of many countries. Some dispositions and beliefs serve as determinants of corruption. One of them is the belief that the potential benefits of corruption will outweigh the potential costs (Rose-Ackerman, 1978). Another determinant is defective moral character exemplified by weaknesses such as greed and selfishness, which also determine corrupt activities (De Graaf, 2007). Clashing moral values that blur the boundary between what is for the common good and the private good is another determinant of corrupt activities. Mass poverty, as Nwabuzor (2005; Dreher et al.. 2009) single out, is another determinant of corruption in the developing world including countries in sub-Sahara Africa.

However, the degree or magnitude of corruption differs from one continent to another, and from country to country. Šumah (2018) claims that the most corrupt countries in the world are developing countries or countries in transitions. This implies that corruption manifests itself more in the poor countries of the world because majority of their population rely heavily on public services and often face demand for bribes (Warf, 2017) from public officials and civil servants. The United Nations Development Programme's (2017). Human Development Index report

presents sub-Sahara Africa as housing more than half of the world's extremely poor who are living in countries that are marked by transition and closed economies, low income, low level of education and poor governance. If corruption is deeply rooted in countries that are characterized by these realities and Africa is presented as a region that embeds them disproportionately, it is clear why the World Bank and Transparency International label sub-Sahara Africa as the most corrupt continent.

As stated briefly in the introductory chapter, corruption is notoriously familiar globally because of its capacity to affect economic, social and political activities. The exact effect corruption has on these activities or national development is a subject of scholarly contention. Whereas subscribers to the 'greasing the wheels hypothesis' like Leff (1964) and Méon and Weill (2010) argue that corruption might raise economic growth, a score of others including Mo (2001) and Gyimah-Brempong (2002) argue that corruption rather negatively affects economic growth. The pro greasing the wheels hypothesis anchor their central arguments on the role of corruption in averting bureaucratic delays, improving efficiency and as an incentive for hard work. For example, by offering bribes that will act as a speed money, people are able to avoid bureaucratic delays. Similarly, the ability to levy bribe will act as an incentives for government employees to work extra hard, especially in the situation where bribe acts as a piece rate. Situating their argument in the context of developing world like sub-Sahara Africa where dysfunctional institutions and bottle-neck bureaucracy constitute a major impediment to economic growth, Méon and Weill (2010) claim that corruption might actually act as a trouble-saving device and improve efficiency.

By helping to avert inefficient institutions and bureaucracies though may improve efficiency and economic growth but for who? Only for the selfish few individuals! It is difficult to imagine how corruption that helps to bypass the weak institutions can improve them to facilitate the progress of all. As Tanzi (1997, pp. 164–165) contests: "… I have little patience for those who try to find benefits in corruption in artificial or unusual situations. When corruption exists, it is often widespread, affects many decisions and many sectors, and distorts markets and the economy." It is now a common knowledge at least in Ghana that corruption frustrates economic development and the pursuit of the common good. It deflates economic, social, and political developmental efforts as well as gains already made in these spheres. In Sub-Saharan African countries including Nigeria, Kenya, Sudan, Somalia, and Ghana, just to mention a few, there is scientific evidence to conclude that corruption has a strong constraint on economic growth and development.

Using data sets from several African countries to estimate a growth equation, Gyimah-Brempong (2002) found corruption negatively affects growth rates, implying that African countries could increase economic performance by reducing corruption. Gyimah-Brempong is upbeat about the fact that for developing countries, the path towards economic advancement must pass through the route of improving their institutions and reducing corruption than through. These measures, according to him, are more efficient than both foreign aid and external development assistance. Resonant with this view on corruption is Mo (2000), who argues that corruption reduces economic growth and productive activities through its effects

on human capital and political instability. Moreover, corruption slows down economic growth and development by distorting incentives and market signals leading to the misallocation of resources, especially human talent into rent-seeking activities (Mauro, 1995). The evidence of corruption being detrimental to human developmental efforts is a well-documented fact and for this very reason, it is important to examine the role of education and institutions in curbing or perpetuating this social evil. This is because education and institutions are humanly devised tools to ensure the sustainable human progress and peaceful co-existence.

Effects of Education on Corruption

As explained in chapter one, the central goal of education is to equip people to know, to do, to be, and to live with others as they ascend from primary, secondary, and tertiary levels of educational maturity. It is about attainment of the needed knowledge, skills and habits to propel individuals and nations to sustainable development. While education occupies a privilege position to play a revolutionary role to transform human experiences for better, the reality turns out that education affects as well as is affected by social, economic, cultural and political realities of society. Both the theoretical and empirical literature is replete with evidence that the effects of education on corruption are mixed playing a transformational role that negatively influences corruption but also a conformist role to sustain or perpetuates corruption. Cross-country studies on corruption including Asongu and Nwanchukwu's (2015) and Cheung and Chan's (2008) works have shown that higher aggregate level of education in a country are connected with lower levels of

corruption as measured by aggregate ranking. This implies that the higher the educational attainment of aggregate populace of a country, the likelihood that corruption will be lower. Thus, these authors tout education as the powerful tool to fight corruption.

The negative effects education has on corruption are often cognitive and non-cognitive in character. The cognitive effects are the intellectual refinement that enables educated individuals to be creative and critical thinkers who are able to put their talents to fair wealth creation that benefits them and society. For Heyneman (2002), education induces non-cognitive skills such as patience and the willingness to sacrifice today's gain for future benefits. Well-educated people, as scholars argued, are likely not to participate in criminal activity and risky behaviors like corruption (Oreopoulos & Salvanes, 2009). A study by Beets (2005) states that higher levels of education rates are correlated with lower level of corruption for a range of education indicators such as literacy rates, enrollment rates and student-teacher ratio for primary grades. The results of Beets' descriptive analysis were remarkably consistent, as corruption at all these education indicators progressively reduces along corruption spectrum from the least corrupt to the most corrupt. These Findings resonate with Mauro's (1995) earlier findings that corruption is associated with lower levels of education inputs. According to Hunt and Laszlo (2012) who studied the effect of bribe paying on the poor in Peru and Uganda, increasing literacy among the poor reduces corruption. This is because much of the bribe paying among the poor is "unwitting" implying that the poor often do not realize that paying a bribe is not and should not be a normal part of a transaction.

This notwithstanding, some scholars believe that education increases rather than reduces corruption. Studies of Mocan (2004) and Kaffenberger (2012) show that individuals with high level of educational attainment are exposed to corrupt activities and are prone to indulge in corruption. Kaffenberger's (2012) study seeks to determine the effect of educational attainment on corruption participation in Sub-Sahara Africa. Using data from a cross-country study conducted by Afro Barometer project that looked at 20 Sub-Saharan African countries, she found that many levels of education have highly significant, positive effects on bribery participation. University graduates were shown to be the most prone to corruption participation followed by people who have gone beyond secondary education, such as attending a technical college. Completing secondary had only the effect of post-secondary schooling by fifty percent; with individual who completed secondary school five percentage more likely to engage in bribery than those with no education at all. In other words, educational attainment is directly proportional to corruption indicating that bribery grows progressively larger as one ascends the higher tiers of education. An education system that is rife with corruption teaches corruption as rational behaviour. If students can pay bribes or exchange sex to receive good grades, they learn that bribery is a normal way to get ahead in society. The same is true if bribes are required to move to the next grade level, to take a standardized test, get into a university and progress through it.

Painfully but arguably so, these, according to Hunt and Lazlo (2012) are standard practices in various African educational systems. The more time a student spends in a corrupt system, the more corruption becomes a part of the students

modus operandi, and the more likely it is that such a student will engage in corruption later in life (Kaffenberger, 2012). In Africa, students spend at least sixteen years between kindergarten and university, and so imagine an educational system that is characterized by corruption. Such a system obviously becomes a tool for nurturing and sustaining corruption rather than obliterating it. It is in this context that Truex (2011) asserts that education is consistently the strongest determinant of corruption acceptance. In reflecting on the merits of the arguments about the relationship between education and corruption, it can be concluded that education has both positive and negative effect on corruption.

Effects of Institutions on Corruption

Institutions, a set of rules and norms of behaviour that govern a society (North, 1989) have their quality defined by certain key variables such as voice and accountability, political stability, rule of law, control of corruption, governance effectiveness, regulatory quality, and economic freedom. The healthier these variables are the more quality institutions embed. The role of institutions in shaping economic development cannot be overemphasized. By establishing clear and enforceable property rights, which minimize transaction costs and reduce the threat of coercion, good quality institutions can be decisive in propelling economies to desired growth and development especially in productivity, capital accumulation, and per capita output (Hall & Jones, 1999; Rodrik, 2004). Few attempts have examined the relationship between institutional quality variables and corruption in empirical, cross-national settings that focus exclusively on developing countries

including those of Africa. One of such studies is Paldam's (2002) work that considered state regulation and corruption. The author found that highly regulated states have higher level of corruption. Goel and Nelson (2005) who have studied the relationship between political and economic variables and corruption conclude that where there is both political and economic freedom, corruption level reduces.

