The Dynamics of Corruption, Capital Flight and Economic Growth with Panel Evidence from Sub Saharan Africa (SSA)

Being a Thesis submitted for the Doctor of Philosophy in Economics at the University of Hull

By

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Abstract

This PhD thesis represents a contribution to the literature on the dynamics of corruption, capital flight and economic growth. It is made up of three empirical essays on corruption, capital flight and economic growth with a particular focus on sub-Saharan African countries. With the exception of chapters one, two and chapter six, which sets out the contextual background and summary findings with policy implications, each of the chapters (three, four and five) can be considered as an independent or standalone piece of work.

Our chapter three dwells on understanding the determinants of corruption; it remains a major concern of most economists and policymakers across the globe and especially those working in developing countries. This concern is not helped by the fact that the uncertainty around the theoretical and empirical approaches to studying corruption has created more ambiguity about its determinants. Many variables have been proposed as robust determinants of corruption by past studies with conflicting outcomes. Using panel data covering 31 sub-Saharan African countries from 1984-2013, this chapter applies Extreme Bounds Analysis (EBA) to identify robust determinants of corruption within the region. We consider 60 potential economic, political and socio-cultural determinants and find that the following variables of ethnolinguistic fractionalisation, internal conflict, bureaucratic quality, democratic accountability, government stability are some of the strongest determinants of corruption in sub-Saharan Africa for the periods of 1984-2013 that we studied.

Chapter four of this thesis uses panel data from 31 countries in sub-Saharan Africa over a 30-year period (1984-2013) to investigate the impact of corruption on economic growth in the region. Existing literature from past studies has paid little attention to the possible existence of systemic macro-level variations in corruption’s impact on economic growth along income lines in SSA. The chapter examines whether the impact of corruption on economic growth vary systematically depending on income. After looking at the entire sample, we further decompose the entire region using the World Bank income classifications of low-income countries (LIC), lower-middle-income countries(LMIC) and upper-middle-income countries(UMIC) to do an in-depth analysis

of the impact of corruption on economic growth across these classifications. Our results indicate that there are large, statistically significant differences in the impact of corruption on economic growth and development in the entire region and across the different income level classifications. The largest negative impact of corruption on economic growth is found in 18 low-income countries, followed by 13 lower-middle-income countries, and while the effect on the 5 upper-middle-income countries, though negative, but is not statistically significant. Overall, the effect of corruption on economic growth across the whole region is negative. The results are robust to different econometric specifications as well as conditioning variables. Our results also have interesting policy implications for economic growth in the whole region and especially in low-income countries.

Chapter five of this thesis presents an empirical investigation into the impact of corruption on economic growth in the presence of capital flight activities. Using a panel of 25 countries from sub-Saharan Africa (SSA) for the period of 1986-2010, the analysis reveals that corruption and capital flight have both independent and combined effects on economic growth; the corruption effect is found to be consistently negative, and the capital flight effect is mixed (both negative and positive effects). We, however, find that the combined effects of corruption and capital flight are consistently negative, which indicates that the overall negative effect of capital flight on economic growth is mainly driven by corruption. Furthermore, using portfolio choice theory of asset allocation, we introduce the corruption variable for the first time as an important determinant of capital flight to test one of our key hypotheses, and our findings across different specifications of the regression equations show that the corruption coefficients are positive and statistically significant at the conventional levels. These results confirm our hypothesis that the nature of corruption in SSA is such that it encourages and promotes capital flight overall in the region.

Dedication

I dedicate this thesis to my wife, Rachel Egbulonu (nee Ashby), for all her support and for holding the home front together for the duration of this study and to our girls, Jessica and Sophia, for the many days and nights spent away from home.

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To the most famous and prolific contributor of all my life (The Godhead: Father, Son and the Holy Spirit), who pulled me through again and again throughout my stay at Hull, a heartfelt expression of gratitude. Overcoming my myriads of challenges throughout the many years of this doctoral thesis would not have been possible without the Trinity.

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Declaration

In accordance with the University of Hull Regulations for Research Degrees, I hereby declare that this thesis is the result of my own original work and was duly composed by me. I also confirm that this thesis does not contain any material that has been accepted or submitted, either partially or wholly, for the award of any other degree at another university.

Alloysius Joseph Egbulonu

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List of Abbreviations

AfDB ....African Development Bank

BC ....Before Christ

CC ....Control of Corruption

CF ....Capital Flight

CPI ....Corruption Perception Index

EBA ....Extreme Bounds Analysis

FDI ....Foreign Direct Investment

FE ....Fixed Effects

FH ....Freedom House

GDP ....Growth Domestic Product

GMM ....Generalized Method of Moment

ICRG ....International Country Risk Guide

IMF ....International Monetary Fund

IV ....Instrumental Variable

MENA ....The Middle East and North Africa

OECD .Organization for Economic Co-operation and Development

ODA ....Overseas Development Aid

OLS ....Ordinary Least Square

POLS ....Pooled Ordinary Least Square

PPP ....Purchasing Power Parity

PRS ....Political Risk Services

RE ....Random Effects

SDG ....Sustainable Development Goals

SSA ....Sub Saharan Africa

TI ....Transparency International

UN ....United Nations

WDI ……………………………..World Development Indicators

WGI ……………………………..World Governance Indicators

Chapter One

1.0 Introduction

1.1Background and context

Modern long-term economic growth, which is the rate of change of GDP[1], is of great fundamental importance to the general well-being of humanity, this is primarily because of the role it plays in improving average living standards over time. A steady pace of economic growth can change the destiny of countries and the living standards of their citizens even within a historically short period of time. For example, the economy with a 7 per cent a year growth of GDP can double its income within a decade whereas the economy which is growing at 3 per cent a year will need more than two decades to reach the same level of growth. This was also succinctly pointed out by Lucas (1988) when he said there is something inherently captivating and universal about the study of economic development which makes it "***hard to think about anything else***". As a consequence, most governments around the world are generally interested in the proceeds of economic growth like higher income levels. Weil (2005) show that average life expectancy is highly correlated with the level of per capita income. This is quite intuitive because as income rises, economic agents are more likely to adopt healthier lifestyles like better diets and are also more able to gain wider access to health services. Both Baier *et al*. (2003) and Acemoglu (2009) also present empirical evidence of modern economic growth where a significant improvement in living standards, life expectancy, infant mortality and education can be seen.

However, it is important to stress that there is a wide variation in the level of economic growth that exists in different economies around the world. The global growth experiences across countries are not similar. For example, the aggregate recorded economic growth rate levels of the following regions of the world: the *Middle East and North Africa (MENA), East Asia and the Pacific (EAP), Latin America and the Caribbean*

[1] According to the (World Bank, 2000), economic growth is seen as the long-term expansion of the productive potential of an economy. The driving concept behind economic growth is the overriding quest to reduce scarcity in an economy and ultimately increase the living standard in general. The standard measure of economic growth is normally quantified by what is known as Gross Domestic Product (which is the entire production of goods and services) or per capita GDP (GDP divided by the population).

(LAC), sub-Saharan Africa (SSA), North America (NA) and the European Union (EU) in the last 50 years are not the same (See Table 2.1 and Figure 2.2 in chapter two for details). Also, more surprising is the fact that even among economies with similar initial conditions (i.e. similar initial per capita GDP) in the past, the difference and divergence can be very striking. For example, in the case of East Asia and sub-Saharan Africa, both regions started out in 1960 with almost similar per capita GDP, but by 2015 the economic growth trajectory became different as the two regions grew following different paths. See Figures 1.1,1.2 and 1.3 respectively for details. Another good example of this is the case of Nigeria and South Korea, Figure 1.4 depicts the GDP per capita trajectory of both countries from 1960 to 2015, again as before, the Figure shows that the current GDP per capita of South Korea in 2015 is US$27221 to the US$2640 for Nigeria in 2015. This is an astonishing increment by a factor of 10.5 from a factor of 0.66 in 1960. These points can be gleaned from Figures (1.1 to 1.4) showing the GDP per capita for both regions (EAP, SSA) and the country experience of Nigeria and South Korea.

In the context of the above economic growth experience for economies of countries within sub-Saharan Africa (hereafter known as SSA), relative to the rest of the world and over the last 56 years for which there are available data, it is safe to say that economic growth and development in SSA has been nothing but disappointing. These growth experiences captured in Figures (1.1-1.4) prompted economists like Easterly and Levine (1997) to refer to Africa as nothing but a ***Growth Tragedy****.* This is understandable, given that about the same time the economies of countries within East Asia and the Pacific experienced long, sustained and exceptional economic growth and thereby earning the name *East Asian Miracle*. Furthermore, some economists and policymakers have attributed the above state of affairs in sub-Saharan Africa to the detrimental effects of corruption (Gymah-Brempong, 2002) and capital flight (Ndikumana, 2015) on economic growth. This view on corruption is also echoed by Transparency International (TI), a German-based global anti-corruption watchdog, which has consistently maintained that: "***The combination of abundant natural resources, a history of autocratic and unaccountable government, as well as conflict and crisis throughout the region have posed particular challenges to governance and the fight against corruption in Africa***". Relatedly, the costs of corruption to the public purse, according to the Global Economic

Forum is estimated to be US$2.6 trillion a year. Corruption also remains one of the greatest obstacles to economic development given that it is known to deprive countries of income to invest in public services, with adverse consequences for health, education, prosperity and general well-being. While the empirical literature on capital flight shows clear evidence (Ndikumana (2010)) that capital flight is not unique to Africa but a global phenomenon, the challenge, however, is in its consequences. According to one of the most recent estimates of capital flight around the world (Zucman (2015)), capital flight from Africa is estimated to be US$500 billion, US$700 billion for Asia and US$1.3 trillion for Latin America. These figures represent 30 per cent of financial wealth from Africa, 4 per cent from Asia, and 22 per cent from Latin America respectively. In terms of magnitude, Africa seems to be the least affected, but concerning consequences, it remains the worst affected region of the world. Putting this into context, the tax revenue losses arising from the above are estimated to be: US$14 billion for Africa, and US$21 billion and US$34 billion for Latin America and Asia regions. For a poor region like SSA, this figure carries with it substantially heavier costs as it also implies forgone economic development opportunities.

The principal motivation of this thesis is to contribute to the economic literature and deepen our understanding of corruption, capital flight and economic growth in general but with a special focus on sub-Saharan African countries. More specifically, this thesis seeks to understand the determinants of corruption, the effects of corruption on economic growth, the causes of capital flight, the independent effects of corruption and capital flight on economic growth, and together with how both phenomena contribute to either promote or undermine economic development in general and particularly in sub-Saharan Africa. Again, despite several decades of research and advances made in data gathering and methodologies, understanding corruption, capital flight and reconciling how this impact upon economic growth remains a disputatious issue. This thesis is partly motivated by this existing contentiousness and the fact that corruption, capital flight and the adequate lack of developmental progress conditioned on economic growth still remains widespread in sub-Saharan Africa. Therefore, this study follows the tradition in economic research by using economic growth theories and the construction of analytical models with the application of new methods, datasets and econometric techniques to study these problems. What follows is a background to these concepts and issues.

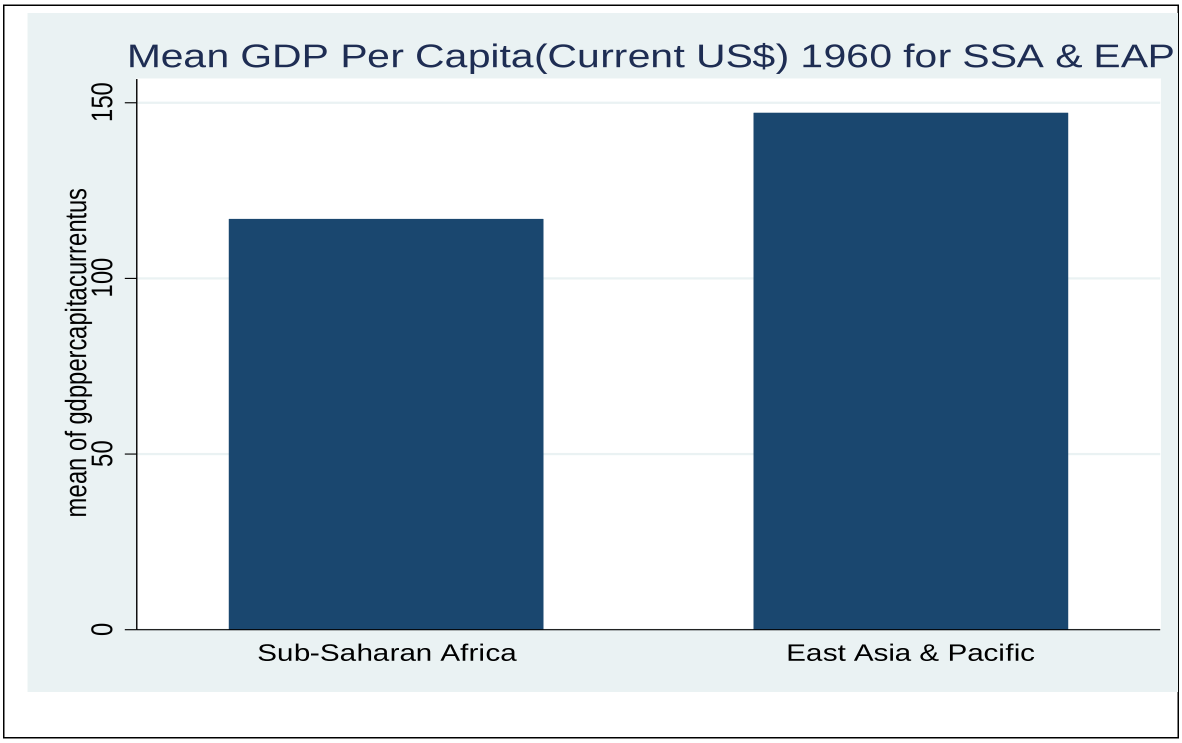


Figure 1. 1: Showing mean GDP Per Capita (Current US$) for SSA & EAP in 1960

Figure 1. 2: Showing mean GDP Per Capita (Current US$) for SSA & EAP in 2015

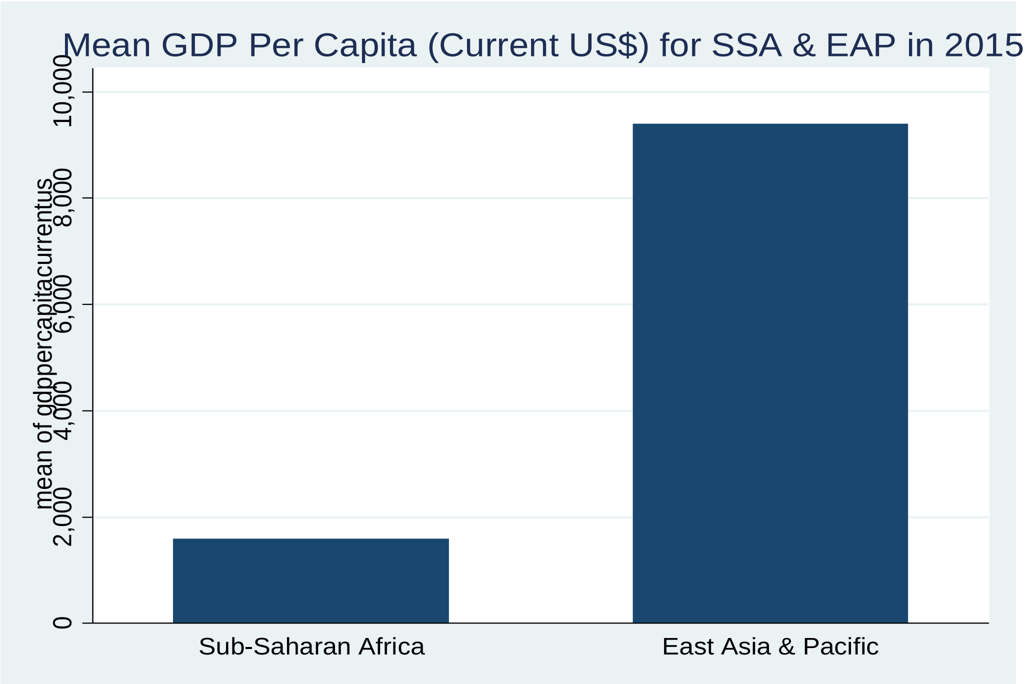


Figure 1. 3: Showing mean GDP Per Capita Current US$(1960-2015) for EAP & SSA Countries.

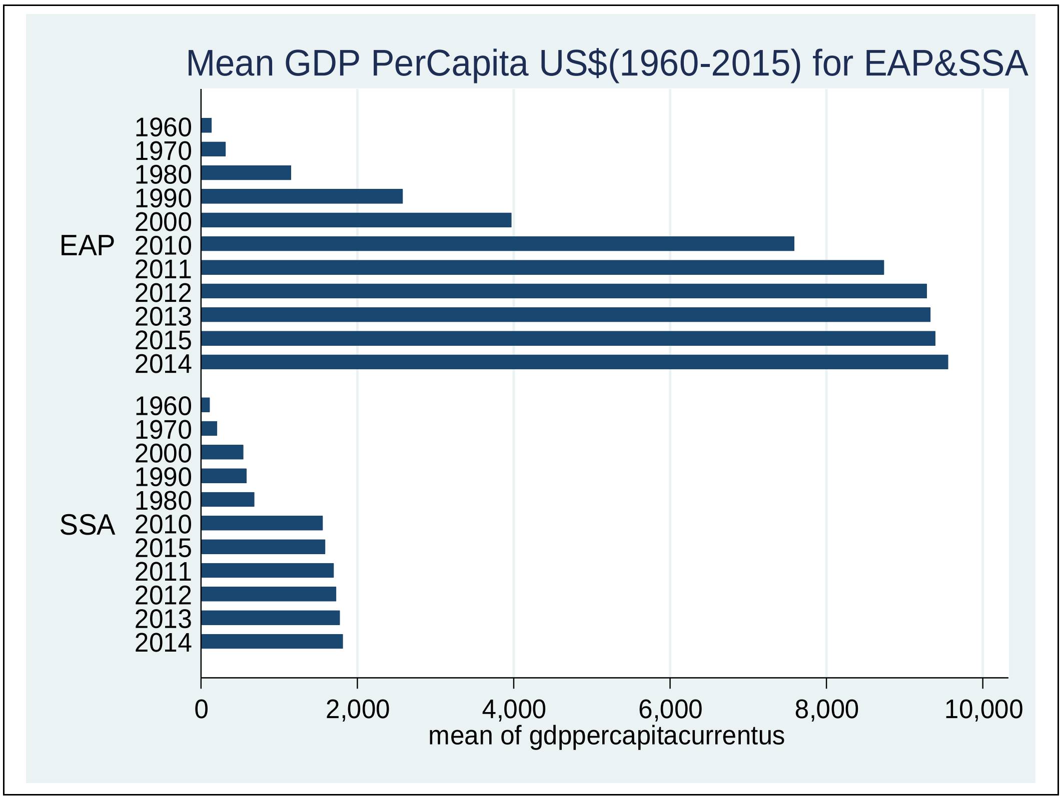
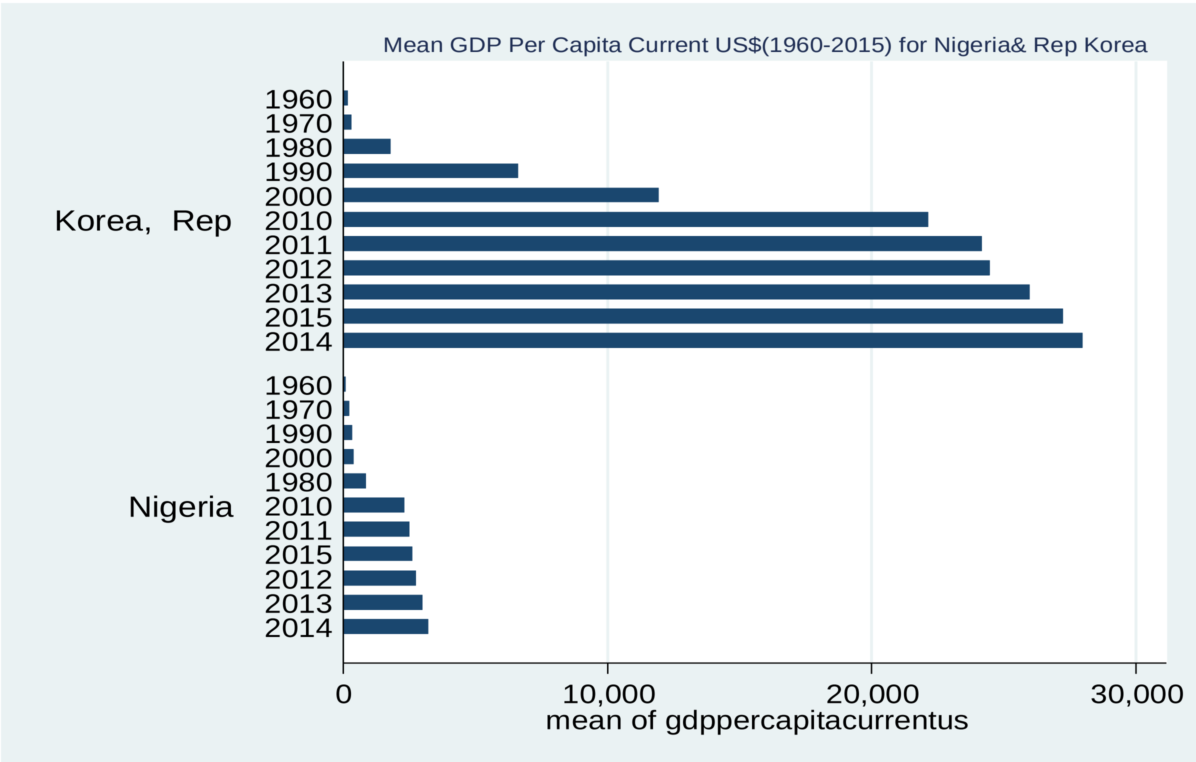


Figure 1. 4: Showing mean GDP Per Capita Current US$(1960-2015) for Korea &Nigeria



Our starting point in this research is that corruption and capital flight are pervasive in sub-Saharan Africa and poses some of the biggest challenges to growth and development throughout the entire region. We investigate three distinct issues that can also be considered independently of one another, and that helps us to examine different areas of corruption and capital flight. On the whole, they help us in the understanding of some channels of corruption and capital flight in SSA countries.

The fundamental and number one key question on our priority list dwells on "what are the fundamental causes of corruption in SSA?" By this we mean, what are the determinants of corruption in SSA? Some have argued that because sub-Saharan Africa is not known to be homogenous in terms of religion, language, culture and ethnicity; corruption is therefore said to be driven by the level of ethnolinguistic fractionalisation in the region. Others opine that apart from the problem of ethnolinguistic fractionalisation, that the bigger problem driving corruption is related to consistent poor policy choices by past leaders over the intervening years. We believe this to be a very important question, as strategies to combat corruption can only be successfully devised after finding out what are the factors driving corruption in sub-Saharan Africa.

We are aware that there are many pieces of evidence on the determinants of corruption within the region with multiple examples of occurrences of corruption from anecdotal experiences; nonetheless, to arrive at any possible and meaningful policy conclusions and implications, it would be very important to have a rigorous analysis. Therefore, using data unique to SSA countries, we proceed by conducting some very important empirical analyses of corruption. As opposed to past studies, our focus is exclusively on SSA countries by using a panel data set that includes 31 countries covering a long span of time (30 years,1984-2013). Using so many observations for individual countries allows us to control for country heterogeneity. The problem and challenge of reverse causality between corruption and other right-hand side variables like economic growth are also addressed. And as common with previous research on corruption, we use some measures of corruption perception levels like (Transparency International corruption index, ICRG corruption index and World Bank control of corruption index).

The second topic we will consider in this thesis is corruption and economic growth with new evidence from sub-Saharan Africa. We set out primarily to examine the effect of corruption on economic growth from 1984 to 2013. Using the World Bank income level classification, we further investigate if the effect of corruption on economic growth varies across different income levels within the region. Looking at the problem from this perspective is particularly important to understanding how corruption contributes to promote or undermine economic growth in sub-Saharan Africa.

The third and final topic that we address is on capital flight, corruption and economic growth in sub-Saharan Africa.

1.2. Statement of the problem and motivation

Long-run growth in real income in sub-Saharan African countries has lagged behind that of other developing regions, especially since the 1980s. The result of what some economists have called the African conundrum has been an increase in absolute poverty and a decrease in income relative to the rest of the world. Many have tried to attribute African economic conditions to geographical factors, or what authors like Jeffrey Sachs have called the "curse of the tropic[2]", while others have blamed ineffective economic and political environment. However, regardless of how you look at it, the common problem is that poverty and economic underdevelopment within the region, as a result, has consistently increased unabated.

The subsistence and worsening conditions of poverty in most developing countries of the world (including sub-Saharan Africa) is a reality that has already called concerted global action into operation. The aim is to half extreme poverty by 2030, ***a la*** the sustainable development goals (SDGs). However, the attainment of such a lofty ambition would remain elusive where official corruption, capital flight and unstable macroeconomic policies thrive steadily as a systemic culture in most of these countries. The poor would evidently continue to be poor despite the various structural adjustments and poverty reduction initiatives enunciated by a broad spectrum of interest groups including governments, international development agencies, non-governmental organizations, musicians and academics.

[2] See Tropical Underdevelopment by Jeffrey Sachs, NBER Working Paper Series/www.nber.org/papers/w8119 . Because countries in sub Saharan Africa are located in areas known as geographical tropical zone, the author argues persuasively that economic development in tropical ecozones would benefit from a concerted effort to develop health and agricultural technologies specific to the needs of the tropical economies.

The intuitive appeal in this reasoning lies in the fact that corruption on the part of public officials can distort resource allocation, exacerbate income inequalities, hamper sustained economic growth and ultimately perpetuate poverty. The condition of poverty is further aggravated where looted public funds from capital-deficient, poor countries are allowed to flow seamlessly to capital-surplus developed nations, as is common with many Sub-Saharan African (SSA) countries, (IMF report 1997). Many economists suggest that capital flight and its macroeconomic effects have devastated Africa's development for many years (Ajayi, 1997) and Ayittey (2002), Fofack and Ndikumana (2014). Some analysts and academic researchers have also argued elsewhere that if all capital kept by Africans overseas was repatriated, the continent would move halfway towards meeting external resources requirements. In fact, another estimate put capital flight from the continent, as being equivalent to about half the external resources required for development in the continent (Amoaka and Ali, 1998). Therefore, the development of meaningful and workable pro-poor policies must give careful consideration to the causal linkages that connect corruption, poverty and economic growth, as well as examining the effect of capital flight on such a relationship, since siphoned public funds whether in the form of aids, loans, grants or foreign exchange earnings can never be in the interest of the poor, and the gap in income distribution is unlikely to be bridged over the short-run to long-run periods without the right macroeconomic policies.

1.3. Research Questions

This study will attempt to explore and analyse the relationship and causality between corruption, economic growth and capital flight in 31 sub-Saharan African countries. To examine the economic growth of these countries and determine whether corruption and capital flight have an impact on economic growth, a good understanding of corruption, capital flight, and economic growth are essential to make an informed decision on pro-poor growth policies in addition to improving living standards by supporting poverty reduction initiatives. The study would, therefore, seek to answer the following research questions:

- What are the robust determinants of corruption?
- How exactly does corruption impede economic growth and development?
- Why does corruption appear to do more harm in some countries than others?
- Do corruption and capital flight have independent impacts on economic growth?

- Do the interactive effects of corruption and capital flight impede economic growth in sub-Saharan African countries?
- Could growth be sustained with an unsound governance system?

1.4 Research Objectives

The thesis research objectives are set out to satisfy the following statements regarding corruption, capital flight and economic growth in sub-Saharan Africa.

- To investigate and understand the robust determinants of corruption in SSA
- To investigate the determinants of capital flight in SSA
- To determine the impact of corruption on economic growth in SSA
- To determine the effect of capital flight on economic growth in SSA
- To investigate the effects of corruption on economic growth in the presence of capital flight in SSA
- To review the body of literature relating to corruption, capital flight and economic growth in SSA
- To derive policy recommendations based on the research findings that will be relevant to the region in curbing corruption, reduce capital flight and promote economic growth and also help in meeting the Sustainable Development Goals (SDGs).

1.5 Significance of the study

The focus of this study is to address the socio-economic challenges associated with inadequate economic growth and development, through the prisms of corruption and capital flight as the main drivers in SSA. The plight of the sub-Saharan African population, especially the poorest population has worsened over the last thirty years. The level of chronic poverty in the sub-continent is alarming and has attracted the attention of the international community. According to the United Nations, extreme poverty remains stubbornly high in low-income nations and those impacted by conflict and political turmoil, most notably in Sub-Saharan Africa. In 2015, 413 million people in SSA were among the 736 million people who lived on less than \$1.90 per day (UN Report on SDGs 2017). Elsewhere, the World Bank Group has identified "corruption as among the greatest obstacle to economic and social development. Corruption and similar misconduct undermine development by distorting the rule of law and weakening the institutional foundation upon which economic growth depends''[3]. Relatedly,

[3] https://www.miga.org/integrity

Ndikumana and Boyce (2003, 2010) also showed that the region is a net creditor to the rest of the world. Their study purports that private assets held abroad as measured by capital flight exceed total liabilities as measured by the stock of debt. This study seeks to provide a rationale for public actions to curb corruption, capital flight and identify policy instruments that will lead to economic growth and development and ultimately lead to poverty reduction in the region. Such policy action must include a macroeconomic policy that will allow for trust in the institutional/governmental sector and promote private sector investment in the region. Given that a greater percentage of SSA countries are still developing, the outcome of this research work can be generalised in such a way that several institutional stakeholders, academic researchers both within the region and other regions with similar characteristics to sub-Saharan Africa will find the outcome of this work highly relevant to policy. The section below summarizes our data, methodology and main findings.

1.6 Data, Sample and Technique

In examining the research objectives that we set out in this thesis, the analytical methods used in the thesis are drawn from the empirical literature focusing exclusively on corruption, capital flight and economic growth. The thesis then reviews extensive literature, both theoretical and empirical, that helps to underscore the roles of corruption and capital flight in the economic growth process of the economies of countries within sub-Saharan Africa. The research is both qualitative and quantitative in nature. In the first instance, it uses some descriptive statistics to shed a better understanding of the analysis, and on the second instance, econometric techniques are employed by using secondary data drawn from different international organisations like the ***World Bank's World Development Indicators (WDI), International Country Risk Guide (ICRG) Data***, ***Political Economy Research Institute, University of Massachusetts, USA***; and other sources. Furthermore, the basis of the test of hypothesis in the research is derived from the several econometric models constructed and along with the advantages and justification for their use; all the different econometric methods are further highlighted in each of the empirical chapters.

The econometric technique that this thesis relied heavily on to study corruption, capital flight and economic growth is known as panel data. To be more precise, the research investigates the robust determinants of corruption, the impact of corruption on economic growth, the determinants of capital flight, and it also separately investigates the individual and combined effects of corruption and capital flight on economic growth in a sample of 31 sub-Saharan African countries. In chapter four, the sample is further divided into income levels based on the World Bank income level classification: 18 of these countries from our full sample of 31 countries are classified as low income, and the remaining 13 countries fall into the categories of lower middle income and upper-middle-income countries respectively. The statistical and econometric software(s) known as ***STATA 13, 14*** and ***R*** were used in running the regressions in this thesis.

1.6.1 Panel Data and Extreme Bounds Analysis (EBA)

According to (Bond, 2002), the use of panel data analysis is quite common in estimating econometric models because of its distinct advantages[4] over other methods of analysis like time series or cross-section. First, unlike in pure time-series and pure cross-sections data, panel data has the distinct advantage of being able to identify and measure effects that are not possible in both time series and cross-section. Secondly, panel data in economic research allows for controlling for unit heterogeneity. Thirdly, panel data models generally tend to improve the efficiency of econometric estimates by giving more data information, more variability, providing a large number of data points. It also reduces collinearity and increases the degree of freedom. Fourthly, unlike in pure cross-section and time-series data, panel data models permit the construction and testing of more complicated models. Given these advantages'; we equally employed extreme bounds analysis (EBA), a form of sensitivity analysis that estimates a range of related models to ascertain how robust the effect of a variable is (Leamer 1985). In principle, any element of the model can be varied commonly through the set of controls. Detail explanation will be given in each empirical chapter as per the model employed.

The original data set is made up of 31 countries[5] and includes annual observations between 1984-2013; however, each chapter uses a data set based on the research questions addressed.

[4] See (Baltagi, 2008 and Greene, 2002) for details.

[5] The countries in our sample are made up of: Angola; Botswana; Burkina Faso; Cameroon; Congo, Democratic Republic; Congo Republic; Cote di'voire; Ethiopia; Gabon; The Gambia; Ghana; Guinea; Guinea

1.7 Contributions to the Literature and Summary of Main Findings

Section 1.7 as a whole is about the contributions of the thesis to the economic literature and the summary findings. Subsection 1.7.1 contains the research contributions to knowledge, and subsections 1.7.2 to 1.7.4 summarize the findings of the thesis as it applies to the respective chapters.

1.7.1 Contribution to the Literature

The main contributions of this research to the literature are summarized as follows:

1. Some clear contributions to the literature on the determinants of corruption are on how we apply Extreme Bounds Analysis (EBA) methodology and panel regressions in chapter three of the thesis to address the problem of model uncertainty. Two (Leamer and Sala-I-Martin) variants of Extreme Bounds Analysis (EBA) were used to identify the robust determinants of corruption by using panel data covering 31 countries in sub-Saharan Africa from 1984-2013. This is the first study to apply panel data by using EBA sensitivity analysis to the study of corruption. We do this by considering 60 potential determinants to find proximate determinants of corruption. This allows uncovering the publication bias and the existence of genuine determinants and the most important factors that drive the large heterogeneity of results available in the literature. This is also the first time, to the best of our knowledge that this methodology (panel EBA) has been applied to the study of corruption in general and SSA in particular. Extending EBA analysis from cross-section to panel data is also an important technical contribution of this thesis.

2. This study investigates the determinants of capital flight and aims to demonstrate that corruption is one of the important causes of capital flight. We do this through the use of portfolio choice theory based on Le and Zak (2006), and by introducing the corruption variable into the capital flight equation in a dynamic panel data setting that focused on our sample of SSA countries. We showed that corruption is a determinant of capital flight. Moreover, we use a new measure of capital flight dataset unique to African countries.

Bissau;Kenya;Liberia;Madagascar;Malawi;Mali;Mozambique;Namibia;Niger;Nigeria;Senegal; Sierra Leone; South Africa; Sudan; Tanzania; Togo; Uganda; Zambia; Zimbabwe.

3. This study contributes to the current scanty literature on the economics of corruption and growth with a focus on African countries in several ways: first of all, we use panel data to provide evidence of the effects of corruption on economic growth for 31 SSA countries in our sample. Previous studies tend to use cross-sectional methods and thereby fail to address the problem of endogeneity. No other previous work employed the use of panel data focusing on SSA countries exclusively. There are country, economic blocs and continental studies but none exist that is specific to SSA countries. Again, several studies use measures of corruption that have little or no coverage of many SSA countries. Even the few studies that cover Africa, did so by employing a dummy variable for the entire continent and also assuming that Africa is a homogenous continent and thereby ignoring the differences between SSA and North Africa, and also between countries within SSA. We do not believe Africa is homogenous and therefore contribute to the literature by adopting the World Bank income classifications to further investigate if there are variations on the impact of corruption on economic growth along income lines. Second of all, this is the first work investigating the impact of corruption upon economic growth in the region over a long period (30 years). The second reason also allows us to capture the long-term dynamics of corruption on growth. Third, this is the first attempt at looking at this topic from an income level classification perspective within SSA.

4. This thesis makes important contributions to the corruption, capital flight and economic growth literature nexus in general and more specifically to the countries within SSA by jointly considering capital flight and corruption in an empirical investigation that focuses on the growth of SSA countries over the period of 1986 to 2010. The principal aim of our analysis is to examine the independent as well as the joint effects of corruption and capital flight on economic growth. Through this method, we test if the presence of capital flight influences the growth impact of corruption. We demonstrate and show clearly that corruption and capital flight have both independent and joint effects on economic growth.

5. Part of the uniqueness of this study is the focus on SSA countries, and to that extent, it can be used as a learning strategy for MENA countries and other developing economies across the globe. Furthermore, because of the data-driven nature of the

thesis and the time period under consideration (1984-2013), the thesis stood out from other previous works.

1.7.2 Robust Determinants of Corruption

The theoretical and empirical literature on corruption advances many viewpoints on its causes. However, without an agreement supported by a theoretical foundation on the determinant of corruption, empirical researchers, in general, are naturally inclined to experiment with certain kinds of variables that may be correlated with corruption. Conversely, by employing a set of right-hand-side variables, others simply focus on a variable that is of particular interest to them. The reasoning is premised on the fact that by running so many regressions and using a certain combination of regressors, it is often plausible to find one particular regressor of interest to be significant and subsequently the same variable becomes insignificant when the regression is run with another set and combination of regressors or right-hand-side variables. This equally holds for the sign of the estimate.

The above gives rise to the problem of model uncertainty and applying some variants of the Extreme Bounds Analysis (EBA) methodology of Leamer (1985), Sala-I-Martin (1997) and Sturm and de Haan (2005), will help us solve this problem in Chapter 3 of this thesis. The concept behind this methodology is to create multiples of $(\boldsymbol{\beta' s})$ estimates for variables that are of particular interest by employing different possible and likely combinations of control variables usually taken from a pool of regressors. The pool in question is usually made up of variables that have been found in the literature to be correlates of corruption. Our main concern is to investigate whether the distribution of $\boldsymbol{\beta}$ lies on one side of the $(\boldsymbol{CDF})$ cumulative distribution function. Employing a large number of covariates that have been found to be correlates of corruption across countries, and also experimenting with different numbers of observations to investigate how robust our finding is and therefore came up with a comprehensive list of potential determinants of corruption by using previous causes of corruption found in the literature survey as a guide. For example, we started with Triesman (2000), and chapter 3 further discusses the determinants of corruption as found in the literature and group them into 3 categories: The first is named economic determinants, followed by socio-cultural determinants which is the second and finally the third is called institutional determinants of corruption. We find strong evidence that ethnolinguistic fractionalisation, internal conflict, government stability, democratic accountability and total natural resource rent are the robust determinants of corruption.

1.7.3 Corruption and Economic Growth

The second topic we considered in this thesis is "Corruption and economic growth with evidence from sub-Saharan Africa". We set out primarily to examine the effect of corruption on economic growth over the period of 1984 to 2013. Using the World Bank income level classification, we further investigate if the effect of corruption on economic growth varies across different income levels within the region. Looking at the problem from this perspective is particularly important to understanding how corruption contributes to promote or undermine economic growth in sub-Saharan Africa as we do not believe that the economies and characteristics of the countries within Africa and SSA, in particular, are the same. This is because most previous studies have looked at Africa in a continental context as opposed to SSA exclusively. We take the view that the economies of countries within North Africa are quite unique and different from the economies of countries within SSA.

Using a perceived measure of corruption (ICRG) and panel data from 31 countries in SSA over a 30 -year period, we implement a panel instrumental variable(IV) and generalised methods of moments(GMM) techniques and find overall, statistically significant negative effect of corruption on economic growth in the entire sample of countries. Furthermore, by using the income level classification highlighted above, we also find that there are statistically significant differences in the effect of corruption on economic growth based on income groupings. The largest impact of corruption on economic growth is found in low-income countries (LIC) and these results are robust to various specifications and conditioning variables. Our results also have very interesting policy implications for economic growth for the entire region, and more importantly for the low-income countries in SSA.

1.7.4 Corruption, Capital Flight and Economic Growth

This chapter examines a very topical issue for sub-Saharan African countries within a broad title of corruption, capital flight and economic growth. First, using portfolio choice theory of asset allocation in a panel of 25 countries from SSA and within 1986-2010 period, we empirically investigate the determinant of capital flight by introducing the corruption variable, for the first time in SSA, as a key determinant of capital flight and the evidence presented from this analysis indicates that the corruption coefficient is positive and statistically significant across all specifications. This result shows that, for the countries within the region, corruption is very fundamental in promoting capital flight and thereby confirming our original hypothesis. Furthermore, and within the above framework, we examine the independent, as well as the joint effects of corruption and capital flight on economic growth. We believe that there is a link between the two phenomena and there has been no previous attempt in linking the two together. This chapter attempts to fill this gap, and we found strong evidence that corruption and capital flight have both independent and joint effects on economic growth; corruption exhibit a consisted negative effect on economic growth and that the effect of capital flight on economic growth is mixed, with both negative and positive effects. However, the joint effects of corruption and capital flight through the interactive term are strongly negative. This finding offers strong support to the argument that the nature of capital flight from sub-Saharan Africa is largely driven by corruption. The finding is also consistent with our hypothesis that corruption and capital flight co-existing together have detrimental effects on economic growth for countries within the region. The results were shown to be robust to different specifications, measures of corruption, and estimation methods.

1.8 Research Outline

This thesis contains six chapters and is organised as follow: Chapter one provides the background context and introduction. It also contains the research motivation, objectives and thesis contribution to knowledge. Chapter two contains an overview and some stylised facts about the SSA region. Chapter three tackles the all-important question of robust determinants of corruption by using the Extreme Bound Analysis (EBA) methodology. In a nutshell, it answers the key question of the level of confidence we should have on the determinants of corruption? Chapter four looks at the effect of corruption on economic growth, it further does this through the prism of income level classification of the World Bank. Chapter five is a unique empirical investigation into the growth implication of capital flight in the presence of corruption. Chapter six, which is the conclusions of the thesis highlights the summation of the research objectives, research technique, and thesis contributions to knowledge, policy recommendations, research limitations and possible areas for future research.

Chapter Two

A brief overview of countries in sub-Saharan Africa (SSA) and some stylized facts.

Apart from the brief overview about countries in SSA, this chapter also discusses factual evidence about SSA that covers the following:(1) Historical pattern of economic growth in SSA since the 1960s when most countries in the region gained political independence;(2) Nature of corruption in the region; and (3) An overview of capital flight in SSA.

The area of the African continent that lies south of the Saharan Desert is what is known geographically as sub-Saharan Africa. In political terms, it is made up of all the countries that are located south of the Sahara except for Sudan, which is sometimes classified as part of the seven countries of North Africa[6]. However, it is worth pointing out that Sudan, geographically sits on the eastern part of the Saharan desert. Except for the 5 mainly Arab states in northern Africa (Algeria, Egypt, Libya, Morocco and Tunisia), sub-Saharan Africa comprises 49 out of Africa's 54 countries[7] in the African continent. According to the World Bank Development Outlook report 2016, sub-Saharan Africa remains the most populated region of Africa with an estimated population of 856 million people as of 2010, and this is from a position of 186 million in 1950. On average, and for the past 60 years, that is about 11 million people a year or approximately 670 million people over the same period of 60 years. Furthermore, it is projected that its population

[6] Algeria;Egypt;Libya;Mauritania;Morocco;Sudan; Tunisia.

[7] Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Central Africa Republic; Comoros; Cape Verde; Chad; Cote di' Voire; Congo; Democratic Republic of Congo; Djibouti; Ethiopia; Equatorial, Eritrea, Guinea; Gabon; Gambia; Ghana; Guinea Bissau; Guinea; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Mozambique; Namibia; Niger; Nigeria; Rwanda; Sao Tome and Principe; Seychelles; Somalia; South Africa; Swaziland; Senegal; Sierra Leone; Tanzania; Togo; Uganda; Zambia; Zaire; Zimbabwe.

by 2060 could be as high as 2.7 billion people[8]. Seychelles, with an estimated population of 0.088 million people is the least populated country in SSA. On the other hand, Nigeria and the Democratic Republic of Congo, are the most populous countries in sub-Sahara Africa. Both countries have an estimated population in the following order: 162 million for Nigeria and 70.9 million for the Democratic Republic of Congo. The green area of the map in figure 2.1 below shows the region of sub-Saharan Africa.

Figure 2. 1 Map of Africa, the green shaded area indicates countries within (SSA) sub-Saharan Africa (SSA) and the grey area comprises of countries in North Africa.

[8] 7 facts about population in sub Saharan Africa http://blogs.worldbank.org/africacan/7-facts-about-population-in-sub-saharan-africa

2.1 The pattern of growth in SSA relative to the rest of the world

With respect to the structure of the regional economy, agriculture remains the mainstay of the economy of countries within SSA. According to UNCTAD (2010) statistics, the primary sector which involves mainly agricultural activity accounted for 40% of the GDP of the region, whilst the secondary and tertiary sectors accounted for 25% and 35% respectively. The Sub-Saharan economy is essentially grounded in four pillars; (a) Oil and mining sector with limited local content, (b) Agriculture and agro-allied business sector below potential. (c) Under-developed manufacturing and services sector. (d) Large and dynamic, informal sector.

A major concern of this section is to first highlight the growth pattern of sub-Saharan Africa (SSA) in the last 50 years relative to other comparable developing countries or regions. The analysis is based on time-series data on GDP per capita and their growth rate from 1960 to 2013 for all the countries in sub-Saharan Africa with available data. For the period under review (1960 to 2010), the SSA growth trajectory, taken in aggregation can be said to be characterised by underdevelopment and dismal economic growth performance. It is even worse if we take into account that about the same time other developing regions of the world grew at an annual rate of 2% on average. Focusing exclusively on sub-Saharan African economies, countries in our sample had a per capita income in 2001-05 that was less than its 1975 level. Growth within the same period was also negative (i.e. a contraction in a country's economy, which is reflected in a decrease in its GDP in a given period). Table 2.1 also decomposes the GDP per capita into sub-periods. As can be seen from the table, during the 1970s to 1980s period; it clearly illustrates that SSA had a much better GDP per capita than the developing regions of East Asia and South Asia. The evidence shows that SSA has been losing a lot of ground until recently. It missed out on the economic miracle that took place in the developing world (Asia) over the last half of the 20th century. Figure 2.2 in the page overleaf shows the GDP per capita trend from the 1960s to 2010. Again, as in the table below; it can distinctly be seen that SSA is lagging behind other regions of the world in terms of economic development. The table is not just made up of numbers; it is a fair and accurate representation of the facts on the ground.

Table 2. 1Pattern of Growth: GDP per capita (US$) and growth by regions (1975-2010)

Region	1975-80	1981-85	1986-90	1991-95	1996-2000	2001-05	2006-10
	GDP per capita						
Sub-Saharan Africa	1,928	1,844	1,782	1,648	1,668	1,768	1,934
East Asia & Pacific	905	1,227	1,686	2,407	3,399	4,595	7,900
Latin America & Caribbean	6,020	6,295	6,315	6,450	6,978	7,205	9,746
Middle East and North Africa	4,179	4,180	4,055	4,326	4,651	5,197	9,167
South Asia	1,132	1,268	1,505	1,745	2,110	2,530	2,482
Low and middle income	2,278	2,560	2,881	3,045	3,513	4,219	4,822
	Growth						
Sub-Saharan Africa	-0.06	-1.60	-0.21	-1.64	0.79	1.79	2.6
East Asia & Pacific	5.26	6.12	5.76	9.10	5.63	7.06	3.2
Latin America & Caribbean	3.31	-0.95	-0.43	1.61	1.53	1.21	2.6
Middle East & North Africa	-0.20	2.41	-1.20	1.18	1.91	2.78	2.4
South Asia	1.03	3.14	3.89	3.01	3.59	4.65	5.8
Low middle income	2.79	1.99	1.93	1.56	3.23	4.58	5.0

Note: Data sourced from the World Bank Development Indicators 2011 and indicates averages for the period.

Figure 2.2: GDP Per Capita(US$) across different regions of the world(1960-2011)

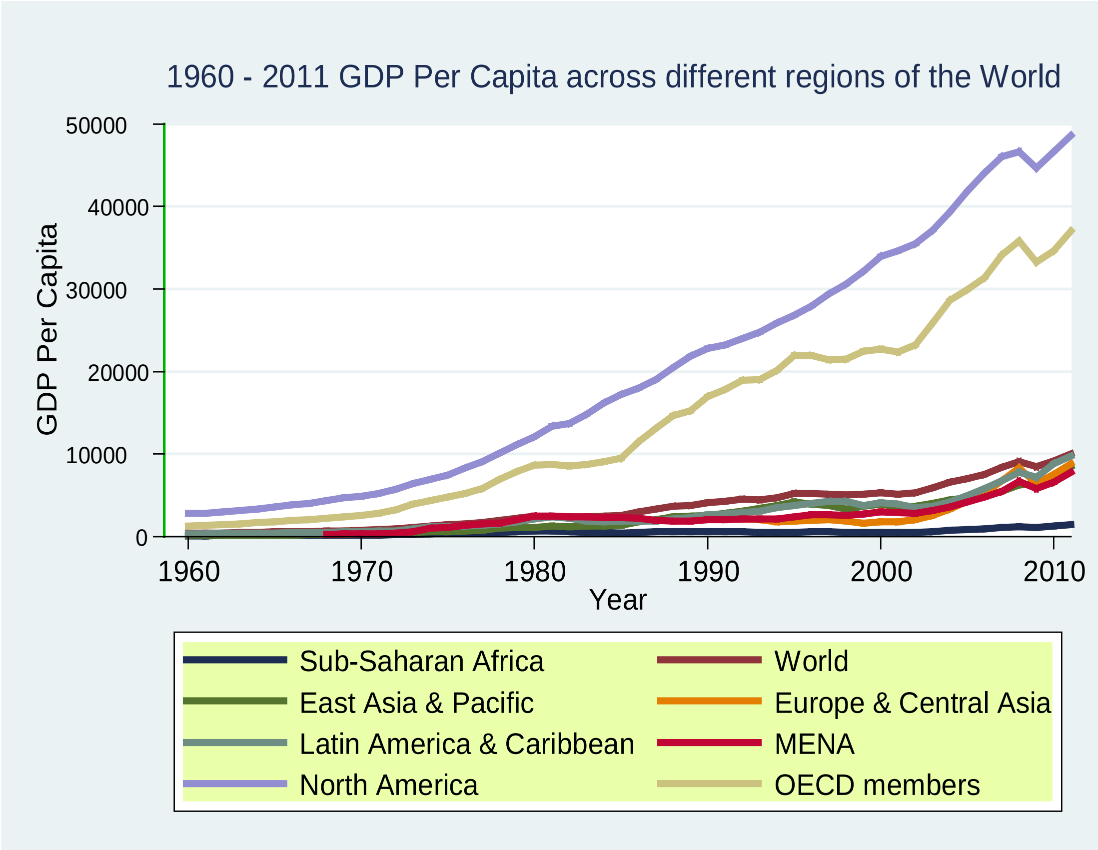


Figure 2. 2: GDP Per Capita(US$) across different regions of the world(1960-2011)

Note: data is sourced from the World Bank Development Indicators (WDI 2011)

Furthermore, looking at how SSA compares with other parts of the world on some recent other economic demographic statistics; Table 2.2 on the next page shows that SSA faces other economic and development challenges. Not only is it the poorest region in the world, but more than half of its nearly 874.8 million people also live on less than two U.S. dollars a day. According to the (World Bank, 2010); nearly 75% of the people across the region lack access to proper sanitation, millions of them do not have access to safe drinking water and food, and every year, approximately 2 million children die in the first 12 months of their lives. The Table also shows that SSA has the highest population growth rate, highest under-five mortality rate, lowest secondary school enrolment, and one of the lowest average gross capital formations across the region.

Given the above state of affairs in SSA over the intervening years, authors like Easterly and Levine (1997), highlights that the possible determinants of lack of economic growth in the region to be attributable to linguistic and ethnic divisions. Equally, Sachs and

Warner (1997) also attribute the lack of growth in the region to geographical factors related to climate and soil fertility. However, other scholars like Mauro (1995) and other multilateral organisations (World Bank), NGO's (Transparency International) believe that corruption has been, and is still a strong factor affecting economic growth in the region.

Table 2. 2:Economic and demographic statistics, data are averages for the periods and sourced from the WDI 2012.

[9]	GDP current US ($) trillion	Population Current(billions)	Gross Capital Formation (% of GDP)	Trade (% of GDP)2011	Population Growth (annual %)	Secondary enrolment, (% gross)	Mortality rate, under -5(p/1000)
OECD	43.89	1.040 b	18	53	0.6	102	5.0
EAP	9.313	1.974 b	42	74	0.7	79	21
LAC	5.649	589 m	22	47	1.1	90	19
MENA	1.202	336.5 m	28	71	1.7	74	32
SA	2.296	1.656 b	32	52	1.4	58	62
SSA	1.266	874.8 m	21	71	2.5	40	109

2.2 Nature of corruption in SSA

Corruption has a wide range of corrosive effects on societies and it is considered to be an insidious plague. The concept of corruption itself is not a new phenomenon; it is as old as the notion of a kingdom and is also a persistent feature of human societies over time. References to corruption and punishment can be found in many ancient sources like The Eddict of Harmhab, King of Egypt (14th century B.C) and The Code of Hammurabi, King of Babylon (22nd century B.C). Other historical examples are the sale of parliamentary seats in the "rotten boroughs" of Great Britain shortly before the Reform Act of 1832[10] and the "machine politics" that affected expanding immigrant

[9] OECD (Organisation for Economic Co-operation and Development), EAP (East Asia and Pacific), LAC (Latin America and Caribbean), SA (South Asia) and SSA (Sub Saharan Africa).

[10] Before the Reform Act of 1832, Britain's electoral systems were neither representative nor balanced. It was characterised by corruption as a range of factors help to decide whether you were eligible to vote. In some places all men could vote, however, in majority of places it depended largely on whether you were a property owner or paid certain taxes. Some boroughs in places like Manchester and Birmingham had no representative in the form of an MP in parliament at all, and at the same time, places like Sarum at Salisbury, referred to as ''rotten'' boroughs, had two MPs but only seven voters. The Reform Act brought some changes to the system.

cities of the United States at the beginning of the 19th century. Recent examples are also common, not only in developing countries like Pakistan, Nigeria and Myanmar, and transition economies like Brazil and Russia. The "expenses scandal" that engulfed the United Kingdom houses of parliament in 2009, is just one sad recent reminder of corruption in a developed world. [See Mishra 2006 and Aidt 2011]. Examples also abound in the private sector: The fall of corporate Enron in the United States of America in the year 2001 and the Olympus Japanese corporate scandal (New York Times, November 18, 2011)[11] are just two good examples.

As noted above, the evil phenomenon called corruption is present in all countries in some way; however, it is particularly rampant in sub-Saharan Africa and highly pervasive in the developing world in general. The real cost of corruption is in its effects in the developing world; its effects are very destructive because of the way it hurts the poor disproportionately by diverting money intended for development and thereby undermining a government ability to provide basic services (Tanzi and Davoodi,1997). corruption is also said to promote inequality through the highly skewed distribution of income (Li et al., 2000), it is equally known to discourage foreign direct investment and foreign aid (Alesina and Weder, 2002; Freckleton *et al.*; 2012).

Corruption in the public sector is viewed as the major obstacle to economic development (Kaufmann, 1997), solid evidence demonstrates the negative effects of corruption upon among other things; economic growth, investment and social welfare (see, for example, Mauro 1995). This obvious negative relationship between corruption and the level of economic development has continued to feed into the growing belief that the degree and persistent nature of public sector corruption are amongst the greatest obstacle to achieving economic growth and social development in the world (World Bank, 2011b).

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http://www.bl.uk/learning/histcitizen/21cc/struggle/chartists1/historicalsources/source2/reformact.html

[11] For details on Enrol of USA and Olympus of Japan corruption scandals seehttp://www.npr.org/news/specials/enron/and Corporate Japan Rocked by Scandal at Olympus by Hiroko Tabuchi.New York Times. November 9,2011 http://www.nytimes.com/2011/11/10/business/global/corporate-japan-rocked-by-scandal-at-olympus.html

The view in the preceding paragraphs has precipitated huge interest, within the international policy sphere, on corruption and how to combat it. Classic examples in this regard are: "Resolution 58/4[12] (October 31, 2003) United Nations Conventions against Corruption. The resolution provides powerful new capacities for mutual legal assistance among countries in the fight against corruption and thereby making it easier to return stolen assets by corrupt leaders". Similarly, the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions (also known as the Anti Bribery Convention)[13] was signed in December 1997 and came into force in February 1999. "It makes it a crime to offer, promise or give bribe to a foreign public official in order to obtain or retain international business deals". Transparency International (TI) regards "corruption as one of the greatest challenges of the contemporary world. It undermines good government, fundamentally distorts public policy, leads to the misallocation of resources, harms the private sector and private sector development and particularly hurts the poor". The World Bank also identified "corruption as the single greatest obstacle to economic and social development, it undermines development by distorting the rule of law and weakening the institutional foundation on which economic growth depends". In the same vein, the G20[14] Leaders in 2010 in recognition of the significant negative impact of corruption on economic growth, trade and development, established what is known as the Anti-Corruption Working Group (ACWG) in Toronto. ACWG main work is to support the G20 growth and resilience agenda, by focusing primarily on where it can help improve current existing efforts in combating corruption and enhance transparency within the international arena.

According to the World Bank (2013), it is estimated that in the year 2001/2002, that the sum or total amount of bribes paid in both developed and developing countries stood

[12] The Convention introduces a comprehensive set of standard, measures and rules that all countries can apply in order to strengthen their legal and regulatory regimes to fight corruption. It calls for preventative measures and criminalisation of the most prevalent form of corruption in both public and private sectors. And it makes a major breakthrough by requiring Member States to return assets obtained through corruption from the country from which they were stolen. https://www.unodc.org/documents/brussels/UN_Convention_Against_Corruption.pdf

[13] Details is contained in the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions and related documents.http://www.oecd.org/daf/anti-bribery/ConvCombatBribery_ENG.pdf

[14] The G20 is a group of twenty highly influential major economies of the world. They meet through an international forum where the 20 countries are represented by their respective leaders and central bank governors.

at one trillion dollars (US$). In percentage terms, this is about 3% of the world GDP at the time. This estimate excludes some variations of corruption like the embezzlement of public funds that are very difficult to estimate. For example, it is now a well-known fact that some deposed autocratic rulers from Nigeria and Zaire, while in office embezzled public funds running into billions of dollars. As shocking as these embezzled figures from these poor countries may be, they merely represent the transfer of financial assets from the state to the autocrat, and do not represent a good indicator of the cost of corruption and thereby affecting only income and wealth distribution but not necessarily output. So, it is a very serious concern for any country.

The general consensus is that the SSA region is characterized by widespread corruption, at both the petty and grand scales. One of the main causes of the high degree of corruption is entrenched in the institutional as well as political aspects of the states, such as nascent democracies and oversized public sectors. The Corruption Perceptions Index (CPI) constructed by Transparency International shows that, with some degrees of variation, SSA countries are ranked below the world median. Moreover, comparing countries with similar income levels, SSA countries are ranked consistently lower. Corruption Perceptions Index (2014) illustrates that three out of the ten bottom countries are from the SSA region. Eighty per cent of sub-Saharan African countries (36 out of 45) score below the global average in the Transparency International Corruption Perceptions Index Similarly, according to the International Country Risk Guide (ICRG) corruption index produced by Political Risk Services, the average score for the period 1984–2013 for the SSA region is around 2 out of the maximum corruption score of 6. Only three of the 30 sub-Saharan African countries included in the International Country Risk Guide's governance indicator have above-average scores. In addition, the World Bank Governance Indicators (2014) ranked all SSA countries poorly for control of corruption (see Figure 2.4).

Furthermore, the overwhelming majority of people in the region think that favouritism is necessary for getting a public sector job. The World Bank, in the world's most comprehensive company-level data provided by Business Enterprise Survey on the various constraints to business performance and growth covering over 130,000 businesses for the period 2002–2014 in 135 countries, reveals that public sector corruption imposes a major administrative and financial constraint on firms. Enterprise survey provides three sets of indicators for corruption. The first set of indicators for the overall corruption index reflects that the proportion of times a firm requires or expects to pay a bribe for six different public services, permits, or licenses, and the score is more than 20 per cent for SSA countries. The second set of indicators show that over 40 per cent of the firms are expected to provide gifts for securing government contracts. The third set of indicators for corruption focuses on bribes or informal payments for obtaining licenses or permits, and nearly 30 per cent and 20 per cent of firms in SSA countries are expected to provide gifts for construction permits and import licenses, respectively. In terms of country profile, Botswana, Cape Verde and Namibia perform much better (less corruption) than the average SSA country in all aspects, whereas Somalia experiences widespread and pervasive corruption in the region.

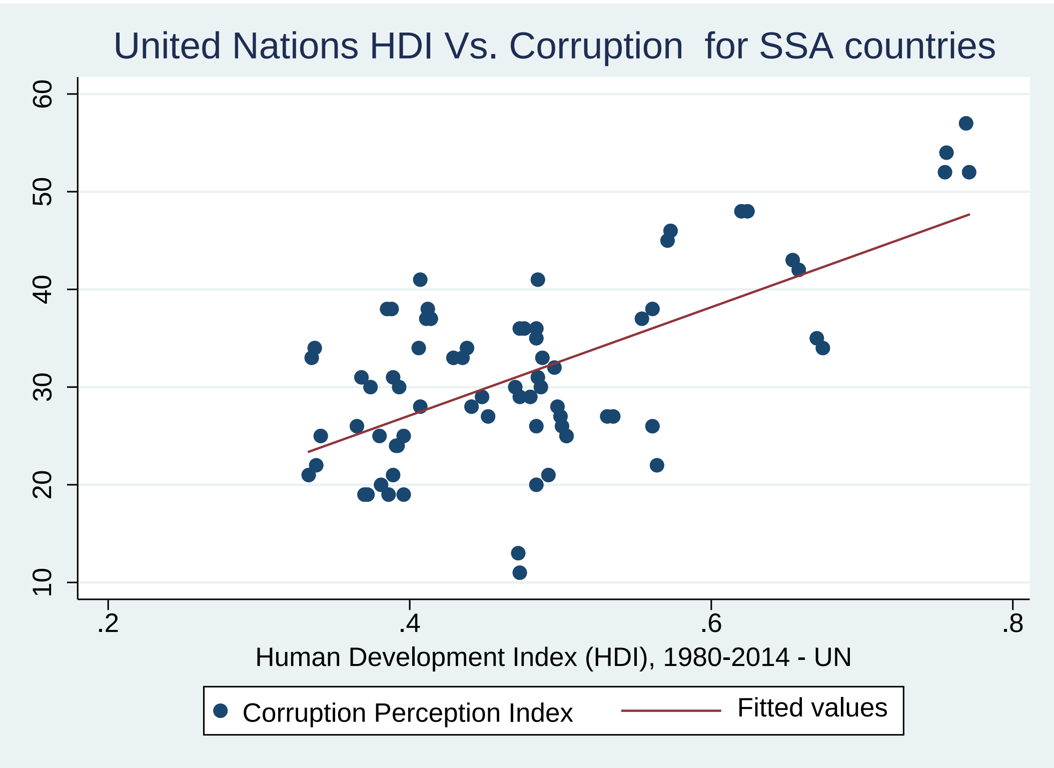


Figure 2. 3: **UN Human Development Index and Corruption in SSA Countries**

The visualization in figure 2.3 shows the cross-country relationship between development, as measured by the United Nations Human Development Index, and corruption, as measured by Transparency International's Corruption Perception Index.

As we can see, countries that score higher in the Corruption Perception Index (i.e. countries seen as less corrupt) tend to also have better scores in the Human Development Index. The vertical axis shows scores in the UN Human Development Index (2013 data, lower values reflect lower development). The horizontal axis shows scores from Transparency International Corruption Index (2013 data, lower values reflect higher perceived corruption).

Corruption is generally seen as a key element in economic underperformance and a major obstacle to poverty alleviation and development. A lot of experts take the view that relative to other parts of the world, corruption in Africa tend to be much more damaging in the form it takes. Jeremy Pope, a founding member of Transparency International, defines corruption in Africa as "***Lootocracy***" and states that: "***you don't find it anywhere else in the world. Even in Latin America, the leaders don't steal everything that moves and shift it offshore***". Similarly, Martin Wolf, a former World Bank economist, who now writes for the London based Financial Times, believes that: "***in Africa, the corrupt removes resource wealth and provides nothing in return. In Asia, regimes like Suharto's would take a cut on everything, but the service would be delivered. While that extract a price from the economy, it is far more beneficial to society***". (Quina, 2008). Put differently, African leaders tend to externalise corruption, while, Asian leaders tend to internalise it.

The nature of corruption in the region is highly endemic and pervasive. For most countries within the region, corruption takes several forms like payment of bribes to police officers and other government bureaucrats for basic services to high-level political corruption involving major players in the top echelon of governments. The danger is that the first help to undermine basic trust in government institutions and the latter leads to greater financial costs to the countries as the sums involved can often run into billions of US$. There is also evidence from academic research, for example, Gyimah-Brempong (2002) in a study on corruption and economic growth in Africa also shows that corruption has a detrimental effect on economic growth, and also found increased corruption to be positively correlated with income inequality. Similarly, Collier and Vicente (2012) also show that corruption can warp the political process as political leaders within the region often get re-elected into office through bribery, fraud and political intimidation and this is partly because winning will give them unfettered access to the state treasury and also guarantee them constitutional immunity from prosecution. Therefore, the stakes of not winning are very high and hence the incentive to use every means possible (including illegality) to get re-elected into public office.

Over the past decade or more, governments within the region have made some progress in the fight against corruption. However, these efforts are not seen as holistic but rather as a token to appease the international donor agencies that now put good governance and transparency as conditionalities for further aid. The anecdotal evidence on the ground also shows that most governments in sub-Saharan Africa tend to use the fight against corruption as a smokescreen to clamp down and discredit opposition politicians through the use of organs of the state like the police and the intimidation of the judiciary.

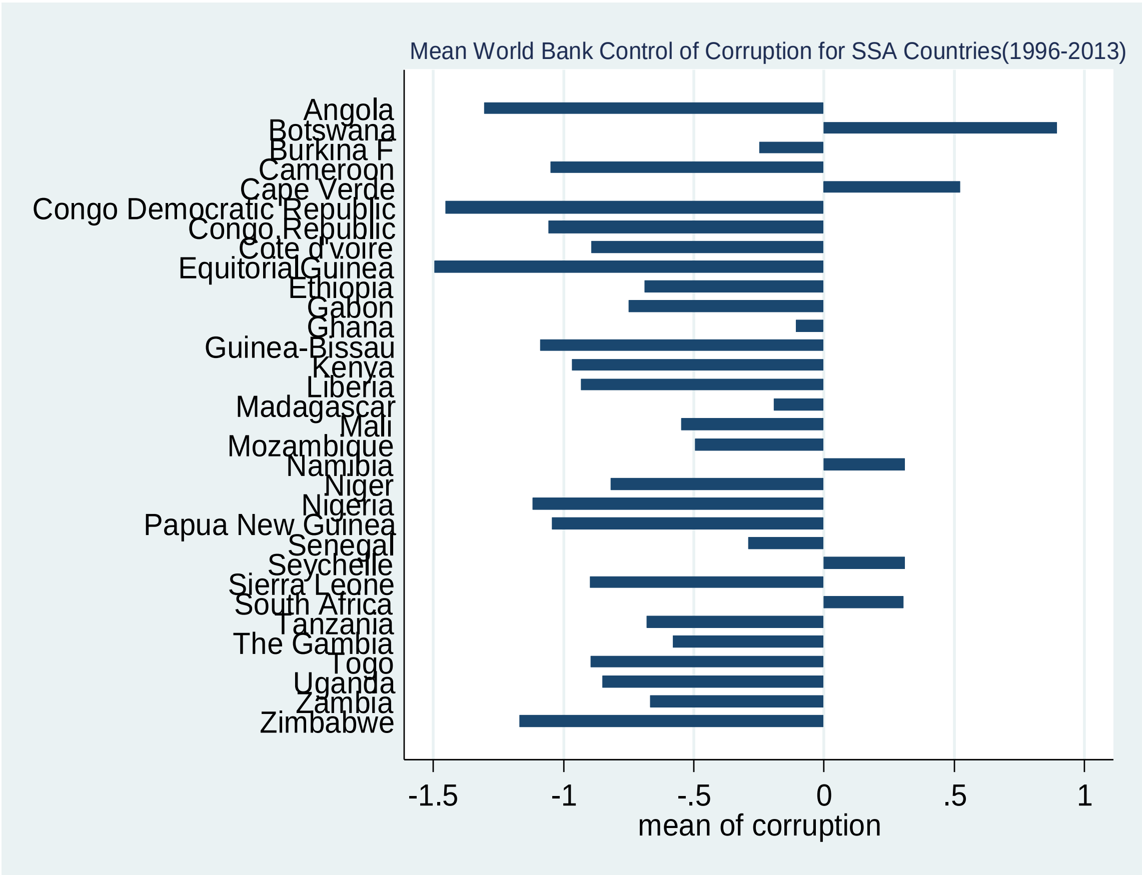


Figure 2. 4: Mean World Bank Control of Corruption (CC) for SSA Countries (1996-2013).

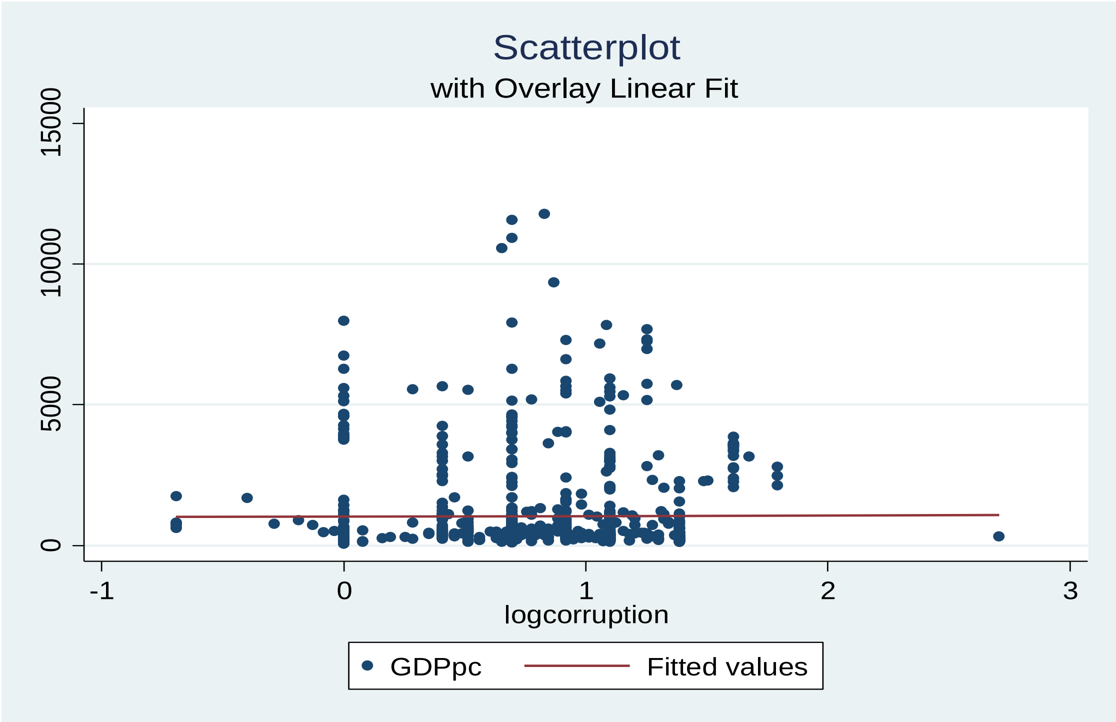


Figure 2. 5: showing GDP Per Capita and log of Corruption Scatter Plot for the period (1984-2013).

Figure 2.5 is a scatter plot with an overlay linear fit of the relationship between corruption and GDP Per Capita. It shows that most countries from our sample are quite corrupt based on their average low corruption scores and very low GDP per capita. Furthermore, Figures 2.6 to 2.9 summarizes the trend of GDP per capita and corruption from some selected countries to help give us a historical picture of both variables over time.

Figure 2. 6: GDP Per Capita and Corruption for Botswana (1984-2013)

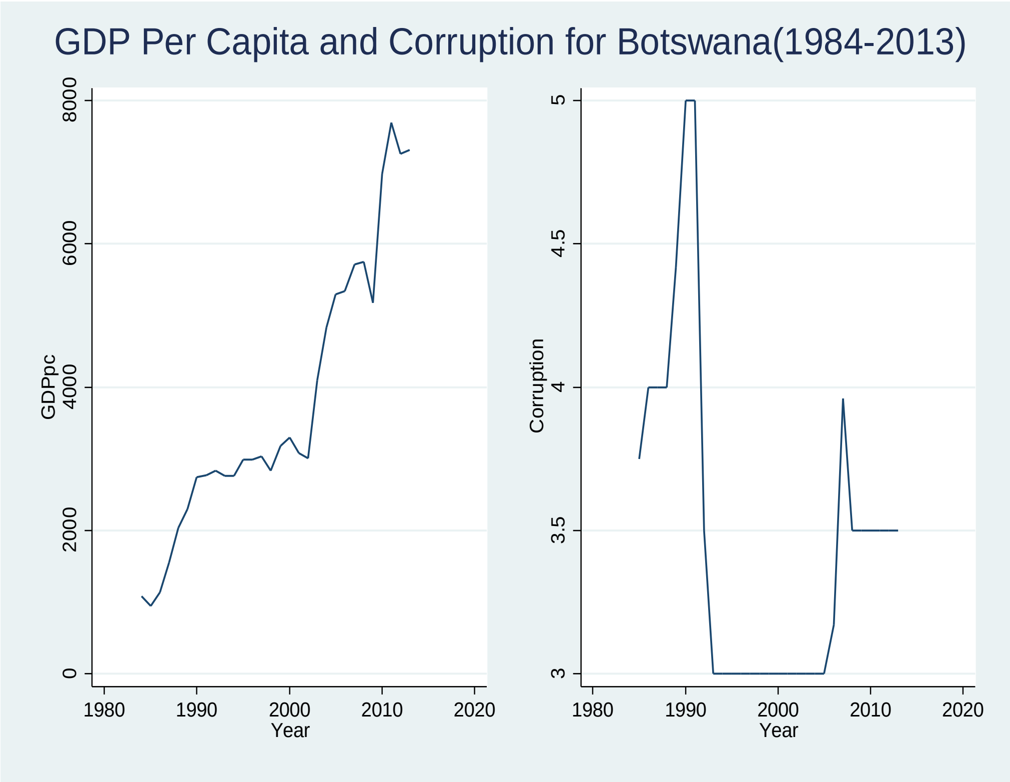
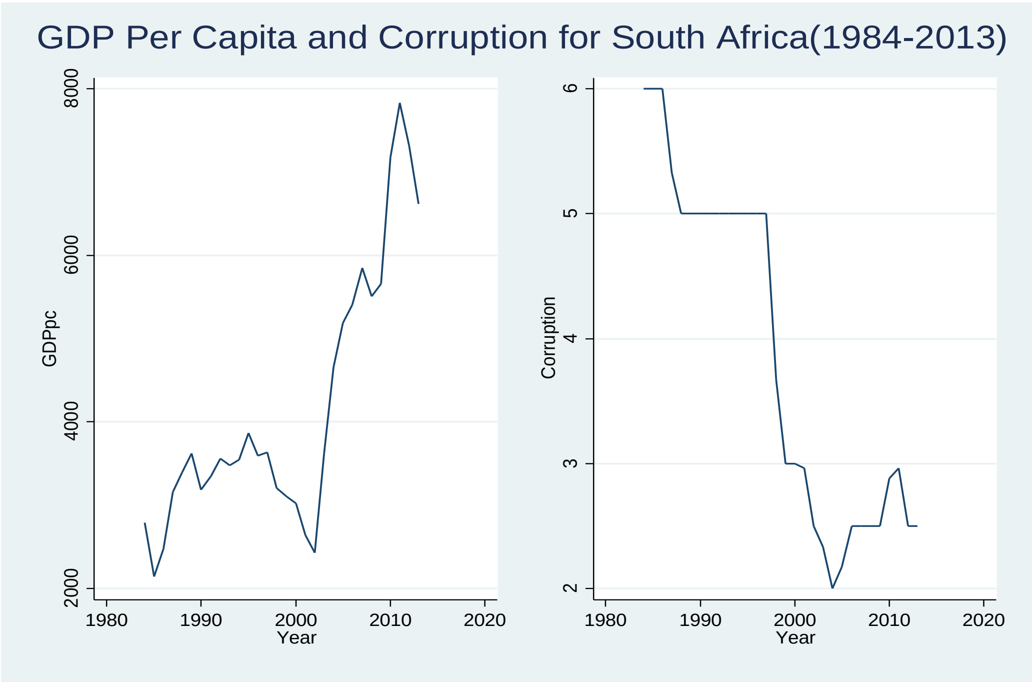


Figure 2. 7: **GDP Per Capita and Corruption for South Africa (1984-2013)**



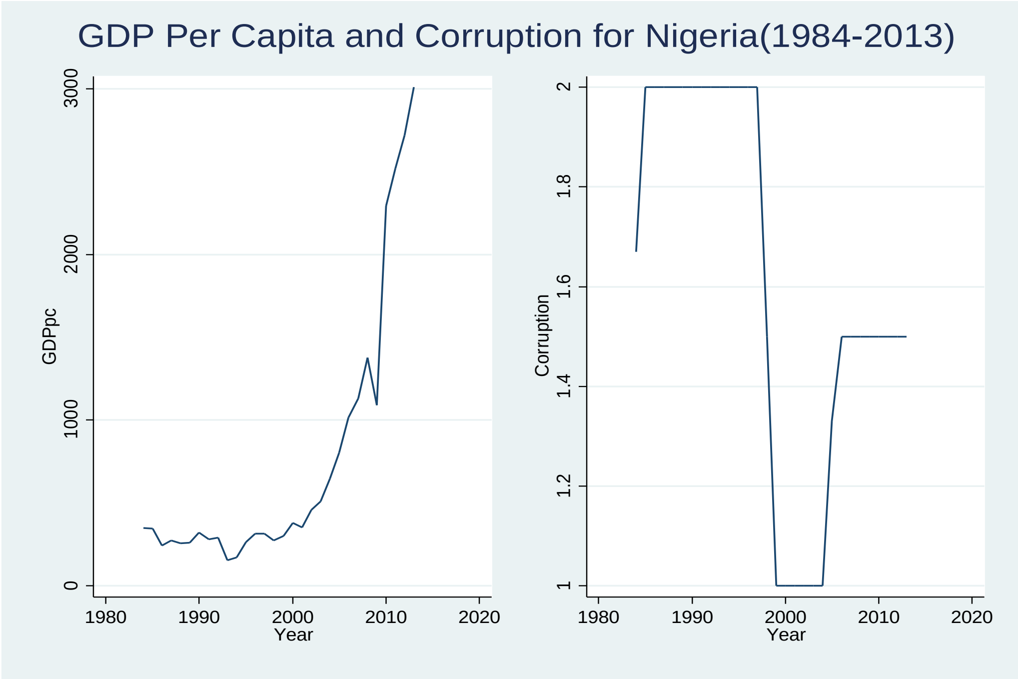


Figure 2. 8:**GDP Per Capita and Corruption for Nigeria (1984-2013)**

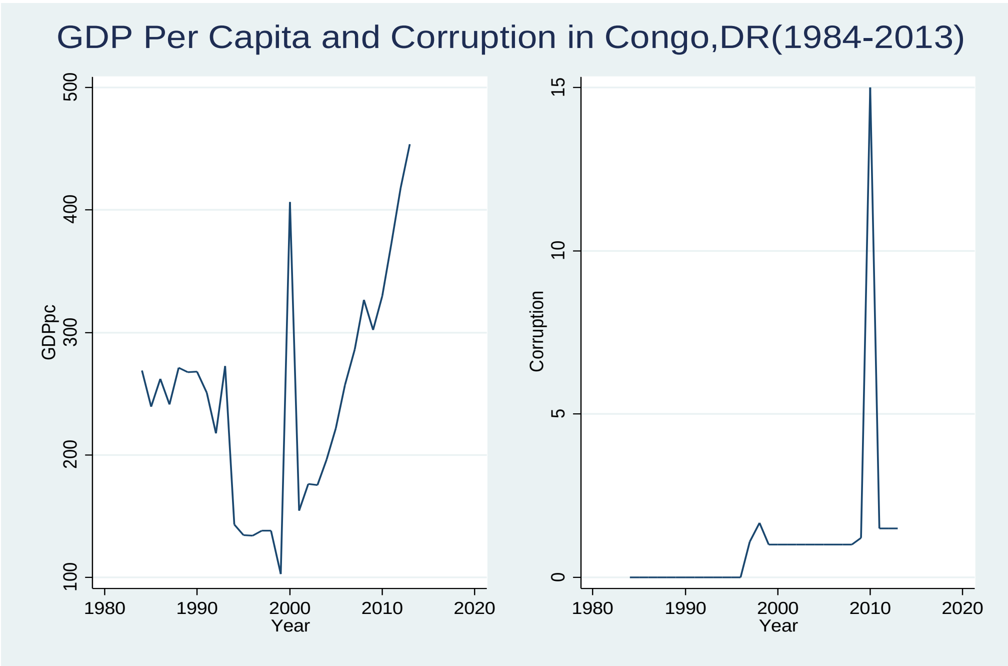


Figure 2. 9: GDP Per Capita and Corruption in Congo,DR (1984-2013)

2.3 An Overview of Capital Flight in sub-Saharan African Countries

In general, a vast amount of money in the billion US$ range disappear each year from emerging markets like Africa and end up in developed countries with tax haven jurisdictions of some sort. Recent work by Zucman (2013) shed some interesting light on the issue by putting it in proper perspective. For example, capital flight from developing countries is estimated to be twice the yearly repayment of debt from developing countries, and it is also ten times equivalent to the yearly world aid flow. Why this is a big problem is premised on the fact that capital flight constitutes a bigger problem for countries from Africa than in other regions of the world. Furthermore, looking at how SSA compares with other parts of the world on some recent other economic demographic statistics; Table 2.2 on page 40 shows that SSA faces other economic and development challenges. Not only is it the poorest region in the world, but more than half of its nearly 874.8 million people also live on less than two U.S. dollars a day. According to the (World Bank, 2010); nearly 75% of the people across the region lack access to proper sanitation, millions of them do not have access to safe drinking water and food, and every year, approximately 2 million children die in the first 12 months of their lives. The Table also shows that SSA has the highest population growth rate, highest under-five mortality rate, lowest secondary school enrolment, and one of the lowest average gross capital formations across the region.

Capital flight literature from SSA and Africa at large over the years has focused more on its causes and on estimating its magnitude. However, two areas are suffering from a dearth of empirical research, which is issues around the developmental impact of capital flight, and also on its distributional effects within the region. This section seeks to steer the conversation in those directions.

A very good starting point in the analysis of the development impact of capital flight is its implications for capital accumulation, domestic resources and how these affect economic growth and public service delivery. Capital flight potentially keeps a country below its domestic investment potential by depleting domestic savings and thereby retarding economic growth. There is further econometric evidence that shows significant negative effects of capital flight on domestic investment in SSA countries (Fofack and Ndikumana, 2010; Ndikumana, 2014a). As a result of the way in which capital flight negatively affects investment and growth, it resulted in the slowing down of poverty reduction. Further empirical evidence also indicates that many countries would have been able to reach the millennium development goals of halving extreme poverty by 2015 if all the capital that fled SSA countries had been invested domestically. (Nkurunziza, 2015) also show that even for those countries within the region that would not achieve the goal, they would have moved substantially closer to the target

The depletion of government revenue, which can be a fall out from the embezzlement of public funds and reduction of the tax base as private wealth is illicitly transferred out of the country is another channel development impact of capital flight. As government revenue declines with the resulting consequences of a reduction in government spending on important public services that will worsen social development outcomes in the areas of health and education. Ndikumana and Boyce (2011), for example, find that debts servicing financed capital flight can lead to a reduction in public expenditure on health and ultimately lead to an increase in child mortality. Therefore, the fiscal effects of capital flight are an important channel of the development impact of capital flight in SSA countries.

At the national level, capital flight is generally perceived to have distributional effects by increasing inequality in income and human development. It is also known to worsen inequality between SSA countries and the rest of the world. On the one hand, the benefits arising from capital flight – accumulation of private wealth in safe havens– accrue to the political and economic elites of SSA countries. These are the individuals who have sufficient private wealth to smuggle abroad; they include public officials who have access to state resources that they can embezzle and transfer abroad for safekeeping. Capital flight, therefore, enables rich people in SSA countries to accumulate tax-free wealth, which deepens income inequality. On the other hand, by depleting public resources and indirectly undermining public service delivery, capital flight forces the poor and the middle class to bear the consequences of higher direct costs for social services such as education and health care. Households are forced to pay more for public services or to resort to more expensive privately provided services. This phenomenon is self-perpetuating due to the perverse incentives that capital flight creates. On the one hand, the political elites who enact policies and manage public services do not suffer the costs of poor quality and shortages in these services. Indeed, few African government ministers send their sons and daughters to public schools in their countries. On the other hand, the poor and middle class who depend on public services have little power to influence policies. Thus, the misalignment of incentives, costs and benefits perpetuate the under-provision of public services resulting from capital flight.

The asymmetric impact of exchange rate depreciation on the poor and the rich is another channel with capital flight distributional effects. The wealth of rich Africans held in safe havens is shielded from the negative effects of the depreciation of the national currency, while the poor whose wealth is held in domestic assets bears the full costs of currency depreciation. This further deepens income inequality within SSA countries. Capital flight also deepens the income gaps between SSA countries and the rest of the world and as a consequence delays the convergence process or catch-up.

Furthermore, it is important to shed light on other important issues other than the income inequality metrics that are commonly used in the literature when it comes to analyzing the distributional impact of capital flight. As a consequence, the remaining part of this discussion will focus on disparities along social development indicators, and by using data to show access to water and sanitation and health outcomes at the national and international level (SSA vs. other regions of the world). Horizontal inequalities are shown by comparing rural to urban areas.

The data clearly shows that SSA countries perform poorly along key indicators of access to social services like water and sanitation and health outcomes. Table 2.4 summarizes the number of countries within the region feature among the worst performers in the world along these development indicators. The region equally shows that it has the highest disparities between rural and urban areas in terms of access to water and sanitation. Countries listed among the worst performers in access to water and sanitation are mostly from SSA and are among the top 15 countries with the highest capital flight to GDP ratios. The data on health outcomes is not any different, it shows similar features. SSA countries make up the majority of the worst performers in terms of life expectancy, child mortality and maternal mortality. Furthermore, the majority of SSA countries at the bottom in terms of these human development indicators also have high capital flight to GDP ratios.

Figure 2. 10: Capital Flight, FDI &ODI from SSA Region (1970-2010)

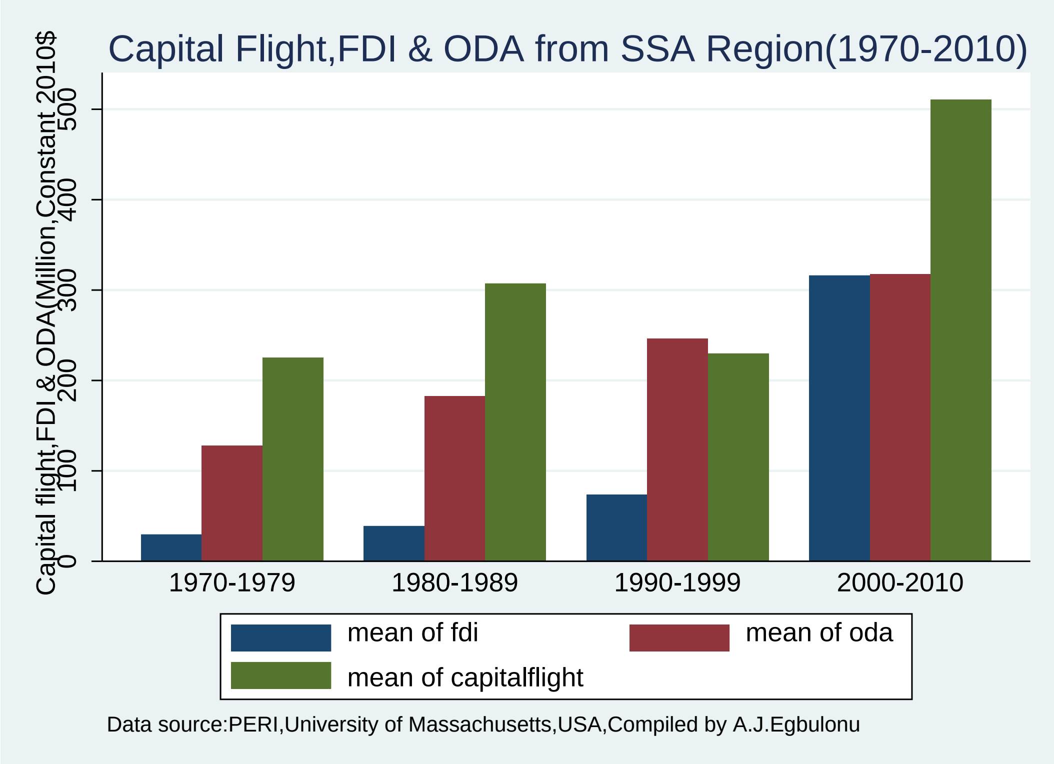


Figure 2.10 shows that in aggregation, the volume of capital flight from SSA relative to measures like foreign direct investment(FDI) flow and the official development aid(ODA) from 1970 to 2010 has increased since the turn of this century. For example, the cumulative amount of capital flight from 2000 to 2010 was more than the amount received in official development aid (317 billion US dollars) and the amount received in foreign direct investment (316 billion US dollars).

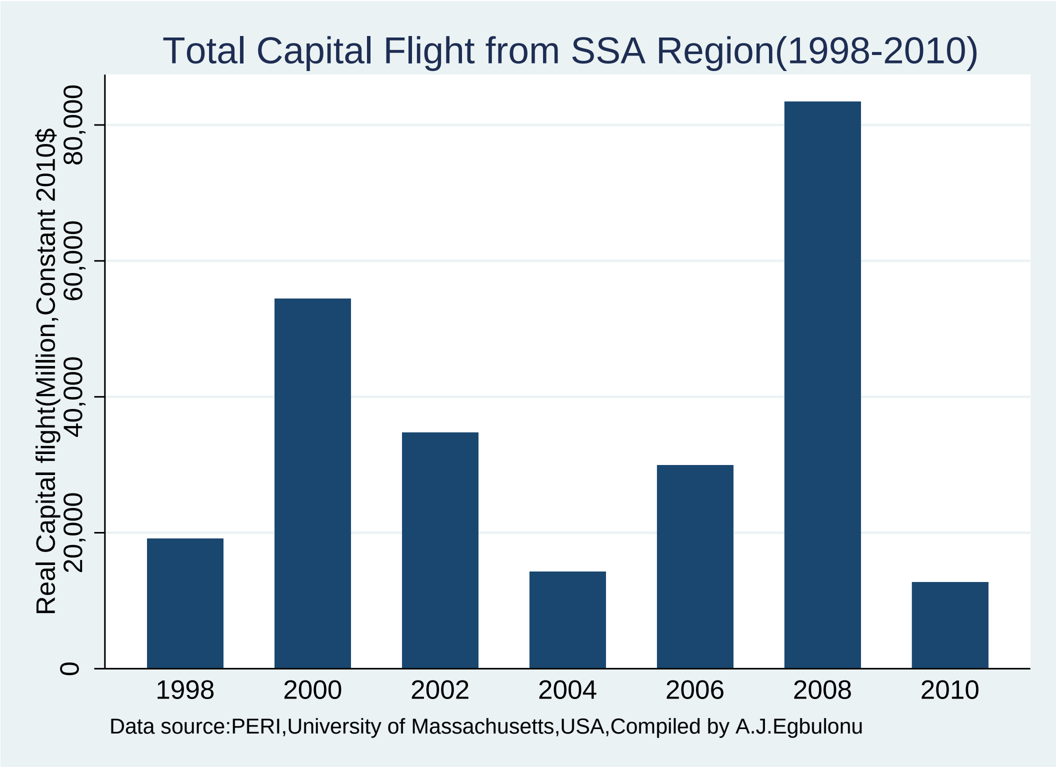


Figure 2. 11: Showing Capital Flight Trend from SSA (1998-2010)

Unlike in Figure 2.10 that highlighted cumulative capital flight over an 11-year period relative to FDI and ODA over the same period, Figure 2.11 on the other hand presents capital flight from a different perspective by showing it on a yearly basis. It can simply be deduced from the above figure that capital flight from SSA has shown both upward and downward trends. Capital flight between 2000 and 2010 period had increased in most of the years than it has fallen. Specifically, it was high in the year 2000 and gradually declined in 2004 but regains its rising mode from that same year and reaching its highest peak in 2008. Total real capital flight in the combined Sub-Sahara African countries was highest in the year 2008. This may be due to the productive nature of countries in the sub-region, which have abundant oil and other natural resources, poor governance and weak institutions, and a poor macroeconomic environment. On the other hand, it recorded the lowest at the beginning of the year 2004. This informs us that capital flight is still an issue that needs particular attention in the sub-region.

Table 2. 3:Showing Capital Flights from Developing Countries, by Regions (Constant 2014, billion US dollars).

	Cumulative Capital Flight 1970-2014	Capital Flight Stock, 2014	Debt Stock 2014	Net External External Assets, 2014	Cumulative Capital Flight to GDP ratio(%)
Central Europe	1436.8	1868	993	875	53
East Asia	2691.2	4317	3595	722	20
Latin America & Caribbean	1350.2	1944	1607	336	25
Middle East & North Africa	1869	2737	692	2045	52
Middle East only	1695.8	2459	572	1887	59
South Asia	174.9	284	580	-296	7
Sub Saharan Africa	405	710	393	317	23
Africa	578	988	513	475	24

Source: James Henry, Global Haven Industry(www.globalhaven.com)

Table 2. 4: Showing Development Outcomes and Capital Flight: Ranking of SSA Countries-bottom/top 40 in the World.