Political, economic and social stability are an important precondition for a successful mitigation of corruption because such stabilities enable governments and the citizens to promote transparent mechanisms for monitoring assessment and control of corruption (Fatić, 2000). Where there is political and economic instability, corruption becomes the available option for survival for citizens. An empirical cross-country study by Broadman and Recanatini (2002) helps to appreciate this claim. Using the regress Graft Index of perceived corruption calculated by Broadman and Recanatini (2002) examine the importance of competitive market institutions and effectiveness and transparency of legal systems in decreasing corruption in 26 transition countries. The authors conclude that where there are greater entry barriers, less effective legal systems, less competitive infrastructure services, corruption is high. However, in situations of increasing democracy, there is a reducing effect on corruption. What these studies have examined is how one or two of the institutional variables ascertain how they relate to corruption. The consensus is that when these variables are available in a system and functionally effective, they mitigate corruption. Nonetheless, none of these studies has examined the relationship between institutions and corruption by factoring in all the institutional variables such as voice and accountability, political

stability, rule of law, control of corruption, governance effectiveness, regulatory quality, and economic freedom. It will be interesting to see how, by using all these in this study to explore the connection between institutions and corruption can help to extend our understanding of the effects of institutions on corruption.

Summary of Chapter

This chapter has reviewed literature on the key studies on corruption, education and institutions. By examining and analyzing existing literature on corruption, it was possible to understand its meaning, classification, manifestation and effects on the economies in Sub-Sahara Africa. It also provides the opportunity to appreciate the efforts scholars have made to gauge the effect education as well as institutions have on corruption. By so doing, it was clear that the corpus of literature on corruption research has neglected the need to examine the effect that both education and institutions have on corruption in Sub-Sahara Africa. Therefore, the review of literature in this chapter has helped to confirm my research problem and the need to fill that gap. The next chapter considers the research methods.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter focuses on data collection and analysis to determine the effect of education and institutions on corruption. It contains the research design used to investigate the research problem. The chapter also explains the context of the research, data sources, and specifies the data analysis model, its description, measurement, and the variables, estimation techniques and the post estimation tests.

Research Design

The main objective of this study was to find out whether or not education and institutions have effect on corruption, and if so, what kind of effect. This implies that the study sought to establish a relationship between two situations – education and corruption; institutions and corruption; and education and institutions, and corruption. Thus, the most appropriate research approach that can specify the relationship between these phenomena is correlational research because correlations establish the existence of relationship or connections between two or more situations (Kumar, 2011). Given that the study seeks to achieve its objectives through empirical assessments that involve numerical measurement and analytical approaches (Zikmund et al., 2010) the research assumed a quantitative nature. Thus, by embracing a quantitative design, it is possible to replicate the study and generalize its findings.

Research Context and Sources of Data

The study employed panel of 41 sub-Sahara African countries – the research context, using annual data for the period 2000 to 2017 obtained from World Governance Indicators (WGI), World Development Indicators (WDI), Transparency International (TI), and Heritage Foundation Index (HFI) (2000-2017). This means that the study analysed secondary data to respond to the research objective stated in Chapter One. This period was selected because of some reasons including, first, data availability, and second, the currency of corruption and its negative effects on poverty eradication and operation and growth of businesses. For example, despite that corruption has always been part of humanity (Pope, 2000), Asiedu and Freeman (2008) state that since 2000, 74 per cent of countries around the world acknowledged that corruption is a major problem to their growth and private businesses.

In fact, the African Governance Report II describes corruption as "the single most important challenge to the eradication of poverty" (Economic Commission for Africa, 2009, p. 12). Sub-Saharan Africa was chosen as research context due to the continent's relatively higher levels of corruption and declining knowledge index (Anyanwu, 2014). The data for Gross Domestic Product (GDP) and Education variables was gathered from the World Bank's Development Indicators specifically from the world bank national accounts data and the Organization for Economic Cooperation and Development (OECD). In addition, data on the level of corruption was obtained from the Transparency International's Corruption Perception index, while the data on institution/governance was from Transparency

International's documentation of the World Government Indicators (WGI). The economic freedom data was sourced from the HFI.

Panel Data Analysis

The panel data analysis was used for this study because scholars adjudge it as the most effective analytic method for studies that extract and handle data from multiple sites, periodically observed over a defined time frame (Stock & Watson, 2015). This analytic framework is effective in handling data panel set consisting of data for **n** different entities observed at different periods of **T**, which Stock and Watson (2015) illustrate below:

$(X_{it}\ Y_{it})$, I = 1, ... n and t = 1, ...T (1)

Deducing from this equation, a simple linear data panel model with one explanatory variable can emerge as follows:

$Y_{it}=\alpha+\beta X_{it}+u_{it}$ (2)

Apart from the fact that the panel data analysis fits the research, it also has several advantages including its ability to increase reliability of the results regardless of sample size, the degree of freedom, and deal with multicollinearity between independent variables (Hsiao, 2007). It is able to address the impact of variable bias even with unbalanced panel data, and offers more nuanced analyzes compared to stand-alone time series or cross-sectional data analysis. In addition to capturing the behaviour of the variables, panel data analysis also provides a more efficient estimation and information of the variables (Greene & Hensher, 2010; & Hsiao, 2007). The appropriateness and above advantages of the panel data analysis

imply that using it for the analysis can contribute to arriving at reliable and valid findings.

Estimation technique/models for panel data analysis

The most widely recommended and used techniques for the analysis of panel data are fixed and random effect models (Torres-Reyna, 2007; Schmidheiny, 2011). Since this study uses panel data drawn from 41 different sub-Saharan African countries, it is important that the study uses random and fixed effect models for the analysis. The fixed effect model assumes the unobservable parameters to be estimated along with the coefficient of the model. The random effect model assumes that the unobservable country-specific effect is assumed to be a random disturbance that is distributed independently of the idiosyncratic disturbance that varies over time as well as across countries (Schmidheiny, 2011). Both the fixed and random effect models were used and this was based on the assumptions that underlay the country-specific effect. Hausman test was used to further determine which estimation should be accepted among the results from the fixed and random effects.

Fixed and Random effects models

Using a panel data model, a fixed and/or random effect is examined for individual variables at a time. The function of dummy variables draws the fundamental difference between the models for fixed and random effects. A parameter estimate of a dummy variable is part of the intercept in a fixed-effect model and is part of the error component in the random variable. Nonetheless, in

both models of fixed and random effects the slopes remain the same across groups or period. The functional form of the models for fixed and random effects is set out below.

Fixed effect model:

$$y_{it} = (\alpha + \mu_i) + X'_{it}\beta + v_{it} \quad (3)$$

The fixed effect, which is also known as Least Squares Dummy Variables (LSDV) model, is a data analysis panel where each entity controls variables that are constant over time but differ across entities (Stock & Watson, 2015).

Random effect model:

$$y_{it} = \alpha + X'_{it} + (\mu_i + v_{it}) \quad (4)$$

With the random effect, the panel data analysis handles the constants for each section as a random parameter instead of fixed (Asteriou & Hall, 2006). In this case, μi is a fixed or random effect specific to the individual (group) or the period excluded in the regression and the errors are distributed separately and identically, $vit \sim IID(0, \delta_v^2)$. Besides these models are post estimation techniques or tests.

Post Estimation Technique

The following post estimation tests are conducted to ensure that the estimates from the regression are robust and consistent. The tests help to gauge the fitness of the model estimated in the study, for example to know whether to use the random or fixed effect.

$$\text{LM} = (b_{LSDV} - b_{random})' \grave{W}^{-1} (b_{LSDV} - b_{random}) \sim X^2(k) \quad (5)$$

$$= \text{Var}\,[(b_{LSDV} - b_{random}] \quad (6)$$

$$= \text{Var}\,(b_{LSDV}) - \text{Var}\,(b_{random}) \quad (7)$$

In equation (5), Ẁ represents the difference in the estimated covariance matrices of LSDV (robust model) and GLS (efficient model). This, however, follows the chi-square distribution with *k* degrees of freedom. The formula explains that a Hausman test examines if the random effects estimates are significantly different from the unbiased fixed-effects estimates. If the null hypothesis, which states that there is no correlation, is rejected, it means that the individual effects μ_i are significantly correlated with at least one of the regressions in the model. After the Hausman test for both the random and fixed effect models, the p-value for both models resulted in significant level, lower than the critical value of 0.05. This implies that the random effect is inconsistent leading to the rejection of the null hypothesis. This gives way for the use of the fixed effect. The weakness associated with the Hausman test, according to Greene and Hensher (2010) though is that the difference of covariance matrices, Ẁ may not be positive definite.

Model specification

Based on the panel data analysis method explained above, the effect of education and institutions on corruption in Sub-Sahara is investigated. The model of the equation, which is based on the model of panel data analysis is explained as model specification for education on corruption, institutions on corruption, and education and institutions on corruption.