Indicator	Number and % of SSA countries among 20 worst performers	Number and % of SSA countries among 40 worst performers	Number of SSA countries among 40 worst performers that are also in the top 15 highest capital flight (% of GDP) for SSA
Life expectancy (WDI)	20 (100%)	39 (97.5%)	10: Sierra Leone, Burundi, Congo Dem. Rep., Côte d'Ivoire, Mozambique, Guinea- Bissau, Nigeria, Central African Republic, Zimbabwe, Congo Rep.
Under-5 mortality Rate (WDI)	19 (95%)	35 (87.5%)	9: Sierra Leone, Congo Dem. Rep., Côte d'Ivoire, Zimbabwe, Guinea-Bissau, Nigeria, Central African Republic, Burundi, Mozambique
Maternal mortality (IHME)	18 (90%)	36 (90%)	13: Central African Republic, Sierra Leone, Côte d'Ivoire, Congo, Guinea-Bissau, Zimbabwe, Congo Rep., Nigeria, Mozambique, Burundi, Congo Dem. Rep., Gabon, Rwanda

Physicians per 1,000 people (WDI)	19 (95%)	35 (87.5%)	10: Sierra Leone, Burundi, Mozambique, Guinea-Bissau, Rwanda, Central African Republic, Zimbabwe, Congo Rep., Congo Dem. Rep., Côte d'Ivoire
Access to improved water sources (WDI)	16 (80%)	31 (77.5%)	9: Congo Dem Rep., Mozambique, Sierra Leone, Nigeria, Rwanda, Guinea-Bissau, Burundi, Congo Rep., Zimbabwe
Access to improved sanitation (WDI)	19 (95%)	31 (77.5%)	11: Sierra Leone, Congo Rep., Guinea- Bissau, Mozambique, Central African Republic, Côte d'Ivoire, Nigeria, Congo Dem. Rep., Sao Tome and Principe, Zimbabwe, Gabon
Rural/urban ratio for access to improved water sources (WDI)	17 (85%)	27 (67.5%)	10: Congo Dem. Rep., Congo Rep., Mozambique, Sierra Leone, Guinea-Bissau, Central African Republic, Nigeria, Gabon, Zimbabwe, Côte d'Ivoire
Rural/urban ratio for access to improved sanitation (WDI)	18 (90%)	25 (62.5%)	7: Central African Republic, Angola, Mozambique, Guinea-Bissau, Congo Rep., Sierra Leone, Côte d'Ivoire
Total health expenditure (WDI)	17 (85%)	28 (70%)	6: Congo Dem. Rep., Central African Republic, Burundi, Guinea-Bissau, Mozambique, Rwanda
Public health expenditure (WDI)	13 (65%)	29 (72.5%)	8: Guinea-Bissau, Congo Dem. Rep., Central African Republic, Burundi, Sierra Leone, Mozambique, Côte d'Ivoire, Nigeria
Public education expenditure (WDI)	17 (85%)	27 (67.5%)	7: Central African Republic, Congo Dem. Rep., Burundi, Zimbabwe, Sierra Leone, Mozambique, Rwanda

Sources: World Bank, *World Development Indicators* (online database: http://databank.worldbank.org/data/home.aspx); Institute for Health Metrics and Evaluation (IHME) (online database: http://www.healthdata.org/).

2.4 Conclusion

In summation, sub-Saharan Africa presents a difficult puzzle to solve. Its lack of adequate economic progress, political instability cum security challenges and general under-development persist even in the wake of the progress experienced in other developing regions about the same time. This chapter and in particular, the sections on the pattern of economic growth, the nature of corruption and the overview on capital flight is very important to the overall structure of the thesis. This is necessary as it provides support for the foundation upon which all three empirical chapters are linked to.

Chapter Three

A Sensitivity Analysis of the Robust Empirical Determinants of corruption: Panel Evidence from sub-Saharan Africa (SSA).

3.1 Introduction

On average, about US$ 2.6 trillion, which represents approximately five per cent of global GDP (OECD, 2013) is lost to corruption annually, and thereby prompting Jim Yong Kim, current president of the World Bank to refer to corruption as a "public enemy number one". Despite years of consistent academic research, the debate on the fundamental causes of corruption rages on. See Triesman (2000), which is one of the earliest and excellent works on the causes of corruption around the world for details. Unfortunately, there is not yet a unifying or universal benchmark model on the causes of corruption; opinions in the corruption literature on what can be classified as a robust determinant are heterogeneous, and evidence from the economics literature indicates that there are several factors that have been found, either through empirical or theoretical studies that can help explain the proximate causes of corruption. The principal way of conducting this sort of research as shown in the literature, consists mainly of running cross-sectional regressions on the determinants of corruption, and typically they assume the following form:

$$\boldsymbol{CORR} = \boldsymbol{\alpha} + \boldsymbol{\beta_1 x_1} + \boldsymbol{\beta_2 x_2} + - - - - \boldsymbol{\beta_n x_n} + \boldsymbol{\varepsilon} \ldots \ldots \ldots \ldots (\mathbf{3.1})$$

Where $\boldsymbol{CORR}$ is the vector of corruption for a country in this case and could be represented by any of the following measures of perceived corruption (ICRG, CPI or CC)[15]. While $\boldsymbol{x_1} \ldots \ldots \boldsymbol{x_n}$ denotes vectors of the control variables and these tend to vary among researchers and papers. The challenge faced by most economists working on economic growth empirics in general and on the economics of corruption in particular hinges on the fact that theories in economics relating to the causes of corruption does

[15] These represent the main measures of corruption known to the literature. International Country Risk Guide (ICRG) have the most comprehensive measure and it is own by the Political Risk Service. Corruption Perception Index (CPI) is another good measure of corruption and it is normally conducted by Transparency International. Finally, the Control of Corruption (CC) is from the World Governance Indicators (WDI) of the World Bank and corruption is one of its measure of governance.

not provide enough guidance on how to select the right or proper specification of an empirical corruption model. Even in cases where it is known that the "true" model looks like equation one above, one is still left with not knowing exactly what particular variables should be included in the model. For example, after running regressions by the combination of different variables, the likely outcome is that variable $\boldsymbol{x_1}$ can be found to be significant when the model includes variables $\boldsymbol{x_2}$ and $\boldsymbol{x_3}$, and on the other hand, it becomes insignificant when another variable $\boldsymbol{x_4}$ is included. As a result, researchers tend to report a preferred model and follow it by conducting some diagnostic tests. Since the "true" variables that should be included are not known, one is left with questions like: what are the variables that are really correlated with corruption? And secondly, how robust are these variables in explaining the true determinants of corruption? This fundamental problem relating to empirical research in economics is what is known as model uncertainty and has been highlighted in empirical economic growth literature by Temple (2000).

One of the earliest attempts on answering the question on how to deal with model uncertainty is through the use of Extreme Bounds Analysis (hereafter known as EBA), which was originally developed by Leamer and Leonard (1983) and Leamer (1985), and this is widely used in cross country growth regressions (Levine and Renelt (1992)), (Sturm, Haan, 2005) so as to help determine which among the many explanatory variables used in the regressions are robust and which are fragile by applying a sensitivity test. According to Leamer (1985), "A fragile inference is not worth taking seriously". Most researchers would have no problem agreeing with that viewpoint. Yet, many empirical studies fail to subject their inferences to sound robustness and specification tests. The benefits of the EBA methodology lies in the fact that, in a situation where there are conflicting or inconclusive suggestions from the literature, it can constitute a very relatively neutral way of dealing with the problems and challenges associated with the selections of variables. By this, we mean a simple process of eliminating selection bias in the regression model. The procedure of implementing EBA allows researchers to run a reasonable large regression and then subsequently check for robustness by varying the subset of the explanatory variables included in the regression. The widest range of coefficient estimates on the variable of interest that conform to standard hypothesis tests is then considered robust if the coefficient of interest remains statistically significant. Leamer (1985) put it this way by saying that we require a framework for “global sensitivity analysis”.

Our contribution to the literature on the causes of corruption in this chapter is to identify a set of robust determinants of corruption within sub-Saharan Africa that will, in turn, inform both academic researchers and policymakers on which determinants of corruption known to the literature receive the most systemic support from the data. This we do by assembling a long list of potential variables suggested in the literature review to be likely determinants of corruption and then conduct a sensitivity analysis on them to ascertain which among the long list of variables are robust or fragile determinants of corruption.

Extreme Bounds Analysis (EBA) is not a methodology commonly used in the literature on corruption but it is known to have been widely applied in cross country growth regressions. See (Levine, Renelt; 1992) and (Sturn, Haan; 2005). As far as we know only Serra (2006) have applied the EBA method to the study of corruption in a cross-sectional setting by using 16 variables. However, we depart from previous studies by focusing exclusively on sub-Saharan African countries and apply EBA in a panel data setting. Another important contribution to the literature is that this is the first study on the determinants of corruption applying the EBA method with panel data as the previous studies mentioned above only used the cross-sectional method. We include all the various factors identified by the previous literature as possible causes of corruption and group them into three classifications: (a) Economic variables; (b) Socio-cultural variables and (c) Institutional/Political variables. Finally, the panel data set used here remains one of the most extensively used in the analysis of the determinants of corruption in general and also in SSA. The period under consideration (30-year period) also remain the longest.

Our results from the histogram method, together with both the panel pooled OLS and Random Effect estimators support the view that indicates that the institutional and political variables of internal conflict, bureaucratic quality, democratic accountability, and government stability are some of the strongest determinants of corruption in sub-Saharan Africa for the periods of 1984-2013 that we studied.

The data used in this chapter comprises 31 countries from sub-Saharan Africa covering 1984 to 2013 periods, and the rest of the chapter is organised as follow: Apart from the introductory section, sections 3.1 to 3.13 provide details on the definition of corruption, measurement of corruption and the related literature on the causes of corruption.

3.2 Definition and measurement of corruption

The causes of corruption are multifaceted and this section will attempt to review the relevant literature about the causes of corruption. However, before going into explaining the causes based on the literature, it will be pertinent to define corruption and also write about the different ways in which corruption is measured in the literature. What follows in this sub-section will be an attempt to define corruption and also talk about how it is measured in sub-sections 3.2.1 and 3.2.2.

3.2.1 Definition

Corruption does not have a precise definition, it is a term that is broadly and loosely used, it can sometimes refer to different things to different people. Therefore, it is imperative from the onset to define what exactly we mean by corruption in the context of this thesis. For our purpose, corruption is defined: "***as the misuse of public office for private gain: where the public is widely defined as including private business, government bureaucrats and international organisation"*** *(*World Bank, 1997). Similarly, another relevant definition of corruption to our thesis is contained in (Jain, 2001), where corruption is defined: "***corruption as acts in which the power of the public office is used for personal gain in a manner that contravene the rules of the game"***. It is also worthy to note that according to Jain (2001), in order for such abuse to occur, a typical corrupt transaction will involve three actors: A principal (i.e. government), an agent (i.e. bureaucrat or public official) and a corruptor (individuals, firms). These definitions are in line with the standard economic approach to corruption, which emphasises incentives and punishments in corrupt acts (Becker, 1968). Aidt (2003) emphasising further how important the definition by Jain (2001) is, opines that there are three prerequisites necessary for the incidence of corruption: First, bureaucrats must have discretionary power. Second, this power is associated with economic rents. Finally, the deterrence to corruption, as a function of the probability of being caught and the penalty for a corrupt act, is abysmally low. The first two preconditions determine the benefit of corruption, while the last precondition influences the cost of corruption. The essential aspects of corruption are, therefore, that, firstly, the public official must have the discretionary power to design policy. Secondly, there must either exist economic rents which can be captured by the public official or the official must have the ability to create economic rents which can be extracted. Finally, the incentive to engage in corrupt behaviour by the public official without the fear of being caught must be very low. This condition is about weak institutions and it requires that the institutional structure of the environment in which the public official operates does not only allow corrupt behaviour but inadvertently encourages it. Our concern on the definition is not about morality as that will lead to all sorts of problems. For example, who will define what is moral? Different cultures around the world will see it differently. In most African and Middle Eastern societies, for example, gift-giving is an acceptable norm but that will not be the case in Western societies. What these definitions entail is to help us identify different forms of corruption that are detrimental to the public good. It covers and captures abuse of influence, institutionalised bribery (both in the public and private sectors) and within the government. Therefore, relying on these definitions helps us to cover all the essential features of exactly what we mean by corruption; this is because it encompasses all activities that are usually considered to be corrupt like bribery, favouritism, nepotism and all other activities of the same magnitude and effects. On the same token, these definitions are specific.

3.2.2 Measurements

Just like the difficulties of having a universally agreeable definition of corruption, measuring or quantifying corruption is also a herculean task because of its nature and different forms (corruption is usually a clandestine activity). However, some kind of measurement or standard is required when comparing corruption across countries because, without it, it would be difficult to make an appropriate comparison. For example, it is very often asserted that developing countries are more corrupt than developed countries. Consequently, a simple question then arises as to how to measure corruption so that cross country comparisons can be meaningful. This has presented a major obstacle for cross country empirical research on corruption. Notwithstanding the difficulties in measuring corruption, more recently, several indicators that attempt to measure some facets of corruption have become increasingly available due in part to the widespread awareness of the importance of governance in general and corruption in particular. The corruption indicators are based on surveys; most of these are perceived corruption indices. Such assessments are also sometimes compiled by various agencies to determine country risk. The term perception indices- since there are no absolute measures- contribute to cross country assessments of the extent of corruption. Such perceived indices are based on the subjective evaluations of experts or survey respondents of how widespread or costly corruption is in a particular country. The indices in table 3.1 below are some of the studies that have attempted to measure corruption:

Table 3. 1: Showing Different Measures of Corruption

Index	Features/Characteristics
CPI Corruption Perception Index	This was first published in 1995. It is a composite index based on the surveys of business experts/corporate sector. It covers about 183 countries and the score ranges from 0 to 10, where 10 represent a very clean country and 0 is very corrupt.
ICRG International Country Risk Guide	It started in the 1980s and covers about 150 countries and thereby making it the largest panel data set available. This is also based on surveys of experts and strongly linked to government stability and accountability. It was first published in 1984 and is still ongoing.
Business International	First published in 1980 but now extinct. It was based on 9 indicators and one of which relates to corruption and bribery.
Global Competitive Report	This was first published in 1979 and it started with only 16 countries but now covers 104 countries. It measures undocumented extra payments and payments favourable regulations and judicial

	decisions. Editions prior to 2000 were no longer in print and subsumed into the CPI
World Development Report	Published only in 1997 and it was based on surveys. One section is related to the level of law enforcement and bureaucratic red tape. It also includes the credibility index to measure the reliability of survey responses.
World Competitive Year Book	First published in 1987 and is still ongoing. It is based on surveys with sections relating to government efficiency and institutional framework. 0 is corruption highly exists and 10 represent not existing.
Control of Corruption(CC)	The World Bank publishes a rating of control of corruption through a team led by Daniel Kaufmann. It is a composite index and covers 199 countries. It was first published in 1996 and assign scores in the following way: -2.5 is corrupt and 2.5 is very clean.
Afro Barometer Survey	This is published by the Institute for Democracy in South Africa, Ghana Centre for Democratic Development, and Michigan State University. It was first published in 1999, covers 12 countries and measures how common corruption is among public officials and (2) whether or not corruption is worse under the previous regime.
Freedom House	This measure looks at the level of corruption in nations in transition and was first published in

	1995 and covers 27 countries. 7 is considered as corrupt and 1 is clean.
Latinobarometro Survey	This measure (1): Corruption increased a lot, a little; or remained the same in the last 12 months. (2): Direct experience of corruption. (3): Proportion of corrupt civil servants.
Economist Intelligence Unit	It covers 115 countries and attempts to measure the pervasiveness of corruption. It was first published in 1980, where 1 is considered corrupt or percentage fairly very common and 10 is considered percentage fairly very rare or very clean.

Mauro (1995), and Knack and Keefer (1995) are credited to have first used these corruption indicators for the empirical analysis of corruption. Since then, most researchers have used a combination of these indicators to estimate the relationship between corruption and a host of other variables.

It is also important to point out that these measures of corruption are not without criticism. For example, Kurtze and Schrant (2007) criticise the CPI to be highly problematic because it measures corruption with questions about nepotism, cronyism and bribe-taking in government with the account of red tape. Similarly, Galtung (2006), criticises the CPI that it does not tell the difference between political corruption and corruption within the civil service. We will conclude by saying that despite the criticisms associated with these measurements of perceived corruption, we believe that it is a good starting point for researchers and policymakers as it has helped in the comparability of corruption across countries. Besides, several empirical studies have benefited from using this data to produce important academic papers[16] with useful policy implications.

3.3 Causes of Corruption: Related Literature

Just like the difficulties associated with defining and measuring corruption, the exact causes of corruption are also very difficult to determine. There are several theoretical viewpoints that purport to explain the existence of corruption; however, there is no definitive consensus on the determinants of corruption. Several empirical researchers experiment with different variables that are said to be correlates of corruption. The results from the empirical literature on the causes of corruption are quite mixed and ambiguous, even with the help of instrumental variables. What follows in this section is not an exhaustive list but an attempt to highlight some of the important determinants of corruption from the empirical literature.

Economic Development

The direction of causality between a country's corruption perception indices and GDP per capita is not quite clear. The results found in the literature to date by researchers is quite ambivalent, for example, see the work of Campos *et al.* (2010) for their 41 studies on corruption using meta-analysis. However, research over the years indicates that there is a strong negative correlation between the two. Having said that, it is important to point out that correlation does not exactly imply causation. It may well be the case of dealing with simultaneity and this view is predicated on the fact that there are several reasons indicating that lower GDP per capita leads to a high level of corruption. On the other hand, high GDP per capita leads to a low level of corruption. In other words, the effect between GDP per capita and the level of perceived corruption can run in either direction. According to Treisman (2000) and Tanzi (2000), in more economically advanced societies economic development tends to increase education, literacy and also depersonalised relationships and therefore the abuse of government office by bureaucrats will easily lead to the exposure of officials in this sort of environment. This

[16] For example, see the works of Triesman (2000) on the causes of corruption: a cross national study, and Mauro (1995) on corruption and growth. These are some of the early studies that used corruption based perception index to model its relationship with economic growth and other variables.

is supported by both theoretical and empirical literature on the economics of corruption. (See Chapter Four, Section 4.4.1 for details).

Democracy

One of the determinants of corruption, at least in the field of political science was thought to be the absence of democracy or democratic deficit. This viewpoint then subsequently metamorphosed into the notion that the trend of corruption could be reduced or reversed if more countries embrace democracy as a system of government. According to some French political science scholars like Bayart (1993), Bratton and van de Walle (1994) and latterly Hope and Chikulo (2000); they study corruption in relation to the informal aspect of political power with a focus on Africa. They emphasise the concept of neopatrimonialism, otherwise known as the politics of the belly or what is known as stomach infrastructure politics in some parts of Africa. They equally make the point, albeit strongly, that unlike elsewhere, politics in sub-Saharan Africa is quite unique and different. It tends to be highly entrenched in corruption personal favours and tribal loyalty. Therefore, the connection and benefit of democracy in the African setting, if they exist, are quite ambiguous. Turning to the empirical literature, the result is quite mixed. Paldam (2002) and Perrson *et al*. (2003) investigated the impact of the present level of democracy on corruption and do not find a clear-cut robust relationship. They conclude that in general, corruption tends to decrease with an increasing level of democracy. Furthermore, the independent effect of democracy on corruption became suspect as both variables interact when it comes to the transition from poor to rich countries. In a related study of 107 countries, Pellegrini (2011) examine the same topic as above and find that democracy can reduce corruption but with a caveat. The result indicates that the effect of democracy on corruption depends on the number of years a country has been exposed to democracy as a system of government. A minimum of 10 years to 45 years of uninterrupted democracy was deemed necessary to reduce corruption in the polity.

The findings above are also supported by earlier and recent works. For example, Triesman (2000) in a study involving sixty-four countries investigates the impact of established democracy on corruption and find a significant impact on corruption. Established democracy in this sense refers to those countries that have practising democracy since 1950. The author concludes that the state of the current degree of democracy is not significant; however, a very long period of a country's exposure to the practice of democracy will reduce corruption. In the same vein, Serra (2006) in a study using global sensitivity analysis investigates the determinants of corruption and finds that if democratic institutions are sustained over a long period of time, countries generally tend to have lower levels of perceived corruption.

Linking corruption to democracy, Drury *et al.* (2006) uses data on GDP growth over sixteen years from 100 countries by differentiating between democratic and non-democratic countries. Their results were quite significant in that corruption was found to have no effect on economic growth in democratic countries. On the other hand, it was found to have a negative effect in non-democratic countries. However, the authors suggested that there are caveats to be mindful of when it comes to the interpretation of the results, and thereby making it quite complex in drawing possible policy implications. Several scholars have questioned the notion of using GDP in this context partly because there are different aspects of well-being that are not factored into GDP, and to that extent, the bad effects of corruption might be underestimated. Therefore, Aidt (2011) suggested that a new approach should be adopted. In this regard Aidt (2011) using data like sustainable development that is captured by per capita wealth from 110 countries over an 11-year period (1996-2007) and find that corruption does have a negative effect on sustainable development. Part of the reasoning behind using per capita wealth is because it is able to capture a country's living standards. The paper concludes by saying that government policy aimed at reducing corruption should target with high value for a society like natural resources.

Another interesting strand of the literature talks about an inverted U shape relationship between corruption and democracy. In a study spanning 1996-2003, and comprising of 75-101 countries, Rock (2009) find a *U-shaped* relationship between corruption and newly introduced democracies and subsequently concludes that corruption tends to rise rapidly at first and begins to decline after a while, say between a period of 4 to 15 years. Other authors that find support for the U shape relationship between corruption and democracy are Mohtadi and Roe (2003). They viewed corruption from the prism of rent-seeking and conclude that the challenge for new democracies is that they do not have the wherewithal or means to combat the activities of rent-seeking behaviour by private agents who tend to have uninhibited access to bureaucrats. They conclude that as democracy grows, several institutions and citizens to checkmate or fight the activities of rent-seeking will become more common and ultimately will reduce the level of corruption within the polity over the long term.

Other studies like Kunicova and Rose-Ackerman (2005) focused on certain elements and features of the electoral systems, and find that the electoral systems of proportional representation tend to be associated with more corruption as opposed to the plurality electoral systems. This is because, with the help of the power of incumbency, it is much harder for citizens and political opposition parties to monitor the electoral process very well.

In summation, the evidence from the empirical literature that democracy reduces corruption is mixed. However, the overall view is that democracy does reduce corruption particularly if other associated features of democracy are established. Therefore, a transmutation of a political system from autocracy to democracy will not reduce corruption immediately except when other institutions of a functioning democracy are equally rooted in the polity.

Colonial Origins

When it comes to colonial heritage acting as a determinant of corruption, one of the best analyses ever given is the work associated with Triesman (2000), who finds that former British colonies tend to significantly lower corruption. This finding can be said to be associated with some unique features of former British colonies which makes it less likely for them to be susceptible to corruption when compared to former French, Spanish or German colonies. It can be explained that part of these unique features comprises of British legal system, the impartiality of the civil service, its educational system and to a large extent, the freedom of the press. Triesman’s (2000) view is supported by other empirical authors like Swamy et al. (2001) who showed a significant difference between former British colonies with Anglo-Saxon political and legal systems and other countries with different political and legal systems as it patterns to corruption. More recently, Serra (2006) investigates the determinants of corruption using extreme bounds analysis in a cross-sectional study and finds a significant relationship between corruption and colonial heritage but it is one that shows that British colonial heritage to have a negative effect on corruption as opposed to the Spanish and French colonial heritage that were both positive. It is also important to stress that when it comes to the study of corruption and colonial heritage, there is no existing study that focused on the impact of colonial heritage on corruption, rather what is inherent in the literature is that the variable of colonial heritage enters as a right-hand variable in studies looking at the determinant of corruption.

Legal Origin and System

One important cause of corruption common in the literature is a country's legal origin. This is partly so because different countries operate under different judicial systems and this, in turn, will naturally have consequences for corruption. The original intent and formulations of the law are different across various jurisdictions, and therefore the level of protection and the room for remedies, like the appeal process available to citizens affected by corrupt decisions made by a bureaucrat. For example, the efficiency of the legal system can help decide the cost of corruption in a country. The probability of being caught in a corrupt act, the likelihood of prosecution and the punishment thereafter all depends on a country's judicial system at the time.

There are predominantly two types of legal systems within the African continent: one is known as the common law system and the other is referred to as the civil law system. The first has its origin and development dating back to the 17th century in England. The common law system was a great attempt by the aristocrats of the day and parliament to reign in on the powers of the monarch from expropriation. The common law system was further developed through judicial precedents and it is usually seen from the prism of limiting as opposed to strengthening the power of the state. The Civil law system, unlike the common law systems, is created by legislation and does not follow judicial precedents, instead, it exists with the purpose of seeking to resolve disputes justly. The civil law systems developed more as an instrument by the sovereign to build an institution that will, in turn, increase the power of the state. Elsewhere, the work of some authors like La Porta *et al*. (1999), Triesman (2000) supports the idea on the effectiveness of the common law system, typically associated with Great Britain and her former colonies, and the reasoning behind this is premised on the fact that it is more dissuasive relative to the civil law doctrine associated with Europe (France) and her former colonies in Africa. It also maintained that the influence of British civil service ethos on her former colonies also ensured that things like the protection of individual property rights contributed to the improvement of government performance like the reduction of corruption. This view has also found support in other empirical research work like Serra (2006). It is important to mention that the "theory of the effectiveness of the British legal system" is not without critics, this view has been strongly challenged in the literature by other numerous researchers, first by Adsera *et al*. (2000), and latterly by Brunetti and Weder (2003), Pellegrini and Gerlagh (2008).

International Openness to Trade

A country's degree of exposure to foreign competition can be used as a yardstick in measuring the degree to which domestic firms enjoy rents. The theory holds that in a competitive open economy, competition from foreign companies can reduce the level of rents available to local companies and thereby reducing the rewards from corruption over the long term. So, protectionist trade policy can be an important determinant of corruption. For example, a government embarking on a protectionist trade policy will increase the rate of corruption where domestic companies are protected from foreign competition. In the empirical literature on the link between openness and corruption, Ades and Di Tella (1991) examines the effects of rents on corruption and finds that countries that are considered more competitive and open to foreign trade tend to be perceived as less corrupt. In other words, countries, where domestic firms are isolated from foreign competition, tend to be perceived as highly corrupt. Similarly, Wei (2001) investigates whether countries that are more open and competitive in terms of international trade are less corrupt. After taking into account their levels of development for the countries in the sample, Wei concludes that naturally more open countries or economies exhibit lower perceived corruption. In a more recent paper, Saha *et al*. (2009) using economic freedom data as a proxy for competition and openness, investigates its relationship with corruption in a cross-panel data analysis of 100 countries and find that economic freedom, on the whole, reduces corruption in the sample of countries studied. However, the finding is related to the level of democracy. For example, the effect becomes stronger where the level of democracy is high.

In summary, the take away from the link between international openness to trade and corruption is that the more competitive and open an economy is, the more difficult it is for corruption to thrive in such an environment and this might be due to the fact that it will become increasingly difficult to hide corrupt payment as competitors, in general, are likely to uncover such payments and thereby increasing the risk of being caught unlike in a monopoly market with one dominant player. Additionally, a country's higher exposure to international trade will also bring pressure to bear on the government to create a level playing field for foreign firms and investors and to also fight corruption.

Religion and Faith

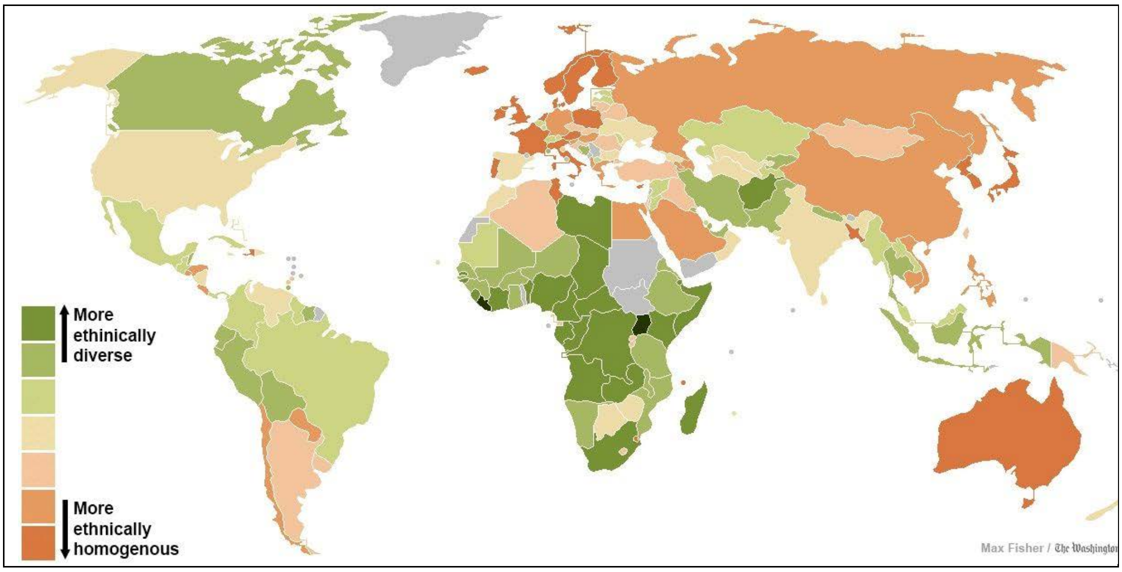
Religious affiliation has been used as a proxy for culture. Investigating the effect of religion on corruption in 100 countries, Paldam (2001) divides religious groups into 11: Anglican, Catholic, Protestant, Old Christian, Muslim, Buddhism, Hindu, Tribal, Oriental, Atheists and Residual; and found only two groups made up of Reform Christian, which Anglicans and Protestants are part of, and Tribal religion to have a negative effect on corruption. The author concludes that differences in terms of religion do have a negative effect on corruption. Similarly, La Porta *et al.* (I997a, 1999) associates "hierarchical" order with the following religions: Catholic, Muslim and Greek Orthodox and find that religion can affect corruption via influence and hierarchy. The study affirms that governments where the above religious beliefs are dominant, tend to perform less favourably to countries where the dominant religion is Protestantism. This result is also supported by Lipset and Lenz (2000) who maintain that "the Protestant ethos is more conducive to norm adhering behaviour ", as a result of how much emphasis is laid on the individual to take responsibility and be accountable for one's own conduct and does not encourage individual failings. The work of La Porta *et al.* (1997a, 1999) shows that religions with strong command and control hierarchy are positively associated with corruption. The order of faith associated with Catholicism and Islam are highly geared towards interventionism than Protestantism and are therefore likely to support the state. For example, Europe in the 16th and 17th centuries when the Catholic Church was part of the state and wielded enormous influence. Presently, most countries in the Middle East are still entangled with the influence of Islam and most countries in SSA are not immune from this either. However, because the protestant church is not interwoven with the state in most countries, they are therefore more at liberty in denouncing corruption amongst bureaucrats. Treisman (2000) also test the hypothesis of the impact of religion on corruption by employing 64 countries in his sample and find that the percentage of Protestants religion in the entire population has a negative effect on corruption. The above result is supported in the literature through the findings of the following authors: Sandholtz and Koetzle (2000), Gerring and Thacker (2005) and more recently by Serra (2006).

Ethnic Division and Fractionalization

Apart from being the poorest region and the most corrupt region in the world, SSA is also home to the most ethnically diverse and fragmented part of the world. It is therefore not surprising that a growing amount of literature relates corruption and ethnic fragmentation to poor economic outcomes for countries within the region. It is also important to point out that as a result of the Berlin Conference of 1884-1885, the boundaries of countries within SSA were a by-product of settled negotiations amongst colonial powers and therefore did not give due consideration to the interest of the different ethnic groups within the region. This singular act further resulted in more ethnic fragmentation as some tribes found themselves in different countries occasioned by artificial borders.

It is a misnomer to assume that Africa as a continent is homogenous. 14 out of the 15 most heterogeneous societies in the world according to Easterly and Levine (1997) are in Africa. This is not without its drawbacks as highly ethnically diverse societies can ultimately lead to a very disastrous corruption outcome. This is because it can precipitate a situation where each ethnic group will fight to be allocated or assigned some specific government ministries or parastatals in the power equation. Furthermore, ethnically fractionalised societies are more than likely to result in independent bribe-takers and according to the work of Shleifer and Vishny (1993), if there are many bribe-takers it can lead to corruption being very damaging to the country in question. This happens when respective bribe-takers refuse to internalise how individual bribe taken affects the revenue of the other bribe-takers. This will lead to less output in general primarily because there will be more bribes per unit of output. Also interesting is the fact that different ethnic groups will fight to take control of the greater share of rents so as to prevent other competing ethnic groups from doing so until they get to a point when the rents run out (i.e. until there is nothing left to extract rents from). Svensson (2000) through regression analysis show empirically the relationship between ethnic division and a high level of corruption. It may also likely be that in ethnically homogenous societies, Tanzi (1998) asserts that leadership that is associated with less corruption has the greatest propensity to succeed.

Figure 3. 1: Global Map of Ethnic Division



Data source: Harvard Institute for Economic Research

As can be seen from figure 3.1 above, the orange countries are more homogenous and the greener countries are more ethnically diverse. Some of the trends that can be gleaned from the map are that countries in Europe and Northeast Asia tend to be the most homogenous, and sub-Saharan African countries are the most ethnically fractionalised(diverse). Somewhere in between in the middle is the Americas, and homogeneity tends to be associated with rich countries

Aid (ODA)

According to the latest available data on aid (ODA) from the OECD[17] in 2017, total aid disbursed to the African continent in both 2014 and 2015 stood at $1,361.86millions and $1,086.17millions respectively. From these figures, over one third went to sub-Saharan Africa in both years ($1,142.1millions in 2014 and $943.87millions in 2015). This is not surprising, given that in sub-Saharan Africa, more than in any other region of the world,

[17] See for details http://stats.oecd.org/Index.aspx?QueryId=42231&lang=en

most dealings with the international community and donor agencies tend to be in the form of aid and foreign debt.

There is no clear-cut theoretical position on aid effects on corruption. Evidence from the empirical literature corruption and aid still remains ambiguous. One strand of the literature investigates the effects of aid on corruption and find that aid can have quite beneficial effects on corruption. For example, the work of Van Rijckeghem and Weder (2001) shows that it is possible to use foreign aid to improve governance in a country. This is done by using aid money for the improvement of training for civil servants, funding civil societies and increasing salaries and wages of government employees. This ultimately can reduce the demands for bribes as the increased wages and salaries can act as an incentive in attracting better competent civil servants and also fund a very vibrant civil society to checkmate the activities of the bureaucrats. This view also has empirical support from the work of Alesina and Weder (2002), who find very weak evidence that aid to recipient countries can exacerbate the problem of corruption to get worse. In a related study, Tavares (2003) also find strong evidence for the hypothesis that aid can help in reducing or decreasing corruption. On the contrary, another view in the literature is that aid may contribute to making governance worse in the recipient countries and this view is supported by Brautigam (2000). Knack (2001) finds that higher aid levels erode bureaucratic quality and the rule of law, but that aid levels are not significantly related to perceived corruption. However, Svensson (2000) find solid evidence that aid may lead to an increase in corruption. Using a “game-theoretic rent-seeking model”, to investigate the nature of the relationship between “widespread level of corruption and other types of rent-seeking activities and concessional assistance”. The results show strong support for the view that foreign aid and windfalls are, on average, in countries where there are groups competing for resources, associated with more corruption

It is worthy to note that aid to sub-Saharan Africa is not only channelled through governments but many local and international NGOs are also used in the process of aid disbursement. According to available data from the OECD in 2009, international donors channelled at least 13% of total worldwide ODA through the NGOs, and in that same year NGOs themselves raised at least 22 billion US dollars. This trend is likely to continue or even increase both in percentage and real terms because major international aid agencies are beginning to rely heavily on NGOs to help in implementing their poverty alleviation programmes.

In a study of 80 countries spanning the 1975-1995 period, Knack (2001) investigates the effect of aid on governance by testing the hypothesis that aid can lead to institutional reforms in the recipient country. Controlling for the fact that donor agencies are likely to give additional aid to countries with a record of poor governance to assist in institutional reforms. The result confirms that aid decreases the quality of governance and is a rent to the recipient country. Furthermore, without any proper coordination, the recipient country can easily rule out institutional reforms and this will increase the level of perceived corruption. In a related study of 32 sub-Saharan African countries over 1982 to 1997, using a similar framework to the above, Bräutigam and Knack (2004) investigates issues around foreign aid, institution and governance in SSA. Using OLS estimator and 2SLS estimator to control for endogeneity, the study concludes that high dependence on foreign aid reduces the incentives for the recipient governments to collect revenues from taxation. This ultimately makes it easy for the government of the day to remain unaccountable to the citizenry. Therefore, aid can sometimes lead to institutional weakening and perverse incentives.

Kangoye (2013) suggested that, when leaders face uncertainty about future aid flows, they want to over-extract rent from this resource in case of aid flows stop. Employing the use of 2SLS estimation method the assembling data spanning 1984-2004 period and conclude that corruption increases when aid flow becomes unpredictable and on the other hand, aid flow can reduce corruption amongst bureaucrats if the intensity of aid flow increases to a recipient's country. On the whole, the aid and corruption results from empirical studies tend to differ in general and may well be attributable to differences with methodologies and sampling.

Women in the Labour Force

Over the last two decades, several studies have promoted the view that there is a difference in behavioural characteristics between men and women. The main hypothesis behind this concept is that women are less corrupt than men, and this result was based on earlier studies that show that women have a higher standard of ethical behaviour (Glover *et al*. 1997), Reiss and Mitra,1998)). Putting it differently, the practical implication of this hypothesis is that if it were to be replicated in the real world of politics and business, it connotes that in a country where women have a higher than normal percentage share in parliament or in the labour force at large, such countries are less likely to be corrupt or behave in any selfish, opportunistic way at the expense of the public purse. This view is supported by the empirical work of Swamy et al (2001), who investigate this hypothesis by using several independent data sets, such as the World Value Survey and other macro data in a cross-country study to look at the relationship between gender and corruption. The results show that when it comes to microdata, women are less likely to be involved in corruption relative to men and using macro data (cross country), the result also shows that where women hold a higher percentage share of the parliamentary seats, powerful positions in government, and constitute a bigger share of the labour force, corruption is said to be less pronounced.

However, this gender-based approach as a determinant of corruption has been heavily criticised by others who believe that the conclusion is a fallacy and also drawn from inadequate evidence. Sung (2003) addresses a similar question to Swamy *et al*. (2001) and highlights the problem of potential bias like omitted variable bias. He goes on to argue that the observed relationship between gender and corruption is spurious and that women are not responsible for lowering corruption. If anything, it was caused by liberal democracy and its associated characteristics that lead to fairer and more honest behaviour that supports increased women participation in parliament and the entire labour force at large. Related to the above viewpoint is the work of Bransia *et al* (2011). Using data from the OECD that captures social institutions and gender inequality, the authors further regress this data on corruption and a hypothesis that gender inequality in society is a result of a poor functioning political system that is embedded within it the promotion of corruption. The results from the regression analysis indicate that corruption tends to be higher in societies where women do not take part in social life adequately. Even after controlling for different factors like the economic and political participation of women, the result still remains robust. What this result show is that by far the greatest inhibitors of women are the social institutions that discourage them from seeking active participation in the things that can lead to social progress in society. To that extent, just focusing on policies and reforms that will arbitrarily increase the number of women in politics, business and the entire workforce so as to reduce corruption in society is not enough.

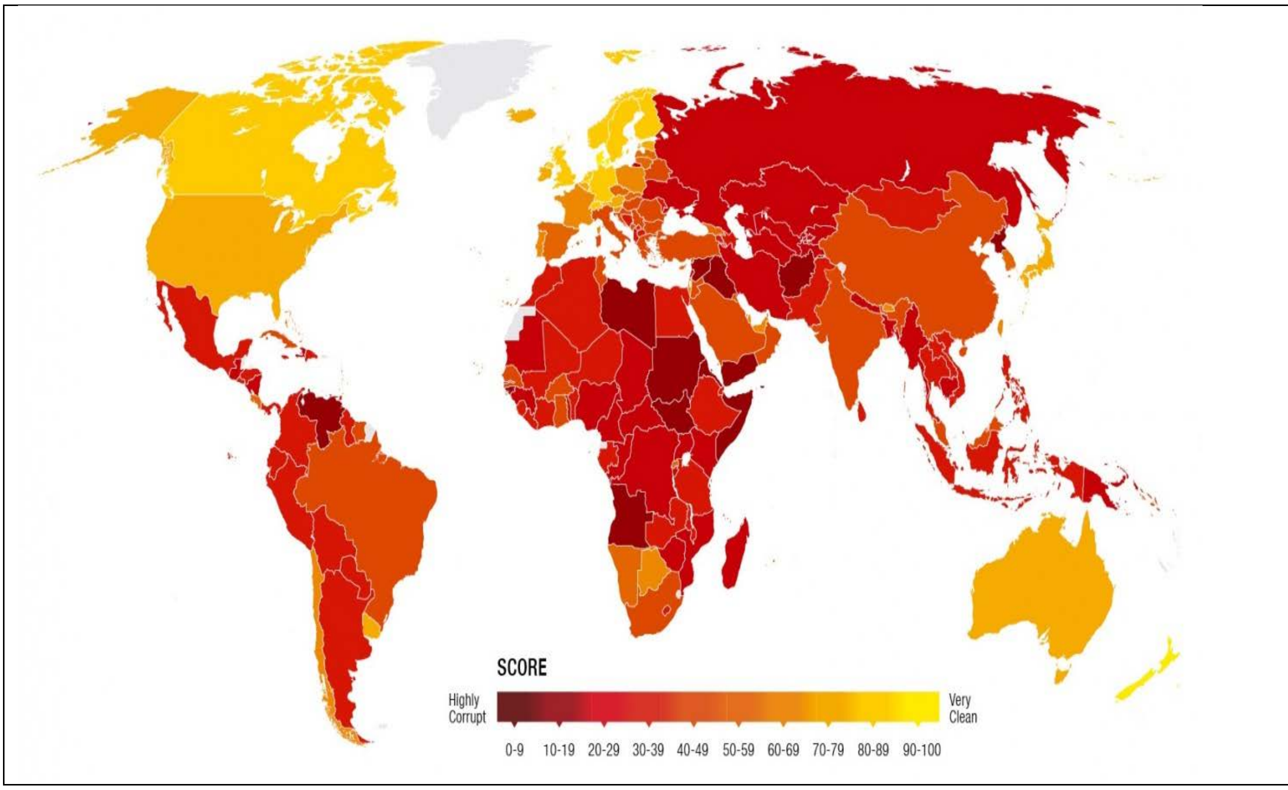
Salaries and Wages

According to Becker and Stigler (1974), the wages and salaries of workers in the public sector can sometimes play a very important factor in the determinants of corruption in a given country. According to their proposed model, higher salaries and wages is inversely proportional to corruption in terms of the nature of the relationship. In other words, higher salaries are related or correspond to low corruption. This is premised on the fact that higher wages can incentivise more public-sector workers (for example, government bureaucrats and civil servants) to be less corrupt. Putting it differently, the theory advances the view that the higher the wages in the public sector relative to the private sector, the higher will be the likely or expected loss from losing the job when caught receiving bribes. The theory seems quite compelling on the face of it but it may run into all sorts of challenges when it comes to practical implementations. In a cross-country study involving 31 developing countries over the period of 1982-1994, Van Rijckeghern and Weder (2001) uses regression and data from this sample to examine the effect of civil service pay on corruption and find that the differences in wages in the civil service and manufacturing is a significant determinant of corruption. To be more precise, when civil service wage increases by a one-point relative to the wages obtainable in the manufacturing sector, corruption was said to decrease by 0.5 points. The results indicate that a significant and large increase in the salaries and wages of civil servants was needed to bring it to a threshold where corruption could be eradicated. The main criticism of the result is that the sample was too small and not representative enough. In practice, most countries within SSA pay very low salaries to public sector workers relative to the private sector primarily because of the over-bloated nature of the civil service. To increase salaries of public sector workers will inherently require the downsizing of workers on the government wage bill, and doing this for most leaders, especially in developing countries, will amount to outright political suicide as it will ultimately cost them votes and besides, public sector jobs are sometimes used as instruments to settle political interest.

Natural Resource Endowment

Natural resource endowment, in theory, should have a positive effect on economic growth and development. However, as a result of the so-called “resource curse”, things do not always turn out well. For example, natural resource endowment can precipitate economic rents as opposed to economic development. This can arise in the case of a resource like oil, whose supply is finite and the extraction costs can often be abysmally low relative to its market price. The incentives for abnormal profits readily available to those who are able to engage in its extraction is enormous, and therefore will be willing to pay or offer reasonable bribes to bureaucrats saddled with the responsibility of allocating extraction rights. There is strong empirical evidence from the literature to support this view. Starting with Ades and Di Tella (1999) who asserts that in countries with large endowments of natural resources, rent-seeking encourages corrupt behaviour as it offers enormous potential gains to government officials responsible for allocating licensing rights to extract such resources. Similarly, and in a more recent panel data paper comprising of 124 countries and over the period 1980-2014, Bhattacharyya and Holder (2010) assert that if the democratic institutions are weak, an increase in rents from natural resource endowment tends to increase corruption. This result is said to be valid even after controlling for various factors like income level effects and regional fixed effects.

Figure 3. 2:Map showing the Perceived level of Corruption around the World



Source: Transparency International, 2016. A closer look at Africa in this global map indicates that most countries within the region are mired in high-level corruption.

3.4 Challenges and Theoretical Framework

The existing empirical literature on the causes of corruption even though it is large, offers predictions that are mixed and sometimes contradictory. To a degree, this is related to the many ways that the study of corruption and its associated causes are modelled in the literature. The challenge, however, is that most of the research findings from these studies suffer from a lack of consensus. For example, different regression models incorporating a wide variety of explanatory variables have been specified to explain corruption and to find its true determinants. Yet, a variable that is often found to be significant in a particular specification of the model loses significance when other variables are introduced into the model. This is partly because each study tends to be concerned with a small group of factors or variables and sometimes a specific variable that is suspected of being a determinant of corruption. Another reason is also because of how corruption is measured in the study. More so, this may well be as a result of the sensitivity of variables considered as important to the causes of corruption and the way the test of robustness is estimated.

It seems appropriate at this juncture to provide a summary and assessment of the main findings of the empirical literature. To do this, we focus on the findings obtained by four comprehensive and detailed studies ((Treisman (2000), Serra (2006), Seldadyo and de Haan (2005, 2006)). While Treisman (2000) does not provide a sensitivity analysis of the estimates (unlike the other two papers), his investigation is quite relevant and introduces several important robustness tests. All these studies find that economic development, proxied by GDP per capita, is a robust determinant of corruption. Furthermore, all the papers find evidence that democracy is robustly associated with lower corruption. While Treisman (2000) and Serra (2006) find that long-standing democratic traditions are a robust determinant of corruption, it is more of certain democratic institutions such as political freedom and the judiciary system ((Seldadyo and de Haan (2005)) and political stability ((Seldadyo and de Haan (2006) that are robustly associated with lower corruption in other papers. Concerning other important determinants, these studies obtain mixed evidence. Protestant religion is robust according to Treisman (2000) and Serra (2006) but does not pass the robustness tests in Seldaddyo and de Haan (2005). Other earlier studies like Shleifer and Vishny (1997), for example, show that a country's legal system and religious affiliation is relevant in causing corruption, whereas in the work of Adsera, Boix and Payne (2000), the same variables loses statistical significance but they further point out that through the diffusion of daily newspapers in a democratic context, corruption can be significantly reduced. Openness to foreign trade, according to Ades and Di Tella (1999) is a primary factor causing relatively low corruption. While Leite and Weidmann (1999) find similar results for openness by employing a different proxy but also pointed out that a country's natural resources endowment can have a positive impact on corruption. On the other hand, Treisman (2000), shows the fragility of the same variable by controlling for uninterrupted democracy and development. Finally, while both Treisman (2000) and Serra (2006) find that colonial heritage is robustly associated with corruption, this variable has not been rendered robust in Seldadyo and de Haan (2006).

The problem from the foregoing therefore is that theory, and particularly the theory on the economics of corruption is not quite clear on the variables that ought to be included in the "true" model, instead what we have tended to be a long list of likely ideal explanatory or right-hand side variables (our list of all the variables is shown in the summary statistics table for this chapter). The main difficulty that usually occurs, according to Sturm and Haan (2002), tend to be that given the data numerous models can be considered reasonable, but produce different results and outcome as it relates to the parameters of interest. Variable $\boldsymbol{X_1}$ may be significant when the regression includes variables $\boldsymbol{X_2}$ and $\boldsymbol{X_3}$, but not when variable $\boldsymbol{X_4}$ is included. So, the challenge then becomes which combination of all available $\boldsymbol{Xk's}$ do we choose?

Studies usually concern their estimations and analysis to particular subsets of these variables and most often do not pay attention to the problem of any "omitted variable bias" when some other variables are missing. On the other hand, after so much data mining others simply report the results of the most " appealing " or convenient regression that conforms with a preconceived idea. As a consequence, most of the results associated with these studies tend to differ very much. Again, when it comes to model specifications, the majority of the studies suffer from a lack of offering careful sensitivity analysis to double-check how robust their conclusions are. As Temple (2000) argued persuasively, "presenting only the results of the model preferred by the author can be misleading". In the same vein, Hussain and Brookins (2001) argue that: "the standard practice of reporting a preferred model with its diagnostic tests, which is what was invariably done in previous studies of corruption, need not be sufficient to convey the level of reliability of the determinants (the explanatory variables). However, Extreme Bounds Analysis, hereafter known as EBA enables the investigator to find upper and lower bounds for the parameter of interest from all possible combinations of potential explanatory variables".

Among the advantages of EBA is that it provides a useful method for assessing and reporting the sensitivity of estimated results to specification changes. As argued by Temple (2000), in empirical research "it is rare that we can say with certainty that some model dominates all other possibilities in all dimensions. In these circumstances, it makes sense to provide information about how sensitive the findings are to alternative modelling choices". Extreme Bounds Analysis gives us what can be considered as somewhat simple ways of executing this. Previous applications of this method in the literature have mainly been related to economic growth.

To estimate our model and test the importance of various explanatory variables in determining corruption, we propose to use the fixed effects and random effects estimators in a panel data context and apply (variants) of the so-called EBA as suggested by Leamer (1983) and developed later by Levine and Renelt (1992) and Sala -I-Martin (1997). The EBA procedure aims to run many regressions, continuously permuting explanatory variables, and to test how the variable of interest "behaves" (e.g., how often it is significant) with respect to the conditioning set, to ascertain the robustness of the determinants across various specifications. The basic idea of this method is to ascertain which explanatory variables are robustly related to our dependent variable across various specifications. In other words, we test the consequences of changing the set of conditioning variables $\boldsymbol{Z}$ for the estimated effect of our variable of interest on corruption.

3.4.1 Extreme Bounds Analysis Methodology

We employ some variants of Extreme Bounds Analysis (EBA) to help us deal with the problem of model uncertainty that arises as a result of so many alternative explanations related to the causes and determinants of corruption in general, however, our focus in this study is on countries within sub-Saharan Africa. This EBA method enables us to investigate whether or not the proposed variables, based on past studies in the literature, are really "true" or robust determinants of corruption. To carry out an EBA, the cross-sectional model of the form presented in equation (3.2)

$$\boldsymbol{y = \beta_1 I + \beta_m M + \beta_z Z + \varepsilon \ldots\ldots (3.2)}$$

Where $y = dependent\ variable$

$I = a\ set\ of\ fixed\ variables\ normally\ included\ in\ all\ the\ regression$

$M = variable\ of\ interest$

$Z = a\ subset\ of\ changing\ variables\ normally\ taken\ from\ a\ pool\ of\ covariates$

The regression equation we estimated was arrived at by extending the above model in equation (3.2) into a panel model as represented by equation (3.3) below:

$$\boldsymbol{CORR}_{it} = \boldsymbol{\alpha}_j + \beta_{ij}\boldsymbol{I}_{it} + \beta_{mj}\boldsymbol{M}_{it} + \beta_{zj}\boldsymbol{Z}_{jit} + \varepsilon_{it} \ldots \ldots (3.3)^{18}$$

Where $\boldsymbol{Corr}_{it}$ is the dependent variable and in this case, it is the vector of the level of perceived corruption and this is represented by the following corruption measures (***ICRG, CPI and CC***). As common in panel data analysis, the indices $\boldsymbol{i}$ and $\boldsymbol{t}$ denotes countries and time, respectively. The right-hand side explanatory variables are further categorized into 3 groups: the first group is a vector of (fixed) explanatory variables that are always included in every single regression and this is denoted by $\boldsymbol{I}_{it} = (\boldsymbol{I}_{1it}\ \boldsymbol{I}_{2it} \ldots \boldsymbol{I}_{nit})$, where $\boldsymbol{\beta}_{ij} = (\boldsymbol{\beta}_{1j}\ \ \boldsymbol{\beta}_{2j}\ \ldots \boldsymbol{\beta}_{nj})$.It is worthy to clarify that even though 3 core variables were used in Levine and Renelt(1992) in their $\boldsymbol{I}_{it}$, this is usually driven by the past literature and in some situations, it could be anything between, $\boldsymbol{Non}$ and $\boldsymbol{Three}$.[19] The $\boldsymbol{I}$ variables are also known as the "focus" or "commonly accepted" variables and these are variables that are always included in the model. In this study, the only $\boldsymbol{I}$ variable included in the model is the logarithm of GDP per capita (measured in terms of purchasing power parity), and this is because it is the only noncontentious regressor based on evidence from past studies. The second category is $\boldsymbol{M}_{it,}$ which is the vector indicating the variable of interest whose robustness we are testing is selected from the $\boldsymbol{Z}_{it}$ set of variables and it is usually done one at a time. Finally, $\boldsymbol{Z}_{it}$is the vector representing the doubtful variables. It is normally identified from the past literature and usually includes a list of potential determinants of corruption apart from those core variables already contained in the $\boldsymbol{I}_{it}$. The convention in the literature is that $\boldsymbol{Z}_{it}$ normally consists of (3 x 1) vector of three control variables taken from the usually long list of variables, $\boldsymbol{Z}_{it.}$ The original EBA test, according to Leamer(1983,1985), uses a stringent single criterion to ascertain whether or not a variable in $\boldsymbol{M}_{it}$ is robust enough to be a determinant of corruption. Based on this criterion, variables in $\boldsymbol{M}_{it}$ is said to be a robust determinant of corruption if the upper extreme bound for $\boldsymbol{M}_{it}$ (i.e., if the

[18] The major difference between the I and Z variables is that while the former represents the standard control variables in the aggregate data analysis, the Z-variables shows likely additional explanatory variables, which is based on the literature may be related to corruption.

[19] While Levine and Renelt (1992) used 3 core variables, Serra (2006) used one variable and Seldadyo and Haan (2006) used none.

highest estimated value for $\boldsymbol{M_{it}}$ plus two standard deviations) is positive. And on the other hand, the variable is not considered robust in the relationship if the lowest extreme bound for $\boldsymbol{M_{it}}$ (i.e., if the lowest estimated value for $\boldsymbol{M_{it}}$ minus two standard deviations) is negative. Putting it differently, for a focus variable to be deemed robust, the lower and upper extreme bounds must have the same sign. However, if the focus variable's upper and lower extreme bounds have opposite signs, then that variable will be declared as fragile. Conventionally, the number of doubtful variables, $\boldsymbol{Z_{it}}$, usually included in every model tends to be limited to three variables (see Levine and Renelt, 1992). However, the actual number of variables to be included in each model is up to the researcher. Leamer's EBA relies heavily on a very stringent criterion for a variable to be declared robust and has come under heavy criticism from other recent authors[20].

In response to the stringent conditions for robustness in both Leamer (1983) and Levine and Renelt (1992) variants of Extreme Bounds Analysis (EBA), Sala-i-Martin (1997) argued that the criterion is quite rigid and that it will be difficult for most focus variables to pass or meet such condition. In the alternative, he then proposed a slightly different method for extreme bounds analysis that focuses not just on the lower and upper extreme bounds but that the focus should be on the entire distribution of the regression, and that if at least 90% of the density function of the estimated $\boldsymbol{\beta_m}$ lies on either side of zero, one could have reasonable confidence that the $\boldsymbol{\beta_m}$ is robust.

Sala-i-Martin maintains that in estimating the distribution of the coefficients $\boldsymbol{\hat{\beta}_j}$ in a normal model, the weighted mean of the regression coefficients is calculated first and then followed by the variances $\boldsymbol{\hat{\sigma}_j^2}$:

$$\boldsymbol{\bar{\beta}} = \sum_{j=1}^{M} \omega_j \, \hat{\beta}_j \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(3.4)}$$

$$\boldsymbol{\bar{\sigma}^2} = \sum_{j=1}^{M} \omega_j \, \hat{\sigma}_j^2 \quad \ldots\ldots\ldots\ldots\ldots \text{(3.5)}$$

Where $\boldsymbol{\omega_j}$ stands for weights that are applicable to every result from the estimated regression model. Applying weights, according to Sala-i-Martin (1997) will help the researcher to "give more weight to regressions or models that are more likely to be the true model," and that is making the assumption that "the true fit of the model j is an

[20] See Sala-i-Martin(1997) and Temple(2000) for some strong criticisms and objections to the use of Extreme Bounds Analysis(EBA).

indication of its probability of being the true model." As soon as the standard errors and the weighted means of coefficients are known, then $\boldsymbol{CDF(0)}$ the cumulative density function is then evaluated at zero.

Unlike in the original implementation of extreme bound analysis, where Ordinary Least Square (OLS) was used as an estimation method, we deviate from (OLS) and implement both the Leamer and Sala-I-Martin versions of EBA in this study by using panel data analysis. However, our conclusion will lean towards or be based on the Sala-I-Martin variant of EBA because of its more acceptable criterion in the literature.

3.5 Estimation Strategy

The section explains the estimation strategy adopted in this chapter and the subsequent subsections explain data and variables used in the analysis.

3.5.1 Data Description

The estimation in this chapter uses panel data and it covers a total of 31 countries in sub-Saharan Africa over a 30-year period (1984-2013). The number of countries could have included all the 49 countries in the region but we were constrained as a result of lack of data availability for all the countries in the region. Our sample is an annual panel dataset and consists mainly of 60 economic, socio-cultural and institutional variables for 31 economies in SSA over the time indicated above. Therefore, for the different regressions estimated, the sample size varies in the EBA procedure mainly because the available data were different for the various combinations of variables used in every estimation.

In our attempt to assess the determinants of corruption in general and in SSA in particular, we assembled a large dataset consisting only of panel data and with a long list of likely explanatory variables. These likely explanatory variables or factors were chosen principally by relying on previous research on the causes of corruption. The definitions and sources of the data/variables used in this chapter can be found in the subsequent paragraphs in this section and Table A3.2 in the appendix of this thesis. The data used in this chapter were constructed from multiple sources like the ***World Development Indicators 2015*** (WDI) where most of the economic variables were taken from. The socio-cultural variables were mostly taken from ***La Porta, López-de-Silanes,***

Shleifer and Vishny (1999), also known as ***La Porta et al***. (***1999).*** We used ***the International Country Risk Guide (ICRG) 2014 to*** obtain the institutional and political variables. To the best of our knowledge of the literature, there are no past studies on corruption that has covered so many variables at any given time and equally covered such numbers of years. The availability of data for many years influenced the sample period studied. The many regressions estimated employed varied sample sizes occasioned by the availability of data. As a result, multiple combinations of variables were included in the EBA estimation for each subsample of economic, political and cultural determinants of corruption.

Corruption (ICRG)[21]: Our dependent variable in this chapter is corruption and to measure it, we use the ***ICRG*** aggregate indicator of corruption produced by the ***International Country Risk Guide***. The measure ranges from 0 to 6, with 0 indicating absolute (high level) corruption and 6 indicating very clean or no corruption. Our choice of this measure of corruption is predicated on the fact that it is a better-known measure of corruption and its coverage dates back to 1984 to the present and includes 140 countries. We, therefore, extract average data from 1984-2013 for 31 sub-Saharan African countries. Following our use of another corruption measure known as the corruption perception index with scores ranging from 0-10 for robustness checks in chapter 4, we decided to convert the ***ICRG*** corruption data for uniformity with the ***CPI*** corruption data. This is simply achieved by dividing every ***ICRG*** data by 6 and then multiplies it by 10. For example, an ***ICRG*** measure of corruption with a score of 3 will end up as $\frac{3}{6} \times 10 = 5$. Furthermore, for ease of simplicity and exposition, we converted the ICRG index into a scale from zero (least corrupt) to six (most corrupt).In other words, we rescaled or converted the original scores ranging from completely corrupt (0) to completely clean (10). The rescaling means that higher values are now associated with more corruption.

Log GDP Per Capita: This is the only $\boldsymbol{I-variables}$ that we include in this study (i.e.it is the only variable that we include in every regression in our EBA analysis) and this is because every known study on the determinant of corruption used this variable in their

[21] See (PRS)the Political Risk Services.http://www.prsgroup.com/countrydata.aspx.

analysis. In terms of the determinant of corruption, it is the least controversial variable as all previous studies using this variable tend to find either a positive, negative or no effect at all on corruption. GDP per capita is the gross domestic product and it is an indication of a country's level of economic development. Several authors have used this data as a proxy for economic development in the study of corruption and found that it has a significant impact on the incidence of perceived corruption in a country, region or the world. Examples of authors in this respect are Mauro (1995, 1997), Triesman (2000) and Serra (2006). **ELF:** This stands for ethnolinguistic fractionalisation and it is one of the explanatory variables used in studying the determinant of corruption. This variable is taken from La Porta *et al*. (1999). The ELF score generally indicates "the probability that two randomly selected individuals from a particular country will not be in the same ethnolinguistic group". In terms of the reading of the score, Mauro (1995) who used this measure as an instrumental variable in a corruption study explained it to mean that the higher the score, the more fractionalized the country. He subsequently found through the same study above that ethnolinguistic fractionalisation is positively correlated with corruption (i.e. this positive effect of ELF on corruption makes corruption worse in the sample of countries studies). In terms of its theoretical foundation; the view presupposes that higher ethnic division, wherever it exists, tends to be negatively associated with economic growth via multiple channels. One example of this channel and is because of the presence of high groups of people with heterogeneous characteristics in relation to ethnicity. These groups tend to differ in religion, language, or ethnic background. Nowhere is this more pronounced than in sub-Saharan Africa, where the different ethnic groups in the region are over 2000. As a result of these high differences in ethnic makeup, when it comes to government services and patronage, the different ethnic groups will be inclined to show their own preferences to the way they want the country to go politically and most often than not, groups are more than likely to show loyalty to their own ethnic group thinking as opposed to the national interest and this on its own deters investment over the short to long terms and ultimately reduces economic growth through lack of political stability and a stable environment that will encourage businesses to thrive.

Colonial Origin: We test the hypothesis as advanced by Triesman (2000) that former colonial origin is a determinant of corruption. The colonial origins in this respect are comprised of British, French and Others. These vectors are made up of dummies indicating each country's colonial heritage in our data. The data is sourced from ***"The Causes of Corruption: A Cross-National Study," Journal of Public Economics, June 2000.*** The rest of the data are updated by the author as most of the countries covered in our sample are different from that of Triesman (2000).

Legal Origin: We conduct the EBA using 3 legal origin dummies known as (British, French and Others). These proxies were first introduced into the literature by La Porta et al. (1999) and have subsequently been used by other authors in later studies. Prominent examples in this respect are Triesman (2000), Serra (2006) and more recently Chanegriha *et al*. (2016). Data from this variable were sourced from the Global Development Network Growth Database, NYU,

Government Expenditure: This measure is taken from the ***World Development Indicators (WDI)*** and is defined by the World Bank as: "general government final consumption expenditure (formerly general government consumption) to include all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defence and security, but excludes government military expenditures that are part of government capital formation".

Life Expectancy: This variable is also sourced from the *World Development Indicators* and it is a proxy that shows how long a child would live if the existing mortality rate at the time a child is born were to remain the same throughout his or her lifespan. This variable is derived through the use of multiple sources like: "(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database", by looking at their respective female and male life expectancy at birth data. Authors that have used this variable are Li Q, An L, Xu J, Baliamoune-Lutz M(2018) and K.Blackburn and R. Sarmah(2006).

Trade/Open: Openness to trade is a very important economic determinant of corruption and to test the robustness of this variable, we use the variable trade from the World Development Indicator dataset as a proxy for the degree of international openness to trade. It is defined as the sum of exports and imports of goods and services measured as a share of gross domestic product. According to Serra (2006), market-unfriendly related trade policies are theoretically linked to corruption. For example, the imposition of import tariffs or unnecessary market regulations is viewed as creating more avenues for rent-seeking behaviours on the part of the bureaucrats as this scenario gives government officials more discretionary powers. Triesman (2000) and Serra (2006) have both suggested that more openness to trade will lead to less corruption.

Internet: This variable is taken from the *World Bank Development Indicators* where Internet users are defined as: "individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc".

Natural Resource Rent: Natural resource endowment is also a very important determinant of corruption and this is partly because for most countries, especially developing countries, natural resource abundance leads to corruption as it creates room for increased rent-seeking behaviour. See (Leite and Weidman (1999)). Our proxy for natural resource endowment is total natural resources rents and is defined as the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents. This variable is taken from the ***World Development Indicator (2015) dataset of the World Bank***.

Religion: This variable is subdivided into 4 and there are measures for the percentage of the population who belong a dominant religion(a)Catholics as % of the population in 1980, (b) Protestants as % of population 1980, (c) Muslims as % of the population in 1980, and (d) NOCPM-Percentage of the population that is not Catholic, Protestant, or Muslim in1980. See the map of the main religions in Africa in Figure 2. These variables are taken from ***La Porta et al. 1999***. "The Quality of Government," Journal of Law, Economics, and Organization, downloaded from Quality of Government Database, at

Quality of Government Institute, Gothenburg University. **Landlocked**: dummy for landlocked countries, from Global Development Network Growth. Database, NYU.

Finally, the other variables of government stability, external conflict, internal conflict, democratic accountability and bureaucratic quality were taken from the international country risk guide (ICRG) of the private organisation known as Political Risk Group. These other variables were motivated by the literature. In other words, they are variables that have been found by past studies on the determinants of corruption.

3.6 Model Specification

The model specification is within the framework of panel data models. Variables, scope, measurements and data sources are discussed in section 3.5 and the panel data analysis with results are in subsection 3.6.1 and section 3.7 respectively.

3.6.1 Panel Data

Our dependent variable is corruption, proxied by the ICRG corruption data and we implemented a panel estimation in this chapter to estimate the extreme bounds analysis (EBA) methodology because of its obvious advantages over the OLS estimator and of its ability in combining time-series and cross-sectional observations so as to estimate the determinants and causes of corruption in SSA countries. Panel data estimation model is very good at incorporating many countries over a large period of time in order to get the best possible statistical results. Our data is made up of 31 countries from SSA (31 cross-sections) and over a 30-year time period, thereby leading to a total of 930 observations in the panel estimation for each of the variables. The use of Panel data estimation is informed by our desire to find more robust results on the determinants of corruption and to ascertain whether or not our results differ from the findings in the past literature. More importantly, we also use panel data to enrich the literature as previous studies implemented EBA using OLS and cross-sectional estimators. The data we used were divided into three separate groups and therefore the estimation was run using economic, political/institutional and socio-cultural variables.

We use the Random Effect (see chapters four and five in this thesis for details about the RE method) estimator for several reasons to estimate the non-economic variables like political/institutional and socio-cultural variables because of the perfect collinearity of some of the variables. As an example, some of the non-economic variables are dummy variables that do not vary through time but only across sections. Table 3.3 contains all the variables considered in this chapter. Further definitions and measurements of other variables can be found in Table A3.2 in the Appendix. On the other hand, we use the FE estimator for the economic variables as it does not assume that effects are uncorrelated with the error term.

3.7 Results

This section presents the empirical results of our Extreme Bounds Analysis applications for all the variables used. Our EBA results are presented under our earlier explained classifications of economic, political/institutional and socio-cultural variables. In explaining our EBA results, we also follow Hlavac (2016) in using the histogram method to help us get a better understanding of the regressions through graphical representation of the respective variables. This means that our EBA results will be explained using 3 different methods: (1) Leamer, (2) Sala-I-Martin, and (3) Histogram methods. However, our conclusion will be drawn from the Sala-I-Martin and Histogram EBA methods because of their distinct advantage over Leamer method.

It must be pointed out at this juncture that Extreme Bounds Analysis can only establish robust linear correlations and therefore cannot deal with problems of causation and endogeneity. Our EBA analysis sought to answer the following two questions: (1) Which determinants, from our list of assembled variables, are robustly associated with corruption (our dependent variable), across a large number of possible regression models? (2) Is a particular determinant from our list of covariates robustly associated with corruption (our dependent variable)? We would also like to clarify that the only $\boldsymbol{I}_{it}$ variable used in this chapter is *GDP per capita* or log *GDP per capita,* which is a proxy for economic development. It is also known as the fixed or free variable and it is included in every regression model. The principal reason for using *log GDP per capita* as a free variable was informed by the literature. It has been shown by almost every known past study on the causes of corruption to be robustly linked. Since *log GDP per capita* is sufficiently common in most studies and also very likely to be relevant in the case of SSA countries, it, therefore, makes it appear to be the least controversial variable and its inclusion as $\boldsymbol{I}_{it}$ is appropriately justified. All the remaining explanatory variables will be considered as $\boldsymbol{Z}_{it}$ variable and by implication are all of potential interests in our analysis. We run the extreme bounds analysis from the package ***ExtremeBounds*** (Hlavac, 2016) in ***R*** statistical software and this allows us to include up to 10 variables of interest. This is to help us avoid the problems of collinearity, and hence, we restrict the EBA to regression where the variable inflation factor (VIF <10) on the variable examined. The EBA estimation includes up to about 5 right-hand sides variables to the baseline control of *log GDP per capita* and thereby leading to the possible estimation of 140,940 regressions and variable combinations.

Table 3. 2: Summary Statistics for all the considered variables

VARIABLES	(1) *N*	(2) *Mean*	(3) *SD*	(4) *Min*	(5) *Max*
Gdppc	923	1,016	1,548	64.81	11,792
Govtexp	852	14.40	6.106	2.047	54.52
LifeExpectancy	899	52.11	5.875	35.79	64.25
Trade Open	885	64.84	27.72	10.95	179.1
Investment	872	18.09	7.546	-2.424	52.94
Population	930	2.685	0.913	-1.826	7.836
Inflation	920	75.40	931.6	-29.17	26,762
Prischlnet	402	65.04	20.30	19.21	98.88
Interest rate	605	10.13	37.73	-96.87	572.9
Polity2	831	-0.745	5.576	-9	9
Debt2	781	5.145	8.194	0.0271	138.9
Cor	930	3.891	1.798	0	10
Elf	864	0.728	0.163	0.0622	0.925
Ehi(inequality)	203	48.55	3.753	37.41	59.95
Wage/Salaries	103	31.83	26.27	3.200	96.40
Land areas qkm	930	637,372	589,715	10,120	2.376e+06
Adult literacy	97	54.99	22.09	12.85	93.73
Labour(Female)	744	45.49	6.041	22.75	55.86
Mortality1	928	86.22	32.56	34.30	171.2
Unemployment	151	11.74	8.770	1	37.60
Surface area	930	654,796	605,394	11,300	2.506e+06
Tax revenue	333	15.38	7.565	0.780	52.46
Total nat ResRent	894	15.31	15.32	0.322	83.43
Imports gs	863	36.59	20.97	7.066	246.8
Exports gs	863	30.05	16.97	2.525	89.63
Internal(conflict)	912	7.665	2.339	0.170	12
External (conflict)	912	9.029	2.111	2	12
Bureacratic quality	912	1.355	0.941	0	4
Govt stability	912	7.323	2.359	1	11.58
Dem acctability	912	2.920	1.213	0	5.500
Mcsp100	922	14.45	27.79	0	164.2
FDI(net)	908	3.231	8.603	-82.89	89.48
Aid(noda)	920	47.93	38.57	-8.285	406.9
Internet	621	2.798	5.513	0	46.50
LOEnglish	930	0.483	0.500	0	1
LOFrench	930	0.422	0.494	0	1

OtherLO	930	0.0968	0.296	0	1
Catho80	930	21.00	19.16	0.200	68.70
Prot80	930	16.44	17.03	0	76
Musl80	930	29.06	29.19	0	91
Latitude	900	11.14	6.832	0	28.80
Nocpm	930	35.57	17.83	3.300	64
Landlock	930	0.290	0.454	0	1
Britcol	930	0.387	0.487	0	1
Frencol	930	0.258	0.438	0	1
Otherco	930	0.355	0.479	0	1

Table 3.3 gives the summary statistics for all the assembled variables included in all the regressions for chapter 3, and Tables 3.4,3.5 and 3.6 shows the correlation matrices for all the explanatory variables and corruption (our dependent variable), in the 3 categories of economic, socio-cultural and political/institutional variables. The summary statistics and correlation matrix of all the variables give us a first clear indication, albeit crudely, of the relationship between corruption and its determinants. There are substantial variations in the mean, minimum and maximum values for the variables in the summary statistics table. Furthermore, the correlation matrices tables in Tables 3.4 to 3.6 are to help us identify potential sources of multicollinearity in our estimation models. Take, for example, Table 3.4 shows the correlation matrix of the institutional and political variables used in our analysis. Here, corruption is negatively correlated with mortality and bureaucratic quality but positively correlated with all other covariates of internal conflict, external conflict, government stability and democratic accountability. The nature of this relationship between corruption and the right-hand variables are not sufficiently strong enough to make us draw strong conclusions. Hence, we present some regression specifications to help us get a better insight and also confirm whether or not there are links between corruption and the following variables of interest: mortality, internal conflict, external conflict, bureaucratic quality, government stability and democratic accountability.

Table 3. 3: Correlation Matrices of the Institutional Variables

	Polity2	*Mortality1*	*Int conf*	*Ext Conf*	*Bur Qua*	*Govt Sta*	*Dem Acc*	*Cor*
Polity2	1							
Mortality	-0.382	1						
Int. Conflict	0.368	-0.431	1					
Ext. Conflict	0.331	-0.328	0.648	1				
Bur.Quality	-0.016	-0.366	0.201	0.166	1			
Govt Stability	0.314	-0.424	0.476	0.379	-0.011	1		
Dem Accbility	0.548	-0.470	0.475	0.422	0.294	0.308	1	
Corruption	0.100	-0.053	0.154	0.082	0.392	-0.030	0.252	1

Notes: Polity2 data are averages and taken from the Polity IV Project, and data on Internal Conflict, External Conflict Bureaucratic Quality, Democratic Accountability and Corruption were all taken from PRS and ICRG data set from 1984-2013.

Table 3. 4: Correlation Matrices for the Economic Variables

	GDPpc	*GE*	*LifeE*	*Trade*	*Inv*	*Pop*	*Infl*	*PSN*	*IntR*	*EHI*	*Wage*	*Alit*	*FLG*	*Unem*	*TaxR*	*Rev*	*TNRent*	*Import*	*Export*	*MCSP1*	*FDINI*	*NODA*	*Interne*
GDPpc	1																						
GE	0.30	1																					
Life Ex	0.34	0.11	1																				
Trade	0.32	0.35	0.19	1																			
Invment	0.28	0.23	0.38	0.36	1																		
Pop	-0.21	0.02	0.19	-0.07	0.01	1																	
Infl	-0.03	-0.04	- 0.07	-0.01	- 0.05	0.07	1																
Prischln	0.48	0.21	0.35	0.45	0.08	0.28	-0.03	1															
IntRate	-0.03	-0.06	0.01	0.03	- 0.12	0.21	-0.22	0.04	1														
EHI	-0.13	-0.04	- 0.39	0.15	- 0.08	0.05	0.27	0.05	0.02	1													
Wage	0.78	0.48	0.24	0.26	0.15	0.64	-0.01	0.60	0.30	0.22	1												
AL	0.56	0.20	0.25	0.33	0.12	0.40	0.11	0.75	0.01	0.29	0.81	1											
FL(G)	-0.01	0.09	- 0.12	0.23	0.13	0.10	0.04	0.32	0.05	0.19	0.08	0.30	1										
Unemp	0.69	0.43	0.21	0.31	0.13	0.54	0.10	0.60	0.24	-0.05	0.87	0.69	-0.02	1									
TaxR	0.54	0.62	0.16	0.33	0.17	0.36	-0.13	0.58	0.15	0.28	0.79	0.56	0.05	0.59	1								
Rev	0.59	0.60	0.09	0.61	0.23	0.25	-0.12	0.47	0.20	0.14	0.72	0.48	0.03	0.58	0.76	1							
TNRent	0.16	-0.09	- 0.07	0.40	0.06	0.04	0.05	0.07	0.08	0.20	-0.17	0.04	0.08	-0.22	-0.29	0.20	1						
Imports	0.03	0.20	0.13	0.71	0.32	0.02	-0.02	0.05	0.02	0.12	0.01	0.06	0.25	0.03	0.30	0.45	0.23	1					
Exports	0.44	0.34	0.17	0.90	0.21	0.07	0.01	0.41	-0.01	0.02	0.37	0.31	0.12	0.48	0.26	0.66	0.55	0.54	1				
MCSP1	0.58	0.09	0.28	0.27	0.26	0.16	-0.06	0.39	0.01	0.09	0.55	0.44	0.04	0.33	0.17	0.17	0.09	0.16	0.22	1			
FDINI	-0.02	-0.02	0.04	0.33	0.22	0.09	0.01	0.06	0.05	3E-04	0.11	0.14	0.09	0.01	0.03	0.18	0.17	0.45	0.188	0.14	1		
NODA	0.12	0.14	0.17	0.35	0.33	0.01	-0.02	0.08	0.05	0.16	0-04	0.04	0.14	-0.01	0.14	0.26	0.03	0.43	0.21	0.18	0.16	1	
Internet	0.41	0.14	0.26	0.05	0.13	-0.13	-0.04	0.34	0.03	0.14	0.59	0.48	0.02	0.35	0.11	0.05	-0.04	-0.02	0.01	0.69	-0.01	0.04	
Cor	0.07	0.19	0.11	-0.02	0.12	0.14	-0.09	0.06	0.14	0.13	0.06	0.09	0.12	0.19	0.39	0.31	-0.27	-0.10	-0.02	-0.11	-0.07	0.14	-0.10

Notes: Data were sourced from different sources as indicated and explained in the Data Sources and Description in this chapter.

Table 3. 5: Correlation Matrices of the Socio-Cultural Variables

	LOEnglish	*LOFrench*	*OtherLO*	*Catho80*	*Prot80*	*Musl80*	*Latitude*	*Nocpm*	*Landlock*	*BritCol*	*FrenCol*	*OtherCO*	*Cor*	*ELF*	*Land area (sq. km)*	*LabourF*
LOEnglish	1															
LOFrench	-0.825	1														
OtherLO	-0.105	-0.272	1													
Catho80	-0.227	0.306	-0.291	1												
Prot80	0.406	-0.268	-0.253	0.243	1											
Musl80	-0.125	0.125	0.099	-0.653	-0.517	1										
Latitude	0.124	-0.173	-0.075	-0.472	-0.014	0.164	1									
Nocpm	0.185	-0.377	0.351	-0.247	-0.037	-0.464	0.176	1								
Landlock	0.093	-0.253	0.271	-0.189	-0.122	0.012	0.267	0.226	1							
BritCol	0.822	-0.678	-0.260	-0.078	0.220	-0.150	0.204	0.136	0.221	1						
FrenCol	-0.569	0.546	-0.193	-0.082	-0.318	0.263	0.208	-0.112	-0.052	-0.468	1					
OtherCO	-0.316	0.191	0.441	0.155	0.066	-0.087	-0.407	-0.036	-0.177	-0.589	-0.437	1				
Cor	0.039	-0.075	-0.039	-0.058	0.098	-0.080	0.345	0.097	0.028	0.110	0.098	-0.202	1			
ELF	0.182	-0.121	-0.029	0.065	-0.064	0.148	-0.397	-0.232	-0.128	0.142	-0.268	0.096	-0.265	1		
Land area (sq.	-0.040	0.022	-0.099	0.052	0.104	0.074	0.149	-0.261	0.005	0.060	-0.025	-0.037	-0.176	0.180	1	
LabourF	0.088	-0.223	0.149	0.373	0.252	-0.556	-0.210	0.291	-0.084	-0.044	-0.254	0.237	0.118	-0.121	-0.449	1

Notes: Data for all variables were sourced from different data sources. Please see the section in this chapter on Data and Sources for further explanations.

EBA Estimates for Institutional and Political variables:

The resulting histograms reproduced in Figures 3.3, 3.4,3.5,3.6,3.7,3.8 and 3.9 in subsequent pages are for both the pooled OLS and Random Effect EBA. The coefficient of each of the investigated variables under the POLS, RE and FE from all of the estimated regression models is represented by the grey bins. The thick blue curve that is superimposed over each histogram represents the corresponding kernel density, and this is a non-parametric approximation of the shape and distribution of each regression coefficient. The kernel density curves can be helpful in identifying whether these distributions have, for instance, multiple modes. The default coefficient value under the null hypothesis is represented by a *red vertical line at zero*, and investigating the histogram visually enables us to get an overview of the EBA estimation results. According to (Hlavac, 2016, page 11), “if most of the histogram bins’ area lies to the right of zero, a majority of the regression coefficient estimates on the corresponding variables are positive”. Holding all other things else equal, a positive coefficient shows that, a higher value of the investigated variable is positively related to the dependent variable (corruption). However, on the other hand, if the results from most of the estimated regressions have most of the bins’ area lying to the left of zero, greater values of the corresponding variable are related to lower corruption, ceteris paribus.

The histogram EBA results for the political and institutional variables using pooled OLS suggests that greater internal conflict, the quality of bureaucracy and the level of democratic accountability are positively associated with corruption. By implication, this means that these variables have a positive correlation with corruption and therefore play some important roles in exacerbating and promoting corruption within the SSA region. The polity2 and external conflict variables appear to show little or no correlation with corruption, and therefore not robust. The only negative and robust variable in the pooled OLS is ***Government Stability*** and this means that a stable government can help reduce corruption in SSA countries. The *Democratic Accountability* variable appears to be an interesting case, as the distribution of the regression coefficients appears to be bimodal. The bimodal nature of the distribution can be easily seen from the two different peaks of the histogram bins, as well as from the double hump of the kernel density curve.

With respect to the random effect EBA histogram results, the results are quite similar to the pooled OLS results. The *External Conflict* is not robust and is therefore not associated with corruption in any significant way. The *Polity2* variable retains the right sign and is positively associated with corruption but is not robust. However, *Internal Conflict*, bureaucratic quality and democratic accountability variables are all positive and robustly related to corruption. Government stability is negatively correlated to corruption. Based on the result from the pooled and random effect histogram methods, we can, therefore safely conclude that the variables of internal conflict, bureaucratic quality, democratic accountability and government stability are all robust determinants of corruption as they have all been found to retain the right sign and robustness across different models.

Having found some institutional and political variables as robust determinants of corruption from the histogram method, we now advance the analysis further by looking at robustness through the Leamer and Sala-i-Martin methods using Tables 3.7 and 3.8 containing both results.

Following the work of Sturm and de Haan (2005), a variable will be considered to be a robust determinant of corruption if only and when 95% of the coefficients are either above zero or below zero. In other words, in most of the cases of the regressions the sign of the coefficient points in the same direction. We do not make any changes to the criterion as we believe that it is very reasonable as some of the models may be misspecified due, for example, multicollinearity. Because we do not know the exact number of misspecified regressions, which may well be more than 5%, therefore, the criterion we imposed is still too strict. Tables 3.7 and 3.8 reports the fraction of all the regressions in which the variable of interest reached 95% significance threshold and the unweighted cumulative distribution function lying above zero. It also shows the upper and the lower bound of the point estimates, its standard deviation, the unweighted parameter estimates for each coefficient. It is important to point out that some of the variables despite being ‘truly’ correlated to corruption might not reach the threshold value. The main advantage of the Extreme Bounds Analysis is therefore that any variable reaching the set threshold, independent of the other variables included in the estimation can be considered as a robust determinant of corruption.

The empirical literature on the determinants of corruption refers severally to many political and institutional variables as possible causes of corruption. The reason for this hinges on the view and belief that opportunities and incentives of generating corruption in a given society are strongly connected with culture and political institutions.

Our institutional and political variables turn out to be extremely robust in most cases in terms of their correlations with corruption. Out of the total of 126 regressions run for this category of variables, we find, for example, the pooled OLS and Random Effect EBA results in Tables 3.7 and 3.8 shows that internal conflict, bureaucratic quality, government stability and democratic accountability to be significantly robust determinants of corruption. The Polity2 variable has the right sign but only met the 75% threshold as opposed to the 95% criterion to be significant. With respect to the EBA results based on the Leamer method, we find support only for 2 variables (bureaucratic quality and democratic accountability) to be robust determinants of corruption. This is not surprising given the stringent criterion normally imposed by the Leamer method.

Shedding more light on the specifics of the political and institutional variables, the risk rating assigned to internal conflict is a maximum of 4 points and a minimum score of 0 points. A score of 4 points equates to very low risk and exposure, and a score of 0 points indicates high risk and exposure to corruption. Given that, on average, most countries in our sample scored very low on internal conflict, the positive correlation results in both POLS and RE is not surprising and it, therefore, connotes that the positive exposure to internal conflict in the countries within SSA helps in promoting corruption.

The correlation between government stability and corruption is negative, very high and robust. Government stability variable on its own is a proxy for a government's ability to remain in office and carry out its agenda or programme, and since a high score of 4 indicates that the government is stable, and on the other hand, a low score of zero indicates instability of the government and the inability to implement its own programme. The negative sign associated with government stability is interpreted to mean that more government stability will ultimately lead to more corruption within SSA countries given that most countries in our sample scored very low (high instability). This result, therefore, is in conformity with the empirical literature (see Serra (2006)) that claims that public official tends to become more opportunistic in their behaviour, particularly if there is a high chance of losing their position and office of influence in the near future due to the unstableness of the government of the day. Putting it differently, it also means that incumbent political office holders will become more corrupt due to the fact that the high government instability will block all the avenues for future rents appropriations once they are out of office.

The theoretical expectation for the bureaucratic quality variable as it relates to corruption is that it should be negatively correlated with corruption and therefore should not be seen to promote or contribute to the growth and expansion of corruption in any positive way. The reason for this view is premised on the fact that quality bureaucracy within a polity can be somewhat autonomous by running efficiently without government interference through political pressure or other vices inimical to the concept of due process which is synonymous with bureaucratic quality. High ratings are given to countries that the quality of its bureaucracy is strong enough to carry on its functions without shocks in policy or in the interruption in the running of government. On the other hand, low scores are given to countries that lack the capacity of strong and quality bureaucracy that can carry on in the face of change at the top of government. Unfortunately, most countries in our sample do not have a strong bureaucratic system in place and tend to be unable to carry on with coherent policy formulations or day to day running of government in the event of a crisis at the top of leadership. In a nutshell, given the low quality of bureaucratic ratings for the region of SSA, the positive robustness between it and corruption, help in promoting corruption within our sampled countries.

Democratic Accountability, which is a subset of democratic institutions is one of the variables considered by previous studies as a determinant of corruption. In theory, it should be negatively correlated with corruption as it is a measure of how responsive or accountable the government of the day is to its citizens. In other words, bad government behaviour can be prevented or reduced when political rights are guaranteed to citizens. On the other hand, corrupt governments are more likely not to be accountable to their people and corruption can very well thrive in that sort of environment. All the regressions run for democratic accountability in the Histogram, Leamer and Sala-I-Martin methods show strong positive coefficients and are statistically significant.

Therefore, the positive and robust correlation between democratic accountability and corruption in our sample is a clear indication that this variable promotes and encourages corruption in SSA countries under the period considered in this study. This result seems to be in line with Triesman (2000), who asserts that when it comes to corruption, what matters is not the presence of democracy per se but more on how long democratic principles have been consolidated over the years (i.e., over a continuous long period of uninterrupted democracy). This result is not surprising given that democracy, as a system of government in most countries in SSA, is less than 50 years and most countries have not experienced uninterrupted democratic rule long enough so as to consolidate on the expected democratic principles and gains.

Figure 3.3 EBA RESULTS FOR POLITICAL & INSTITUTIONAL VARIABLES (POOLED OLS)

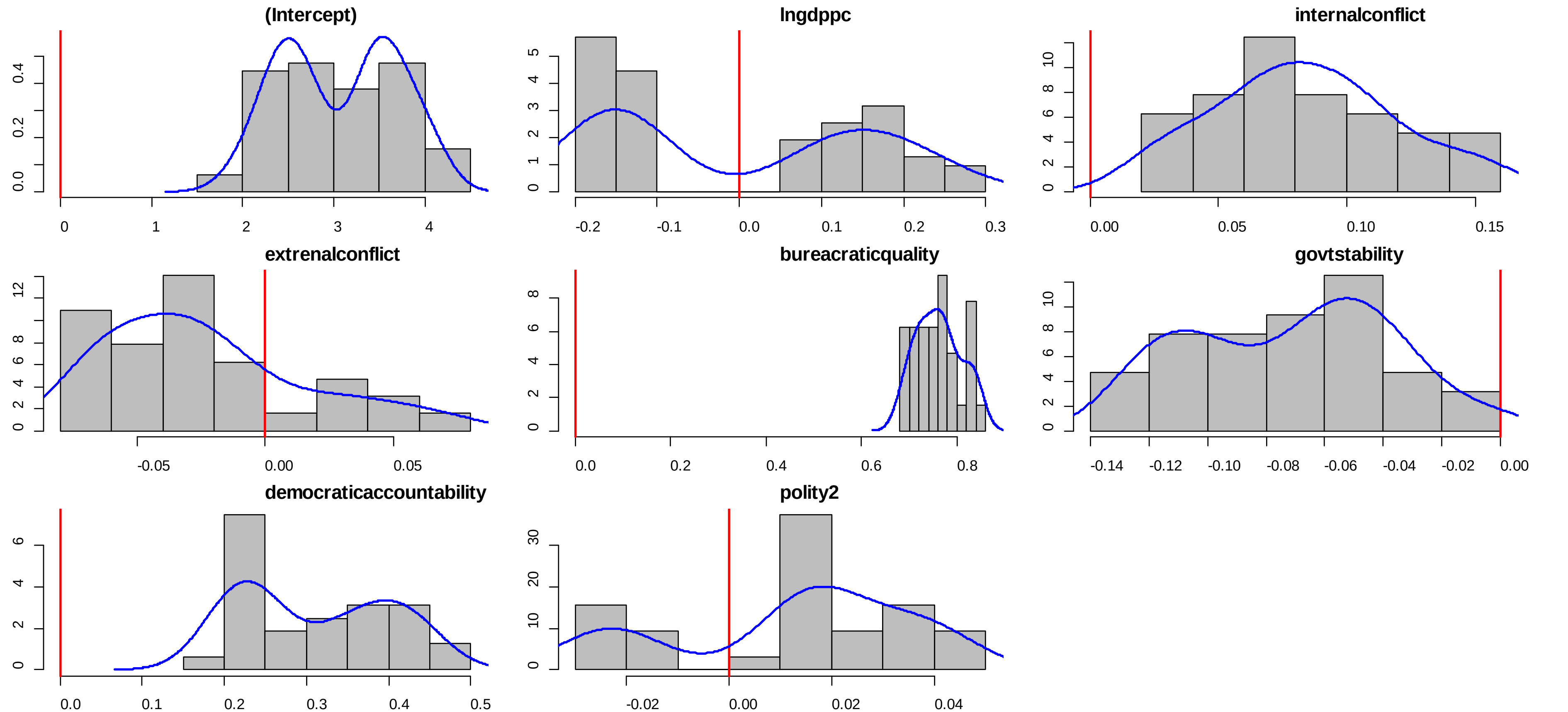


Figure 3. 3: Histograms summarizing the estimation results for the EBA political and institutional variables using Pooled OLS only.

The horizontal axis shows the magnitudes of the regression coefficients, while the corresponding probability density is shown on the vertical axis.

Table 3. 6: **EBA RESULTS FOR POLITICAL/INSTITUTIONAL VARIABLES (POOLED OLS) (1984-2013)**

	beta.lowest	beta.highest	beta.mean	tstat.mean	pct.sgf95	pct.above.zero
internalconflict	0.021	0.160	0.084	2.743	0.750	1
extrenalconflict	-0.072	0.073	-0.023	1.229	0.031	0.219
bureacraticquality	0.686	0.844	0.761	11.542	1	1
govtstability	-0.123	-0.002	-0.071	2.649	0	0
democraticaccountability	0.187	0.453	0.309	5.519	1	1
polity2	-0.028	0.043	0.012	1.994	0.344	0.750
lngdppc	-0.184	0.270	0.001	2.389	0.365	0.492

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10),at most 5 predictors from Z simultaneously.

Figure 3.4 POLITICAL & INSTITUTIONAL VARIABLES (PANEL RANDOM EFFECT HISTOGRAM EBA)

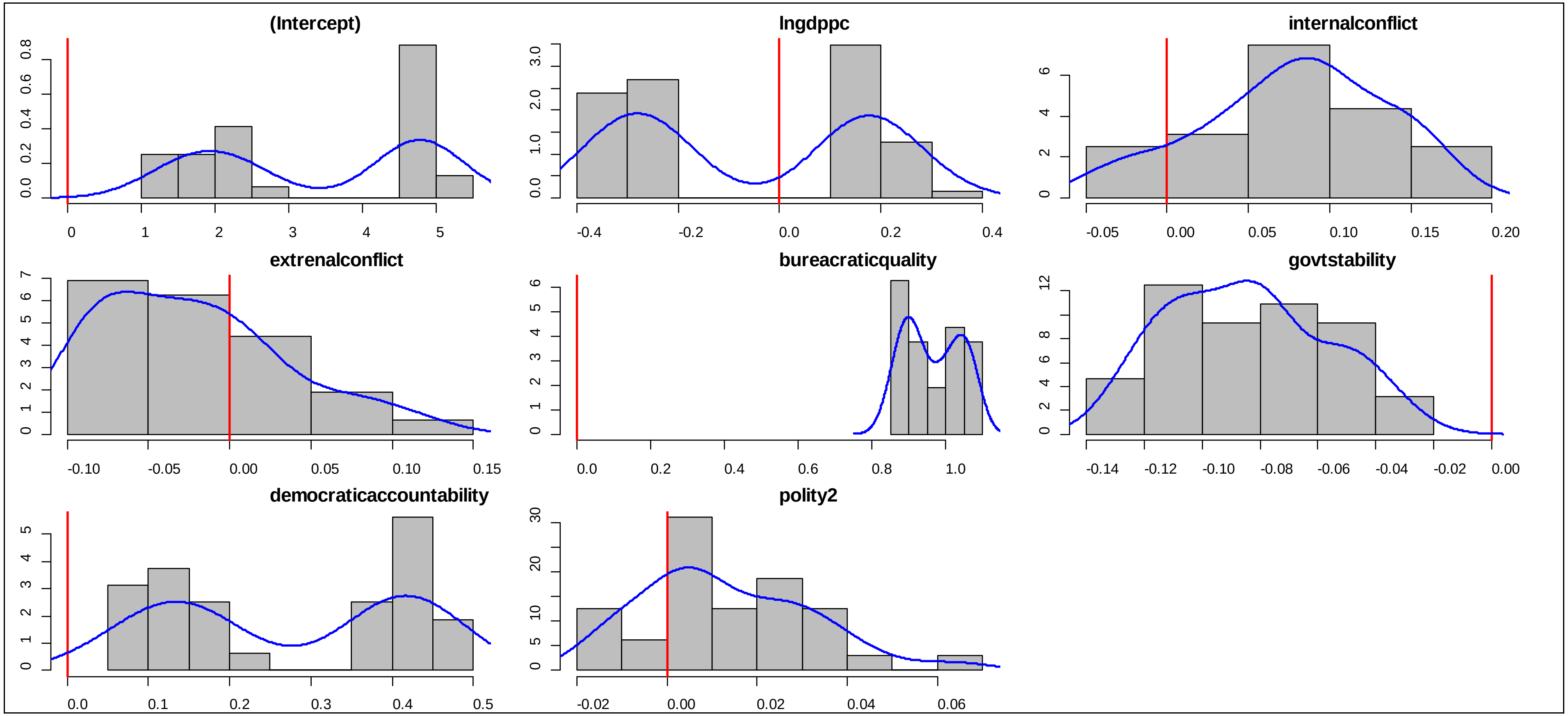


Figure 3. 4: Histograms summarizing the estimation results for the EBA political and institutional variables using Random Effect only.