Model specification for education on corruption

$$CORR_{it} = \beta_0 + \beta_1 EA_{it} + GDP_{it} + u_{it} \quad (8)$$

The functional form of the model is specified as:

$$EA_{it} = f(PSE_{it}, SSE_{it}, TSE_{it}) \quad (9)$$

Where,

EA_{it} = Educational Attainment

PSE_{it} = Primary School Enrolment (gross %)

SSE_{it} = Secondary School Enrolment (gross %)

TSE_{it} = Tertiary School Enrolment (gross %

u_{it} = Error Term

Expressing equation (8) in a more explicit form, it becomes:

$$CORR_{it} = \beta_0 + \beta_1 PSE_{it} + \beta_2 SSE_{it} + \beta_3 TSE_{it} + \beta_5 InGDP_{it} + u_{it} \quad (10)$$

Where β_1 through to β_5 are the parameters or the slope of the independent variables. β_0 is the intercept, implying that if all the other variables are given as zero, it explains the dependent variable in the equation. The coefficients of the education variables are expected to be ambiguous implying that the signs could be positive or negative (β_1, β_2 and $\beta_{3<}{}^{>}0$). The Logarithmic transformation on GDP in equation (10) was to account for the non-linearity in the variables that were selected, and its coefficient (β_5) is expected to be negative.

Model specification for institutions on corruption

$$CORR_{it} = \beta_0 + +\beta_1 INS_{it} + GDP_{it} + u_{it} \quad (11)$$

The functional form of the model is:

$$INS_{it} = f(VA_{it}, RL_{it}, GOVE_{it}, Pols_{it}, CC_{it}, RQ_{it}, ECO_{it}) \quad (12)$$

Where,

INS_{it} = Institutions

VA_{it} = Voice and Accountability

RL_{it} = Rule of Law

$GOVE_{it}$ = Government Effectiveness

$Pols_{it}$ = Political Stability and Absence of Violence

CC_{it} = Control of Corruption

RQ_{it} = Regulatory Quality

ECO_{it} = Economic Freedom

u_{it} = Error Term

Expressing equation (11) in more explicit form,

$$CORR_{it} = \beta_0 + \beta_1 VA_{it} + \beta_2 RL_{it} + \beta_3 GOVE_{it} + \beta_4 Pols_{it} + \beta_5 CC_{it} + \beta_6 RQ_{it} + \beta_7 ECO_{it} + \beta_8 InGDP_{it} + u_{it} \quad (13)$$

Where β_1 through to β_8 are the parameters or the slope of the independent variables. β_0 is the intercept, which implies that if all the other variables are zero, the coefficient β_0 will explain the dependent variable in the equation. Theoretically, the coefficients of β_1, β_2, β_3, β_4, β_5, β_6 and β_7 in equation (13) are expected to be negative. Logarithmic transformation was done on the control variable (GDP) in equation (13) to account for the non-linearity in the variables that were selected. The coefficient (β_9) is expected to be negative, implying that growth in GDP per capita will reduce corruption.

Model specification for education and institutions on corruption

$$CORR_{it} = \beta_0 + \beta_1 EA_{it} + \beta_2 INS_{it} + GDP_{it} + u_{it} \quad (14)$$

The functional form of the model specified is:

$$EA_{it} = f(PSE_{it}, SSE_{it}, TSE_{it}) \quad (15)$$

$$INS_{it} = f(VA_{it}, RL_{it}, GOVE_{it}, Pols_{it}, CC_{it}, RQ_{it}, ECO_{it}) \quad (16)$$

Where,

EA_{it} = Educational Attainment

PSE_{it} = Primary School Enrollment (gross %)

SSE_{it} = Secondary School Enrollment (gross %)

TSE_{it} = Tertiary School Enrollment (gross %)

INS_{it} = Institutions

VA_{it} = Voice and Accountability

RL_{it} = Rule of Law

$GOVE_{it}$ = Government Effectiveness

$Pols_{it}$ = Political Stability and Absence of Violence

CC_{it} = Control of Corruption

RQ_{it} = Regulatory Quality

ECO_{it} = Economic Freedom

u_{it} = Error Term

Expressing equation (14) in a more explicit form, the following equation is derived:

$$CORR_{it} = \beta_0 + \beta_1 PSE_{it} + \beta_2 SSE_{it} + \beta_3 TSE_{it} + \beta_4 VA_{it} + \beta_5 RL_{it} +$$

$$\beta_6 GOVE_{it} + \beta_7 Pols_{it} + \beta_8 CC_{it} + \beta_9 RQ_{it} + \beta_{10} ECO_{it} + \beta_{11} GDP_{it} + u_{it} \quad (17)$$

Where β_1 through to β_{11} are the parameters or the slope of the independent variables respectively, β_0 is the intercept, suggesting that if all the other variables are zero, the coefficient β_0 explains the dependent variable. The coefficients of β_4,

β_5, β_6, β_7, β_8 and β_9 in equation (17) are expected to be negative. That is β_4, β_5, β_6, β_7, β_8 , $\beta_9 < 0$ implying that any changes in any of the predictor variables will reduce the level of corruption.

However, concerning Sub-Sahara Africa, the coefficient of the institutional variables may show ambiguous signs based on the governance and institutional structures that exist in the countries of the region. For instance, some countries in Africa may have the voice and the ability to hold their leaders accountable for their transgression while in office, but they may be too passive to do so due to constraints such as tribal, political, religious and geographical interests (Uwimana, 2012). In many Sub-Sahara African countries, imports and exports licenses and exchange rate control, regulatory quality can curb or promote corruption.

Furthermore, the coefficients of the education variables are expected to be ambiguous implying that the signs could be positive or negative (β_1, β_2 and $\beta_{3<}^{>}0$). Studies by Kaffenberge (2012), Mocan (2004), and Truex (2011) converge in the view that education activities positively influence corruption because as individuals climb the educational ladder, they become more susceptible to corrupt activities. This position is in contradistinction with the findings of Asongu and Nwachukwu (2015), Cheung and Chan (2008), and Beets (2005), which posit that education plays a crucial role in combating corruption

Logarithmic transformation was done on GDP on equation (13) to account for the non-linearity in the variables that were selected. The equation is as follows:

$$CORR_{it} = \beta_0 + \beta_1 PSE_{it} + \beta_2 SSE_{it} + \beta_3 TSE_{it} + \beta_4 VA_{it} + \beta_5 RL_{it} + \beta_6 GOVE_{it} + \beta_7 Pols_{it} + \beta_8 CC_{it} + \beta_9 RQ_{it} + \beta_{10} ECO_{it} + \beta_{11} InGDP_{it} + u_{it} \quad (18)$$

GDP is in current US dollars and has larger figures as compared to the other variables. In addition, the log-log model also known as the log-linear model has an interpretation as elasticities, unlike the linear model that has an interpretation as marginal effects. The log-linear model assumes a constant elasticity over GDP data set. The log-linear model decreases the magnitude of the variables. This reduces the possibility of heteroscedasticity in the model (Gujarati & Sangeetha, 2007) The coefficient of GDP (β_{11}) is expected to be negative meaning economic growth reduces corruption activities. According to Aidt (2009) economic growth will reduce corruption as corrupt leaders will want to receive their bribes but to do this, they need to hold on to power and pander to their people in the short term by reducing corruption. Paldam (2002) also maintains that a growing economy has more resources to invest in the prevention of corruption.

Interaction of education (TSE) on institutions

$$CORR_{it} = \beta_0 + \beta_1 EA_{it} + \beta_2 INS_{it} + GDP_{it} + u_{it} \quad (19)$$

Expressing equation (19) in a more explicit form, the following equation is derived:

$$CORR_{it} = \beta_0 + \beta_1 TSE * RQ_{it} + \beta_2 TSE * GOVE_{it} + \beta_3 TSE * RL_{it} + \beta_4 TSE * CC_{it} + \beta_5 TSE * VA_{it} + \beta_6 TSE * ECO_{it} + \beta_7 TSE * PolS_{it} + \beta_8 PSE_{it} + \beta_9 SSE_{it} + \beta_{10} TSE_{it} + \beta_{11} VA_{it} + \beta_{12} RL_{it} + \beta_{13} GOVE_{it} + \beta_{14} Pols_{it} + \beta_{15} CC_{it} + \beta_{16} RQ_{it} + \beta_{17} ECO_{it} + \beta_{18} InGDP_{it} + u_{it} \quad (20)$$

Description, measurement and justification of variables

In determining the effects of education and institutions on corruption in Sub-Sahara Africa, the study made use of annual data over the period of 2000 to 2017 containing eleven independent variables, which fall under the categories of education, institutions, and control variables. The educational variables are educational attainment, which comprises gross primary, secondary, and tertiary enrollments. The institutional variables are voice and accountability, rule of law, government effectiveness, political stability and absence of violence, control of corruption, regulatory quality, and economic freedom, and finally, the control variable – gross domestic product (GDP). These variables are examined in relation to the dependent variable – corruption perception index (CPI), to ascertain the effect education and institutions have on corruption.

Corruption perception index (CPI)

The CPI measures the level of corruption in a country at a particular point in time. As defined in chapter two, corruption in this dissertation is understood as abuse, dishonesty or criminal activity undertaken by a person or organization entrusted with a position of authority for private gain. CPI, which Transparency International, the global anti-corruption non-governmental organization issues annually, ranks countries by their perceived level of public corruption. Although some researchers accuse the CPI as being subjective, it is the most recommended and used index by researchers to measure corruption (Abramo, 2008); Asongu & Nkwachukwu, 2015). The CPI ranks countries on a scale of 0 and 100. The score of zero indicates a high level of perceived corruption in which commercial

transactions are entirely dominated by corruption, bribery, extortion, while a CPI score equal of hundred indicates that the country is quite clean.

Educational Attainment

Educational attainment represents the highest level or degree of education a person has completed. For Jenkins and Sabates (2007), it is more about the direct outcome of education as opposed to the input, process or the indirect outcome. In order to have a formal education, one goes through some stages, from pre-schools or kindergarten to primary school or elementary school, then to secondary school, tertiary school, and any other higher educational attainment such as master's degree or doctorate. The variable of interest, which is education, is measured as a level of school enrollment in primary, secondary and tertiary school or education. Asongu and Nwachukwu (2015) who have used these variables in their cross-country studies on corruption in Sub-Sahara Africa recommend that they can be used to determine the effect that education has on corruption.

Primary school enrollment: These authors explain primary school gross enrollment ratio as the ratio of total enrollment, regardless of age, to the age group population, which corresponds officially to the educational level shown. Primary education provides basic reading, writing, and math skills to children, along with a basic understanding of subjects such as history, geography, natural science, social science, art, and music.

Secondary school enrollment: For the secondary school gross enrollment ratio, Asongu and Nwachukwu refer to it as the ratio of total enrollment, regardless of

age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using teachers that are more specialized.

Tertiary education enrollment: The tertiary education gross enrollment ratio denotes the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. A successful completion of secondary education is a prerequisite for ascendance to the tertiary level of education.

Institutions

Institutions connote a set of rules that govern a society. Because the concept is multidimensional in character, for example, encompassing democracy, social services, economic growth, et cetera, capturing and measuring institutions or institutional qualities is difficult. Nonetheless, Kraay, Kaufmann and Mastruzzi (2010) devised proxies, which measure on a scale of -2.5 to 2.5 for the following institutional qualities: rule of law, government effectiveness, political stability and nonviolence, control of corruption, voice and accountability and regulatory quality (Chakraborty, 2017; & Okonkwo, 2017). Kraay, Kaufmann and Mastruzzi (2010) explain that on the scale -2.5 shows bad quality of institutions whereas 2.5 represents good quality of institutions. These indices, which fall under the umbrella of the world governance indicators, constitute what this study relies on.

Rule of law: As a governance indicator, rule of law captures perceptions of the extent to which citizens trust in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, the courts as well as the likelihood of crime and violence. The estimate gives the country's score on a scale of -2.5 to 2.5 where the lower the value, the poor the quality of rule of law, and thus, increases corruption. Since better laws and order increase the likelihood of identifying and punishing illicit rent appropriations, a perception that the rule of law is strong lowers the incentives to behave dishonestly.

Government effectiveness: This index captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of government's commitment to such policies. The Kraay, Kaufmann and Mastruzzi's estimate gives the country's score on a scale of -2.5 to 2.5 where the lower the value, the less effective government is, and thus, increases corruption.

Political Instability: Also known as flow of political exchange (Claude, 1975), political stability represents a system where members of an administration and government can democratically change power without violence. Political stability gauges the perceptions of the likely effects of politically motivated peace and stability on a country. Its opposite is political instability, which refers to the perception of the likelihood that a government will be destabilized or overthrown unconstitutionally or violently by means of political violence or terrorism. The estimate gives the country's score on a scale of -2.5 to 2.5 where the lower the value, the poor the quality of political stability, and thus, increases corruption. High

political instability has a direct relationship with high level of corruption (Billger & Goel, 2009; Campbell & Saha, 2013). For example, a government official who knows his or her term in office will be short-lived because of a prevailing political instability is more likely to be involved in rent-seeking behaviour (Park, 2003).

Control of corruption: Control of Corruption measures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Moreover, the Kraay, Kaufmann and Mastruzzi's estimate gives the country's score on a scale of -2.5 to 2.5 where the lower the value, the poor the control of corruption, and therefore, increases corruption.

Voice and Accountability: Voice and accountability help to understand the extent to which a country's citizens are able to participate in selecting their government as well as enjoy freedom of expression and freedom of association. Similarly, the estimate gives the country's score on a scale of -2.5 to 2.5 where the lower the value, the poor the voice and accountability is, and thus, increases corruption. A public official in a country where citizens believe that these freedoms are high and well secured is likely to feel a rapid discovery and punishment for a corrupt act.

Regulatory Quality: Regulatory quality as a variable of institutional quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. The Kraay, Kaufmann and Mastruzzi's estimate gives the country's score on a scale

of -2.5 to 2.5 where the lower the value, the poor the quality of regulation, and thus, increases corruption.

The Heritage Foundation Index of Economic Freedom: This institutional index explains a government's ability to protect economic and civil liberties of its constituents. This index is measured in 10 different components where each component outcome is assigned a score from 0 to 100 with 100 representing the most free and 0 is least free of corruption. The ten components are property rights, government integrity, fiscal health, business freedom, labour freedom, financial freedom, tax burden, monetary freedom, government spending, and judiciary effectiveness. Several studies have concluded that economic freedom reduces corruption in a society (Acemoglu & Verdier, 1998) because economic freedom shows how open countries are to competition; the level of economic intervention by government; and the autonomy and power of judiciary systems to implement rule of law (Eiras, 2003). This implies that lack of economic freedom due to lack of rule of law, for instance, can increase corruption.

The Gross Domestic Product (GDP)

GDP is the sum of gross value added by all resident producers in the economy plus any product taxes minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources (World Bank, 2016) Data are in constant 2010 U.S. dollars. GDP is included in the model in order to control for the economic prosperity of the citizens. In economic theories such as two gap, big push, stages of growth, the vicious cycle of poverty and other

economic growth theories, economic growth is viewed as a necessary but not a sufficient condition for poverty reduction. This is because a country may experience economic growth but if the benefits do not trickle down to the masses, many people will remain in poverty.

By considering GDP per capita, which is gross domestic product divided by midyear population, the model controls for the effect of GDP on household income, which may positively affect school enrollment level and cause an ultimate effect on corruption level in the current period (Frimpong & Adu, 2014)

Diagnostic Test

A major methodological issue associated with the analysis of panel data is the possible correlation between the error terms of different periods. This leads to the violation of the assumption of constant variance for the error term that is Var ($\mathcal{E}_{it}$) $\neq$δ, known as heteroscedasticity). Therefore, a post-estimation test of this assumption was done to determine the estimates' efficiency. The study conducted a modified Wald test in testing for heteroscedasticity in the fixed effects model and Panel Groupwise Heteroscedasticity Tests (for random models). The concentration was not on multicollinearity since panel data has the advantage of containing less multicollinearity (Hsiao, 2007). In order to correct for serial correlation and possible heteroscedasticity, the study run a robust command as part of the panel estimate.

Summary of Chapter

This chapter explained the research design for the study, which is correlational and quantitative in nature. Relying on secondary panel data involving 41 Sub-Sahara African countries, the data was analysed using the fixed and random effect technique. The results obtained from the analysis are interpreted, presented, and discussed in the next chapter.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This correlational research, which drew secondary quantitative data from 41 countries in Sub-Sahara Africa from 2000-2017 sought to investigate whether or not education and institutions have any effect on corruption. The panel data analysis technique was used. A run of Hausman's test enabled me to choose between fixed and random effects for the interpretation. This chapter presents and discusses the results. The first section is an explication of necessary descriptive statistics. In the second section, guided by the following hypotheses of the dissertation, the results or the research empirical estimates (estimates of fixed and random effects) are presented:

1. H_1: Education (TSE) has an effect on corruption.
2. H_1: Institutions (RL, RQ, VA PolS and ECO) have an effect on corruption.
3. H_1: Education (TSE) and institutions (RL, RQ, CC, VA, GOVE, PolS and ECO) have joint effect on corruption.

The final section is an interpretation and discussion of the findings by putting them into dialogue with the literature.

Descriptive Statistics

In conducting any regression analysis, it is crucial to get the data set to know the information it conveys. The descriptive analysis briefly addresses the basic

statistical properties of the variables used in the model for the period between 2000 and 2017. The descriptive statistics contain the means, minimum, maximum, and standard deviation and are presented in Table 1.