The horizontal axis shows the magnitudes of the regression coefficients, while the corresponding probability density is shown on the vertical axis.

Table 3. 7 EBA RESULTS USING RANDOM EFFECT FOR POLITICAL/INSTITUTIONAL VARIABLES (1984-2013)

	beta.lowest	beta.highest	beta.mean	tstat.mean	pct.sgf95	pct.above.zero
internalconflict	-0.042	0.162	0.077	2.750	0.656	0.875
extrenalconflict	-0.097	0.117	-0.023	1.690	0.094	0.344
bureacraticquality	0.852	1.078	0.964	14.850	1	1
govtstability	-0.128	-0.032	-0.085	3.671	0	0
democraticaccountability	0.052	0.455	0.274	4.996	0.812	1
polity2	-0.014	0.064	0.013	1.461	0.312	0.812
lngdppc	-0.351	0.321	-0.053	3.744	0.460	0.492

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10), at most 5 predictors from Z simultaneously.

Figure 3. 5: ***Histogram EBA for Socio-Cultural Variables Using Pooled OLS***

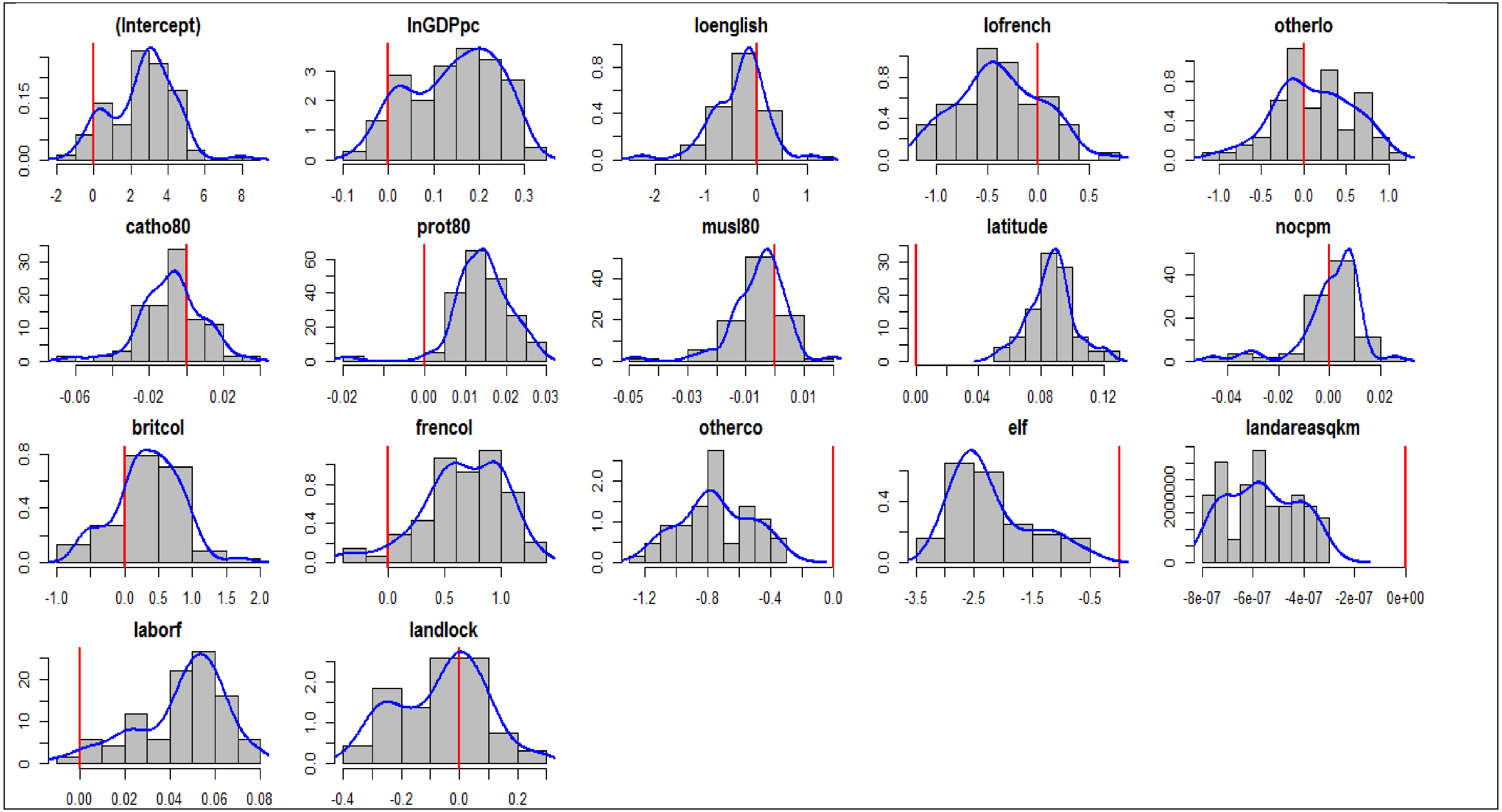


Table 3. 8: **EBA PANEL POOLED OLS RESULTS FOR SOCIO-CULTURAL VARIABLES**

	beta.lowest	beta.highest	beta.mean	tstat.mean	pct.sgf95	pct.above.zero
loenglish	-2.262	1.060	-0.339	2.081	0.062	0.231
lofrench	-1.161	0.693	-0.385	2.520	0.027	0.203
otherlo	-1.042	1.022	0.108	1.602	0.212	0.545
catho80	-0.062	0.032	-0.008	2.960	0.183	0.268
prot80	-0.019	0.028	0.014	3.238	0.878	0.986
musl80	-0.048	0.020	-0.005	2.344	0.039	0.234
latitude	0.051	0.121	0.086	9.017	1	1
nocpm	-0.046	0.026	0.001	1.744	0.258	0.597
britcol	-0.652	1.683	0.344	2.671	0.527	0.797
frencol	-0.391	1.263	0.662	4.030	0.857	0.957

otherco	-1.227	-0.313	-0.749	5.001	0	0
elf	-3.180	-0.506	-2.211	5.840	0	0
landareasqkm	-0.00000	-0.00000	-0.00000	5.658	0	0
laborf	-0.010	0.079	0.045	3.915	0.838	0.985
landlock	-0.396	0.281	-0.063	0.948	0.031	0.369
lnGDPpc	-0.067	0.307	0.145	2.397	0.615	0.920

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10), at most 5 predictors from Z simultaneously.

Figure 3. 6: Histogram EBA Random Effect Results for Socio-Cultural Variables

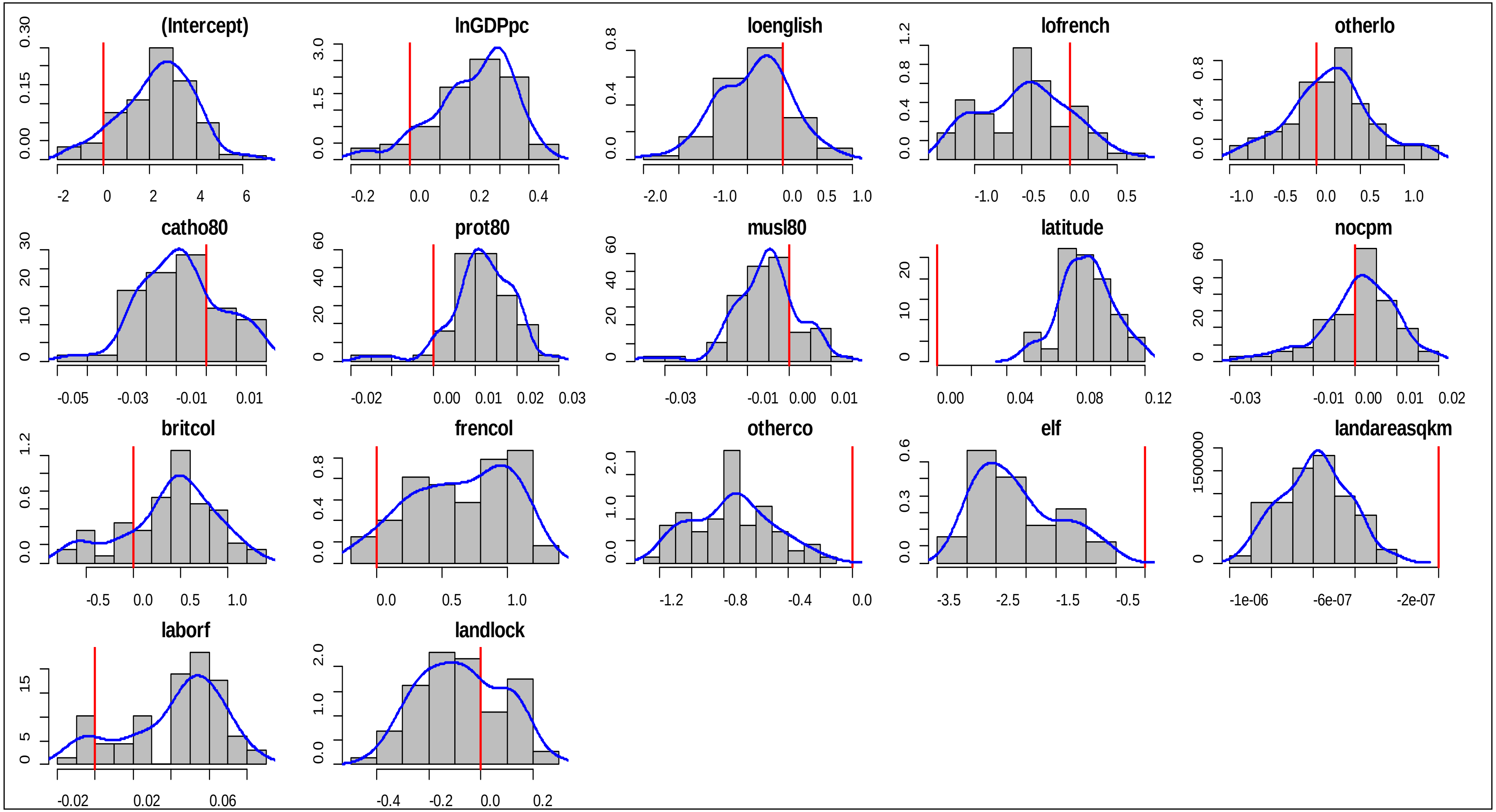


Table 3. 9 EBA RESULTS USING RANDOM EFFECT FOR SOCIO-CULTURAL VARIABLES (1984-2013)

	beta.lowest	beta.highest	beta.mean	tstat.mean	pct.sgf95	pct.above.zero
loenglish	-1.902	0.859	-0.412	2.468	0.070	0.197
lofrench	-1.247	0.754	-0.464	2.833	0.014	0.194
otherlo	-0.952	1.266	0.156	1.680	0.225	0.648
catho80	-0.046	0.018	-0.008	3.024	0.159	0.254
prot80	-0.016	0.029	0.012	2.828	0.694	0.952
musl80	-0.034	0.013	-0.006	2.460	0.092	0.184
latitude	0.051	0.118	0.086	9.091	1	1
nocpm	-0.026	0.019	0.001	1.574	0.250	0.639
britcol	-0.710	1.297	0.389	2.974	0.662	0.794
frencol	-0.152	1.234	0.646	4.044	0.770	0.951
otherco	-1.233	-0.148	-0.747	5.176	0	0

elf	-3.122	-0.614	-2.149	5.968	0	0
landareasqkm	-0.00000	-0.00000	-0.00000	6.036	0	0
laborf	-0.014	0.086	0.042	3.771	0.765	0.882
landlock	-0.411	0.292	-0.075	1.160	0.014	0.311
lnGDPpc	-0.196	0.468	0.214	3.676	0.780	0.920

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10), at most 5 predictors from Z simultaneously.

EBA Results for Socio-Cultural Variables:

All the Extreme Bounds Analysis results for all the ***Socio-Cultural variables*** are contained in Figures 3.5 and 3.6 for the POLS and RE Histogram EBA. While the main POLS and RE results are presented in Tables 3.9 and 3.10 respectively. Evidence from some past empirical studies like (La Porta *et al*.1997,1999), Triesman (2000) and more recently Serra (2006) suggest that there is a positive or negative impact of different religions like (***catho80, prot80, mus80, nocpm***) may have on corruption. We follow the literature and therefore test the hypothesis that a country's religion (***catho80, prot80, mus80, nocpm***) may have some impact on corruption in our sample of countries, and found that none of the percentages of a country's population associated with dominant religion is statistically significant in all the regressions and even across different specifications and estimation methods. However, we do find some evidence that the percentage of the population who are protestants does have the right sign, it is negatively correlated with corruption, however, it is not significant even at the 10% level. Perhaps, the stringent nature of the EBA method may have been responsible (only 87.8% of the protestants variable was significant. In conclusion, unlike Triesman (2000), Serra (2006) and ElBahnasawy (2012), we do not find strong evidence to support the view that different religions may substantially have diverse effects on corruption. This lack of robustness between population percentages of dominant religions and corruption could be attributable to our sample. It is thought that the 3 dominant religions (***catho80, prot80, mus80***) are not indigenous to the people and that followers of these faiths still hold other views that may prevent them from displaying absolute teachings.

Furthermore, we test the sensitivity of a country's legal origin (English legal origin, French legal origin and Other legal origins) to corruption by using legal vectors first introduced by La Portal et al. (1999). Looking at the EBA analysis results for all the three legal origin dummies, we do not find any strong and statistically significant results but we do find evidence that all the legal origins are negatively correlated to corruption. Even looking at the relative size of the coefficients of all the legal origins shows that none of them met the stringent criterion for robustness under all the EBA methods. This, therefore, shows that we cannot conclude that all the countries in our sample, regardless of the type of legal origin, have a robust legal system that promotes or undermines corruption. According to Triesman (2000), what really matters to corruption is not just a country's legal origin but also a legal culture within the country that is strongly linked to its colonial origin. We test the hypothesis that colonial origin or heritage is a determinant of corruption by using the three-colonial heritage (***britcol, frencol and otherco***) predominant in SSA countries. The Extreme Bounds Analysis results from all regressions relating to the 3 colonial origins indicates that both the (***britcol, frencol***) are negatively correlated to corruption but are not statistically significant. This further show that both the British and French colonial heritage have the right signs and do not contribute to promoting corruption in SSA. However, one interesting result we found was the variable(***otherco***), which represent countries in SSA that were never a colony to the British, French or other colonial powers. Our consistent results across all specifications indicate that the variable for other colonial origin is negative and statistically significant to corruption. This means that other things being equal, the variable for ***other colonial origin*** is a strong determinant of corruption because of its robustness. Therefore, this variable does not exacerbate the corruption situation but rather abates it.

Mauro (1995), La Porta et al. (1999) and Triesman (2000) constitute part of a growing body of literature that relates corruption to ethnolinguistic fractionalisation (ethnic division in a country), and nowhere does this view seem truer than in sub-Saharan Africa. Apart from the fact that it remains home to the poorest region in the world, it is also noted for being one of the most ethnically fragmented regions in the world[22]. We test this view by running a sensitivity analysis for the ethnolinguistic fractionalisation variable on corruption and our result shows a strong and robust correlation between both variables, albeit, one that is negative. One plausible reason for our result, according to Triesman (2000), is that ethnolinguistic fractionalisation is robust and positively correlated with corruption if a proxy for economic development is not controlled for and that the sign and direction of robustness changes from positive to negative once log GDP

[22] , See Alesina,A. ***et al***(2002) for details.The world's most 20 diverse countries are all in sub Saharan Africa. According to the data, Uganda has the highest ethnic diversity rating, and this is followed by Liberia. One of the reasons for this level of diversity is attributed to the continent's colonial legacy.

per capita is introduced. Given that our regression included a proxy for economic development, our result is similar to Triesman (2000).

Latitude in this respect is a proxy for weather and climate, which are both parts of the geography of an area. The theoretical view according to some economists is that latitude is positively and significantly related to corruption. They assert that countries farther away from the equator are less corrupt than others. We test this hypothesis by running an Extreme Bounds Analysis regression on both variables. Our EBA results across different specifications show that in terms of correlation, the latitude variable is positively strong and significantly correlated to corruption. By implication, this means that latitude is a robust determinant of corruption in our sample of countries and can be seen to be promoting corruption in the region.

Figure 3. 7: Histogram EBA POLS Results (Economic Variables) is shown on the next page.

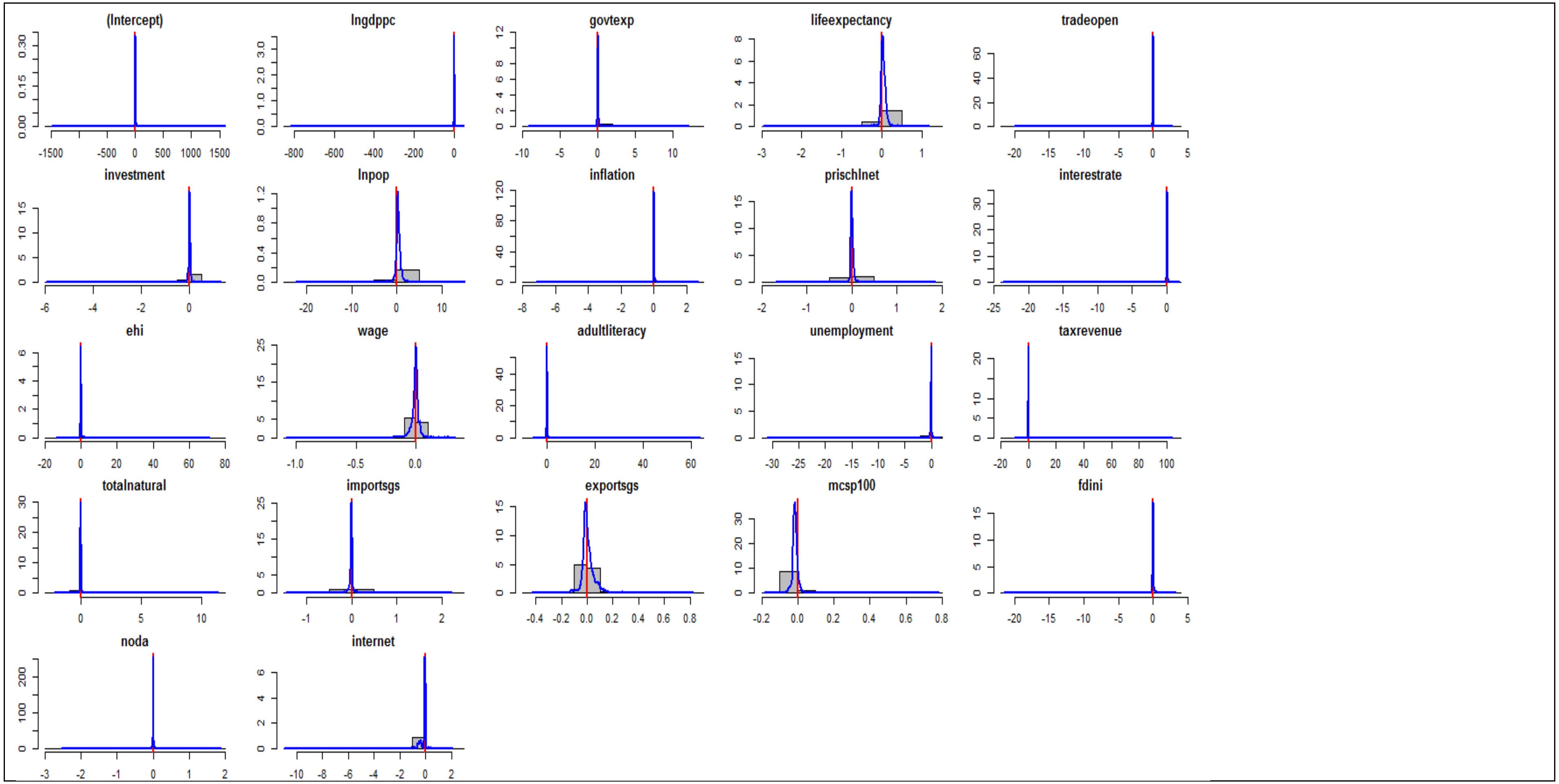


Table 3. 10 EBA RESULTS USING POOLED OLS FOR ECONOMIC VARIABLES (1984-2013)

	beta. lowest	beta. highest	beta. mean	tstat.mean	pct.sgf95	pct.above.zero
govtexp	-131.416	15.446	-0.026	1.475	0.247	0.686
lifeexpectancy	-2.949	5.069	0.043	1.762	0.324	0.774
tradeopen	-20.136	2.766	-0.015	1.293	0.036	0.310
investment	-3.111	3.393	0.020	1.322	0.197	0.781
lnpop	-41.740	117.434	0.511	1.820	0.348	0.843
inflation	-3.578	2.521	0.009	1.185	0.073	0.433
prischlnet	-83.852	4.147	-0.031	1.406	0.095	0.490
interestrate	-23.704	11.326	0.001	1.555	0.084	0.491
ehi	-40.407	130.390	-0.044	1.773	0.009	0.184
wage	-1.135	19.944	0.006	0.724	0.011	0.450
adultliteracy	-7.376	39.601	0.045	0.841	0.062	0.786
unemployment	-2.159	0.754	-0.038	0.976	0.006	0.309

taxrevenue	-10.599	103.503	0.086	1.877	0.358	0.779
totalnatural	-7.721	0.384	-0.049	3.363	0.005	0.039
importsgs	-12.033	3.037	-0.016	1.037	0.060	0.480
exportsgs	-0.486	0.990	0.009	1.362	0.113	0.486
mcsp100	-0.788	0.055	-0.016	2.629	0.002	0.097
fdini	-8.318	35.591	-0.002	0.953	0.040	0.335
noda	-0.255	10.869	0.009	1.476	0.258	0.824
internet	-1.751	8.745	-0.125	2.821	0.001	0.118
lngdppc	-359.586	130.743	0.092	1.877	0.344	0.779

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10)

Figure 3. 8: ***SECOND EBA RESULTS USING POOLED OLS FOR ECONOMIC VARIABLES (1984-2013)***

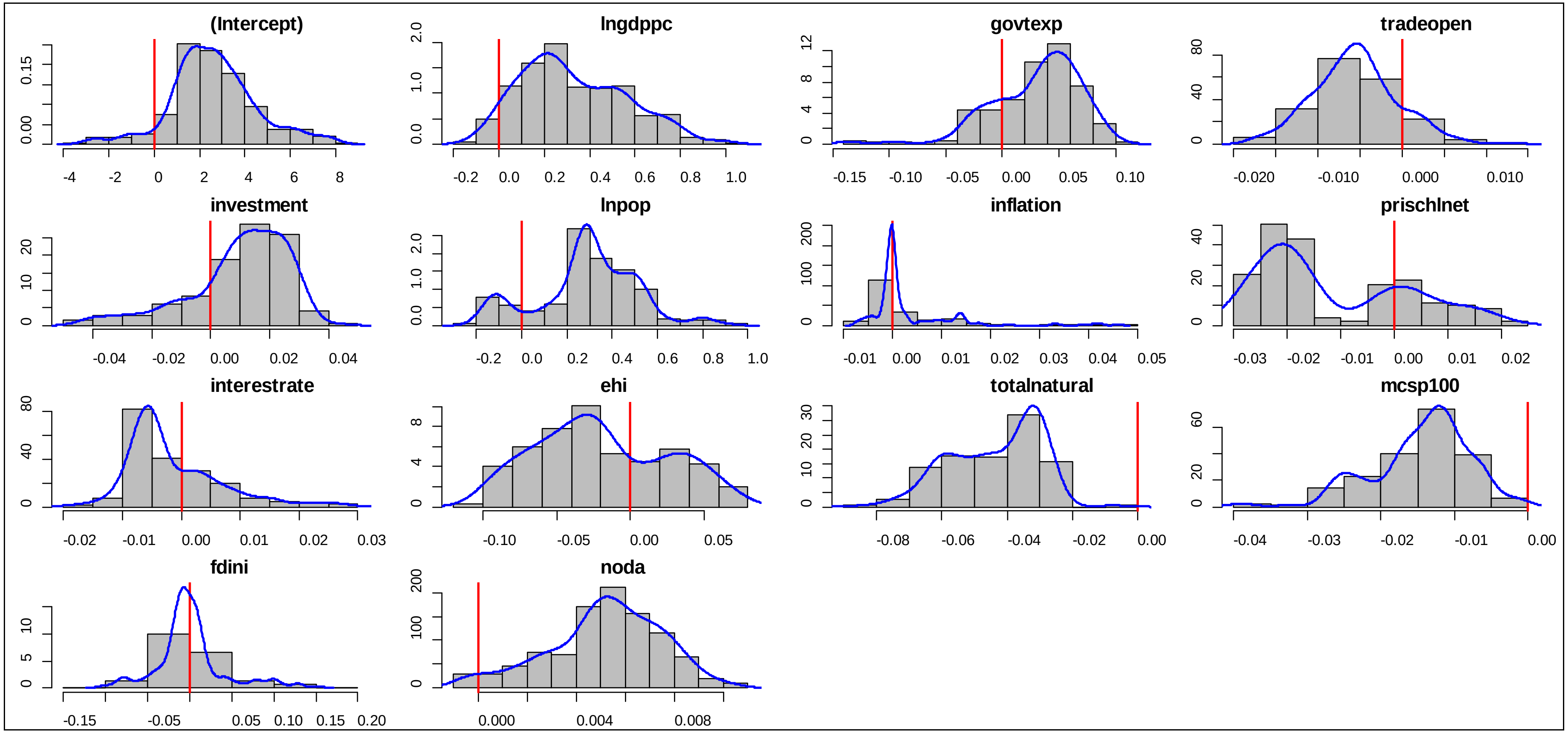


Table 3. 11:SECOND EBA RESULTS USING POOLED OLS FOR ECONOMIC VARIABLES (1984-2013)

	beta.lowest	beta.highest	beta.mean	tstat.mean	pct.sgf95	pct.above.zero
govtexp	-0.159	0.097	0.031	2.453	0.621	0.788
lifeexpectancy	-0.021	0.185	0.033	1.837	0.323	0.908
tradeopen	-0.018	0.011	-0.005	1.495	0	0.132
investment	-0.049	0.043	0.009	1.241	0.225	0.760
lnpop	-0.459	0.907	0.233	2.417	0.460	0.831
inflation	-0.008	0.090	0.004	1.457	0.030	0.404
prischlnet	-0.031	0.026	-0.013	2.691	0.017	0.193
interestrate	-0.019	0.058	0.00002	1.831	0.016	0.358
ehi	-0.098	0.094	-0.018	1.074	0	0.300
totalnatural	-0.076	-0.010	-0.042	5.828	0	0
mcsp100	-0.039	0.001	-0.015	3.111	0	0.011
fdini	-0.095	0.152	0.002	0.861	0.041	0.441
noda	-0.001	0.011	0.005	2.453	0.593	0.936
lngdppc	-0.205	1.009	0.314	2.689	0.580	0.922

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10)

Figure 3. 9 ***:HISTOGRAM EBA RESULTS USING PANEL FIXED EFFECTS FOR ECONOMIC VARIABLES (1984-2013)***

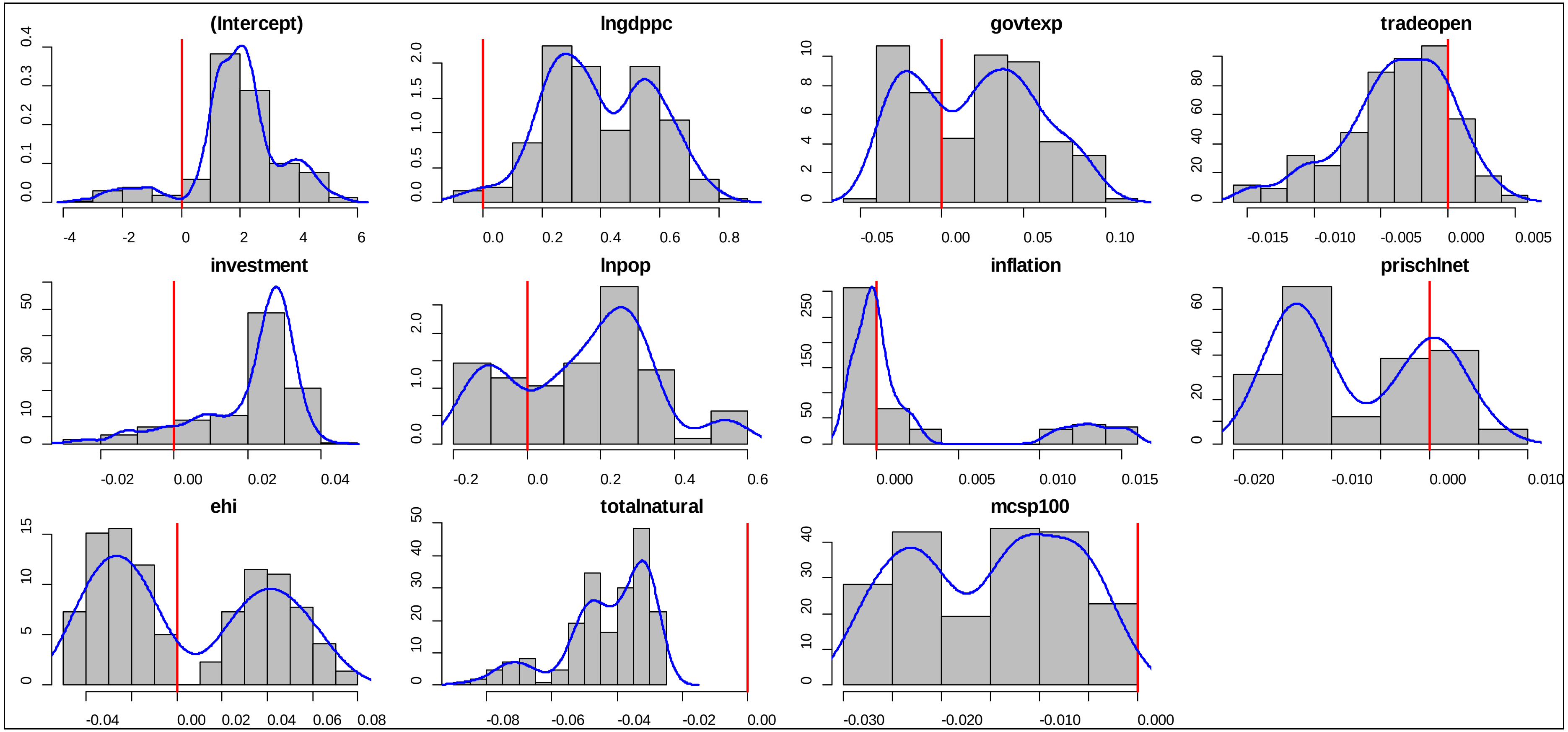


Table 3. 12: **EBA RESULTS USING PANEL FIXED EFFECT FOR ECONOMIC VARIABLES (1984-2013)**

	beta.lowest	beta.highest	beta.mean	tstat.mean	pct.sgf95	pct.above.zero
govtexp	-0.044	0.100	0.019	1.907	0.479	0.630
tradeopen	-0.015	0.005	-0.004	0.885	0	0.160
investment	-0.027	0.041	0.021	1.839	0.498	0.890
lnpop	-0.185	0.570	0.150	1.789	0.301	0.735
inflation	-0.002	0.016	0.002	2.191	0	0.384
prischlnet	-0.020	0.007	-0.007	1.522	0	0.242
ehi	-0.049	0.073	0.005	0.766	0	0.452
totalnatural	-0.088	-0.027	-0.043	5.075	0	0
mcsp100	-0.030	-0.0003	-0.015	2.145	0	0
lngdppc	-0.097	0.821	0.397	3.390	0.798	0.983

EBA with all the combinations. Year –fixed effects included but not reported.VIF control (VIF<10)

Explaining and interpreting EBA Estimates for Economic Variables:

The Extreme Bounds Analysis results for the economic variables using Histogram, Leamer and Sala-I-Martin methods are contained in Figures 3.7,3.8 and 3.9 for the histogram EBA and Tables 3.11,3.12 and 3.13 for both Leamer and Sala-i-Martin EBA. With respect to the natural resource rent variable, we find it to be positive and statistically significant in both the POLS and Histogram EBA estimations. This result of a positive correlation between natural resource rent and corruption is in line with Ades and Di Tella (1999), who hypothesize that where there are larger rents for bureaucrats to capture, corruption tends to be inherently higher. This is even more so if the economy is driven by natural resource endowment and geared towards the export of these resources. However, the result from the panel fixed effect does not support this view. Furthermore, we test the hypothesis by Ades and Di Tella (1999) that trade openness or international trade will reduce the amount of profits available for corrupt bureaucrats to extract because it increases competition, increases the choice available to consumers and reduces the market-dominant power of domestic producers. Our results across all specifications did support this view as the variable on trade openness was found to be negatively correlated with corruption but not statistically significant. This result may well be related to the fact that most governments across the region operate a market economy that encourages foreign direct investment and is open to international trade in general. This result is also supported by the following authors (Sandholtz and Koetzle (2000), Sandholtz and Gray (2003), and Gerring and Thacker (2005)) who also find a relationship between corruption and openness to trade.

The results of other determinants of corruption examined in relation to their relationship to corruption are: government expenditure (+), investment (+), population (+), unemployment (-), net aid (-), inflation (+), the share of exports (+), the share of imports (+). These variables were found not to be significant but the results are indicative of the sign of the correlation between different variables and corruption, it does not in any way connote the degree of statistical significance and causations.

We checked for evidence of a link between corruption and income inequality (measured by EHI) and the relative wage in the public sector. These were not generally significant in the regressions that included basic controls. However, we find income inequality to be positively correlated with corruption but is not statistically significant. The result from the public-sector wage, on the contrary, is negatively correlated with corruption but is not statistically significant. This does not mean that such relationships do not exist, but we did not manage to find them in any of the data at our disposal.

3.8 Conclusion

Summing up, in this chapter we investigate the determinants of corruption using Extreme Bounds Analysis (EBA), a methodology developed by Leamer (1985) and Sala-i-Martin (1997), to address the problem of model uncertainty inherent in the corruption literature. We employ a panel dataset covering 31 countries in sub-Saharan Africa and over the 1984-2013 period and we also consider 60 economic, socio-cultural and political variables that have been previously proposed in the literature as determinants of corruption. As far as we are aware, this is the largest set of variables ever assembled and the largest coverage of data in any analysis of the determinants of corruption in SSA. Our application of EBA to the study of corruption further enriches the literature by extending previous work in its use of a large panel dataset instead of the use of cross-sectional data employed in previous EBA studies. Furthermore, we also include economic, socio-cultural and political variables in the study and as a result, we believe that our work significantly extends the existing literature that seeks to understand the determinants of corruption. We use Leamer (1983), Sala-i-Martin (1997) and Histogram EBA methodologies in our analyses. We apply pooled OLS on the three categories: (a) Economic, (b) Socio-cultural and (c) Institutional variables and to avoid collinearity, we further advance the work by applying panel fixed effects on the economic variables and random effects on both the socio-cultural and political variables. Our results, which are robust to different methods shows that the variables of ethnolinguistic fractionalisation, internal conflict, bureaucratic quality, democratic accountability, and government stability, and natural resource rents are some of the strongest determinants of corruption in sub-Saharan Africa for the period review (1984-2013).

Finally, we reiterate that Extreme Bounds Analysis is a very rigorous test and also place emphasis on the fact that some variables that failed the test should not by themselves be interpreted as strong evidence that those are not robust determinants of corruption. However, variables that pass the EBA test should be taken seriously as robust determinants of corruption and should possibly be considered as standard control variables for empirical studies on the causes of corruption. It is also paramount to equally make clear and emphasize that the EBA method used in this chapter does not allow us to interpret our results as causation, it should rather be interpreted as a robust correlation. One area for future work could be to compare the results of our EBA with other estimation methods so as to help identify other robust determinants of corruption.

Chapter Four

Corruption and Economic Growth: New Panel Evidence from sub-Saharan Africa (SSA).

4:1 Introduction

Grasping the reasons for the major differences in economic growth rate and income levels among countries (why are some countries poorer than others?) is a fundamental question that has preoccupied economists and policymakers for years. For the African continent and countries within Sub Saharan Africa (hereafter known as SSA) in particular, this has been a persistent problem for most of its governments for much of the last fifty years. In comparison with other regions of the world, there is a general consensus within the economic literature that SSA countries underperformed grossly over the last five decades. The average economic growth rate within this period declined to about 2 per cent, while the population growth rate was about 2 per cent or more, and by implication, this amounted to zero or negative per capita growth. This long period of stagnation attributed to why Africa was described in the media as the basket case of the world. In its lead editorial on (May 13, 2000), the editors of the well-respected *Economist* magazine described Africa as "The hopeless continent''. (See Easterly and Levin, (1996)); Artadi, Sala-I-Martin (2003) and Figures1.1 to 1.4 in chapter one, Table 2.1 and the subsection on the pattern of growth in chapter 2 of this thesis for more details)). In addressing this question, an important strand of the literature has paid special attention to the role of corruption in the growth process. Corruption has severally been recognised as one of the major impediments to economic growth and development in many countries of the world. A recent IMF (2016)[23] report, for example, argues that virtually all state functions; from taxation, monetary policy to education and other areas of governance, can be negatively affected by systemic corruption and thereby leading to devastating social and economic outcomes like poverty for citizens. Empirical studies also show that corruption negatively impacts economic growth by lowering investment (Mauro, 1995; Wei, 2001). Similarly, (Bertrand et al., 2007)

[23] Corruption: Costs and Mitigating Strategies Staff Discussion Note. Staff Team from the Fiscal Affairs and Legal departments. https://www.imf.org/external/pubs/ft/sdn/2016/sdn1605.pdf

maintains that corruption affects economic growth by distorting the allocation of resources. A recent 2014 study by Transparency International on its index on corruption for that year shed some interesting light on how corruption is still very endemic in SSA. This is because the majority of the countries within Africa in that study recorded a score of less than 5(scores ranges between 0 to 10, with zero being very corrupt and 10 very clean). Apart from academic studies, anecdotal evidence[24] on how endemic corruption is in SSA also abound. Therefore, countries within SSA provide an interesting laboratory for the study of corruption and economic growth.

While much attention has focused on corruption and growth in general, there is also a burgeoning and increasing literature on corruption and other institutional variables. However, there is very little research into this subject as it relates to countries within sub-Saharan Africa for over a long period of time. Moreover, previous empirical studies on this issue have generated conflicting results, with some suggesting that corruption generates positive outcomes and others hold the view that corruption generates negative outcomes. Despite all these challenges, yet few studies have attempted to empirically investigate how corruption impacts upon economic growth in SSA countries. Given the significance of economic growth and how it is a necessary condition for economic development, understanding how corruption impacts economic growth should be an issue of key importance for both academics and policymakers with a keen interest in the governance of SSA.

In this chapter, we contribute to the already established, albeit, contrasting empirical literature on the impact of corruption on economic growth. Given that a large part of the previously published empirical work on this topic focused on cross country data by comparing developed and developing countries and then implementing them in a cross-sectional method. We, however, deviate from this and investigate first, the impact that corruption has on economic growth by looking at the entire sample and secondly, we further decomposed the entire sample into income level groups based on the World Bank classifications and do an in-depth study of the effects of corruption on economic growth along with these groupings (income levels) in SSA countries and find out how

[24] Anecdotal evidence in this context presupposes that the argument about corruption in SSA countries is not much about its existence but more about its degree and the damage it is causing.

this undermines or promote economic growth in general. Apart from deepening our understanding of the effects of corruption on economic growth in an SSA context, it is also very imperative to know if there are variations on how corruption works together with a country's level of income in affecting economic growth; we also ask whether corruption work more or less effective in promoting economic growth? We empirically examine these effects by using a sample of 31 SSA countries (see Appendix A4.1 for the list of countries) over the period starting in 1984 and ending in 2013. According to Triesman (2000), heterogeneity among countries with diverse cultures, religions and institution matter in understanding differences in cross country regression. The body of empirical literature at present on the impact of corruption on economic growth is mostly based on cross country models which are insufficient in explaining unobserved country-specific heterogeneity. To address these econometrics shortcomings and achieve our research objectives, we extend the present body of literature in different ways: In particular, we do so by using panel data techniques. To be more specific, this is done by employing the pooled OLS, Instrumental Variables (IV) and GMM (General Method of Moments) estimation approach so as to overcome the endogeneity problems that many studies of this nature suffer from.

Furthermore, to deepen a better understanding of the subject matter through our analysis within the region, we consider the heterogeneity of the SSA group by subdividing these countries according to their level of economic development, using the World Bank classification of income groups[25]. "For the current 2015 fiscal year, low-income economies are defined as those with a GNI per capita of $1,045 or less in 2013; middle-income economies are those with GNI per capita of more than $1,045 but less than $12,746; high-income economies are those with a GNI per capita of $12,746 or more. Lower middle income is separated at a GNI of per capita of $4,125." Therefore, we concentrate only on low-income countries, low middle-income countries and upper-middle-income countries as all countries in our sample falls under these three groupings.

[25] This is based on PPP GNI, which is gross national income (GNI) converted to international dollars using (PPP) purchasing power parity rates.

This study contributes to the current scanty literature on the economics of corruption and growth with a focus on sub-Saharan African countries in several ways: first of all, this work uses panel data for the 31 SSA countries with a longer time period (1984-2013) to address the main research questions. No other previous work employed the use of panel data focusing on SSA countries exclusively. There are country, economic blocs and continental studies but none exist that is specific to SSA countries. Second of all, this is the first work investigating the impact of corruption upon economic growth in the region over a long period (30 years). The second reason also allows us to capture the long-term dynamics of corruption on economic growth. Third, this is the first attempt at looking at this topic from an income level classification perspective within SSA. Finally, we use an original specification to address the estimation problems of a latent and long-term phenomenon such as corruption and to also evaluate the sensitivity of our results. To be more specific, we compare the results by implementing three estimators: The Pooled OLS estimator, the 2SLS estimator using IV and the dynamic panel (GMM) estimator. The results from the full sample of countries and under different income level classifications show that, on the whole, there is a strong and negatively statistically significant effect of corruption on economic growth within the entire sub-Saharan African region and this result is equally strong across different income level groups. Except for the 5 countries categorised as an upper-middle-income group, where the corruption coefficient is still negative but not statistically significant. Our results suggest that the growth impact of corruption in the region is highly detrimental to economic growth but a higher income level can mitigate the overall negative effect. Our results are robust to different specifications of the growth equation and methods.

The remainder of this chapter is organised as follow: In the next section, we look at the literature on economic growth and corruption. Subsequently, we will describe the theoretical framework in section 4.3 and then go on to describe the empirical strategy, the variables and the data used in the study in section 4.4. Sections 4.5 and 4.6 presents the results and discussions together with the robustness checks. The final section in 4.9 is on the conclusions and policy implications.

4:2 Literature Review

In this section, without presuming to be exhaustive in the research previously carried out on this topic, we present the literature on the impact of corruption on economic growth. A very solid and natural starting place in relation to the analysis of corruption is to follow Becker's (1968) "standard economic model of crime" and then apply it to the study of corruption. Other authors like Polinsky and Shavell (1979,1984) latterly expanded it and it presupposes in the basic model that: "persons contemplating corruption take into account the expected benefits in the form of bribes, favours or payment in kinds and compare the monetary equivalent of these gains with the expected costs in the probability they will be caught and the monetary sum (or the equivalent) of the punishment should they be convicted". Formulating the study of corruption this way makes it to be in sync with how Allingham and Sandmo (1972) applied Becker's model of crime to their work on "economics of tax evasion". Therefore, corruption will not take place if the expected gains from such activities are negative, and on the other hand, if there are positive net gains to be expected, then corruption is likely to take place.

4.2.1 Theoretical Approach and Literature

The theoretical literature on corruption has grown rapidly in the last few years. There are two schools of thought contemporaneously representing opposing points of view relative to corruption-economic growth nexus (Huntington 1968 and Myrdal 1971). The two polar strands of thought are: Corruption can be efficiency-enhancing by greasing the wheel of commerce. This is also known as the ***efficiency-enhancing strand.*** This is sometimes referred to as "speed money" or "greasing the wheel hypothesis" in the corruption literature. The idea has a long history and first gained prominence in the 1960s with an article by Nathan Leff called "Economic Development Through Bureaucratic Corruption" (Leff (1964)). The supporters of this view argue that corruption (i.e. payment of bribery to bureaucrats in many forms) acts like oil that greases and facilitates the engine of economic growth as it helps government officials to make the process of project approval more efficient. By so doing, it promotes efficiency by allowing individuals in the private sector to correct pre-existing government failures of all types (Leff (1964), Huntington (1968) and Summers (1977)). Leff (1964), who is one of the early theorists on the study of corruption argued persuasively that corruption can be a virtuous thing when it comes to promoting economic growth. The conclusion of the work is premised on the fact that corruption can be used to break down a regulatory burden that can be a hindrance to economic growth. For example, the work maintains that bureaucratic bottlenecks created by government bureaucrats can be circumvented by businesses by finding better ways by paying bribes. The high inflation and price controls in both Brazil and Chile during the early 1960s was used by Leff (1964) to illustrate how corruption in Brazil actually benefited consumers by loosening the freeze on food production. Thereafter, he concluded that sluggish markets can be lubricated or greased by corruption to help achieve higher social welfare. Other proponents of this view are (Bayley 1966; Huntington 1968 and Lui 1985). This viewpoint also found support in the work of other authors like Leys (1964) and Bayley (1966). Both authors maintain that: "corruption can amend a bureaucracy by improving the quality of its civil servants". For example, relative to wages in the private sector, government officials receive low salaries and wages and the possibility of getting extra income through bribes can act as an incentive for bureaucrats to speed up services for those who can afford to pay (Meon and Sekkat 2005). According to (Aidt 2003), corruption in this functionalist view is generally regarded as a rational market response to government failure. Corruption can improve economic efficiency by firstly, speeding up time-consuming bureaucratic procedures; secondly, it can also lead to more efficient resource allocation by inducing competition for scarce public resources between agents.

The idea and concept, since then have been given a theoretical foundation by the works of, say, for example, Lui (1985) who show how the efficiency of public administration can be enhanced by paying bribes to reduce the cost associated with queuing. For example, using a queuing model, Lui (1985) shows that economic agents tend to have varied profit prospects; as a consequence, the amount different agents (firms and businessmen) can afford and are ready to pay is a wide range and therefore have different opportunity costs. Some businesses would be more than happy to pay and avoid red tape and others will behave otherwise. Government contracts and issuing of licenses can be improved through the payment of bribes to bureaucrats. This payment of bribes for public goods (i.e. license) if well implemented can ultimately lead to Pareto-optimal efficiency or allocation. This is primarily because only firms that are efficient in the market will be in a position to pay the highest bribe. Khan (2006) described a concept known as “Statist corruption” and proposes that, depending on the context, corruption can have some positive impact. Generally, these are State interventions that are legal and can be beneficial to society. This sort of intervention may include regulations of financial markets and managing tariffs and taxes to speed up the rate or speed of technological development. A very good example of this type of corruption with the necessary legal backing is lobbying and perhaps, political contributions. Beck and Maher (1968) also show a similar result in the study of efficiency-enhancing effects of corruption in a given society. Beck and Maher (1968) introduced the ‘‘auction model’’ and showed that the effect of the bribes was the same as in open competitive auction primarily because the license will be allocated to the highest bidder as the bureaucrat acts like an auctioneer. However, the main difference between corruption and open competitive auction in this model is that who will receive the payment generated from the sale of the license? In the case of an open auction, the government treasury is the receiver, and in the case of corruption, the corrupt official will be the receiver. More recently, Acemoglu and Verdier (1998) establish that for the prevention of all corruption to be optimal, the cost associated with ensuring that public officials are not corrupt can be too high in a situation where public officials are required to uphold property rights and enforce contracts.