Table 1: ***Summary Statistics of Variables, 2000 to 2017***

Variable	Obs	Mean	Std. Dev.	Min	Max
CORR	663	13.164	15.450	1	65
CC	663	-0.621	0.617	-1.563	1.217
GOVE	663	-0.700	0.595	-1.884	1.057
RQ	663	-0.626	0.572	-2.236	1.127
RL	663	-0.667	0.636	-2.009	1.077
VA	663	-0.230	5.285	-1.839	94.976
PolS	663	-0.460	2.298	-2.699	38.105
GDP	663	1760.261	2569.044	113.567	16433.94
SSE	663	45.102	19.762	6.197	109.444
PSE	663	102.090	19.568	32.356	149.308
TSE	663	8.510	6.438	0.352	40.596
ECO	663	147.668	80.651	1	309

Note: Std. Dev. = Standard Deviation; Min = Minimum; Max = Maximum; Obs =Observations.
Source: Tangonyire (2020)

From Table 1, the mean that is the average value within the study period for each of the variables is shown. For the dependent variable, CORR, the mean value is 13.164. This shows that averagely, the selected Sub-Sahara African countries have quite a low CPI judging from the scale of 0 to 100 used for ranking of countries

by Transparency International (2018) where a score of 100 denotes a country is free of corruption. A careful analysis of the Transparency International's annual data on global CPI from 2000 to 2017 shows Sub-Sahara African countries are perennial low-flyers having been consistently ranked poorly. With the exception of Botswana, Namibia, South Africa and Cape Verde, which have been ranked among the first 50 countries by Transparency International, most of the other African countries are ranked poorly with Somalia, Nigeria, Sudan, South Sudan, and Chad consistently sharing in the last ten positions since 2000. For example, in 2000, Botswana, the consistently best-ranked Sub-Sahara African country occupied 26th place out of 90 countries and 34th position out of 180 countries in 2017 that the CPI covered. However, Nigeria ranked 90 out of 90 countries and in 2017, Somalia ranked last out of the 180 countries (Transparency International, 2000, 2017). This means that there is high level of corruption in the region. When interpreting the effect of education and institutions on corruption, it is important to note that CPI is measured such that decreasing values denote higher level of corruption.

Regarding the education variables, the mean for Primary School Enrollment (PSE) is 102.09. The high mean may be because of inclusion of students whose ages exceed the official age group (UNESCO, 2020). If there is late enrollment or repetitions, the total enrollment can exceed the population of the age group that officially corresponds to the level of education, leading to the ratio greater than 100%. The mean for Secondary School Enrollment (SSE) is 45.102, implying that less than half of secondary school going students are enrolled in school under the countries under consideration. This means there is a high rate of dropout after

primary school. The mean for Tertiary School Enrollment (TSE) is 8.510 showing a very low percentage of enrollment. This indicates that a very low level of tertiary school enrollment pertains in Sub-Sahara Africa perhaps because of poor performance in secondary school standardized examinations or inability to afford tertiary education due to poverty. The mean for the GDP for the region is 1760.261. The mean values for the institutional variables – corruption control (-0.621), government effectiveness (-0.700), regulatory quality (-0.626), voice and accountability (-0.230), and political stability (-0.460) all show negative mean values. These variables performed below zero. From Kaufman, Kraay, and Mastruzzi's (2010) scale of -2.5 to 2.5, the negative variables imply that the institutional quality is poor. However, the economic freedom variable is 147.668. The Heritage Foundation explains that a country with an economic freedom score of 0 implies that such a country is least free of corruption and when it is 100, the country is the most free of corruption. The matrix correlation analysis of education and institutions and corruption is explained in Table 2.

Table 2: ***Matrix Correlation Analysis of Education and Institutions and Corruption***

Variable												
CORR		**CC**	**GOVE**	**RQ**	**RL**	**VA**	**PolS**	**GDP**	**SSE**	**PSE**	**TSE**	**ECO**
CORR	1.000											
CC	0.178***	1.000										
GOVE	0.132***	0.875***	1.000									
RQ	0.185***	0.782***	0.871***	1.000								
RL	0.194***	0.897***	0.913***	0.877***	1.000							
VA	-0.014	0.099*	0.106**	0.095*	0.117**	1.000						
PolS	0.009	0.280***	0.278***	0.251***	0.307***	0.953***	1.000					
GDP	0.159***	0.526***	0.587***	0.425***	0.495***	0.027	0.139**	1.000				
SSE	0.259***	0.485***	0.486***	0.428***	0.476***	0.038	0.127***	0.646***	1.000			
PSE	0.151***	0.178***	0.122***	0.122***	0.141***	-0.004	0.074**	0.051	0.240***	1.000		
TSE	0.336***	0.271***	0.296***	0.290***	0.290***	-0.002	0.043	0.420***	0.568***	0.058	1.000	
ECO	0.246***	0.419***	0.484***	0.599***	0.513***	0.064	0.114**	0.159***	0.35***	0.219***	0.232***	1.000

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

Note: PSE = Primary School Enrollment; SSE = Secondary School Enrollment; TSE= Tertiary School Enrollment; CORR = Corruption perception Index; CC = Corruption Control; RQ = Regulatory Quality; VA = Voice and Accountability; RL = Rule of Law; PolS = Political Stability; GOVE = Government Effectiveness; ECO = Economic Freedom; GDP = Economic Growth rate

Source: Tangonyire (2020)

Table 2 shows the simple correlation coefficients between the independent variables and corruption. The institutional variables – CC, GOVE, RQ, RL, and ECO are positively correlated and significant with corruption at 1% with ECO showing the highest correlation and GOVE showing the lowest positive correlation. Pols also shows positive correlation with corruption but it is insignificant. However, VA has a negative correlation that is insignificant. All the education variables – PSE, SSE and TSE have positive and significant correlation with corruption with TSE showing the highest correlation and PSE showing the lowest correlation. The control variable, the GDP is also positively correlated and significant in relation to corruption.

Presentation of the Results

This section presents the fixed and random effect models. However, the analysis is based on the fixed effects on the effect of education on corruption (Table 3); the effect of institutions on corruption (Table 4); the effect of education and institutions on corruption (Table 5) and the joint effect, that is, the interaction of education (tertiary education enrolment) and institutions on corruption (Table 6). The fixed effect model is chosen because after the Hausman test for both the random and fixed effect models, the p-value for both models resulted in significant level (0.000), which is lower than the critical value of 0.050. Details of the Hausman test are in appendices A, B, C and D.

Effects of education on corruption

The results in Table 3 show the relationship between education and corruption.

Table 3: ***The Effect of Education on Corruption***

CORR	Fixed effect	Random effect
SSE	0.190	0.0540
	(0.136)	(0.0434)
PSE	0.0810	0.0967***
	(0.100)	(0.0300)
TSE	1.013***	0.706***
	(0.254)	(0.107)
LnGDP	5.928	-0.286
	(5.128)	(0.775)
Constants	-53.03*	-4.151
	(29.73)	(5.471)
Number of observation	660	660
Hausman (x^2)	68.97	
Prob>chi2	0.000	

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

Source: Tangonyire (2020)

Hypothesis 1*: H0: Education (TSE) does not have any effect on corruption*

H1: Education (TSE) has an effect on corruption.

As shown in Table 3 primary school enrollment (PSE), secondary school enrollment (SSE) and tertiary school enrollment (TSE) are the independent variables through which the study investigated the effect of education on corruption. It can be seen from the table that the fixed effect value for PSE = 0.081; SSE = 0.190; and TSE = 1.013. This implies that positive coefficients of PSE, SSE, and TSE imply that these variables reduce the level of corruption but at different levels of significance. Whereas both PSE and SSE do not have any significant effect on corruption despite the positive coefficients, TSE has a significant effect on corruption implying that the higher the educational attainment of people in sub-Sahara Africa, the higher the possibility of them being less involved in corrupt activities. The absence of any significant effect of PSE and SSE on corruption is in line with intuition because as Asongu and Nwachukwu (2015) argue at that level of education, students engage less in economic activities that will warrant corruption. It can thus, be concluded that education has positive influence on corruption, that is to say that it contributes to reduce corruption activities in the countries under study. Therefore, the results of this study reject the null hypothesis and fail to reject the alternative hypothesis.

Effects of institutions on corruption

Table 4 on the next page shows the effect of institutions on corruption.

Table 4: ***The Effect of Institutions on Corruption***

CORR	Fixed effect	Random effect
CC	-12.040	4.167*
	(7.761)	(2.255)
GOVE	-15.660*	-13.83***
	(8.033)	(2.920)
RQ	19.220***	2.370
	(6.396)	(2.467)
RL	16.860**	7.550**
	(7.318)	(2.972)
VA	2.865**	0.536
	(1.310)	(0.470)
PolS	-7.066**	-1.525
	(3.280)	(1.130)
LnGDP	12.200**	3.040***
	(4.902)	(0.717)
ECO	0.0420**	0.0363***
	(0.0161)	(0.00915)
Constants	-74.50**	-14.33**
	(33.57)	(6.003)
Number of observation	661	661
Hausman (x^2)	91.08	
Prob>chi2	0.000	

Standard errors in parentheses $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Sources: Tangonyire (2020)

Hypothesis 2*: H0: Institutions* (RL, RQ, VA PolS and ECO) ***do not have any effect on corruption.***

H1: Institutions (RL, RQ, VA PolS and ECO) ***have an effect on corruption.***

Table 4 shows the institutional variables such as control of corruption (CC); government effectiveness (GOVE); regulatory quality (RQ); rule of law (RL); voice and accountability (VA); political stability (PolS); and economic freedom (ECO). From the table, the fixed effect values for the variables are, CC = -12.040; GOVE = -15.660; PolS = -7.066; RQ = 19.220; RL = 16.860; VA = 2.865; and ECO = 0.042. The negative coefficients of corruption control, government effectiveness and political stability imply that these variables have a negative effect on corruption indicating that CC, GOVE and PolS do not reduce corruption. On the other hand, regulatory quality, rule of law, voice and accountability and economic freedom have positive coefficients, which implies that these variables reduce corruption. Based on these trends, it can be concluded that like the tertiary education variable, the institutional variables such as rule of law, voice and accountability, regulatory quality and economic freedom reduce corruption. Therefore, the results do not support the null hypothesis but rather confirm the alternative hypothesis.