It is worthy to note that the claim that corruption can be efficient and grease the wheel of commerce, as presented in the models above, can be quite misleading because they are based on the problematic assumption of the pre-existence of government failure in the market. This assumption has been criticised in the literature because corruption can only be efficiency-enhancing in a second-best world scenario, because of the distortion caused by ill-functioning government (Meon and Sekkat 2005).

The opposing viewpoint in the theoretical literature maintains that corruption creates inefficiencies as opposed to correcting them. It is formally known as the ***efficiency reducing strand***. This is to say that corruption negates economic growth as it adds to the cost of doing business and introduces significant uncertainty in the decision-making process. The proponents of this view including Murphy et al, (1993), Gould and Amaro-Reyes (1983), United Nations (1990), Mauro (1995), Mo (2001), and Monte and Papagni (2001) suggest that corruption is disadvantageous to businesses and innovators. Other well-known advocates of the ***efficiency reducing*** school of thought of corruption are Mydal (1968), Rose-Ackerman (1978), Shleifer and Vishny (1993). Their respective research findings at different times conclude that corruption lowers economic growth. According to Rose-Ackerman (1978), the efficiency-enhancing argument of corruption on economic growth should be dispensed with, and this is primarily because, based on her research findings, corruption may appear to be promoting economic growth in certain sectors of the economy but if it is allowed to spread to many other sectors at once or to the wider economy as a whole, the domino effect can well be that corruption can ultimately lead to stagnation as it would be become difficult to do things without paying bribes. Invariably, it will create an expectation of higher bribes on the part of the current bureaucrats and ultimately slow down the pace of work in the wider economy until more rents are extracted. Similarly, Shleifer and Vishny (1993,1994) assert that the efficiency-enhancing argument was built on the wrong assumption that the efficient allocation of the public good would be Pareto optimal because the regulatory burden is exogenous. On the contrary, they maintain that the regulatory burden of a country tends to be endogenously determined given that corrupt bureaucrats, with minds set on extracting more rents in the future, can internally influence the country's legislators through lobbying to pass laws and regulations that are counterproductive. Also, in a related study, Kaufmann and Weil (1999) find that regulatory burden to be endogenous. They find a positive correlation between the amount of bribes companies pay and the problems bureaucrats create for them by way of harassment. This is partly because the level of bribes that companies can pay is endogenously determined by bureaucrats, who can sometimes behave like a monopolist by demanding higher bribe payments from those firms who have the ability and capacity to pay it and vice versa for those without the ability to pay. Therefore, even in certain conditions, like (in equilibrium) there is no certainty for even companies that gave the highest bribes will not be confronted with the problem of additional red tape and bottleneck.

Incorporating an informal economy in a theoretical argument by using its size and linking corruption to growth, Sarte (2000) demonstrate that in order to extract rents bureaucrats create artificial barriers preventing firms from entering into the formal sector. To this end, the probability of firms' preference to pay bribes to government officials in order to enter the formal sector is determined by the costs to the firm for remaining in the informal sector. For example, if the costs of remaining in the informal sector are low relative to the costs of entering the formal sector for the firms, the likely outcome is the size of the informal sector will increase and this will, in turn, reduce and scopes for government bureaucrats to extract rents. The implication from the foregoing example is that it would encourage the growth of the informal sector of the economy and reduce corruption overall. However, if the costs of staying in the informal sector are higher, then this will precipitate the opposite effect and as a consequence increase corruption.

According to the model proposed by Ehrlich and Lui (1999), holding public offices is highly competitive amongst bureaucrats, and this is partly because they expect to profit privately from holding such positions and to also be protected from prosecution. This is not surprising given that such offices will afford them the opportunities to embark on malpractices that leads to the diversion of government resources from economic growth-promoting activities like an investment in physical infrastructures and human capital development. Similarly, Blackburn *et al.* (2006) using a dynamic general equilibrium model presents how rent-seeking activities interact with economic activity, and then demonstrates how the efforts to cover up or conceal rent-seeking activities(corruption) in the economy, some resources are expended and this ultimately results in lower investment and thereby leading to lower growth. Naturally, such activities affect a country's level of development because those resources would otherwise be channelled into productive ends. Furthermore, after building on their previous work of 2006, Blackburn *et al*. (2011) also demonstrate the way economic growth can be affected by corruption, particularly those associated with public procurement contracts. They show that when it comes to public procurement, government officials or bureaucrats do not give due considerations to how the goods and services they are paying for will enhance and promote economic growth, instead, they are preoccupied with and inclined to spend government money on the procurement of goods and services that would provide them with the greatest scope for corruption and kickbacks from government contractors. This motivation ultimately leads to the execution of all sorts of white elephant projects with next to no economic value to the country. It also encourages paying for goods and services with the greatest opportunities for more bribes as opposed to value for money.

(Murphy et al.1991; Acemoglu and Verdier, 2000) maintain that corruption may lead to the misallocation of resources away from economic productive activities or sectors to less productive activities like rent-seeking. For example, given free choice, people enter into occupations with the highest returns on their abilities. According to (Rosen, 1981), able people choose professions that indicate increasing returns to their ability and this is because increasing returns enable superstars to earn abnormal returns on their talents. Talented people tend to generally help improve or add value to technology when they become an entrepreneur and thereby productivity and income will grow in that line of business. However, in an environment where rent-seeking sectors offer talented people higher returns than the productive sector, income and growth can become much lower than possible because these talents would engage in rent-seeking than engaging in any productive activity because of the payoff. In practical terms, this to a degree epitomises what is going in most of the countries within our sample. As a result of natural resource abundance within the region, and the prevalence of weak institutions, the reward from innovation and talent is poor relative to rent-seeking.

According to (Andvig and Moene, 1990), corruption can also play an important role in generating poverty traps. In related literature, Rose-Ackerman (1999) identified several channels or ways in which poor people are hurt by corruption: Firstly if bribery is prohibitively expensive, the ability of the poor to escape poverty through small scale enterprise may be affected negatively. Secondly, poor people are more likely to face higher taxes and receive the sub-standard or shambolic level of public services.

It is important to point out that the robustness of the negative effect of corruption on growth is not convincing to all researchers. For example, Svensson (2005) has questioned the validity of Mauro (1995) by stating that while it is true that there is strong evidence on the negative effect of corruption on growth at the micro-level, the same cannot be said to hold at the macro level because the evidence for it remains inconclusive across countries.

Furthermore, Campos *et al*. (2010) in a meta-analysis study of the effect of corruption on economic growth investigated 41 different studies with a total of 460 estimates of corruption on growth. They report the following conclusions: about 6% provide evidence for a positive and significant relationship between corruption and economic growth, 62% indicated a statistically insignificant relationship between the two, and 32% of the estimates reviewed support a statistically negative impact of corruption on economic growth. The earlier arguments in favour of the efficiency-enhancing effects of corruption on growth are premised on static and partial perspectives of the context in which corruption is taking place (Bardhan, 1997; Kaufmann and Wei, 1999; Aidt, 2003).

4.2.2 Empirical Literature (Corruption and Economic Growth)

Most of the available empirical literature on the effect of corruption on growth tend largely to suggest that the absence of corruption can accelerate economic growth. The first seminal empirical work in this area is credited to Mauro (1995). His results indicate that for a cross-section of 58 countries and under the period 1960 to 1985, corruption is found to negatively affect growth in the form of a one standard deviation improvement in the corruption index is associated with a 0.8 percentage point increase in the annual growth rate of GDP per capita. Similarly, Rahman et al (1999) in a country study of Bangladesh investigates the impact of corruption on economic growth and gross domestic investment and the overall results of the study indicate that corruption affects economic growth indirectly. Also, Wei (1997) in a study incorporating data from fourteen countries found that foreign investment can be discouraged where there is a prevalence of corruption. He obtained the coefficients of -0.09 and -9.92 for corruption and the host country's marginal tax rate.

In a related work spanning 1970- 1985 by Mo (2001), the direct and indirect effects of corruption on economic growth was estimated by using long term growth rates of per capita GDP, corruption perception index, other variables measuring three transmission channels and additional control variables. The outcome indicates that a unit increase in the corruption index corresponds to a reduction in the growth rate by 0.545 percentage points. However, upon controlling for other variables and employing both ordinary least square (OLS) and two-stage least square (2SLS) estimation, the direct effects of corruption become insignificant. Others who have also found similar results in terms of the negative impact of corruption on economic growth are: (Bardhan, 1997; Tanzi, 1995; 1997; UNDP, 1997; Knack and Keefer, 1996; Tanzi and Davoodi, 1997; Abed et al. 1998]. Other related studies have looked at issues about the nature of corrupt practices and the implications for efficiency and welfare (e.g., Banerjee 1997; Carrillo 2000; Klitgaard

1988, 1990; Rose-Ackerman 1975, 1978, 1999; Shleifer and Vishny 1993); while the work of Alesina and Drazen (1991), Alesina and Rodrik (1994), Perotti (1993) and Persson and Tabellini (1994) - stresses the importance of political considerations in influencing redistributive policy, indicating how inequality may affect growth by creating pressures to either implement or postpone different types of public programme.

Furthermore, in a study of 110 countries involving SSA and the MENA regions, and covering the period 1984 to 2006, N. Bissessar (2009) looked at how corruption is said to be characterised by persistence. Employing the Markov Transition Chain Matrices in the empirical analysis showed that these aforementioned regions are characterised by persistent corruption over the period under consideration.

Other previous works related to this topic from the African continent are drawn from: Anoruo and Braha (2005) in a sample of 18 African countries empirically investigates the effect of corruption on economic growth by employing the Phillips-Hansen fully modified OLS procedure and their result indicates that corruption directly retards economic growth by lowering productivity, and indirectly by restricting investment.

Ballamoune-Lutz and Ndikumana (2009) in a paper on corruption and growth in a sample of mainly African countries, investigates the impact of corruption on public and private investment. Focusing mainly on investment as a transmission channel through which corruption undermines economic growth, their result shows that corruption has a negative and significant effect on domestic investment. This positive effect on public investment was said to support the view that corrupt bureaucrats seek to increase capital expenditure so as to maximize private gains or rent-seeking. On one hand, the negative impact on private investment increases the cost of doing business and at the same time increasing the degree of uncertainty over expected return on capital.

Gyimah-Brempong (2002) uses a dynamic panel estimator in a panel study of African countries to examine how income distribution and economic growth is affected by corruption. The result indicates that there is a direct and indirect effect of corruption on economic growth through the reduction of investment in physical capital. A unit increase in corruption was found to reduce the growth rates of GDP and per capita income by between 0.75 and 0.9 percentage points per year respectively. His results also showed that increment in corruption is positively correlated with income inequality and thereby concluded that the twin effects of increased inequality and decreased income growth clearly suggest that corruption hurts the poor more than the rich within the continent. Table 3.4 on the next page summarises more extensive literature under the following headings: authors, topic, the methodology employed, data, control variables and results.

Another interesting reason for focusing this research on SSA countries is because previous studies like the three papers on corruption by ((Anoruo and Braha (2005), Ballamoune-Lutz and Ndikumana (2009), and Gyimah-Brempong (2002)) all looked at Africa as a whole; however, this study will focus exclusively on SSA as we believe it is important and a special case because its economies to a degree are quite unique and distinct from that of North Africa. For example, the economies of the countries within North Africa tend more to fuse or align themselves to the economies within the Middle East. The World Bank and other international organisations recognised this difference and hence why economies within North Africa and the Middle East are classified as (MENA) and this is different from SSA.

The studies discussed thus far have tended to dwell on the linear relationship between corruption and growth with the expected correlation to be unambiguously positive or negative for corruption. However, it is worthy to point out that several studies also considered the non-linearity of the relationship between corruption and growth through the prisms of political stability, institutional quality and political regime. A good example in this respect is Cerqueti *et al* (2012) using a game-theoretical setup that shows a non-linear relationship between corruption and growth that could arise depending on the degree of ethnic fragmentation in a country. Relatedly. Other empirical studies like Swaleheen (2011), Saha and Gounder (2013), and Saha *et al* (2017) have equally found a non-linear relationship between corruption and growth. These studies typically find that a quadratic function fits the data well.

In conclusion, the literature review on corruption and economic growth presented in the preceding paragraphs and in Table 4.4 overleaf are far from conclusive as the consensus from the literature can be grouped into four strands:(a) positive impact on economic growth, (b) negative impact on economic growth, (c) no impact on economic growth and (d) *U shape* relationship between corruption and economic growth. Furthermore, one paramount feature of the corruption-economic growth literature hinges on finding the right channels through which corruption can have an effect on economic growth. Figures 4.9 to 4.12 shows the relationship between initial GDP per capita and GDP per capita for the period of 1984 to 2013 from selected countries in our sample.

Table 4. 1: Summary of the Previous Studies on Corruption and Growth: mixed findings

Authors	Subjects	Methodology	Measure of Corruption	Data/Mechanisms	Control Variables	Results
Acemoglu and Verdier (1998	Corruption and growth	Modelling		Government failure, misallocation of talent.		Negative impact of corruption on growth
Aidt (2008)	Corruption, institutions and economic development	Threshold Model estimating the impact of corruption on growth with corruption acting as an endogenous variable	TI Index	The impact of corruption on growth is conditional on the government regime in quality political institutions regimes. Conversely, growth reduces corruption.	Initial income, geography, education, political and legal institutional development	Non- linearity of the corruption-growth relationship
Alesina and Weder (2002)	Corruption and foreign aid	Regression	ICRG, WDR, BI, WCY & CPI	ICRG index 1982-95,WDR index 1997,BI index 1980-83,WCY index 1996,CPI 1997;political	Colonial history, political alliance, openness, income per capita, institutional development	Increased aid leads to increased corruption

				right index 1974-89 from Gastil(1990); average debt relief per capita 1989-97 from Easterly (1999); investment as a percentage of GDP, private capital flows 1975-1995 from the World Bank		
Anvig and Moene (1990	Corruption and growth	Modelling		The impact depends on the cost for bureaucrats of being corrupt		Various impacts, multiple self-fulfilling equilibria of corruption as a cause of the poverty trap
Ali and Isse (2003)	Corruption and economic growth	Regression	ICRG	ICRG index1982-1990, CPI 1995-99; economic freedom from Gwartney and Lawson(1997); ethnicity from Mauro (1997) and Easterly and Levine(1997).	Initial GDP, population growth rate and education	Higher corruption causes lower economic growth both now and in the future, no effect of corruption on investment/GDP

F. Mendez and Sepulveda (2005)	Corruption, growth and political regimes	Regression	ICRG, IMD, CPI	ICRG 1984-2000,CPI 1996, population	Population, real income per capita, education and investment	Growth-maximizing level of corruption is significantly greater than zero, with corruption only being beneficial at low levels of incidence and detrimental at high levels of incidence.
Gyimah-Brempong (2002)	Corruption, Inequality and economic growth	Regression	CPI, ICRG	CPI 1993-99 for African countries, real GDP growth, real GNP growth, Gini coefficient, income per capita, gross investment/GDP, gross national savings/GDP, imports/GDP, education, ethnolinguistic fractionalisation	The savings rate, import/GDP ratio, education and ethnolinguistic fractionalisation	Corruption decreases the growth rate of income per capita directly by reducing the productivity of existing resources, and indirectly through reduced investment.

Kaufmann (2003)	Corruption, governance, institutional quality.	Descriptive statistics, time series		Aggregate governance indicators, Executive Opinion Survey by WEF		Little improvement in governance over the years.
Mauro (1995)	Corruption and economic growth	Regression	BI	BI index 1980-83; GDP per capita at PPP 1980, average investment 1980-85, growth in GDP per capita 1980-85 from Heston et al. (1988); ethno linguistic fractionalisation index 1960 from Taylor and Hudson (1972)	Ethnolinguistic Fractionalisation, Population, Education, Government Expenditure-e	A significant negative relationship between corruption and investment, and corruption and growth.
Mauro (1997)	Corruption, economic growth, investment and expenditure	Regression	ICRG,BI	ICRG index 1982-95 and BI index 1980-83, 1970-85	Government Expenditure, Education, Investment	Significant negative relationship between investment and corruption

Ehrlich and Lui(1999)	Bureaucratic corruption and Endogenous Growth	Endogenous Growth Theory and Equilibrium Model	Business International Index	Rent seekers are likely to target the innovative sector		Corruption reduces the incentive for investment in the development of human capital.
Giavazzi & Tabellini(2007)	Economic and political liberalization	Difference in – difference Estimation	ICRG Index of Corruption		Economic and political liberalization	Economic liberalization is far more important in reducing corruption than democracy
Billger & Goel(2009)	Corruption and democracy	OLS and Quantile Regression	Corruption Perception Index(CPI)		Economic prosperity, democracy, economic freedom, government and urbanisation	Democratic institutions reduces corruption
Sung(2004)	Democracy and political corruption	Regression	Corruption Perception Index(CPI)		Inflation, unemployment democracy and purchasing power parity	Democracy gives rise to the temporary upsurge of corruption

Bardhan(1997)	Corruption and Development: A Review	Oligarchic setting with organised rent		Unorganised corruption and oligarchic setting discourages investment		Negative impact on capital accumulation and economic growth
Larson(2006)	Reform, Corruption and Growth	Oligarchic Setting		Nature of rent-seeking and organised corruption		Disorganised rent is economically inefficient
Wedeman (2004)	The Intensification of Corruption in China	Rent-Seeking		Centralised authority and dividend sharing corruption can coexist with good economic growth		Corruption is good for growth in the short run and bad for growth in the long run
Heckelman and Powell(2010)	Corruption and the Institutional environment of Growth	Regression	Transparency International Corruption Perception Index	By allowing entrepreneurs to avoid inefficient policies	Economic Freedom, Polity V and EFW Index	mixed findings: Corruption is good for growth when economic freedom is limited but the beneficial impact of corruption decreases as economic freedom increases

Anoruo and Braha(2005)	Corruption and Economic Growth: the African Experience	Regression	Transparency International Corruption Index (CPI)	Directly by lowering productivity and indirectly by restricting investment	Investment, Population growth and initial GDP per capita	Corruption retards economic growth directly by lowering productivity, and indirectly by restricting investment.

4:3 Theoretical Frameworks

Given that there is a vast literature on growth, and understanding the factors that contribute to economic growth is very important, we proceed to examine both the exogenous and endogenous growth theories to aid us in this respect. It should be noted at this point that the primary purpose of this section is not to provide an in-depth review of the theoretical literature but to examine the role of governance as a channel through which growth is affected in SSA countries. Therefore, we use both the exogenous and endogenous theories to guide our theoretical underpinnings.

The Solow (1956) model of economic growth is a workhorse model in explaining the causes of macroeconomic growth. In explaining the process of economic growth, the model proposed that growth takes place through exogenous changes in factor accumulation. The model is premised on a production function with the following : $output(Y), physical\ capital(K)$, $labour(L)$ and $knowledge(A)$ (which also reflects the degree of technological progress of a country) as the key variables which cause changes in per capita income growth. It assumes that savings rate, population growth, and $technological\ progress(A)$ are exogenous in the model, and are seen to determine the steady-state level of income per capita. $Capital(K)$ and $labour(L)$ are the two inputs of production and each are paid their marginal price. From these specifications, the functional form of labour augmenting neoclassical production function in Cobb-Douglass form at time (t) can be represented as follows:

$$Y(t) = K_t^{\alpha} A_t^{\beta} (L_t)^{1-\alpha-\beta},\ where\ 0 < \propto < 1 \ldots\ldots\ldots..(4.1)$$

Here, $Y = output\ or\ aggregate\ level\ of\ real\ income$

$K = capital\ or\ the\ level\ of\ physical\ capital$

$L = labour\ or\ the\ amount\ of\ labour\ employed$

$A = total\ multifactor\ productivity$

Moreover, empirical evidence across countries offers mixed support for the Solow model. Limitations of the model include its failure to explain how or why technological progress occurs within its framework. In addition, the model also failed to explain large differences in the residuals across countries with similar technologies.

On the other hand, the endogenous growth theory argues that in the above Solow model, there is no explicit place for government or public sector intervention. However, the role of the public sector in economic development is very important in many ways than one. More importantly, in the early stages of development, the public sector (government) often plays a key role as the engine of economic growth. These failings ultimately led to the development of the endogenous growth theory, which included technological progress and knowledge accumulation in the model (i.e., it endogenizes technical progress and knowledge accumulation). This model argued that the exogenous theory did not allow for government intervention in the form of policies. The theory also highlighted the role of private institutions that can provide incentives for people to innovate and ultimately promote long term economic growth. In a developing country's context, the government role in allocating and distributing resources is very crucial. The public sector is traditionally modelled as a productive externality for the private producers by the government and this comes at the cost of private disposable income decreased by taxes. According to (Romer, 1986), Endogenous Growth models offer a better explanation of the process of long-run economic growth. It takes the view that innovation brought about by investment in knowledge generation is the determinant of long-term economic growth.

Furthermore, it is very important to emphasize that the determinants of economic growth are heterogeneous based on the evidence from the literature. In other words, there is no empirical consensus on the determinants of growth. This reasoning is premised on the fact that the estimation techniques used in the study of cross-country growth regressions provide different answers as a result of how the regression is specified. For example, different researchers often use a proposed subset of right-hand side variables or regressors found in the literature. On the other hand, other researchers first employ a large number of regressors, and then subsequently classify those variables that appear to be significantly related to the dependent variable in a statistical sense from the many regressions run, and then keep them as determinants and causes of economic growth (Rodrik, *et al.*2002). Evidence from the economic growth literature shows that over 160 variables have been found as possible determinants of growth. In a related study by Durlauf *et al.* (2005), many variables numbering up to 150 variables were identified as possible determinants of economic growth based on the different variables used in growth equations from past literature. In a similar vein, Levine and Renelt (1992) found that more than 50 variables in the growth literature to be significantly and statistically correlated with economic growth in at least one regression. Consequently, and to an extent, the decision on what regressors to use will to a greater degree also depends on what the researcher is looking for.

From the foregoing, a number of earlier studies have heavily influenced the way the regression equation in this chapter has been specified: Examples in this respect are Barro (1991), Mauro (1985) Mendez and Sepulveda (2006), and more recently Aidt *et al.* (2008). To be more specific, the theoretical underpinning and model that the estimation in this chapter follows in terms of model specifications are based on Barro (1991). This is also well known within the growth literature as the "Barro Cross-Country Regression Framework". Part of the rationale for adopting the Barro model is based on the fact the model allows the inclusion of a wider range of policy variables including corruption. This model provides both the theoretical foundation and analytical tool for the analysis of the impact of corruption on economic growth in SSA countries.

4:4 Empirical setup

This section explains the econometric methodology used, and also describes the data on the measures of corruption and growth along with the other control variables used in the empirical analysis.

4.4.1 Data description

The dataset used in our estimations covers the period from 1984 to 2013 and is across 31 sub-Saharan African countries. we follow the standard practice and construct 6 non-overlapping 5–year period averages (1984-1988,1989-1993,1994-1998,1999-2003,2004-2008 and 2009-2013), and this is in order to minimize business cycles effects. This ultimately implies a maximum sample size of 930 observations.

Dependent Variable – Economic Growth Indicator: The measure of growth used is growth in per capita GDP (current US$), typically expressed as an annual percentage change. GDP growth is used in Mendez and Sepulveda (2001), Li, Xu and Zou (2000), Ali and Isse (2003), Svendson (2003) and Mauro (1995) and Ali (2010). In most cases, GDP per capita is used to factor in the growth in population (Mauro, 1995) and (Tanzi and

Davoodi, 1997). However, this study will include population growth as an independent variable as it allows us to identify and isolate the individual effect of population growth on economic growth. GDP data in the literature is mostly sourced from the World Bank, IMF or Penn World table et al (various years). The relevant data are extracted from the World Bank Development Indicators (WDI 2014).

Independent Variable –Corruption: The main data on corruption were taken from the Researcher's Dataset constructed by Political Risk Services (ICRG, 2014). The degree of corruption is measured by an index constructed by the PRS group, published as part of their International Country Risk Guide. The ICRG corruption index varies from 0 to 6, with higher values indicating higher corruption. The definition provided by the PRS (2014, p3) indicates that this corruption index intends to measure corruption in the political system and is concerned with actual or potential corruption in the form of excessive patronage, nepotism, job reservation, ''favour for favour'', secret party funding, and suspiciously close ties between politics and business: the reasoning for this particular choice is threefold. First, this index provides a measure of corruption over a substantial period of time. Due to data limitations, some of the earlier studies on corruption were forced to use measures of corruption that covered only a fraction of the time period under consideration. In this study, the time period and choice of countries have been limited only for the period and countries for which data on corruption is available. Second, the ICRG index appears to measure multiple dimensions of corruption which are important given the difficulty of defining corruption. Third, although based on perceptions, in the context of corruption such measures are appropriate. Others to have used this data as a proxy for corruption including but not limited to Knack and Keefer (1995), Tanzi and Davoodi (1997); Wei (2000), and Mendez and Sepulveda (2006).

Polity2: This is the institutional quality and is measured by the revised combined polity score (polity2) of the Polity IV database (Marshal and Jaggers, 2013). The polity2 variable gives a combined score on both democracy and autocracy, with a range of between -10 and +10, with +10 being the highest democracy score and -10 the maximum autocracy score. In this calculation, each country is assigned both a democracy and autocracy score. Established democracies usually get a democracy score of 10. Many developing countries, even after the third wave of democratisation following the cold war, are imperfect democracies, combining democratic principles of multi-party elections (often marked by violence and malpractice) with autocratic powers vested in the elected executive. In these countries, both the democratic and autocratic scores are strictly non-zero, with the combined number often ranging from -6 to +6. A higher non-negative score indicates a greater degree of democracy. The score for our sample indicates that the mean polity score increased from 1995 to 2013 period, but it is still far from a perfect or desirable democracy score of 8 or above.

Initial GDP per capita: This is also known as the initial income and the variable is used to capture the convergence effect in economic growth theory highlighted by Solow (1956). It is widely used in the literature on economic growth empirics and it can also be sometimes referred to as the beta convergence of the neoclassical growth approach. The initial per-capita GDP and can be the level of GDP from any base year chosen by the researcher. The specified base year should be a stable year with respect to economic activities and reliable data should be available for the selected year (Agarwal, 2006). As discussed in Levine and Renelt (1992), the theoretical argument for including this measure in a growth regression is that, following the theory of convergence, countries with a lower level of initial GDP should experience faster growth compared to countries that have already reached high levels of growth. As discussed in Solow (1956), the idea of convergence comes from an exogenous growth model based on neo-classical assumptions. The theory follows that, in countries with similar institutions and factors like savings rates and population growth, poor countries should experience higher levels of per-capita GDP growth. This higher growth is attributable to both lower diminishing returns to capital in capital-poor developing countries and the replication of technology already available in developed countries. However, as found in Barro's seminal article, "Economic Growth in a Cross-Section of Countries" (1991), Levine and Renelt (1992) also found evidence supporting only conditional convergence—indicating that poor countries grow faster than rich countries, only if a human capital measurement is controlled for (in this study, secondary school enrolment) in the explanation of per-capita GDP growth. An earlier example also includes, Baumol (1986) using data from Maddison (1982) for the period 1870-1973, regressed the growth of GDP per capita over a particular period of time and in relation to its initial levels and found that the regression coefficient beta had a negative sign. This shows that countries with lower initial GDP per capita tend to grow faster than countries with higher initial GDP per capita. This is also supported by Demchuk (2003), this variable is normally used to help capture the initial state of the economy and control for some heterogeneity across countries. This can be partly explained by the catch-up effect in growth empirics under the idea that developing countries have the opportunity to catch up with advanced economies by simply adopting technologies at a lower cost and a higher return rate than advanced economies.

Government Size: This control variable is measured as the ratio of government consumption to GDP. It includes all the government's current expenditures for purchases of goods and services including compensation for employees. According to neoclassical economic theory, this is expected to have an ambiguous effect on growth. The ratio of government consumption to GDP is negatively related to growth. This is because big governments are bad for growth as it encourages less spending in productive assets (Blanchard 2009). It is a generally held view amongst most macroeconomists that fiscal policy has a positive effect on growth in the short run because a higher level of government consumption should translate into the provision of more social capital that should encourage production and growth and likely to produce a budget deficit in the long run.

Openness: This is seen as the total trade measured as a percentage of GDP. This is often used as a measure of the openness of an economy and it is expected to have a positive effect on the growth rate since increased trade can be seen as an indication of a well-functioning economy. This view is supported by Weil (2009) who argued persuasively that countries that are more open to trade tend to grow more. However, it should be noted that the latter notion is not an argument for an effect on growth but merely an indication that could be the case. This variable is taken from the WDI (2014).

Investment: This is also known as the gross fixed capital formation and according to the World Bank (2014), it consists of outlays on additions to the fixed assets of the economy which are made up of land improvements, plants, machinery, equipment and purchases. One would expect investment to have a positive effect on economic growth. It is generally agreed in neoclassical economic growth literature that increased investment in a country's physical capital and human capital does increase the level of GDP and increase the growth rate. Therefore, this variable is expected to have a positive impact on economic growth

Population: This is closely related to economic growth and it is included in the analysis in the spirit of neoclassical growth theory (Solow and Swan, 1956). Population growth is measured as the annual percentage change in population. This is another standard control variable used by nearly every study either as an independent variable or it is subsumed into a per capita GDP measure of economic growth. As the population increases, one would expect an increase in consumption and the size of the labour force, both of which would increase demand and output in an economy.

Life Expectancy: Human capital is recognised in the endogenous growth theory as one of the strong determinants of economic growth. See Mankiw et al. (1992), Barro and Sala-i-Martin (2004). Both authors and other researchers have long emphasised the importance of human capital to growth in both developed and developing countries. We have used Life Expectancy as a proxy for human capital. Life expectancy at birth in this context is defined as the number of years a newborn infant would live if the prevailing pattern of mortality at the time of its birth were to stay the same throughout its life.

Inflation: This is one of the control variables added to help explain the dependent variable, economic growth. It is proxied by the consumer price index and according to the World Bank, it reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals such as yearly. Inflation is generally an important indicator of macroeconomic stability. We expect an indirect relation between inflation and economic growth. In studies by Tobin (1965), Stockman (1981), and Jones and Manuelli (1995), the inflation rate was used as an indicator of macroeconomic stability. A higher rate of inflation is generally detrimental to economic growth because it discourages investment and investment is a necessary condition for sustainable economic growth.

4.4.2 Estimation Methods

From the literature, Ordinary Least Square (OLS) is normally applied as a standard estimation tool. However, because we are working with a panel data, our first model is carried out with pooled OLS estimation and subsequently, further estimations will be substantiated by other two advanced models like The Two-Stage Least Square (2SLS, IV) technique so as to help address the problem of endogeneity usually associated with pooled OLS. We also employed the Generalized Methods of Moment (GMM) as a robustness check in the study.

As highlighted above, a potential endogeneity challenge arises because economic growth may also affect the level of corruption and the direction of this effect can be quite unclear. Corruption can become more profitable: on one hand through higher economic growth when it triggers more availability of rents. On the other hand, it also increases the amount of resources that can be used to control corruption. In both cases, corruption will be correlated with the error term in the pooled OLS and thereby biasing the estimates. To overcome this major problem of endogeneity, several authors in the past have carried out a two-stage least (2SLS) regression by including an instrumental variable. This is a perfectly valid approach in theory. However, finding a valid instrument in practice can be quite a herculean task. As a way forward, we turn to the literature to find the right instrument and implement IV on our relatively large sample of data. This will make the results obtained more consistent and reliable.

As an instrument for corruption, the variable of the ethnolinguistic fraction is used by La Porta et al (1999). We follow, Mauro (1997), Ali and Isse (2003) who all have shown empirically in different large cross-country studies that the (ELF) variable is highly correlated with corruption and therefore it is a valid instrument.

4.4.3 Estimation Strategies

The primary focus of this paper is to investigate empirically how corruption, on the one hand, impact economic growth, and on the other hand, we ask if there are differences in how corruption impacts economic growth across different income level grouping within an SSA context. While so many papers have looked at the effect of corruption on economic growth around the world, quite a few have looked into how corruption behave across the different income levels groupings by following the World Bank classification of income levels within sub-Saharan Africa. We do this because all the economies of countries within sub-Saharan Africa are not exactly homogenous. Clearly, there are quite some similarities across the different economies within the region, however, we explore only the heterogeneity based on income levels. To the best of our knowledge, this paper is the first attempt at addressing this topic in the context of SSA countries. More so, we use a more up to date data set and we employ pooled Ordinary Least Square (OLS), Fixed Effect (FE), Random Effect (RE) and General Method of Moments (GMM) estimators, which is something that is lacking in much of the previous research related to this topic. The advantage of GMM is that it alleviates the endogeneity problems that other studies of this nature suffer from. In particular, the possibility that fiscal and corruption variables may be influenced by growth. Why we also think that panel data is the best methodology for this research is because of the heterogeneous nature of the countries within SSA. According to Islam (1995), the disadvantage of cross-sectional analysis is the assumption of treating all countries in a study as if they have or face the same production function and thereby ignoring countries specific characteristics.

In line with the specification of the Barro model, and following the studies of Anorou and Braha (2004) and Mo (2001); this chapter adopts the endogenous growth model because it allows the inclusion of more policy variables in the economic growth equation. Hence, the model was modified to enable us to include the corruption index as one of its explanatory variables. In all specifications, the relevant equations were formulated:

$$\boldsymbol{GDP = f(\,COR, IGDP, POL2, INV, OPEN, LE, GOV\,, POP, INF,\,) \ldots \ldots \ldots (4.2)}$$

Where $\boldsymbol{GDP}$ is the average of the growth rates over 1984-2013, $\boldsymbol{COR}$ is a measure of corruption, $\boldsymbol{IGDP}$ is GDP per capita in 1984(initial GDP), $\boldsymbol{GOV}$ is gross government expenditure as a percentage of GDP, $\boldsymbol{POP}$ is the population growth rate, $\boldsymbol{LE}$ is a measure of human capital, $\boldsymbol{INV}$ is the gross domestic investment as a percentage of GDP, $\boldsymbol{OPEN}$ is total trade measured as a percentage of GDP and $\boldsymbol{POL2}$ measures the institutional quality for the period(1984-2013).

To begin with, the model will be operationalised by extending the traditional cross-section model into a panel data form by specifying its regression format as thus:

$$\boldsymbol{Y_{it} = \alpha + \beta_1 CORR_{it} + \sum_{j=1}^{m} \gamma_j X_{j,it} + \delta_t + \mu_i + \varepsilon_{it} \ldots \ldots (4.3)}$$

Where:

Y_{it} *is the growth rate of real per capita GDP of country i in year t*;

$CORR_{it}$ *is a measure of corruption*

$X_{j,it}$ *is a set of explanatory variables*

δ_t *is a vector of common time varying effects*

μ_i *captures unobserved time − invariant country specific effects*; *and*

ε_{it} *is the time varying error term*

By including a measure of perceived corruption as our variable of interest, and also by controlling for other known determinants of economic growth known to the literature, we are then able to study the effects of corruption on economic growth. If as expected, $\boldsymbol{\beta_1}$ is negative it then goes to show that corruption does indeed have a negative effect on economic growth. If however, $\boldsymbol{\beta_1}$ turns out positive, it suggests that corruption has a positive effect on economic growth within the sample of countries under consideration.

The estimation technique or analysis used in this study is panel or longitudinal data from 31 sub-Saharan African countries, over the period ***1984 – 2013***. Table ***A5.2*** in the appendix lists all the countries included in the analysis and the countries are selected on the basis of data availability. Since this chapter widely uses different panel data estimation techniques, it is important to present a brief overview of their relevance and importance.

Observations in panel data involve two dimensions: Cross-sectional dimension represented by a subscript *i* and a time series dimension represented by a subscript *t*. In other words, panel data set has time series and cross-sectional dimensions. It can also have a complicated clustering structure. The applications of regression models to fit panel data set are more complex than for simple cross-section data sets. Nonetheless, their use in applied econometric work has increased in recent years. For more details on the subject see Econometric Analysis of Panel Data (Baltagi, 2012), Econometric Analysis of Cross Section and Panel Data (Wooldridge, 2010), and Econometric Analysis (Greene, 2011).

Pooled OLS

The starting point in analysing panel data is through estimating a pooled OLS model. The pooled model is similar to our standard ordinary least square but the difference here is that pooled OLS estimation is able to pool together both cross-sectional and time-series observation of the sample, this widens the database and helps to get more reliable estimates of the parameters. It is also worthy to note that pooled ordinary least square (OLS) methods can lead to biased results because it ignores unobserved cross-country heterogeneity. For example, there are good reasons to believe that unobserved individual factors such as differences in culture, institutions, legal and colonial history are difficult to observe, and they are most likely to affect corruption and growth in the sample countries. Using panel data does have so many advantages over the conventional OLS method, as it is able to identify such country-specific effects which time-series or cross-sectional methods are unlikely to detect. Again, using panel data reveals so many dynamics that are difficult to detect with cross-sectional data. Other known advantages are: Panel data usually contain less multi-collinearity and more degrees of freedom than cross-sectional data which may be viewed as a panel with T=1, or time series data which is a panel with N=1 and thereby improving the efficiency of econometric estimates. Because it contains information on both the inter-temporal dynamics, the individuality of the entities may allow one to control the impact of omitted variables. An interesting aspect of panel data is that they have large numbers of observations. For example, if there are *n* units of observations and the survey are undertaken in *T* time periods, there are potentially *nT* observations consisting of time series of length *T* on n parallel units.

GMM

To consider the consistency of our earlier results, we conduct two additional robustness checks by implementing a different methodology known as the Generalised Method of Moments (GMM) and secondly by changing one of the controls used in both the pooled OLS and (IV 2SLS) estimations. Instead of using log initial GDP per capita to capture the Solow convergence hypothesis, we use lagged value and this too is a common practice in economic growth literature.

To estimate the effect of corruption on economic growth, we use the following model:

$$\boldsymbol{Y_{it} = \alpha + \beta_0 y_{i,t-1} + \sum_{i=1}^{k} \beta_1 X_{k,it} + \gamma Corr_{it} + \varepsilon_{it}} \dots (\mathbf{4.4})$$

$$\boldsymbol{\varepsilon_{i,t} = \vartheta_{i,t} + \mu_{i,t}} \dots .. (\mathbf{4.5})$$

Where Y_{it} is our proxy for economic growth (GDP per capita growth); the subscripts *i* and *t* represent country and time periods respectively. X_{it} is a set of control variables common in the growth literature and this includes government expenditures as a percentage of GDP, trade openness, investment as a share of per capita GDP. Furthermore, X_{it} also, comprises inflation, population growth rate, polity2 and life expectancy, which is our proxy for human capital. Our variable of interest, corruption, is represented by $Corr_{it}$. The error term is contained in ε_{it} and the disturbance term in equation (4.3) consists of two components ;($\vartheta_{i,t}$) is a function of a country time-invariant fixed effect that may not have a mean of zero and ($\mu_{i,t}$) is the idiosyncratic time-varying shock that has zero mean. Equation (4.3)can be estimated through the ordinary least squares (OLS) estimator. However, it is important to note that this method of estimation may suffer from endogeneity problems for two principal reasons: the first one is that the lagged value of GDP per capita growth is a part of the dependent variable, and the second problem relates to reverse causation or potential endogeneity from economic growth to the control variables. This is because of feedback effects occasioned by treating all the control variables as potentially endogenous. In addition, there is also the problem related to the presence of a country-specific time-invariant effect a simple OLS will not be able to account for in the regression process. One way of solving these problems is through the use of Instrumental Variables (IV) estimator, but having used this method earlier, we turn to another way of overcoming these problems by applying a dynamic panel system GMM estimator.

The System GMM estimator was first developed by Arellano and Bover (1995) and subsequently modified by Blundell and Bond (1998). We use it to estimate equation(4.3) as it is very good at handling problems related to the endogeneity of the regressors by generating instruments from the lagged values of the controls. Furthermore, some of the other advantages of system GMM over other estimators are: By using internal instruments, the system GMM estimator accounts for possible endogeneity by treating the model as a set of equations in first difference and in levels.

For example, the right-hand side variables in our case like the lagged value of GDP per capita growth, trade openness; investment and corruption in the equation (4.2) are considered to be endogenous and may have an association with the error component that tends to vary over time and across countries. The system GMM can help avoid dynamic bias by instrumenting lagged values of the endogenous explanatory variables. Another known advantage of the system GMM according to (Baum et al., 2003) is that in the presence of heteroskedasticity in error variance, the estimator provides more efficient estimates over the least square method. This is more so when the form of heteroskedasticity is unknown.

Given the above advantages of the system GMM estimator, we apply this dynamic panel method to a set of 31 sub-Saharan African countries over the 1984-2013 period to conduct robustness checks on our previous results.

The system GMM estimator, under an additional set of assumptions, can overcome these problems and increase efficiency. To be more specific, if the assumption that the regressors first differences are not correlated with the country effects holds, lagged values of the first differences can be used as instruments in the equation in levels. The estimation will then combine the set of moment conditions available for the first-differenced equation with the additional moment conditions available for the level equation. To avoid dynamic panel bias, we instrument for all variables which are not strictly exogenous. These include all the right-hand side variables in all the robustness regression specifications. In this case, Hayakawa (2007) shows that the System-GMM estimator is less biased than the Difference-GMM, even though the latter uses more instruments.

In carrying out the post-estimation diagnostics, we apply two specification tests to help confirm the consistency of the GMM results. The two specifications tests will also help us to check the validity of the instruments and the assumption of no serial correlation in the error term (ε_{it}) . The presence of a serial correlation can cause a bias to both the standard errors and the estimated coefficients. One of the tests is the Arellano and Bond (1991) test for the presence of serial correlation. This test makes the assumption that in the first-differenced error term ($\Delta\varepsilon_{it}$), there is a first-order serial correlation but not a second-order serial correlation. We can safely conclude that the original error term is serially uncorrelated if and when the test fails to reject the null hypothesis of no second-order serial correlation. Another test we carry inherent in this method is the Hansen (1982) *J*-test for over-identification of restrictions and examining the exogeneity of the instruments under the null hypothesis that the instrumental variables are uncorrelated with residuals. It then follows the form $\boldsymbol{\chi 2}$ distribution with $(J - K)$degree of freedom. Here K is the number of endogenous variables and J remains the number of instruments. The instruments are then adjudged to be valid if the null hypothesis is not rejected.

The results obtained in the GMM modelling framework when compared to the pooled OLS and Instrumental variables estimators are somewhat similar:

4.5 Empirical results

Table 4.3 shows the correlation matrix for the list of variables employed in the full sample. The table also reveals that there appears to be no presence of multicollinearity. In general, an absolute correlation coefficient of >0.7 among two or more predictors indicates the presence of multicollinearity.

Furthermore, Tables 4.2 and 4.3 provides the summary statistics for the main variables used in the analysis for this chapter: GDP per capita growth; initial GDP per capita; corruption; government expenditure as a proportion of GDP; life expectancy; trade and openness; investment as a percentage of GDP; population growth rate; inflation; and polity2. These variables are applicable not just in our full sample but were also used in all the summary statistics for the income level groupings.