Effects of both education and institutions on corruption

Table 5: ***The Effect of Education and Institutions on Corruption***

CORR	Fixed effect	Random effect
CC	-9.608**	3.198
	(3.896)	(2.202)
GOVE	-15.09***	-11.58***
	(4.237)	(2.845)
RQ	15.37***	1.342
	(3.727)	(2.385)
RL	16.68***	7.020**
	(3.998)	(2.890)
VA	2.490***	0.780
	(0.690)	(0.476)
PolS	-6.134***	-2.082*
	(1.697)	(1.145)
LnGDP	4.569**	1.231
	(2.271)	(0.861)
SSE	0.138**	-0.00287
	(0.0614)	(0.0445)
PSE	0.0904	0.0907***
	(0.0559)	(0.0317)
TSE	0.890***	0.659***
	(0.122)	(0.106)
ECO	0.0293***	0.0254***
	(0.0104)	(0.00917)
Constants	-43.60***	-15.86**
Number of observation	660	660
Hausman (x^2)	121.58	
Prob>chi2	0.000	

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Sources: Tangonyire (2020)

Table 5 above presents the effects of both education and institutions on corruption. From this table, some of the variables achieved their respective signs while others did not. Control of corruption, government effectiveness and political stability have negative coefficients signaling that they are unable to reduce

corruption levels. This result is expected because if all the anti-corruption institutions in Africa do not perform their work well as whistleblowers, corruption in the region cannot reduce.

From Table 5, institutional variables such as regulatory quality, rule of law, voice and accountability, economic freedom, as well as educational variables like, secondary school and tertiary school enrollments have positive coefficients and relate positively to corruption. This means that a unit increase in any of these variables leads to a corresponding decrease in corruption.

The Joint Effect of Education and Institutions on Corruption

Hypothesis 3*: H0: Education (TSE) and institutions do not have joint effect on corruption*

H1:Education (TSE)and institutions have joint effect on corruption

Table 6 presents the joint effects of education (TSE) and institutions (CC, RL, RQ, GOVE, ECO, PolS and VA) on corruption. Given that the tertiary school enrolment (TSE) variable is the only significant education variable, it is used to interact with the institutional variables. When TSE was interacted with the institutional variables, four of the seven interacted variables – rule of law, control of corruption, voice and accountability, and political stability were statistically significant. Hence, the null hypothesis is rejected. This implies that education and institutions have joint effect on corruption.

Table 6: ***The Joint Effect of Education and Institutions on Corruption***

CORR	Fixed effect	Random effect
CC	1.219	6.641*
	(6.765)	(3.785)
GOVE	-18.30*	-13.03**
	(10.53)	(5.443)
RQ	8.635	-2.108
	(8.493)	(4.629)
RL	7.944	6.447
	(8.427)	(4.802)
VA	-0.0641	-0.398
	(1.486)	(0.867)
PolS	0.109	0.873
	(3.653)	(2.095)
LnGDP	3.607	1.218
	(4.147)	(0.864)
SSE	0.146	-0.00590
	(0.126)	(0.0449)
PSE	0.0987	0.0858***
	(0.0923)	(0.0316)
TSE	0.763**	0.608**
	(0.368)	(0.265)
ECO	0.0190	0.0259*
	(0.0242)	(0.0140)
TSE*RQ	0.539	0.367
	(0.774)	(0.434)
TSE*GOVE	-0.113	0.0194
	(1.018)	(0.524)
TSE*RL	1.133*	0.140
	(0.667)	(0.474)
TSE*CC	**-0.957****	-0.275
	(0.456)	(0.311)
TSE*VA	**0.293***	0.129
	(0.155)	(0.0935)
TSE*ECO	0.002	0.000194
	(0.00208)	(0.00128)
TSE*PolS	**-0.711***	-0.332
	(0.385)	(0.215)
Constants	-39.97*	-14.34**
	(23.33)	(6.922)
Number of observation	660	660
Hausman (x^2)	103.55	
Prob>chi2	0.000	

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Sources: Tangonyire (2020)

In finding the partial effect of education (TSE) and rule of law on corruption from equation (20) gives us;

$$\frac{\partial CORR}{\partial TSE} = \beta_{10} + \beta_3(\overline{RL})$$

Putting the mean value of RL from the descriptive statistics

$$\frac{\partial CORR}{\partial TSE} = 0.763 + (1.133)(\overline{RL})$$

$$\frac{\partial CORR}{\partial TSE} = 0.763 + (1.133)(-0.667)$$

$$\frac{\partial CORR}{\partial TSE} = 0.763 - 0.755711$$

$$\frac{\partial CORR}{\partial TSE} = 0.007289$$

This indicates that when the rule of law is weak and there is a unit increase in tertiary school enrolment, corruption decreases by 0.0072.

From equation (20), finding the partial effects of rule of law on corruption gives;

$$\frac{\partial CORR}{\partial RL} = \beta_{12} + \beta_3(\overline{TSE})$$

$$\frac{\partial CORR}{\partial RL} = 7.944 + (1.133)(8.510)$$

$$\frac{\partial CORR}{\partial RL} = 7.944 + 9.64183$$

$$\frac{\partial CORR}{\partial RL} = 17.28366$$

This implies that even when there is a unit increase in the quality of rule of law index, in the presence of tertiary education enrolment, corruption decreases by 17.28 units.

Again, in considering the partial effect of education (TSE) and voice and accountability on corruption from equation (20) provides;

$$\frac{\partial CORR}{\partial TSE} = \beta_{10} + \beta_{11}(\overline{VA})$$

$$\frac{\partial CORR}{\partial TSE} = 0.763 + (0.293)(-0.230)$$

$$\frac{\partial CORR}{\partial TSE} = 0.763 - 0.6739$$

$$\frac{\partial CORR}{\partial TSE} = 0.O891$$

This means that on average when there is absence of voice and accountability and there is a unit increase in tertiary school enrolment, corruption will decrease by 0.0891 units.

Looking at the partial effects of voice and accountability on corruption from equation (20) gives;

$$\frac{\partial CORR}{\partial VA} = \beta_{11} + \beta_5(\overline{TSE})$$

$$\frac{\partial CORR}{\partial VA} = -0.0641 + (0.239)(8.510)$$

$$\frac{\partial CORR}{\partial VA} = -0.0641 + 2.03389$$

$$\frac{\partial CORR}{\partial VA} = 1.9697$$

This implies that if there is an increase in voice and accountability in the presence of tertiary education enrolment, corruption level will decrease by 1.9697 units.

Similarly, considering the marginal effects of education and political stability on corruption using equation (20) provides;

$$\frac{\partial CORR}{\partial TSE} = \beta_{10} + \beta_7(\overline{PolS})$$

Putting in the value of the mean in the descriptive statistics

$$\frac{\partial CORR}{\partial TSE} = 0.763 + (-0.711)(-0.460)$$

$$\frac{\partial CORR}{\partial TSE} = 0.763 + 0.32706$$

$$\frac{\partial CORR}{\partial TSE} = 1.09006$$

This indicates that when political stability is held constant and there is one unit of increase in tertiary school enrolment, corruption level will decrease by 1.09 units. Similarly, calculating the partial effects of political stability on corruption by using equation (20) gives;

$$\frac{\partial CORR}{\partial PolS} = \beta_{11} + \beta_7(\overline{TSE})$$

$$\frac{\partial CORR}{\partial PolS} = 0.109 + (-0.711)(8.510)$$

$$\frac{\partial CORR}{\partial PolS} = 0.109 - 6.0561$$

$$\frac{\partial CORR}{\partial PolS} = \text{-}5.94161$$

This means that when there is a unit improvement in political stability while holding tertiary school enrolment constant, corruption will reduce by 5.94161 units.

In determining the partial effect of education on corruption level from equation (20) provides.

$$\frac{\partial CORR}{\partial TSE} = \beta_{10} + \beta_4(\overline{CC})$$

Putting in the mean value of control of corruption from the descriptive statistics

$$\frac{\partial CORR}{\partial TSE} = 0.763 + (-0.957)(-0.621)$$

$$\frac{\partial CORR}{\partial TSE} = 0.763 + 0.0594297$$

$$\frac{\partial CORR}{\partial TSE} = 0.8224$$

This means that when there is an increment in tertiary school enrolment while control of corruption measures are kept constant, corruption will decrease by 0.8224.

Additionally, in finding the partial effects of control of corruption on corruption level from equation (20) gives;

$$\frac{\partial CORR}{\partial CC} = \beta_{15} + \beta_7(\overline{TSE})$$

$$\frac{\partial CORR}{\partial CC} = 1.219 + (-0.957)(8.510)$$

$$\frac{\partial CORR}{\partial CC} = 1.219 - 8.14407$$

$$\frac{\partial CORR}{\partial CC} = -6.925$$

The results show that when tertiary school enrolment is kept constant and there are improved measures to control corruption, corruption level will reduce by 6.925 units.