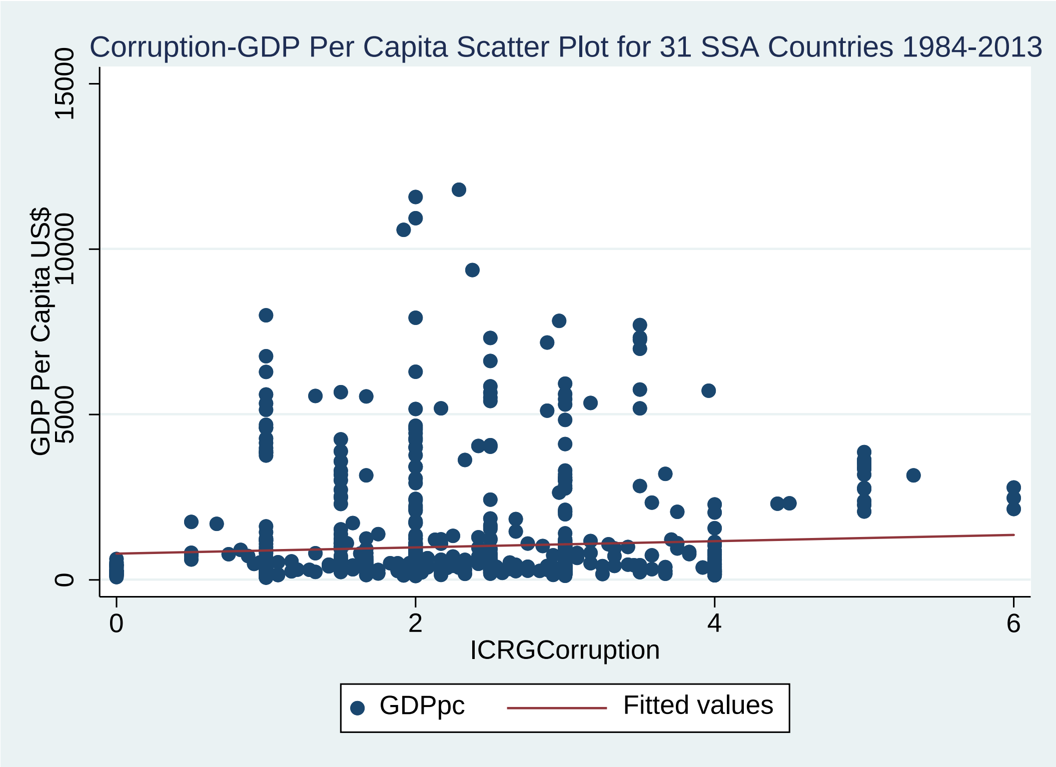


Figure 4. 1:showing corruption-GDP Per Capita Scatter Plot for 31 SSA Countries (1984-2013)

Table 4.2: Summary Statistics for SSA full sample

VARIABLES	(1) **Obs**	(2) **Mean**	(3) **SD**	(4) **Min**	(5) **Max**
GDP pc Growth	920	0.857	6.628	-50.23	91.67
Initial GDP(log)	930	6.054	0.811	5.047	8.395
Corruption(log)	882	0.822	0.425	-0.693	2.708
Govt Exp	852	14.40	6.105	2.047	54.51
Life Expectancy	899	52.11	5.875	35.79	64.24
Trade Open	885	64.83	27.72	10.94	179.1
Investment	872	18.09	7.546	-2.424	52.93
Population	930	2.684	0.913	-1.826	7.835
Inflation	920	75.39	931.6	-29.17	26762
Polity2	831	-0.744	5.576	-9	9

Correlation	*Matrix*	*for the*	*full*	*sample*	Table4.3					
	GDP pcg	***lgdp(log)***	***Cor(log)***	***Govt Exp.***	***Life Exp.***	***Tradeopen***	***Investment***	***Population***	***Inflation***	***Polity2***
GDP pcg	1									
lgdp(log)	-0.0444	1								
Cor(log)	-0.0527	0.0625	1							
Govt Exp.	-0.0673	0.338	0.258	1						
Life Exp.	0.0813	0.4007	0.0313	0.1022	1					
Tradeopen	0.0525	0.4003	0.0147	0.3279	0.2	1				
Investment	0.1166	0.1798	0.0724	0.2583	0.4038	0.3333	1			
Population	0.008	-0.1963	0.1546	0.0052	0.1939	-0.0549	-0.0021	1		
Inflation	-0.1413	-0.0171	-0.0478	0.0917	-0.1555	0.0538	-0.0156	0.0046	1	
Polity2	0.1411	0.0886	0.0246	0.1301	0.1795	0.2093	0.1443	-0.1255	-0.0214	1

Table 4. 2: Correlation Matrix for the Full Sample

Table 4. 3: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013)

GDP Growth=DV VARIABLES	**(1) POLS**	**(2) POLS**	**(3) POLS**	**(4) POLS**	**(5) POLS**	**(6) POLS**
Initial GDP pc (log)	-0.129	-0.538**	-0.547*	-0.682**	-0.725**	-0.553
	(0.243)	(0.269)	(0.285)	(0.329)	(0.367)	(0.336)
Corruption(log)	***-1.206****	***-0.535***	***-0.780***	***-0.894****	***-0.863****	***-0.920****
	(0.705)	***(0.538)***	***(0.514)***	***(0.510)***	***(0.506)***	***(0.519)***
Gov't Exp		-0.0349	-0.0419	-0.0305	-0.0289	-0.0425
		(0.0595)	(0.0575)	(0.0559)	(0.0564)	(0.0575)
Trade/Open		0.0317***	0.0242**	0.0255**	0.0257**	0.0202*
		(0.0105)	(0.0121)	(0.0122)	(0.0120)	(0.0120)
Investment			0.107**	0.0861*	0.0835*	0.0874**
			(0.0467)	(0.0464)	(0.0452)	(0.0424)
Inflation				-0.000931***	-0.000923***	-0.000952***
				(0.000255)	(0.000261)	(0.000296)
Life Expectancy				0.0402	0.0458	0.00965
				(0.0448)	(0.0498)	(0.0491)
Population					-0.110	0.134
					(0.401)	(0.409)
Polity2						0.131***
						(0.0392)
Constant	3.560**	3.498**	2.524	1.589	1.822	2.611
	(1.734)	(1.609)	(1.763)	(2.149)	(2.378)	(2.191)
Observations	180	175	174	174	174	174
R-squared	0.023	0.069	0.124	0.149	0.149	0.194

Robust standard errors in parentheses Full Sample
*** p<0.01, ** p<0.05, * p<0.1

Table 4. 4: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013)

GDP Growth=DV VARIABLES	(1) **IV 2SLS**	(2) **IV 2SLS**	(3) **IV 2SLS**	(4) **IV 2SLS**	(5) **IV 2SLS**	(6) **IV 2SLS**
Corruption(log)	***-2.013***	***-2.393***	***-3.289*****	***-4.064*****	***-3.951*****	***-4.239******
	(1.768)	***(1.569)***	***(1.620)***	***(1.716)***	***(1.545)***	***(1.524)***
Initial GDP pc(log)	-0.0586	-0.467	-0.522	-0.673*	-0.596	-0.429
	(0.256)	(0.303)	(0.339)	(0.404)	(0.463)	(0.425)
Trade/Open		0.0291***	0.0207*	0.0211*	0.0209*	0.0144
		(0.0108)	(0.0124)	(0.0125)	(0.0124)	(0.0124)
Govt Exp		-0.00357	0.0136	0.0427	0.0360	0.0275
		(0.0702)	(0.0702)	(0.0720)	(0.0689)	(0.0671)
Investment			0.103**	0.0811	0.0856*	0.0927**
			(0.0495)	(0.0496)	(0.0496)	(0.0473)
Inflation				-0.00124***	-0.00124***	-0.00128***
				(0.000269)	(0.000266)	(0.000285)
Life Expectancy				0.0406	0.0307	-0.00795
				(0.0504)	(0.0544)	(0.0531)
Population					0.191	0.446
					(0.545)	(0.569)
Polity2						0.145***
						(0.0464)
Constant	4.271	5.333**	5.252*	5.106	4.519	5.664*
	(2.685)	(2.542)	(2.805)	(3.145)	(3.200)	(3.025)
Observations	168	164	163	163	163	163
R-squared	0.008	0.013	0.016	-0.010	0.002	0.030

Robust standard errors in parentheses Full sample
*** p<0.01, ** p<0.05, * p<0.1

Table 4. 5: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013)

GDP Growth=DV VARIABLES	(1) **IV GMM2S**	(2) **IV GMM2S**	(3) **IV GMM2S**	(4) **IV GMM2S**	(5) **IV GMM2S**	(6) **IV GMM2S**
Corruption(log)	***-2.013***	***-2.393***	***-3.289*****	***-4.064*****	***-3.951*****	***-4.239******
	(1.768)	***(1.569)***	***(1.620)***	***(1.716)***	***(1.545)***	***(1.524)***
Initial GDP pc(log)	-0.0586	-0.467	-0.522	-0.673*	-0.596	-0.429
	(0.256)	(0.303)	(0.339)	(0.404)	(0.463)	(0.425)
Trade/Open		0.0291***	0.0207*	0.0211*	0.0209*	0.0144
		(0.0108)	(0.0124)	(0.0125)	(0.0124)	(0.0124)
Govt Exp		-0.00357	0.0136	0.0427	0.0360	0.0275
		(0.0702)	(0.0702)	(0.0720)	(0.0689)	(0.0671)
Investment			0.103**	0.0811	0.0856*	0.0927**
			(0.0495)	(0.0496)	(0.0496)	(0.0473)
Inflation				-0.00124***	-0.00124***	-0.00128***
				(0.000269)	(0.000266)	(0.000285)
Life Expectancy				0.0406	0.0307	-0.00795
				(0.0504)	(0.0544)	(0.0531)
Population					0.191	0.446
					(0.545)	(0.569)
Polity2						0.145***
						(0.0464)
Constant	4.271	5.333**	5.252*	5.106	4.519	5.664*
	(2.685)	(2.542)	(2.805)	(3.145)	(3.200)	(3.025)
Observations	168	164	163	163	163	163
R-squared	0.008	0.013	0.016	-0.010	0.002	0.030

Robust standard errors in parentheses Full sample
*** p<0.01, ** p<0.05, * p<0.1

Robustness Check.Table 4. 6: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013)

GDP Growth=DV VARIABLES	(1) **1S-GMM**	(2) **1S-GMM**	(3) **1S-GMM**	(4) **1S-GMM**	(5) **1S-GMM**	(6) **1S-GMM**
GDP per capita(lag)	-0.000101	-0.000174	-0.000268	-0.000370*	-0.000249	-0.000273
	(0.000184)	(0.000215)	(0.000207)	(0.000211)	(0.000233)	(0.000233)
Corruption(log)icrg	***-2.502****	***-1.394****	***-0.936***	***-1.062****	***-1.301*****	***-1.345*****
	(0.869)	***(0.743)***	***(0.667)***	***(0.571)***	***(0.571)***	***(0.571)***
Trade Open		0.0360***	0.0250**	0.0219**	0.0203**	0.0182**
		(0.0102)	(0.00986)	(0.00916)	(0.00915)	(0.00917)
Govt Exp		-0.0967**	-0.0969**	-0.0493	-0.0461	-0.0577
		(0.0481)	(0.0451)	(0.0421)	(0.0422)	(0.0423)
Investment			0.115***	0.112***	0.125***	0.119***
			(0.0406)	(0.0379)	(0.0377)	(0.0377)
Inflation				-0.000969**	-0.00105**	-0.00104**
				(0.000436)	(0.000438)	(0.000437)
Life Expectancy				0.0293	-0.0124	-0.0264
				(0.0446)	(0.0447)	(0.0449)
Population					0.364	0.508
					(0.360)	(0.363)
Polity2						0.133***
						(0.0446)
Constant	4.801***	2.306*	0.361	-1.266	-0.0123	0.763
	(1.157)	(1.205)	(1.180)	(2.401)	(2.257)	(2.269)
Observations	152	147	147	147	147	147
Number of id	31	31	31	31	31	31

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

Table 4. 7: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013) LIC

GDP Growth=DV VARIABLES	(1) **IV 2SLS**	(2) **IV 2SLS**	(3) **IV 2SLS**	(4) **IV 2SLS**	(5) **IV 2SLS**	(6) **IV 2SLS**
Corruption(log)	***-4.079*****	***-2.555****	***-2.901****	***-3.494*****	***-3.324*****	***-3.568******
	(1.695)	***(1.516)***	***(1.497)***	***(1.561)***	***(1.488)***	***(1.351)***
Initial GDP pc	1.051	0.0301	1.372	1.577	1.777*	1.977*
	(1.124)	(0.926)	(0.951)	(1.000)	(1.063)	(1.147)
Trade/Open		0.00552	-0.0128	-0.0185	-0.0166	-0.0211
		(0.0154)	(0.0171)	(0.0172)	(0.0163)	(0.0184)
Govt Exp		-0.00734	-0.0538	-0.0830	-0.0915	-0.103
		(0.0773)	(0.0709)	(0.0728)	(0.0733)	(0.0790)
Investment			0.187***	0.190***	0.194***	0.215***
			(0.0438)	(0.0485)	(0.0488)	(0.0562)
Inflation				-0.00608***	-0.00595***	-0.00616***
				(0.00128)	(0.00121)	(0.00120)
Life Expectancy				0.0218	-0.0163	-0.0326
				(0.0644)	(0.0668)	(0.0749)
Population					0.586	0.665
					(0.541)	(0.547)
Polity2						0.0350
						(0.0563)
Constant	0.941	4.206	-4.442	-5.067	-6.182	-6.261
	(5.249)	(4.643)	(5.084)	(5.214)	(5.469)	(5.764)
Observations	465	423	420	416	416	391
R-squared	-0.031	-0.041	0.009	0.011	0.024	0.011

Robust standard errors in parentheses **LIC Panel B**
*** p<0.01, ** p<0.05, * p<0.1

Table 4. 8: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013) LIC

GDP Growth=DV	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**IV GMM**	**IV GMM**	**IV GMM**	**IV GMM**	**IV GMM**	**IV GMM**
Corruption(log)	***-4.079*****	***-2.555****	***-2.901****	***-3.494*****	***-3.324*****	***-3.568******
	(1.695)	***(1.516)***	***(1.497)***	***(1.561)***	***(1.488)***	***(1.351)***
Initial GDP pc(log)	1.051	0.0301	1.372	1.577	1.777*	1.977*
	(1.124)	(0.926)	(0.951)	(1.000)	(1.063)	(1.147)
Trade/Open		0.00552	-0.0128	-0.0185	-0.0166	-0.0211
		(0.0154)	(0.0171)	(0.0172)	(0.0163)	(0.0184)
Govt Exp		-0.00734	-0.0538	-0.0830	-0.0915	-0.103
		(0.0773)	(0.0709)	(0.0728)	(0.0733)	(0.0790)
Investment			0.187***	0.190***	0.194***	0.215***
			(0.0438)	(0.0485)	(0.0488)	(0.0562)
Inflation				-0.00608***	-0.00595***	-0.00616***
				(0.00128)	(0.00121)	(0.00120)
Life Expectancy				0.0218	-0.0163	-0.0326
				(0.0644)	(0.0668)	(0.0749)
Population					0.586	0.665
					(0.541)	(0.547)
Polity2						0.0350
						(0.0563)
Constant	0.941	4.206	-4.442	-5.067	-6.182	-6.261
	(5.249)	(4.643)	(5.084)	(5.214)	(5.469)	(5.764)
Observations	465	423	420	416	416	391
R-squared	-0.031	-0.041	0.009	0.011	0.024	0.011

Robust standard errors in parentheses **LIC Panel B**
*** p<0.01, ** p<0.05, * p<0.1

Table 4. 9: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013) LMIC

GDP Growth=DV VARIABLES	(1) GMM	(2) GMM	(3) GMM	(4) GMM	(5) GMM	(6) GMM
Initial GDP pc(log)	-1.989***	-2.785***	-2.833***	-3.251***	-3.265***	-1.979**
	(0.616)	(0.687)	(0.693)	(0.717)	(0.729)	(0.892)
Corruption(log)	***-2.262****	***-2.679****	***-2.635****	***-2.273****	***-2.292****	***-2.720****
	(0.631)	***(0.722)***	***(0.728)***	***(0.724)***	***(0.748)***	***(0.787)***
Trade/Open		0.0354***	0.0302***	0.0406***	0.0409***	0.0338***
		(0.00940)	(0.0101)	(0.0107)	(0.0111)	(0.0118)
Govt Exp		-0.137**	-0.157***	-0.152***	-0.153***	-0.163***
		(0.0565)	(0.0586)	(0.0579)	(0.0588)	(0.0605)
Investment			0.0616	-0.0486	-0.0478	-0.0849
			(0.0427)	(0.0533)	(0.0539)	(0.0565)
Inflation				-0.0170*	-0.0173*	-0.0177*
				(0.00900)	(0.00931)	(0.00959)
Life Expectancy				0.163***	0.161***	0.138**
				(0.0579)	(0.0605)	(0.0635)
Population					0.0668	0.769
					(0.650)	(0.714)
Polity2						0.141**
						(0.0585)
Constant	16.13***	21.13***	20.93***	15.83***	15.84***	9.035
	(3.734)	(4.024)	(4.055)	(5.165)	(5.166)	(5.908)
Observations	239	229	229	226	226	213
Number of id	8	8	8	8	8	8

Standard errors in parentheses LMIC Dynamic 1SGMM
*** p<0.01, ** p<0.05, * p<0.1

Table 4. 10: Corruption and Economic Growth in sub-Saharan Africa (SSA)(1984-2013) UMIC

GDP Growth=DV	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	GMM	GMM	GMM	GMM	GMM	GMM
Initial GDP pc(log)	-2.183***	-4.659***	-4.591***	-5.553***	-5.598***	-6.069***
	(0.580)	(0.911)	(0.982)	(1.459)	(1.462)	(1.701)
Corruption(log)	***-0.838***	***1.591***	***1.643***	***0.608***	***0.580***	***-0.0554***
	(0.792)	***(1.004)***	***(1.042)***	***(1.297)***	***(1.300)***	***(1.558)***
Trade Open		0.0257	0.0273	0.0244	0.0345	0.0264
		(0.0194)	(0.0212)	(0.0262)	(0.0276)	(0.0292)
Govt Exp		-0.512***	-0.513***	-0.422***	-0.402***	-0.444***
		(0.0769)	(0.0771)	(0.0891)	(0.0908)	(0.0973)
Investment			-0.0111	-0.00491	-0.0415	-0.0208
			(0.0596)	(0.0618)	(0.0693)	(0.0806)
Inflation				-0.00453**	-0.00417*	-0.00423*
				(0.00221)	(0.00224)	(0.00237)
Life Expectancy				0.113	0.158	0.120
				(0.0995)	(0.107)	(0.142)
Population					-0.805	-0.138
					(0.686)	(1.138)
Polity2						0.0664
						(0.140)
Constant	19.27***	42.90***	42.44***	43.28***	42.50***	48.52***
	(4.854)	(9.172)	(9.517)	(11.13)	(11.17)	(12.30)
Observations	141	130	130	126	126	118
Number of id	5	5	5	5	5	5

Standard errors in parentheses 1SGMM UMIC
*** p<0.01, ** p<0.05, * p<0.1

Table 4.12 Summary Statistics for all Low-Income Countries (LIC)

VARIABLES	(1) Obs	(2) Mean	(3) SD	(4) Min	(5) Max
GDP pc Growth	532	0.705	7.716	-50.23	91.67
Initial GDP (log)	540	5.564	0.357	5.047	6.613
Corruption(log)	500	0.807	0.428	-0.693	2.708
Govt Exp	484	13.02	4.996	2.047	54.51
Life Expectancy	522	50.80	5.368	35.79	64.24
Trade Open	503	57.14	22.52	10.94	179.1
Investment	494	17.46	7.695	-2.424	48.65
Population	540	2.750	1.075	-1.826	7.835
Inflation	532	95.99	1194	27.04	26762
Polity2	486	-1.137	5.267	-9	9

Table 4.13 Summary Statistics for 8 Lower Middle-Income Countries (LMIC)

VARIABLES	(1) Obs	(2) Mean	(3) SD	(4) Min	(5) Max
GDP pc Growth	240	0.760	4.335	-13.06	30.34
Initial GDP(log)	240	6.265	0.389	5.741	6.990
Corruption(log)	239	1.293	0.378	-0.186	1.896
Govt Exp	230	12.96	4.723	4.833	31.81
Life Expectancy	232	53.07	5.238	40.77	63.20
Trade Open	234	65.62	29.27	11.08	156.8
Investment	230	16.96	6.562	5.458	52.93
Population	240	2.706	0.430	1.377	4.375
Inflation	240	18.82	28.32	-29.17	165.5
Polity2	216	-1.740	5.449	-9	8

Table 4.14 Summary Statistics for 5 Upper Middle-Income Countries (UMIC)

VARIABLES	(1) Obs	(2) Mean	(3) SD	(4) Min	(5) Max
GDP pc Growth	148	1.561	5.335	-27.14	18.50
Initial GDP(log)	150	7.482	0.638	6.621	8.395
Corruption(log)	143	1.448	0.472	0.506	2.302
Govt Exp	138	21.63	6.586	8.335	45.26
Life Expectancy	145	55.28	7.012	40.65	63.88
Trade Open	148	89.72	26.51	38.64	178.9
Investment	148	21.95	7.303	3.617	46.10
Population	150	2.413	0.7915	0.856	4.445
Inflation	148	93.10	509.7	20.80	5399
Polity2	129	2.403	5.862	-9	9

Tables 4.12 to 4.14 shows the summary statistics for the key variables in the different income groups. The tables show the variations in the mean, standard deviation and minimum and maximum ranges in the data.

Estimation Results Continued:

As our starting point, we first estimate our model using the average data over the period of 1984-2013 by using pooled ordinary least squares (POLS) in a sample of 31 sub-Saharan African countries. We perform this estimation on country averages so as to aid comparability with other previous studies in the literature. These estimates can also be interpreted as representing aggregate correlations over the long term. We are motivated, particularly by the fact that most existing empirical studies normally tends to group sub-Saharan Africa and sometimes even the entire continent of Africa into a dummy variable in a worldwide cross-country regression. However, we deviate from these methods of analysis by focusing purely on sub-Saharan Africa by using panel data.

Table 4.4 reports the main results obtained using pooled ordinary least square (POLS) estimator with robust standard errors. In all the regression specifications, the dependent variable is the GDP per capita growth. On the whole, all the control variables have the expected signs and are significant no matter the specification employed. Starting with the initial GDP per capita, it has a negative coefficient and is statistically significant at the conventional levels and this shows that the (Solow, 1956) conditional convergence hypothesis is verified. This also means that countries starting out with lower initial GDP per capita have the tendency to grow faster relative to rich countries, and this equally indicates that the initial level of economic development of an economy is a key and fundamental determinant of economic growth. So, countries within our sample have confirmed the Solow (1956) convergence hypothesis. This is also taken as evidence from the literature, but conditional on other covariates that poorer countries are catching up on richer countries. Concerning the variable on government expenditure, the coefficient is negative in all the specifications but it is not statistically significant. This connotes that government expenditure has a negative effect on economic growth and thereby showing some degree of government burden that inhibits economic growth. This result is somewhat in line with the views held by some economists who argue that public spending can hurt growth by taking resources away from the more efficient private sector to the less efficient public sector (Barro, 1997). The coefficient associated with the trade openness variable is positive and statistically significant at the conventional level across all specifications. This implies that trade openness is good for economic growth and this is also in line with neoclassical and endogenous growth theories. In the case of neoclassical theory, the positive effect of trade on economic growth is seen through the prism of comparative advantages like technology differences and production factors endowments. In endogenous growth theory, the positive effects of trade on growth can be seen through the example of technological diffusion between countries. The coefficient on investment as seen from the regression result is positive and statistically significant at both 5% and 10% conventional levels across all specifications. This positive coefficient of investment is as expected and it conforms with economic growth theory and earlier empirical studies on the effect of investment on economic growth. The result on investment also indicates that for the countries in our sample, investment is good for economic growth. By this, we mean that for the period under consideration, the level of investment was crucial in promoting economic growth in SSA. As expected, the coefficient on inflation is negative and strongly statistically significant at the

1% conventional level across all specifications. Inflation is generally seen as a good indicator of macro-economic stability, and by implication what this result connotes is that inflation was not managed properly to help in promoting economic growth within the region. The coefficient associated with the population growth variable is negative but it is not statistically significant at the conventional level. This result translates into the adverse effect of overpopulation on economic growth and conforms with the finding in the Solow theory of economic growth.

Turning to our main variable of interest which is **corruption**, we observe that in all the specifications, the corruption coefficient is negative but is not statistically significant in specifications (2 and 3) and statistically significant in specifications (1,4,5 and 6) at the 10 percent level. Overall, the corruption results show the degree of its negative direct impact on economic growth in sub-Saharan Africa over the intervening period of 1984 to 2013. This result supports the school of thought that corruption, overall, is detrimental to economic growth and the result is similar to the findings of other empirical cross-sectional studies of (Mauro 1995; Tanzi 1997; Gyimah-Brempong 2002; and Dreher and Herzfel 2005, among others).

Having found strong support for our thesis from the regression evidence at this preliminary stage, which is that in aggregation, the effect of corruption upon economic growth is negative from our sample of 31 selected countries in SSA over the 30-year period. However, we are cautious of the limitation of the pooled OLS estimator and hesitate to completely rely on these results to form the basis of our robust analysis. This is because regression results obtained through pooled OLS method can be problematic and misleading particularly if the unobserved country-specific growth effect and the right-hand side variables are correlated in some way. However, it is a very useful way to provide comparative values for other more appropriate models and also summarize the strong correlation in the data.

IV

Furthermore, having identified issues of potential endogeneity problems with the pooled OLS, we are inclined to proceed with our attempt to find a convincing instrument to enable us to perform Instrumental Variables (IV) by using two-stage least squares(2SLS) and (GMM) estimations. It should be noted that a good instrumental variable should have the quality of being highly correlated with the endogenous explanatory variables but not have a direct influence on the dependent variable. Additionally, as suggested by Baker, Bound and Jaeger (1995), we also check for the two key indicators of a good instrument: which are the partial W and F statistics of the instrument. As a rule of thumb, the thresholds of between 10 and 25 have been suggested by Staiger and Stock (1997). It has also been shown by Baker, Bound and Jaeger (1995) that even a small correlation between the potential instruments and the error term can seriously bias the (IV) estimates if a set of potential instruments is weakly correlated with the endogenous variables.

To deal with endogeneity, the equation is re-estimated by using two-stage least square (2SLS) and SGMM. An array of instruments for corruption has been utilized in the existing literature, each having its merit and drawback. One instrument that has been considered to affect economic growth but is very unlikely to affect corruption is a country's level of ethnolinguistic fractionalisation. The (EFL) index is frequently used in the economic growth literature and is defined as the probability that two randomly selected individuals in a given country will belong to different ethnolinguistic groups (Easterly and Levin 1997). We instrument for corruption using the said index of ethnolinguistic fractionalization as an instrument. This chapter chooses to follow the strategy employed by Mauro (1995), Ali and Isse (2003) and Gyimah-Brempong and Munoz de Camacho (2006) who all instrumented ethnolinguistic fractionalisation index (EFL) as an instrument for the measure of corruption.

Our IV results are presented in Table 4.5 and Looking at the results, the key indicators for instrumental validity are quite favourable to our choice of instrument for corruption. A standard test for overidentification restrictions fails to reject the null hypothesis that the instrument and the error term are not correlated. Furthermore, the results of our R2 ranging from 0.08-0.03 are low but it is important to point out that most of our independent variables are statistically significant (Jim Frost,2017). Secondly, the F-statistics have values above the 10-25 range. The results of the growth equation using 2SLS and GMM estimators across all the models differ with respect to the explanatory variables considered. The effects of the control variables are consistent across the models and also similar to the results of our POLS. Starting with the initial GDP, its coefficient is negative across all specifications (1-6) and thereby confirming the convergent hypothesis in the Solow growth model and this result is also similar to the POLS. As per the openness to trade variable, the coefficient is negative and statistically significant across all specifications. The variables on investment and inflation, all have the right signs and are statistically significant at the conventional level. When it comes to our main variable of interest, **corruption**, its coefficient is both negative and statistically significant at the conventional levels. The explanatory power of the effect of corruption on economic growth in the IV model (Table 4.6) is stronger than in POLS and this further confirms the appropriateness of the model. The corruption coefficient ranges between -2.013 and -4.239 and is significant at both 1% and 5% levels respectively. In synthesis, results from our IV model validate our POLS and strongly supports the view in the economic literature that corruption can be sand in the wheels of economic growth.

4.6 Robustness Checks

To check the sensitivity and robustness of our earlier results, we embark on a number of changes by employing other estimation techniques and also changing a key determinant. Table 4.7 presents the robustness check results obtained through estimating specifications (1-6) by using the system GMM estimator earlier explained. In this model, we drop the initial GDP per capita variable due to its collinearity with the other variables used by the one-step system GMM estimator and we include a lagged value of the dependent variable instead. Again, like in the previous estimates, the parameters of the variables are quite similar except with a minor variation in the government expenditure variable. The coefficients for the government expenditure variable is negative all through in GMM and significant at the conventional levels in specifications (2-3), however, it is only negative and not significant in the specification (2) in the IV and also not significant in specifications (3-6). The parameter values of the corruption variable are similar to those earlier obtained in both the POLS and IV estimators: The parameters range from -2.502 to -1.345. The corruption coefficient which entered the model in specifications (1-6) is negative all through and statistically significant at the convention levels. This result, again, confirms the negative effect of corruption on economic growth in SSA and is, therefore, a piece of further evidence supporting our original hypothesis that corruption does not grease the wheel of economic growth, if anything, it is highly detrimental to economic growth in the sample of countries in SSA which this research is based on.

4.7 Evidence from Income Level Grouping

As a result of having established that corruption, from the full sample of countries studied thus far in this chapter, is detrimental to economic growth, we argue that examining and investigating whether corruption varies across income groups will further deepen our understanding and contribute to the literature on corruption and economic growth in a unique way. Besides, it is highly plausible that our results are driven by the inclusion of some countries. For example, countries within SSA do not all belong to one income level grouping. Some are Low-Income Countries (LIC), Low Middle-Income Countries (LMIC) and Upper-Middle-Income Countries (UMIC). Therefore, within the same period under consideration, some of the countries have proven to be less corrupt and also experienced better economic development than others. As far as we are aware, this is the first study that is looking at corruption based on income level within sub-Saharan Africa. The motivation for looking at the study of corruption from this perspective is borne out of the fact that even though the economies of countries within SSA share common characteristics and features, there are, however, somewhat different in terms of income levels. We explore these differences in income level for countries within our sample to ascertain whether or not corruption's effect on economic growth varies along the income level line? In other words, is our result driven by the sample of countries studied without due consideration to the obvious differences in income levels across the region? We, therefore, follow the World Bank classification of income group by considering the heterogeneity of the SSA group and subdivide them accordingly. "For the current 2015 fiscal year, low-income economies are defined as those with a GNI per capita of $1,045 or less in 2013; middle-income economies are those with GNI per capita of more than $1,045 but less than $12,746; high-income economies are those with a GNI per capita of $12,746 or more. Lower middle incomes are separated at a GNI of per capita of $4,125." We concentrate only on low-income countries, low middle-income countries and upper-middle-income countries as all countries in our sample falls under these three groupings. We, therefore, re-estimate the growth equation for different samples based on income level.

Figure 4. 2:Showing Corruption-GDP Scatter Plot for 18 LIC Countries (1984-2013)

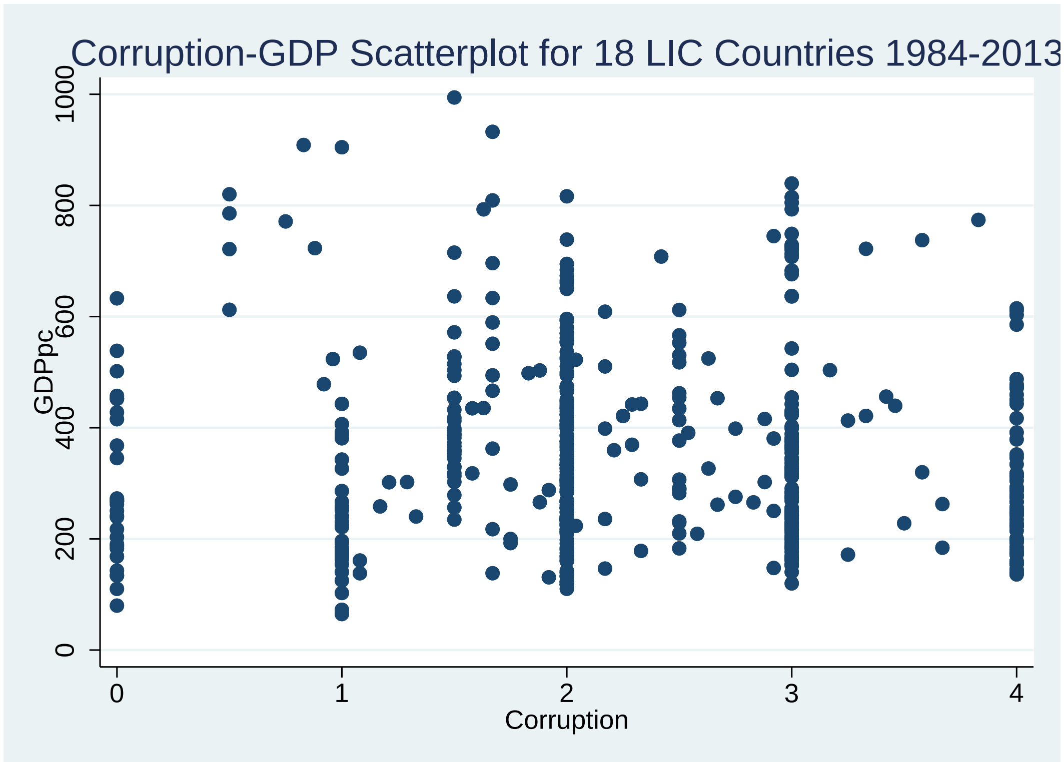


Figure 4. 3 : Showing Corruption-GDP Scatter Plot for 13 LMIC Countries (1984-2013)

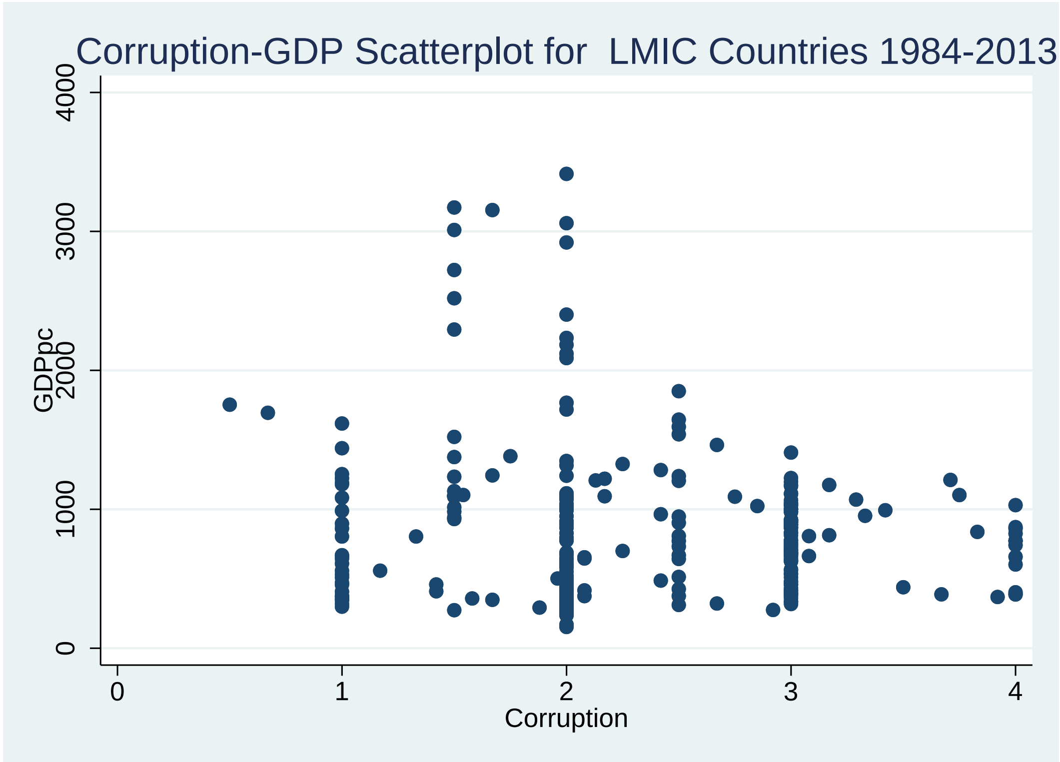
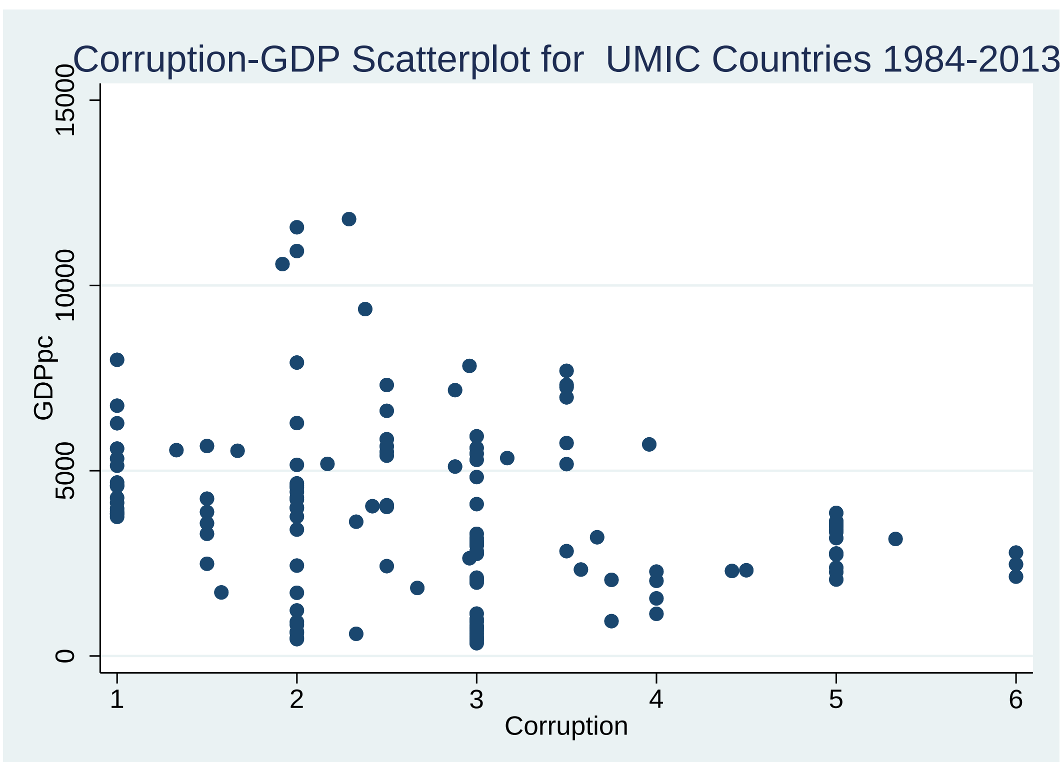


Figure 4. 4:Showing Corruption-GDP Scatter Plot for UMIC Countries (1984-2013



Tables 4.8,4.9,4.10 and 4.11 presents the regression results for comparative analysis between the aforementioned income groups of 18 low-income countries and 13 countries comprising of 8 lower and 5 upper-middle-income countries respectively. As can be inferred from the results by focusing mainly on our variable of interest, the coefficient for the corruption variable in both the low (LIC) income countries and lower-middle-income countries (LMIC) is negative and statistically significant at the conventional levels. For the low-income countries, For the low-income countries, the parameter values for corruption ranges between -4.079 and -3.568, whereas for the lower-middle-income countries, the parameter values for corruption ranges between -2.262 and -2.720. Finally, in respect to the upper-middle-income countries (UMIC), our main variable of interest which is corruption is positive but statistically significant in specifications 2 to 4 and negative in specifications 1 and 6 but not statistically significant. Overall, the corruption effect on economic growth in the full specification (6) is negative but not statistically significant at the conventional level. This connotes that even though the corruption coefficient is negative, its effect on economic growth in the sample of the 5 countries that make up this group is very negligible.

A cursory glance at the scatter plots for all income groups: low-income countries, lower-middle-income countries and upper-middle-income countries in Figures 4.2,4.3 and 4.4 show that the relationship between GDP per capita and our measure of perceived corruption proxied by the ICRG corruption index is negative across all income levels. The negative evidence gleaned from the scatter plots, lays further evidence on the negative effects of corruption on economic growth in sub-Saharan Africa, it may well also be an indication that low to lower-middle countries are unable to generate enough income to control corruption to a level where it is no longer detrimental to economic growth.

4.8 How this study compares to other related research

Having obtained very robust and consistent results, on the negative and detrimental effects of corruption on economic growth, across different models of regressions and different samples of countries, we, therefore, proceed to see how our results compare with other previous findings from the literature on the same and related topic. Starting with one of the earliest empirical works on corruption and economic growth; Mauro (1995,1997) implemented both OLS and 2SLS by using other known determinants of economic growth and found that corruption had a negative and statistically significant effect on economic growth. Even when ethnolinguistic fractionalisation was used as an instrument for corruption in a 2SLS model, similar results were also found, albeit, with a higher corruption coefficient. Our findings from this research in chapter 4 are in line with the above results, except that our focus was on the SSA region.

In a related cross-country comparison study of the determinants of economic of corruption, Ali and Isse (2003) employed some control variables like initial GDP, education (proxied by secondary school enrolment), and the population growth rate in a regression model. When the corruption variable entered the growth model, the authors found that corruption, both in the 1980s and 1990s, is negative and strongly correlated to economic growth. These findings imply that corruption was very persistent over the decades and became more endemic the longer the persistence. The authors further took the view that there were inherent endogeneity concerns and problems from their results. They then addressed the endogeneity problem in the model by implementing the instrumental variable (IV-2SLS).

Following the work of Mauro (1997), the authors instrumented for corruption by using ethnolinguistic fractionalisation (ELF) as an instrument. They subsequently found that ethnolinguistic fractionalization to be negatively and significantly correlated with corruption but not correlated with economic growth. The study concludes that higher corruption is detrimental to economic growth. Apart from the major difference being the time period covered in the study, the broad finding of this paper, like in Mauro (1995), is in agreement with our findings concerning the negative effect of corruption on economic growth.

In another empirical study on corruption and economic growth, Anoruo and Braha (2005) investigate the effect of corruption in a sample of 18 countries from Africa. It is important to clarify at this point that Africa in this context refers to the entire continent as opposed to our study that focuses on sub-Saharan Africa, covering more years and more countries. Using the Philips-Hansen fully modified procedures in a time-series setting to ascertain the long-run dynamic between corruption and economic growth, the study concludes that the results for the period under consideration confirm that corruption retards economic growth indirectly via undermining investment and directly through lowering productivity. This finding also confirms our overall results that highlighted how corruption retards economic growth within the SSA region.

In a panel data study involving 61 countries across the globe and over a 20-year period, Gyimah-Brempong and Munoz de Camacho (2006) examines if there are regional differences in the way in which corruption promote or undermine both economic growth and income inequality. After using two different measures of corruption in their regression analysis, the authors conclude that there are statistically significant differences across the regions of the world on how corruption impacts economic growth and income distribution. The study further confirms that the greatest impact of corruption on economic growth was in African countries, and Asian and OECD countries had the least impact. Concerning the income distributional impact of corruption, the largest impact was found in Latin America. This paper's findings are somewhat similar to ours. Like our work, panel data was implemented but the paper took a global perspective by looking at different regions of the world while we focused on the SSA region alone. The negative effect of corruption on economic growth across different regions of the world are in line with our findings based on income level classification across the SSA region.

Lisciandra and Milemaci (2015) in a within-country panel data study examines the impact of corruption on economic growth across the different regions of Italy from 1968 to 2011. The paper departs from using the conventional measure of corruption common to the literature and uses instead real reported crime statistics as a proxy for corruption. The data is further averaged over a 5-year period to take into consideration the effect of business cycles in their analysis of corruption, and subsequently found a negative significant impact of corruption on economic growth over the long term. Similarly, Petrarca et al. (2012) also use panel data analysis to investigate, through the implementation of a dynamic growth model, the impact of corruption on economic growth in different Italian regions over the period of 1980 to 2004. Like in the previous study, the authors use the number of prosecutions in Italy as a proxy for corruption and equally find strong evidence of a negative correlation between corruption and economic growth. The general overarching findings of these two papers on the negative effect of corruption on economic growth are broadly in line with our thesis and findings, and this is despite looking at the issue from a different region.

4.9 Conclusions

This chapter applied panel data, instrumental variables and a Generalised Method of Moments (GMM) estimator to rigorously analyse the impact of corruption on economic growth with an exclusive focus on 31 countries in sub-Saharan Africa. Using the ICRG data for the measure of perceived corruption perception index as our proxy for corruption from 1984 to 2013, we also explore whether there are differences in the way in which corruption affects economic growth across the different income classifications within the region. We further address the endogeneity concerns between corruption and economic growth and our results show that corruption has a negative, large, and statistically significant effect on economic growth and development in sub-Saharan Africa. We also find significant differences in the effects of corruption on economic growth across the different income level classifications. The largest negative effect of corruption on economic growth is found in 18 low-income countries (LIC), followed by 13 lower-middle-income countries (LMIC) and while the effect on the 5 upper-middle-income countries (UMIC), though negative, is however not statistically significant. These differences based on income levels are perhaps due to the notion that as economies begin to experience sustained economic growth and development, corruption will become less of an inhibitor to economic growth. The result is robust to different specifications, samples, and econometric techniques. Overall, the effect of corruption on economic growth is negative across the whole region. Our results also imply that reducing corruption will be paramount to increasing economic growth and development over the medium to the long term. Furthermore, our results also indicate that the different income groups within the regions should put a strong emphasis on policies to reduce corruption as a way of increasing economic growth and thereby reducing poverty. While the reduction of corruption in low-income countries and lower-middle-income countries may be very vital for increasing the rate of economic growth, it is likely to be less important for economic growth in upper-middle-income countries. If our findings hold true, then the reduction of corruption across all countries within sub-Saharan Africa by the same proportion will not only increase the economic growth rate, it will also help to improve economic development across different income levels. However, since the measure of corruption employed in this study is, at best, based on perception, we would, therefore, suggest that the interpretation of our findings should be with caution.

Chapter Five

Corruption and Capital Flight: Growth Implications with Panel Evidence from sub-Saharan Africa (SSA).

5.1 Introduction

Countries within sub-Saharan Africa (SSA) are facing substantial and major financing gaps, and thus hindering the much-needed public and private investments that will make it likely for the region to achieve the Sustainable Development Goals (SDGs)[26] adopted by member states of the United Nations in September 2015 in New York. Take for example the first and second dimensions of the goals: economic development and social inclusion; achieving them by the year 2030 will be a mirage if conscious efforts are not made to block the gaps and black holes in the continent's public finances. More so, member countries in SSA are starting from very low initial conditions: levels of deprivation are acute, infrastructure is inadequate and capital is in short supply. Achieving the SDGs will, therefore, be a particularly herculean task, given that paradoxically, the sub-Saharan African region is also been the source of large-scale capital flight over the last 40 years. The scale of the challenge is enormous and according to Kar and Freitas (2012), who find empirical evidence that between the intervening periods of 2001 to 2010, developing countries on average, lost between US$ 586 billion to US$919 billion annually to capital flight. Furthermore, just in the year 2010, developing countries loss to capital flight stood at US$859 billion (minimum) and US$1,138 billion (maximum) and by way of putting things in perspective, OECD aid to developing countries in 2010 alone based on the OECD (2011) report was US$129 billion, these figures make up between 11 to 15 per cent of the wealth that left poor countries as a result of capital flight. Capital flight has indeed become an increasing source of concern for governments, economists and policymakers in developing countries, as it implies a loss of resources that could be used to foster economic growth and development by engaging the fund in economic activities within the source countries.

Furthermore, in a different but related study of capital flight in Africa, Ndikumana *et al*. (2015) examined 39 countries in Africa covering 1970 to 2010 period and came to the conclusion that capital flight from the region peaked at US$1.3 trillion in constant terms.

[26] See http://www.sustainabledevelopment2015.org/index.php/news/284-news-sdgs/1630-un-secretary-general-releases-post-2015-synthesis-report for details on SDGs.

This figure, in 2010 represents eighty-two per cent of the GDP of all the countries considered in the study. The authors (Ndikumana *et al*. 2015, p.9) concluded that: "If this capital was invested abroad and earned interest at the going market rates, the accumulated capital loss for these countries over the thirty-nine-year period was US$944 billion". Putting the scale of the loss into perspective, for the year 2008, the total GDP of all countries within SSA was estimated to be US$997 billion. Taking a global view on the volume of capital flight across the other developing regions (Asia and Latin America) of the world, the African region does not top the list in real US$ terms but it remains the biggest when compared to the size of the economies of countries within SSA. It is also important to emphasise that capital flight as a problem is not unique to sub-Saharan African countries or other developing countries in particular, it is a global challenge to both developed and developing countries in general. As a matter of fact, recent academic work by Zucman (2013), show that less developed countries account for a small share of global unrecorded financial flow or capital flight.

Capital flight, in terms of level, is generally heterogeneous across the continent; however, what is very obvious from Figure 4.1 is that countries like Nigeria and Angola that are known as oil-producing nations are topping the list in terms of the amount of capital flight from SSA. The main concern, therefore, is that while the volume of capital flight from Africa may be small relative to other regions of the world, it carries with it some substantially heavier costs for the African economies in terms of foregone economic development opportunities, and perhaps this is why the nature of capital flight from the region is particularly injurious. Other previous related independent studies conducted for SSA countries have equally established the existence of capital flight as well as its effects on economic growth (as a precursor to the findings of Ndikumana *et al*. (2015), see other similar works by Morgan Guarantee and Trust Company (1986); Lessard and Williamson (1987); Murindi, Hermes and Lessink (1996); Ajayi (1997); Boyce and Ndikumana (2000), among others).

Given that sub-Saharan African countries are lagging behind in major human development indicators relative to other parts of the world (see Tables 2.1 and 5.1), capital flight according to Fofack and Ndikumana (2010), carries heavy opportunity cost as it undermines the much-needed domestic investment, and from the recent work of Nkurunziza (2015), It equally retards economic growth and undermines poverty reduction. Therefore, even though capital flight from sub-Saharan Africa may appear smaller in absolute terms when compared to other regions of the world (Henry,2012), the challenge, however, is that it is associated with a relatively higher burden and therefore deserves serious attention. Empirical evidence on the ground in the region equally indicates that most of the flight capital from SSA countries ultimately hurts the poor and is usually a by-product of official corruption as established, for example by the activities of some African leaders[27]. Even more recently in 2016 is what is now known as the "Panama Papers"[28] scandal. Despite this reality, few studies, if any have attempted to systematically incorporate corruption into the capital flight and economic growth analysis.

According to Transparency International Report(2016,p15), "around 80 per cent of citizens in sub-Saharan African countries live on less than US$2 a day. Corruption is one of the factors perpetuating poverty. Poverty and corruption combine to force people to make impossible choices like do I buy food for my family today or do I pay a bribe to get treated at the clinic? Poor people often have low access to education and can remain uninformed about their rights, leaving them more easily exploited and excluded. In order to fight against their social exclusion and marginalisation, poor citizens need space for dialogue with the authorities". Relatedly, the Chair of Transparency International, Jose Ugaz, equally opines in the report People and Corruption: Africa Survey (2015,p2) that:[29] "Corruption creates and increases poverty and exclusion. While corrupt individuals with political powers enjoy a lavish life, millions of Africans are deprived of their basic needs like food, health, education, housing, access to clean water and sanitation". We know from the literature review, that in many developing countries (SSA region included), corruption does not work as a progressive form of taxation and therefore, it becomes a greater burden to the poor simply because, most often than not, they end up paying a higher proportion or share of

[27] Examples of African Leaders in this regard are: President H. Boigny of Ivory Coast, President Mobutu of Zaire, General Sani Abacha of Nigeria https://www.laits.utexas.edu/africa/ads/273.html

[28] The "Panama Papers" scandal is a trove of leaked documents, apparently the biggest data leak in history (11 million documents) from the Panamanian law firm, Mossack Fonseca, with international specialism to launder money, create shell companies, hide cash from tax authorities and dodge sanctions for those willing to engage the firm. Many past and current African leaders' names were found in these documents. http://time.com/4297388/panama-papers-africa-investment/

[29] https://www.transparency.org/en/press/corruption-on-the-rise-in-africa-poll-as-governments-seen-failing-to-stop-i

their personal income as bribes just to enable them to get access to simple and basic public services. (World Bank, 2005). Similarly, an earlier study by Kaufmann (2003) also asserts that younger democracies can be weakened by the presence of corruption within the polity and equally causes many aid-funded programmes to fail. Elsewhere, Wei (2002) concurs with the finding in World Bank (2005) and asserts that payment of bribes and official corruption tend to act like an additional tax and invariably undermine the much needed (FDI) flows into emerging economies like the sub-Saharan African region. However, the literature on corruption and economic growth have shown little or no interest in the link that exists between corruption and capital flight.