Looking at the results reported and presented in relation to the hypotheses, the study identified the following key findings:

- Education (TSE, SSE, PSE) has positive effect on corruption.
- Institutions have both positive (RL, RQ, VA, and ECO) and negative (CC, GOVE and PolS) effects on corruption.
- Education (TSE) and institutions jointly have positive (RQ, RL, VA and ECO) and negative (GOVE, CC and PolS) effects on corruption.

Discussing the Findings

The main objective in this research has been to investigate whether or not education, institutions, and education and institutions have joint effect on corruption, and if so what kind of effect. As the results indicate, education and institutions influence corruption. In the paragraphs that follow, examine the findings of this study by putting them into dialogue with existing literature.

Finding one: Education has positive effect on corruption

In chapter two, the study examined a corpus of existing studies on the relationship between educational attainment and corruption. It emerged from these studies especially those of Cheung and Chan (2008), Hunt and Lazlo (2012), Asongu and Nwachukwu (2015), and Šumah (2018) that education is a powerful tool to mitigate corruption. Asongu and Nwachukwu whose cross-country research focused on Africa established that the higher the educational attainment of aggregate populace of a country, the likelihood that corruption will be lower. According to Hunt and Lazlo (2012) who studied the effect of bribe paying in Peru and Uganda, bribe paying among the illiterate poor is "unwitting", thus they often do not know that paying a bribe is not and should not be a normal part of a transaction. This means that increasing literacy among the poor reduces corruption.

The results of this study support the conclusion that education has effect on corruption and the effect is positive indicating that education helps to mitigate corruption level. Using educational attainment variables such as primary, secondary, and tertiary school enrollments attainments, the results show that all these variables have positive effect on corruption with primary school graduates less likely to influence corruption compared to secondary and tertiary graduates. The results in Table 3 show this trend. Therefore, education has positive effect on corruption; it helps to mitigate corruption. This conclusion does not resonate with findings of Mocan (2004); Truex (2011); Kaffenberger (2012), and Dimant (2013) that individuals with high level of educational attainment are exposed to corrupt activities and are prone to indulge in corruption. Kaffenberger's (2012) study, for

instance, which sought to determine the effect of educational attainment on corruption participation in sub-Sahara Africa, found that education system that is rife with corruption teaches corruption as rational behaviour. In such context, students learn that bribing for good grades, jobs, promotion, just to cite a few examples, is a normal way to get ahead in society. An insight this claim introduces to the debate is that educational attainment alone may not be responsible for the effects of education on corruption but the quality of education that such attainments embed.

For example, an educational system that churns out graduates with solid level of competence, conscience/character, compassion, and commitment to the common good is likely to influence corruption negatively. The existential reality though is that corrupt educational systems and practices are standard practices that plague Africa (Hunt & Lazlo, 2012). Analyzing the mega corruption scandals that hit Africa including Mobutu Sese Seko (Svensson, 2005), Sani Abacha (Pallister & Capella, 2000); and Jackie Selebi (Schwella, 2013), the study realised that the people who were involved were highly educated people. Therefore, it can be argued that educational attainment can mitigate corruption especially if it is holistic and of quality.

Finding two: Institutions have both positive and negative effects on corruption

The findings of this study show that out of the seven institutional variables that were analysed, corruption control, government effectiveness and political stability affect corruption negatively. As explained earlier in this chapter in the section where this study presented the results, an improvement in the quality of these variables has a corresponding effect in mitigating corruption. The finding that government effectiveness (GOVE) shows a negative impact on corruption is in resonance with Dreher et al., (2009) who concluded that government effectiveness reduces corruption. Similarly, the findings on political stability are consistent with those of Goel and Nelson (2005); Fatić (2000); who credit political stability for its role in reducing corruption activities. These authors converged that political and social stability are an important precondition for a successful mitigation of corruption because they enable governments and the citizens to be free to promote transparent mechanisms in executing their assigned duties.

Nonetheless, the results of this study show that the relationship between institutions and corruption through the lenses of control of corruption, government effectiveness and political stability is negative. In other words, CC, GOVE and PoLS have negative coefficients in relationship to corruption. This implies that they are unable to reduce corruption.

However, the other variables such as regulatory quality, rule of law, voice and accountability and economic freedom have positive coefficients implying that they have influence in reducing corruption. In other words, a unit increase in these variables has a corresponding significant level of impact on corruption (see

Table.4). Broadman and Recanatini (2002) studied institutions and corruption, and concluded that where there are greater entry barriers – regulatory quality, corruption increases. Lambsdorff (2006) who investigated causes and consequences of corruption in a cross-section of countries is emphatic that bad regulation and corruption are two sides of the same coin implying that an increase in regulatory quality has a corresponding positive influence on corruption. That means that enforcing stringent policies and regulations in relation to the rule of law has a statistically significant positive relationship with corruption (see Table 4). It is important to note however, that stringent regulations and laws can be conducive and lucrative environment for people to circumvent the law by offering more bribes to law enforcement agents or allowing them to accept bribe offers (Owoye & Bissessar, 2014).

Similarly, economic freedom, and voice and accountability have positive coefficients, which means that they are able to reduce corruption. This is congruent with Eiras' (2003) work on 'Ethics, corruption and economic freedom' in which she concludes that lack of economic freedom forces people to involve in informal economic activity, which is a fertile ground for corruption. Regarding voice and accountability, this study shows that this variable has a positive coefficient. This means that a unit increase in voice and accountability reduces corruption. This resonates with Shah (2007) who also found that increase in voice and accountability mitigates corruption because it obliges government to demonstrate effectiveness in achieving goals and meeting demands of society. If in Africa, the focus of my study, there are countries with citizenry that prioritise the national good as a reference

point for every interaction and activity, it is likely that a unit increase in economic freedom and voice and accountability will have a positive impact on corruption as Eiras' findings show. However, my research context is marked by greed, enthnocentricism, nepotism and the winner takes all mentalities. In order of precedence, the personal or private good comes before the common good. There is also hardly any level playing field in countries in sub-Sahara Africa where political and ethnic power differentials define the character of socio-political interaction and activity. Thus, when there is a statistically significant positive influence voice and accountability, and economic freedom have on corruption, it reduces.

From the dynamics of all the institutional variables discussed, two conclusions can be made about the relationship of institutions with corruption. First, institutions influence corruption both positively and negatively. That is to say that RL, RQ, VA, and ECO have positive effect on corruption and CC, GOVE and PolS have negative effect on corruption. Second, comparing the magnitude of the direction of influence, institutions influence corruption more positively than negatively because apart from four of the variables having positive influence, the impact of all of them is statistically significant compared to only two of the negatively impacting variables that are significant (See Table 4).

Finding three: Education (TSE) and institutions jointly have positive and negative effects on corruption

Table 6 shows the results of the joint effect of education and institutions on corruption. Out of the seven institutional variables – regulatory quality, government effectiveness, rule of law, control of corruption, economic freedom, voice and accountability and political stability that were interacted with tertiary school enrolment (TSE), only four have positive coefficients – rule of law, regulatory quality, voice and accountability and economic freedom. By bearing positive coefficients, it means that when higher educational attainment (TSE) interacts with these RL, RQ, VA and ECO, the joint effect is reduction in corruption levels. However, when TSE interacted with institutional variable (control of corruption, government effectiveness and political stability), it resulted in negative coefficients signifying that the joint effect does not reduce corruption levels. As explained in the introductory chapter, to the best of my knowledge, there is no study focusing on sub-Sahara Africa that combined education and institutions to investigate their joint effect on corruption. Nonetheless, as discussed in the first and second findings, scholars who researched government effectiveness (Dreher et al., 2009); and political stability (Goel & Nelson, 2005) conclude that positive coefficients of these variables implies that they are able to reduce corruption. Therefore, it can be concluded that whereas the joint effect between education (TSE) and rule of law, regulatory quality, voice and accountability and economic freedom have positive effects on corruption levels, the effect is negative when TSE interacts with control of corruption, political stability and government effectiveness.

Summary of Chapter

In this chapter, guided by the research objective to investigate the relationship between education and institutions, and corruption, and the hypotheses reiterated at the beginning of this chapter, the study interpreted, presented and discussed the key findings of the research. It was realised that education especially (TSE) has positive impact on corruption; institutions have both negative and both impact on corruption; and education and institutions jointly influence corruption positively and negatively. In Chapter Five, the study is summarized and concluded and recommendations made for future research.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This final chapter provides the summary, conclusion and recommendations of the study.

Summary

This correlational study set out to contribute to the understanding of how education, institutions, and education and institutions jointly relate to or influence corruption in sub-Sahara Africa. The corruption literature reviewed in chapters one and two revealed that scholars have shown increased interests in corruption studies that have led to contributions on theories, meaning of corruption and its relationship with education, institutions and development. While impressed by these contributions, existing literature on corruption does not reveal works in sub-Sahara Africa that considered the joint effect of education and institutions on corruption. Put differently, based on the review of corruption literature, there seems to be no study that has taken into cognizance the effect of educational variables – primary, secondary and tertiary school enrollments as well as institutional variables – rule of law, regulatory quality, governance effectiveness, control of corruption, political stability, voice and accountability, and economic freedom on corruption.

It was important to understand the holistic relationship between education and institution, and corruption because it could add some insights to the pool of knowledge on corruption research. These insights could include how education and institutions mitigate or nurture and perpetuate corruption. When shared with policymakers, the insights could enrich policies that aim to address corruption. Filling this research gap with the hope of the above contributions inspired this

study. Thus, the main objective of the study was to investigate whether or not education and institutions have effect on corruption, and if so, what kind of effect.

The research demonstrates that to get a better understanding of this relationship, it was necessary to guide the study with the following hypotheses:

1. H_1: Education (PSE, SSE, TSE) has an effect on corruption.
2. H_1: Institutions (RL, RQ, VA, ECO, GOVE, CC, and PoLs) have an effect on corruption.
3. H_1: Education (TSE) and institutions (RL, RQ, VA, ECO, GOVE, CC, and PoLs) jointly positive and negative effect on corruption.

The study employed panel of forty-one sub-Sahara African countries using annual data obtained from World Governance Indicators, World Development Indicators, Transparency International, and Heritage Foundation implying that secondary data was used for the study. Fixed and random effect technique was used to analyse the data that enabled me to come up with the following three key findings:

- Education especially TSE has positive effect on corruption;
- institutions have both positive (RL, RQ, VA, ECO) and negative (CC, GOVE, PolS) effects on corruption; and
- education and institutions have both positive and negative joint effects on corruption.

Reflecting on the relationship between these findings and literature, the study draws some conclusions.

Conclusions

As stated above, three interrelated hypotheses were posed to guide the research. The first hypothesis concerned the relationship between education and corruption. To this hypothesis, it could be said that education positively influences corruption. In other words, the higher people's educational attainment in sub-Sahara Africa, the more likely there will be reduction in corrupt activities, thus supporting the alternative hypothesis. However, this is applicable in educational systems that are of high quality, and as a result, churn out graduates who embed competence, conscience, compassion and commitment.

The second hypothesis was about the relationship between institutions and corruption. The findings reject the null hypothesis and confirm the alternative hypothesis that institutional variables such as control of corruption, government effectiveness, regulatory quality, rule of law, voice and accountability, political stability, and economic freedom influence corruption both negatively and positively. Thus, institutions have double edge effect on corruption, negative and positive.

The third hypothesis concerned the effect education and institutions can jointly have on corruption. That means that educational and institutional variables are considered jointly. To this hypothesis, it can be concluded that education (tertiary education enrolment) and institutions have both positive and negative influences on corruption, thus confirming the alternative hypothesis. Relying on the number of variables that showed negative or positive correlation with corruption, I

found that education and institutions have more joint positive than negative influence on corruption in sub-Sahara Africa.

A question that runs through the study is the 'And so what? question. Put differently, what implications has this research to knowledge generation, policy, practice, methodological development, and future research? The study aimed to contribute something to these dimensions. The content of this research embeds richness which when interpreted critically, can contribute to enriching the existing corpus of knowledge in corruption studies. The findings on the influence of education and institutions on corruption, when critically appraised help to understand that these tools or norms, which societies establish to mitigate corruption turn to nurture and perpetuate it. Such an awareness can help relevant authorities to rethink the content and structures of education and institution to make them more effective in mitigating corruption.

As argued earlier an educational system, which is of quality will produce educated masses who will be well equipped intellectually, emotionally, and ethically such that they make the institutions work well for the common good. In this sense, this research contributes to knowledge generation, policy and practice improvement. This correlational study relied on secondary data but what is novel was its incorporation of educational and institutional variables into one joint equation that enabled me to gauge the kind of influence education and institutions have on corruption. More importantly, the findings of the research have addressed the research objective by showing that there is a relationship between education and corruption, institutions and corruption, and education and institutions, and

corruption. As atomic units, education influences corruption positively; institutions have both negative and positive effects on corruption; and when conjoined, they have double edge effects on corruption with the pendulum swinging more towards the positive side. Thus, despite the limitations of the study including measurement error arising from multiple definitions of corruption and unavailability of complete data from some of the countries, I am delighted to have undertaken this study. It was worth the pain because I not only find the process as a rich learning experience but enjoyed every step of the study from its conceptualization to conclusion.

Recommendations

The key findings of the study are that education has positive effect on corruption, and institutions have both positive and negative effects on corruption. The findings reveal that the higher people's educational attainment in sub-Sahara Africa, the less likely they are going to be corrupt implying that the educational systems must produce graduates who embody competence, conscience, compassion and commitment. Thus, the study recommends that education policymakers such as Ministries of Education of sub-Sahara African countries need to emphasize character formation as a key part of the education curriculum they develop to educate the populace. Balancing the cognitive and non-cognitive aspects in the curriculum can result in graduates who embody both competence and the spirit of the common good.

Similarly, the finding that institutions show both positive and negative effects on corruption means that the quality of the institutions is poor. Therefore,

governments of the various countries under consideration, policymakers, and anti-corruption institutions like Transparency International need to collaborate to put in place structures that will enable the institutions to work efficiently and effectively to improve their quality.

The finding that educational attainment positively influences corruption does not show whether males and females who ascend the educational ladder behave the same way in relation to corruption. Therefore, a future research can explore the relationship between male and female educational attainment and corruption to provide insights into gender, education and corruption.

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APPENDICES

A: Hausman Specification Test for Education

	Coefficients Fixed effect (b)	Random effect (B)	Difference (b-B)	Standard Error sqrt(diag(V_b-V_B))
lnGDP	5.928012	-0.28589	6.213905	2.210189
SSE	0.190209	0.054002	0.136207	0.045364
PSE	0.080974	0.096717	-0.01574	0.049409
TSE	1.012793	0.706135	0.306658	0.063887

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B = 68.97

Prob>chi2 = 0.0000

Therefore (V_b-V_B is not positive definite)

B: Hausman Specification Test for institutions

	Coefficients		Difference	Standard Errors
	Fixed Effects (b)	Random Effects (B)	(b-B)	sqrt(diag(V_b- V_B))
CC	12.04376	4.16663	-16.21039	3.396133
GO VE	-15.65523	-13.82555	-1.829683	3.342785
RQ	19.22229	2.369797	16.85249	3.001031
RL	16.86423	7.550229	9.314006	2.967178
VA	2.865183	0.5358676	2.329316	0.5506529
PolS lnG	-7.065586	-1.525497	-5.540089	1.374883
DP	12.19512	3.04042	9.154696	1.878643
EC O	0.042026 2	0.0363264	0.0056997	0.0057545

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)= 91.08

Prob>chi2 = 0.0000

Therefore (V_b-V_B is not positive definite)

C: Hausman Specification Test for Education and institutions

	Coefficients			
	Fixed Effect	Random effect	Difference	
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
CC	-9.608443	3.197916	-12.8064	3.213488
GOVE	-15.09406	-11.58069	-3.51337	3.140408
RQ	15.37373	1.341824	14.03191	2.863655
RL	16.68164	7.019605	9.662037	2.762516
VA	2.48986	.7798466	1.710013	0.500457
PolS	-6.133953	-2.082044	-4.05191	1.252913
lnGDP	4.56919	1.231283	3.337907	2.101218
SSE	0 .1378223	-0.0028738	0.140696	0.042299
PSE	0 .0903971	0.0907292	-0.00033	0.046069
TSE	0.8904129	0.6589962	0.231417	0.060147
ECO	0.029336 .0254096	0	0.003926	0.004985

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 121.5

Prob>chi2 = 0.0000

Therefore (V_b-V_B is not positive definite)

D: Hausman Specification Test for Education and institutions (interaction)

	Coefficients			
	Fixed Effect (b)	Random Effect (B)	Difference (b-B)	Standard Error sqrt(diag(V_b-V_B)
CC	1.218891	6.6409	-5.422009	3.458843
GOVE	-18.30338	-13.02765	-5.275728	2.946229
RQ	8.635424	-2.108444	10.74387	3.055082
RL	7.944402	6.447348	1.497054	3.272467
VA	.0640518	-0.3979549	0.3339031	0.4766788
PolS	.1087175	0.8729511	-0.7642335	1.174617
lnGDP	3.60674	1.218175	2.388564	2.13809
SSE	.1461656	-0.0058963	0.1520619	0.0430759
PSE	.0987272	0.0858022	0.012925	0.0472041
TSE	0.762953 3	0.607581	0.1553723	
ECO	.0189967	0.0258699	-0.0068732	0.004948
TSE*RQ	.5389133	0.3670848	0.1718285	0.107219
TSE*GOVE	.1133553	0.0193539	-0.1327092	0.1562573
TSE*RL	1.133492	0.139846	0.9936459	0.1793349
TSE*CC	-.9568083	-0.2746073	-0.6822011	0.1922905
TSE*VA	.2930926	0.1289134	0.1641792	0.0207148
TSE*ECO	.0015728	0.000194	0.0013788	
TSE*PolS	-.7109176	-0.3322753	-0.3786422	0.0596413

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(17) = (b-B)'[(V_b-V_B)^(-1)](b-B = 103.55

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

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