Building on previous work on corruption in chapters two and three of this thesis, corruption in sub-Saharan Africa is highly endemic and this is illustrated by the ***hbar*** in Figure 5.2., which averages the Transparency International data on corruption from 1984 to 2013, it shows the mean corruption scores for countries within our sample (SSA). The Transparency International scores are perception index-based and the score ranges from 0 to 10, with a score of 10 being very clean and a score of 0 is very corrupt. As can be gleaned from Figure 5.2, except for Botswana that scored 5.8, every other country in our sample had a score of less than 5 over 10. As a matter of fact, the biggest economy in sub-Saharan Africa, Nigeria had an average score of 2 out of 10. The remainder of the countries in our sample had a disappointing regional average score of 1.8 out of 10. Given that the global average score is 4, therefore the SSA average indicates how corrupt the public sector across the region is perceived to be and reinforces the view that much of sub-Saharan Africa remains in what is known within the literature as the “rampant corruption category”. Therefore, for there to be any meaningful capital repatriation of some sort in SSA, corruption will have to be reduced in a very significant way.

From the foray into the literature, one thing is clear, there have been clear advances made in estimating the magnitude of capital flight and also in investigating its determinants (see, for example, Collier *et al*. (2001); and Boyce and Ndikumana (2011)). While it can be said that these studies have given us good insights into the concept of capital flight, they nonetheless fail to consider the role of corruption in promoting capital flight in sub-Saharan

Africa. The literature also has relatively much less to offer or say as far as corruption and capital flight evidence goes in undermining economic growth and outcomes. Yet, such evidence is needed for the design and implementation of policies to curb capital flight, reduce corruption and promote economic growth within SSA countries. Therefore, the primary aim of this study is to remedy these shortcomings.

The above studies clearly show that there exists a rich literature dealing with the links between corruption and economic growth on one hand, and capital flight and economic growth on the other hand but beyond the level of anecdotal experience, there remains a dearth of literature on econometric modelling on all three (corruption, capital flight and economic growth) at the same time. To the best of our knowledge, there is no existing work on economics on this subject. However, one thing is paramount; one cannot simply dismiss the link between corruption and capital flight when examining their growth implications for SSA countries.

This chapter makes important contributions to the corruption, capital flight and economic growth literature nexus in general and more specifically to the countries within SSA by jointly considering capital flight and corruption in an empirical investigation that focuses on the economic growth of SSA countries over the period of 1986 to 2010. The principal aim of our analysis is to examine the independent as well as the joint effects of corruption and capital flight on economic growth. Through this method, we test if the presence of capital flight influences the growth impact of corruption. As earlier stated in this chapter, it is obvious that there is a degree of link that exists between the two phenomena. It is also reasonable to assume that the presence of corruption will help to influence capital flight and ultimately undermine economic growth. To be more specific, we start from the premise that corruption may have a significant role in promoting capital flight and therefore hypothesise that corruption has a significant role in capital flight effects on economic growth within SSA countries. As a result of the foregoing, we also interact the measures of corruption with capital flight. Furthermore, in the later section of this chapter, we also contribute to the literature on the determinants of capital flight by empirically including corruption as one of the causes of capital flight on the right-hand side of the equation. This is another clear contribution to the literature as previous studies on the determinants and causes of capital flight (Ajayi (1997) and Ndikumana (2008)) demonstrate a consistent lack of inclusion of this important variable of corruption.

The choice of carrying out our analysis at a cross-country level for SSA countries rather than at a country-specific level is influenced mainly by the availability of data on capital flight unique to African countries (the database constructed by Boyce and Ndikumana [30](2010)). This is the first attempt at using this particular measure of capital flight to study corruption and economic growth. Using panel data from 25 sub-Saharan African countries, this chapter also tries to investigate the underlying factors that affect capital flight and how capital flight and corruption interact together to promote or undermine economic growth in SSA countries. From the backdrop to the literature, this research seeks to firstly, examine the determinants of capital flight, more specifically, we introduce corruption variable into the model so as to ascertain whether or not corruption is good for capital flight. Secondly, we study the interactive term of corruption and capital flight on economic growth. The research sub-questions are:(a) To identify the determinants of capital flight in the selected SSA countries, (b) To identify if corruption is a determinant of capital flight in the selected SSA countries, (c) To examine the impact of corruption and capital flight on economic growth independently and (d) To examine the interactive impact of corruption and capital flight on economic growth in the selected SSA countries.

Based on the determinants of capital flight explored in the literature, six broad categories of (Past Capital Flight, Rate of Return Differentials, Macroeconomic Instability, Political Instability, Capital Inflows, and External Debt) have been found as consistent determinants of capital flight: Our findings, confirming past studies, show that corruption, our main variable of interest as to how it relates to capital flight, is positive and statistically significant across all specifications. Furthermore, we also show that corruption and capital flight have

[30] The data cover the following countries: Angola, Botswana, Burkina Faso, Cameroon, Democratic Republic ofCongo,RepublicofCongo,Coted'Ivoire,Ethiopia,Gabon,Ghana,Guinea,GuineaBissau,Kenya,Madagascar,Malawi,Mozambique,Nigeria,Sierra Leone, South Africa, Sudan,Tanzania,Togo,Uganda,Zambia,Zimbabwe.

both individual and joint effects on economic growth within the region. The remainder of the chapter is organised as follows. Section 5.2 looks at the definition and measurement of capital flight, Section 5.3 is a brief overview of capital flight and corruption in selected sub-Saharan African countries. Section 5.4 presents the related literature on capital flight, corruption and economic growth. While Sections 5.5 and 5.8 presents the theoretical frameworks and sections 5.6 to 5.10 describe the model, data and empirical strategies. Section 5.9 reports the empirical results and finally, the conclusions are in section 5.10.

5.2 Definition and Measurement of Capital Flight

When it comes to defining capital flight there are several definitions in the literature, one good example is given by Dooley (1986) who defines capital flight as outflows that are held by a non-resident, that is beyond the reach of local monetary and fiscal policies or do not yield an interest domestically. Similarly, it also refers to the movement of money from investment in one country to another in order to avoid country-specific risks like hyperinflation, political instability and anticipated depreciation and devaluation of the local currency. The phenomena tend to point towards the notion that: capital flight is said to occur when government officials and wealthy individuals in society move financial assets out of the country in desperation to avoid actual or expected government intervention that could substantially reduce the value of their assets. It includes everything from carrying cash across the border in suitcases so as to avoid an expected increase in taxes to lying about the number of receipts gained from exporting products and using the excess export earnings to buy a mansion in Chelsea or Kensington, London, United Kingdom

Capital flight as a phenomenon is unobservable and therefore has to be estimated. Measuring capital flight is not straightforward and can be quite difficult, and this is partly because of the existing lack of consensus in having a precise definition of the concept. As a result, the measurement of capital flight is usually driven by the definition adopted per time. However, the literature on capital flight has identified several measures. The nature of capital flight is likely to affect its estimations but not its economic consequences. Generally, the following measures of capital flight can be found in the literature: Dooley

Method; Residual Method; Hot Money Method; Trade Mis-invoicing Method and Asset Method.

The Dooley Method: This method tends to define capital flight as all legal and illegal capital outflows that are driven by the singular desire to place assets or wealth beyond the reach and control of domestic authorities. This method of computing capital flight takes the total number of capital outflows as reported in the balance of payments statistics and then makes some modifications by accounting for errors and omissions. It also factors in the difference in the change in the stock of external debts and external borrowing, and if the stock of external debt is larger than external borrowing the difference is assumed to be part of capital flight. Furthermore, by using a representative market interest rate and in this case, the United States of America deposit rate, the stock of external assets is computed in such a way to align with the reported interest rate earnings in the balance of payment. Finally, capital flight is measured as the difference between total capital outflows and the change in the stock of external assets matching reported interest income.

Capital flight according to the Dooley method can be computed as:

$$TCO = FB + FI - CAD - \Delta FRS - NEO - \Delta WBIMF - - - - - 5.1$$

Where TCO denotes total capital outflows, FB denotes foreign borrowing as reported in the balance of payment statistics. FI is the net foreign investment flows, CAD while is the current account deficit, and FRS is the foreign exchange reserve. NEO is net errors and omissions and $WBIMF$ represents the difference between the change in the stock of external debt reported by the World Bank and foreign borrowing reported in the balance of payments statistics published by the IMF.

The stock of external assets (SEA) is calculated as:

$$SEA = (l + r_w)RR_t \dots \dots \dots 5.2$$

Where $r_w$denotes international market interest rate and $RR_t$is the registered receipt. Capital flight from the Dooley method is then measured as:

$$CF_d = TCO + SEA \dots \dots . . 5.3$$

The Residual Method: This is the most used method in the literature and is otherwise known as the World Bank method. It is fairly straightforward in the way it is computed. In addition to comparing the sources and uses of capital flows, it also considers all private capital outflows as capital flight. It also acknowledges the challenges of separating normal and abnormal capital outflows, and as a result, it measures all unrecorded outflows as capital flight. In addition to foreign reserves FRS as uses, the current account deficits (CAD) on one hand is compared with both the net increases in external debt (ED) and the net inflow of foreign investment (FI). When the sources are more than the uses of capital inflows, the difference is then referred to as capital flight. From the foregoing, the residual method of capital flight can be presented in an equation format as follow:

$$CF_r = \Delta ED + FI - CAD - \Delta FR \ldots \ldots .5.4$$

where Δ denotes change and CF represents capital flight

It is worth pointing out that the residual method has been widely used in the literature and in some cases with minor variations to the above formula. Some studies that have implemented the above standard approach are: Erbe (1985) and the World Bank (1985), while a modified version of the residual method was implemented by Morgan Guaranty Trust (1985) and Murinde *et al*. (1996) by including the change in the foreign assets of the local baking system.

The Hot Money Method: This measure takes the view that capital flight is measured by adding up non-bank private short-term capital outflows together with net errors and omissions. This is akin to a situation the capital outflows are responding to short term differences in the various market conditions (domestic and international). Examples of authors that have used this method to measure capital flight are: Cuddington (1986) and Gibson and Tsakalotos (1993). The hot money method of computing capital flight can be summarized by the following formula:

$$CF_h = SCO + NEO - - - -5.5$$

where CF denotes hot money capital flight and SCO is the total amount of short-term capital flows.

The Trade Mis-invoicing Method: In this method, capital flight is derived by comparing data from both the exporting and importing countries. Capital flight happens when importers report higher values of imported goods when contrasted with the values of the same reported exported goods. Some of the authors that have used trade mis-invoicing measures of capital flight are Claessens and Naude (1993). On the other hand, exporters are said to be engaged in capital flight when they report lower values of goods exported when compared with the same values of reported goods by importers. Export under-invoicing and export over-invoicing are the mechanisms under which capital flight occur through residents including resident's abnormal capital outflows. In other words, both the malpractices of export under-invoicing and import over-invoicing are the financial vehicle through which domestically accumulated wealth is siphoned outside the country. However, this method of measuring capital flight is highly contested and deemed inaccurate because of the poor quality of import and export data occurring as a result of trade mis-invoicing. Critique of this measure, amongst others, include: Lessard and Williamson (1987); Ajayi (1997); Collier et al. (2001) and Boyce and Ndikumana (2002) proposed that adjustments of the capital flight figures by using the residual method will correct for the abnormality.

The Asset Method: This method of measuring capital flight represents a direct and shortcut approach. Authors like Hermes and Lensink (1992); and Collier *et al*. (2001) measure capital flight way by taking the total stock of assets of non-bank residents held by a foreign bank which is readily available from the IMF's IFS. Put differently, it measures the minimum amount of assets held abroad. In addition to a bank account, residents can also hold their assets in other forms. For example, assets can be held via foreign equity holdings. The drawback for this method according to Ajayi (1997) is that it fails to recognise the fact that huge amount of assets not related to bank deposits are equally held abroad and even the so-called bank deposits can also be held in financial jurisdictions with banking secrecy enshrined in their statutes books and thereby making it difficult to identify the names and nationalities of the depositors.

Figure 5. 1: Capital Flight from SSA (1970-2010) (billion, constant 2010US$)

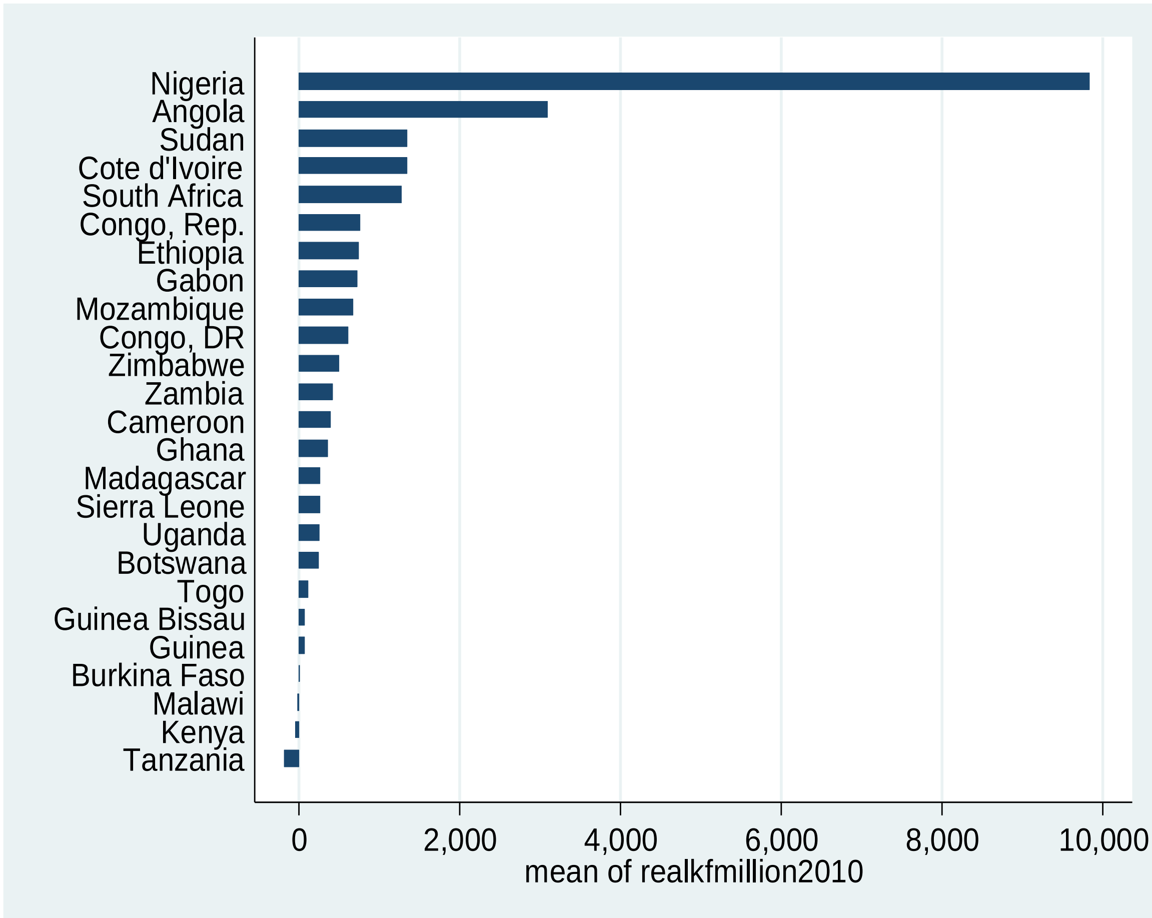


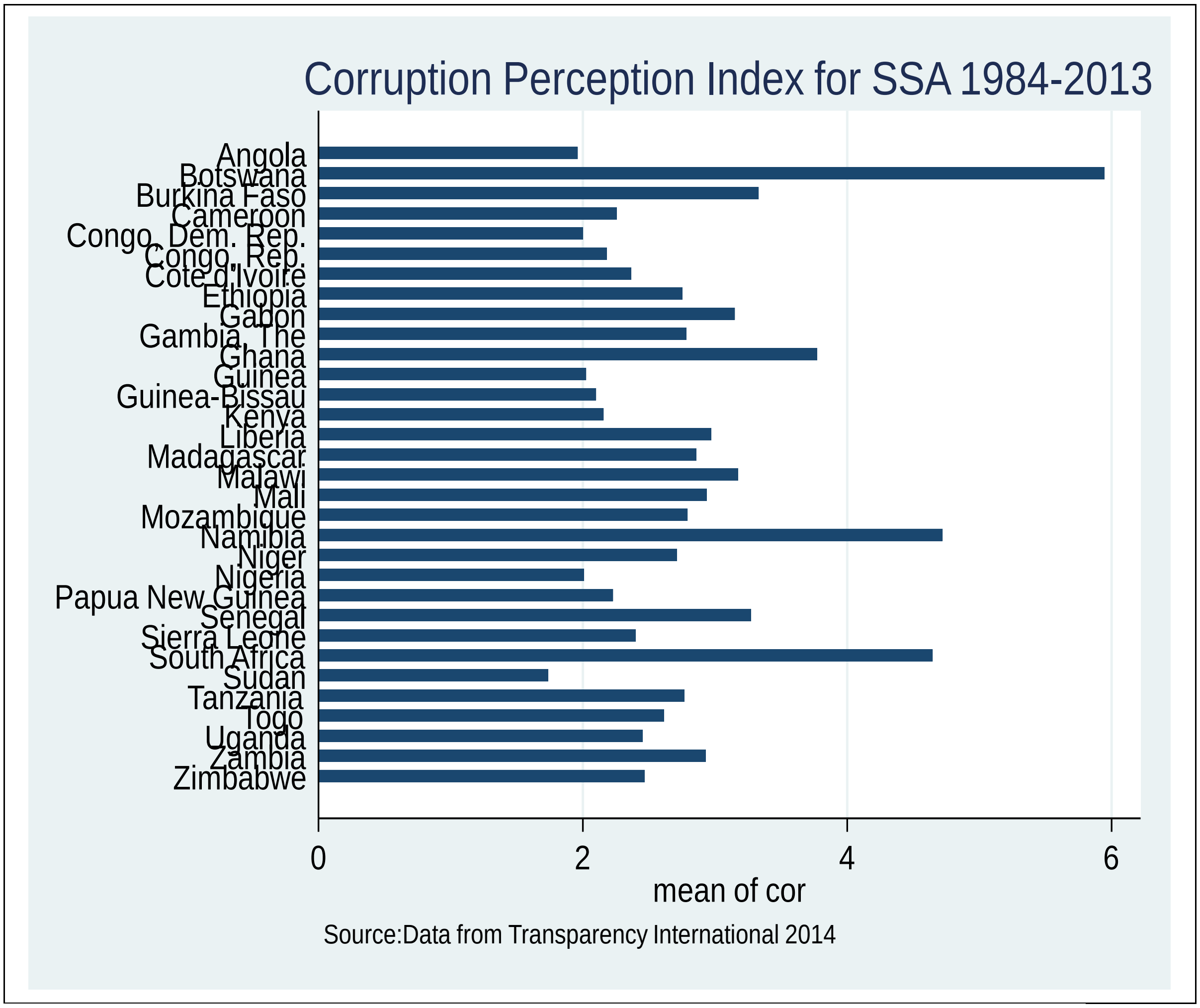
Figure 5.1: Showing mean Real Capital Flight (% of GDP)from SSA countries using the Boyce and Ndikumana (2010) Dataset. On the x-axis is capital flight, and on the y-axis are the countries. From this figure, one can see a trend for concern in terms of the volume of capital flight from most countries in our sample. The descending order *hbar* shows that about 84 per cent of countries from the sample are faced with problems of capital flight.

Table 5. 1: Table showing Capital flight from Africa, 1970-2010(billion, constant 2010US$)

Period	**FDI**	**ODA**	**Capital Flight**
1970-1979	29.8	128.0	225.2
1980-1989	39.1	182.8	307.4
1990-1999	73.9	246.5	230.3
2000-2010	316.3	317.5	510.9
Total	459.1	874.8	1273.8

Data is sourced from www.peri.umass.edu and computed by the author

Figure 5. 2 :Showing Mean Corruption Perception Index for SSA Countries



5.3. An Overview of Capital Flight and Corruption in selected SSA Countries

This section will highlight the nature of capital flight from selected African countries between 1970 to 2010. Given that we cannot show every country in SSA, our choice of countries was driven by the fact that we want to reflect every economic bloc in the region and also based on data availability. Therefore, our choice of countries has a good geographical spread within SSA. All data on capital flight are taken from Boyce and Ndikumana data on capital flight from the Political Economy Research Institute, University of Massachusetts, United States of America.

Cameroon: Figure 5.3 shows the pattern of capital flight estimates from Cameroon within the intervening period of 1970-2010. The overall amount of capital flight from Cameroon stood at $20 billion and thereby making it the 10th among countries from sub-Saharan Africa that experienced a huge amount of capital flight for the period of 1970-2010. According to Boyce and Ndikumana (2012), capital flight from Cameroon within this period was driven majorly by trade misinvoicing as it represents 83% of capital flight from the country. Looking at figure 5.3 closely, we can see that capital from Cameroon progressively peak in the 1970s, 1980s, 1990s and 2000s. For a poor country like Cameroon, $20 billion is a huge amount of money and this represents an opportunity foregone in terms of the much-needed funds for investment within the country. This amount could have gone a long way in creating infrastructures that can help in reducing poverty within the country.

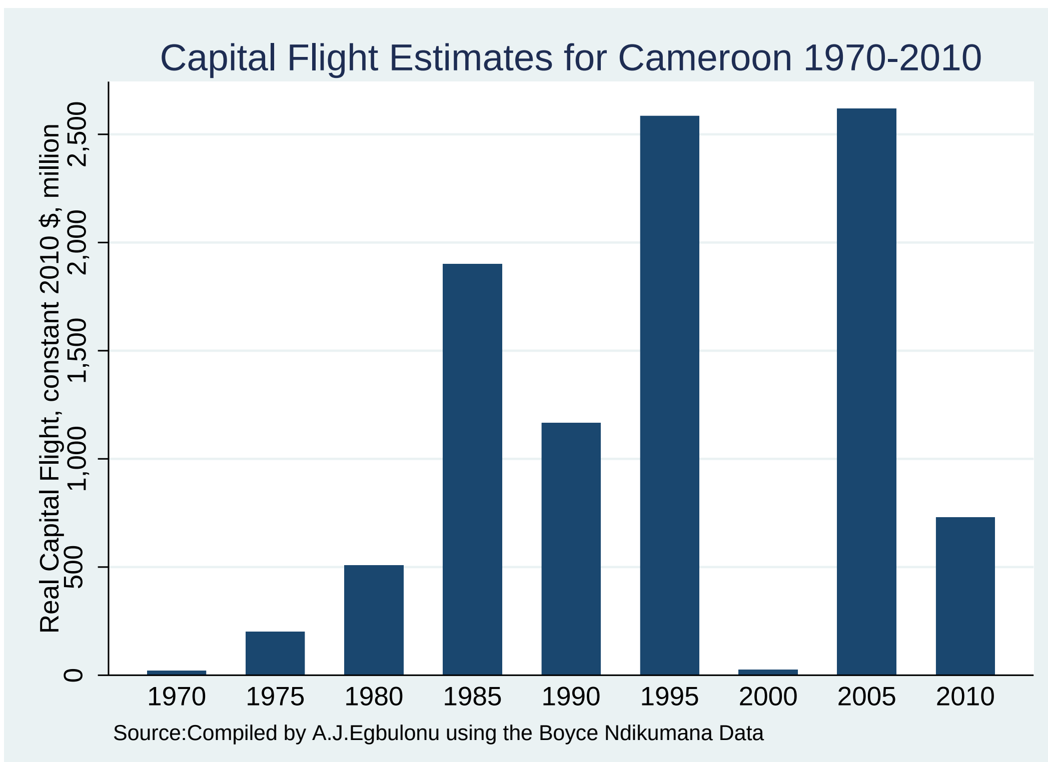


Figure 5. 3:showing the trajectory of capital flight in Cameroon (1970-2010)

Nigeria: Following the rebasing of Nigeria's overall GDP in 2013, it became the largest economy in Africa. However, it is a country besieged by the plague of capital flight, and until this very day, it still continues to constitute a cause of concern for economic management.

Figure 5.4 is a bar chart summary pattern of capital flight estimates from Nigeria for the period 1970-2010. For the intervening period under consideration, an estimated $311.4 billion was lost to the Nigerian economy as a result of capital flight. This amount makes the country number one on the list of countries from Africa when it comes to capital flight. As shown in figure 5.4, capital flight in Nigeria seems to have followed the political trend. The period 2000 to 2010, which indicate a period of unbroken democratic rule seems to show capital flight at its peak. In a related study on the analysis of capital flight from Nigeria from 1970 to 2004 by Ajilore (2010), the evidence also shows an annual average of capital flight as a percentage of GDP of 6.4% for the period indicated above. Further evidence also shows the presence of a financial revolving door kind of relationship between external debt and capital flight. The capital flight estimates of $311.4 billion from Nigeria for the period of 1970-2010 show that not only is the country losing huge sums of money that could otherwise be invested for the development of the country, it also undermines long term economic growth.

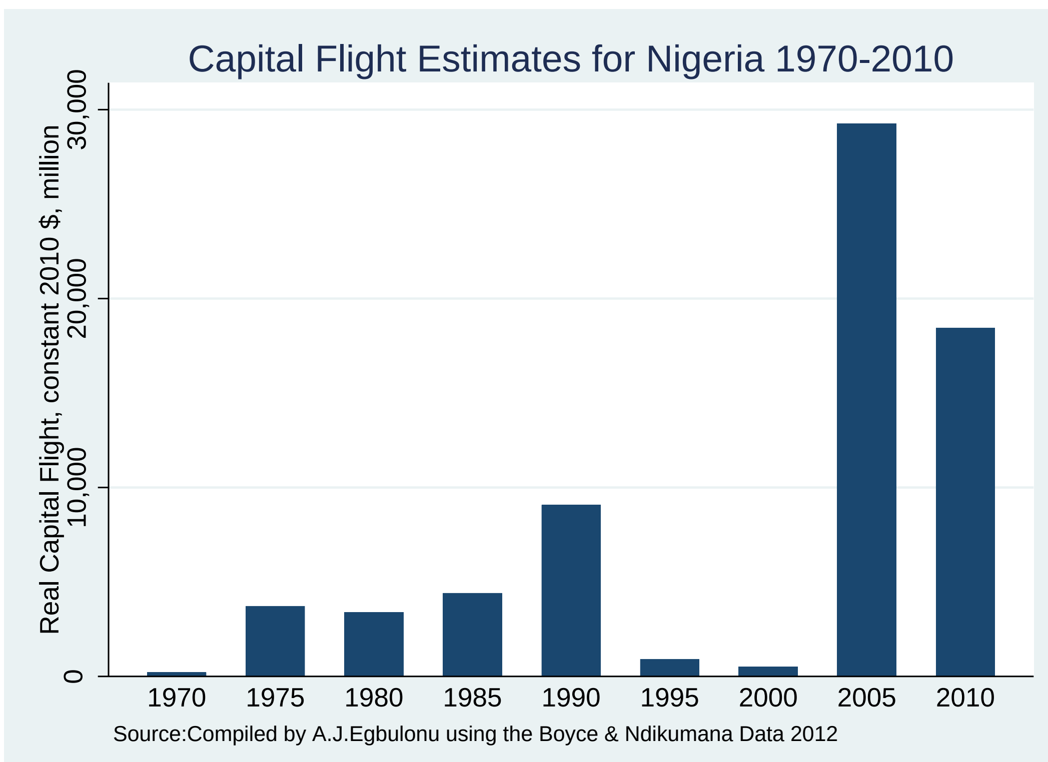
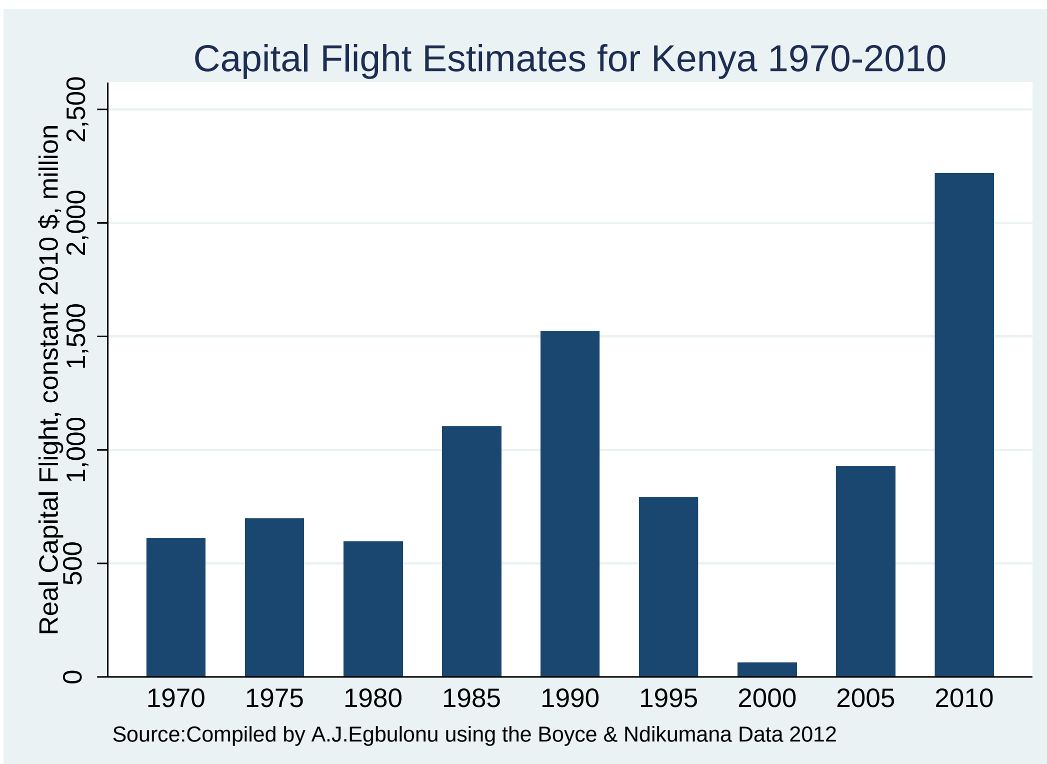


Figure 5. 4 : showing the trajectory of capital flight in Nigeria (1970-2010)

Kenya: Capital flight estimates from Kenya for the period of 1970-2010 constitute a major economic challenge for the people and government of the country. Figure 5.5 which summarizes capital flight estimates from the country on average shows a progressive and deteriorating condition. It is estimated that about US$4.9 billion was lost to capital flight on the data we used. According to the World Bank, in the year 2008, Kenya's external debt stood at US$7.44 billion, and paradoxically, capital flight estimates from Kenya is about US$6.369 billion based on recent data from Washington based Financial Integrity Group(GFI). This amount is close enough to cancel out Kenya's external debt. It is also worthy to think about the lost opportunity for the people of Kenya if this huge sum were to be invested in infrastructure programmes to reduce poverty. From the figure below, a year in year progressive trend for capital flight can be seen from 1970 to 1990, followed by a drop in 1995,2000 and thereafter peaked in 2010.

Figure 5. 5:showing the trajectory of capital flight in Kenya (1970-2010)



Zambia: Capital flight estimates from Zambia between 1970-2010 as depicted in figure 5.6 is a picture of a mixed bag, with fluctuations in terms of the exact amount at different times.

For the period under review, capital flight from Zambia peaked at $3 billion in the 1970s, $2 billion in the 1980s, and $1.5 billion in the 1990s and over $2 billion in the 2000s. The total capital flight estimates from Zambia within this period was $17.3 billion. This shows that on average, the country has witnessed a significant large outflow of domestic capital, and for what is considered to be a predominantly poor country if the large capital outflows were to be retained in Zambia, it can help in boosting economic development programmes.

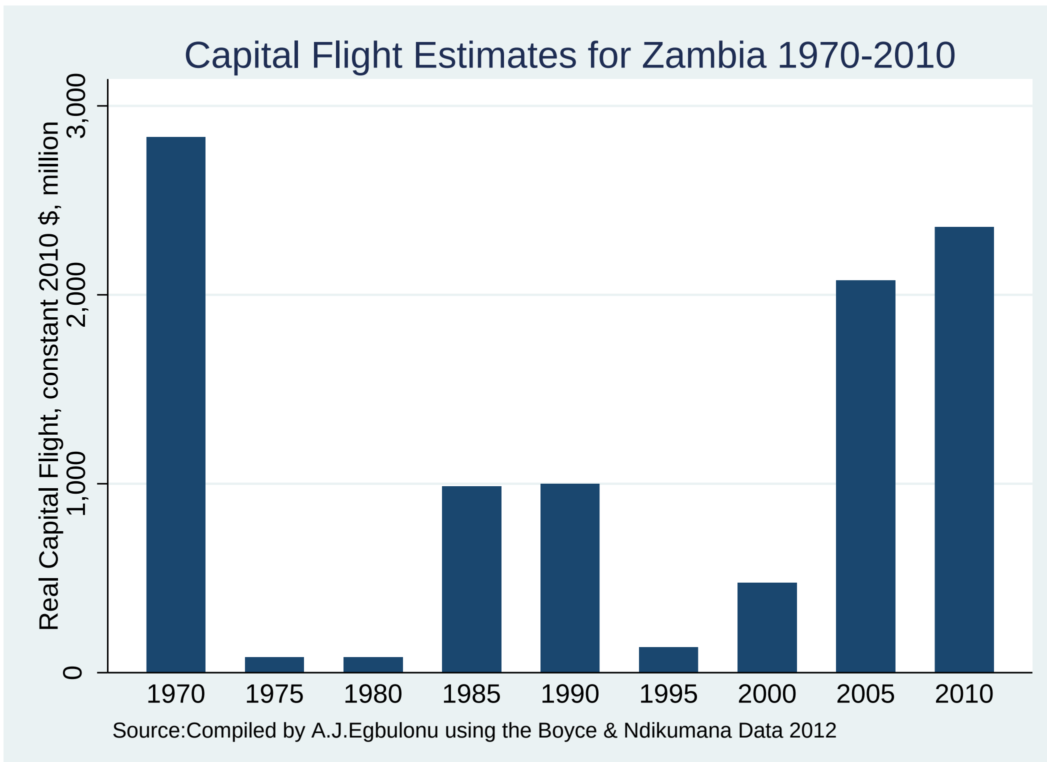
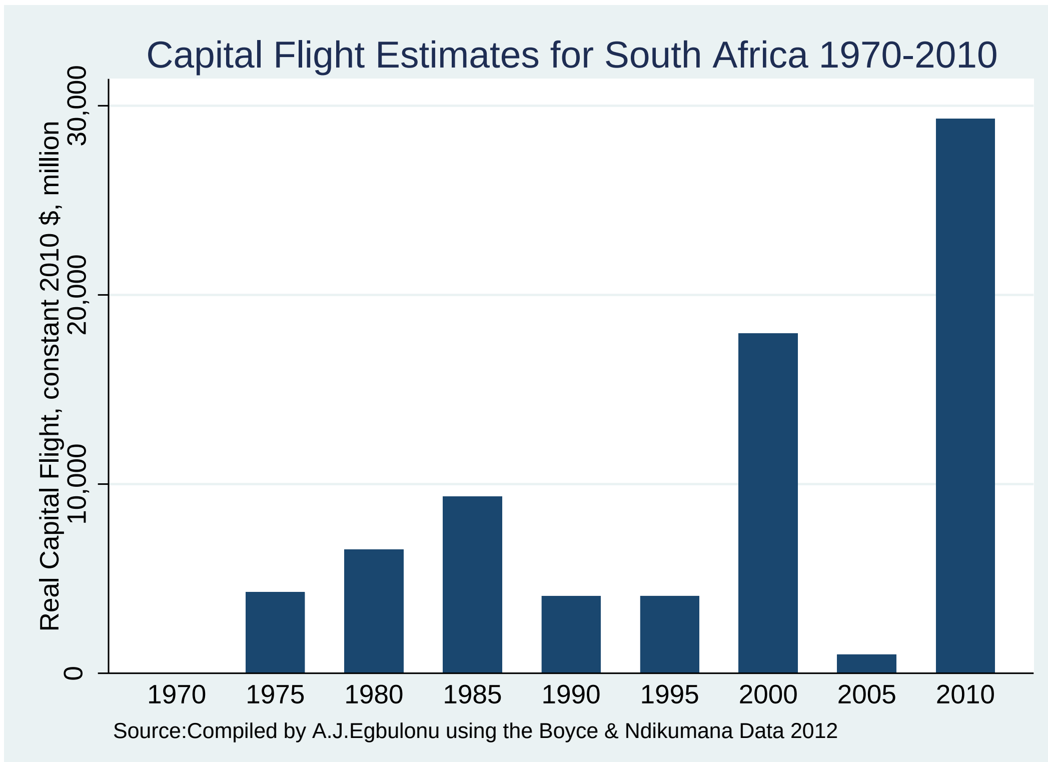


Figure 5. 6: showing the trajectory of capital flight in Zambia (1970-2010)

South Africa: South Africa, for a very long time, was the largest economy in sub-Saharan Africa both in overall size and in GDP per capita term before it was overtaken by Nigeria in 2013 by overall size. Nonetheless, it remains probably the most sophisticated economy in Africa and is considered an upper-middle-income country by international institutions like the IMF, World Bank and the United Nations. Figure 5.7 depicts the trajectory of capital flight from the country for the period of 1970 to 2010. In the 1970s and 1980s, capital flight from South Africa peaked at $10 billion, and it was slightly less than $10 billion in the 1990s. However, in the 2000s, it peaked at over $20 billion. Overall, capital flight from South Africa within the period indicated above stood at $38.5 billion and thereby making it the second country in sub-Saharan Africa with the highest amount of capital outflows. Given this huge sum in capital flight from South Africa, it poses a major challenge for the country, and if not addressed by present or future governments, it will continue to impede the country's ability to deal with structural issues like high unemployment and inequality.

Figure 5. 7: showing the trajectory of capital flight in South Africa (1970-2010)



Congo Democratic Republic: The Congo Democratic Republic used to be known as Zaire under the leadership of its long-term ruler, late president Mobutu. It has a long history of pervasive corruption, extreme poor governance challenges like civil unrest, as well as political and economic instability. Equally related to the country's myriads of economic challenges is the issue of capital flight. Capital flight estimates from the Congo Democratic Republic for the 1970-2010 period is shown in figure 5.8. For the period under review, capital flight from the Democratic Republic of Congo peaked at US$3.8 billion in the 1970s, over US$2 billion in the 1980s, the 1990s saw a slight reduction to little less than US$2 billion and the 2000s experienced an upward trajectory in the region of US$3 billion. According to

Boyce and Ndikumana (2012), the overall total capital flight estimates from the Congo Democratic Republic within this period was US$33.3 billion. Similarly, Kar et al. (2008) using the World Bank residual method of estimating capital flight to study capital flight from the Democratic Republic of Congo for the 2001 to 2006 period and estimates that total capital flight from the country stood at US$15.5 billion. The amount involved is very mind-boggling on every level. This is because for a poor country like the Democratic Republic of Congo often referred to as a paradox of plenty because of its abundant natural resource endowment: For example, the country is home to 10 per cent of the world's reserve of copper and 80 per cent of the world's reserve of Coltan, and at the same time its population suffer from extreme poverty as 80 per cent of its population live on less than US$2 a day. This significant domestic capital outflow if retained within the country could have gone a long way in boosting long term infrastructural investment and poverty reduction.

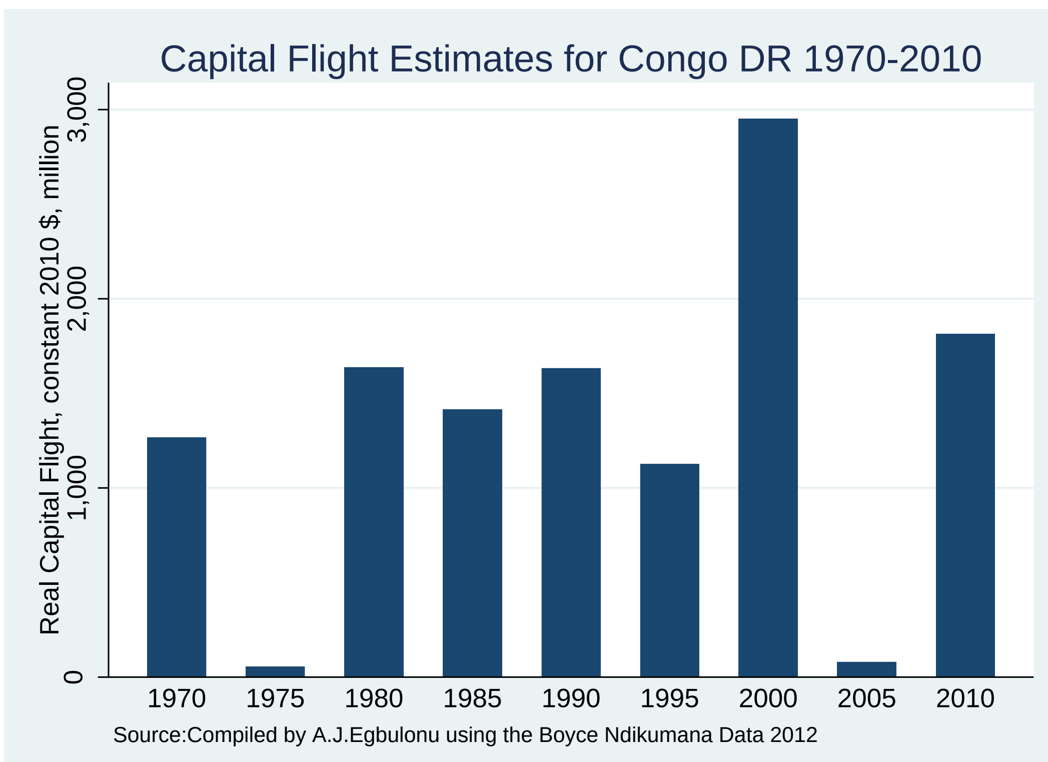


Figure 5. 8 : showing the trajectory of capital flight in Congo, DR (1970-2010

Ethiopia: Ethiopia, which is one of the poorest countries in the world with a per capita GDP of US$365 and with about 38.9% of its population living in poverty is also facing the problem of endemic capital flight. Figure 5.9 shows a historical estimate of capital flight from Ethiopia for the period of 1970-2010. For the period under consideration, capital flight from Ethiopia, according to our data peaked in the 1980s, and this is probably related to the Ethiopian famine of the 1980s. It subsequently peaked in the early 2000s and currently appears to be on the increase. This upward trajectory of capital flight from Ethiopia is corroborated by a recent study by the Global Financial Integrity group, which found that the country lost about US$11.7 billion to capital flight between the years 2000 to 2009. This amount is small in comparison with the finding from the work of Boyce and Ndikumana (2012) that estimated that the total amount lost to capital flight from Ethiopia to be US$24.9 billion. Similarly, a recent work by Geda and Yimer (2017) estimates that capital flight from Ethiopia for the period 1970 to2012 to be US$31 billion. These staggering sums, yet again, shows the country experienced a significant amount of capital outflows within this period.

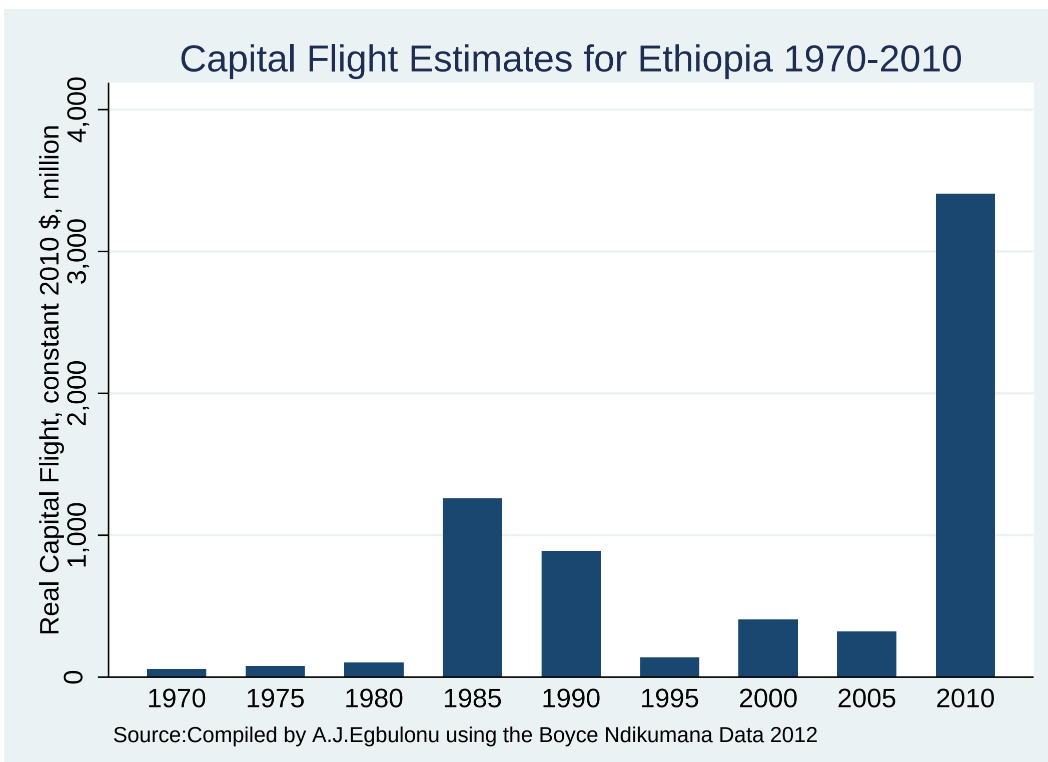


Figure 5. 9 : showing the trajectory of capital flight in Ethiopia (1970-2010)

In summary, the central message on capital flight from sub-Saharan African countries is that if the region had been successful, to a significant degree in reducing capital flight over the decades via sound macroeconomic policies and good governance, the region would have not only paid off its external debt, it would have also had better access to funds to invest in human capital development and the much-needed capital intensive infrastructural projects and thereby making the likelihood of meeting the Sustainable Development Goals(SDG's) more feasible within time.

5.4 Related Literature

Measuring capital flight can be quite difficult, and this is partly because of the existing lack of consensus in having a precise definition of the concept. What follows in section 5.3.1 is the literature on the determinants of capital flight. Sections 5.3.2 to 5.3.5 provides some much-needed insight into the literature on capital flight and economic growth, capital flight and corruption and finally on the measurements of capital flight.

5.4.1 Determinants of Capital Flight

On the basis of the determinants of capital flight explored in the literature, six broad categories have been found as consistent determinants of capital flight:

Past Capital Flight: All else being equal, past capital flight have a tendency to persist over time. In other words, past capital causes more capital and connotes a positive relationship with real capital flight. These characteristics are attributed to the concept of habit formation and hysteresis. Past studies confirming this behaviour are; Ndiaye (2009) in a study of the Franco Zone area of Africa found that past capital flight have a positive effect on current capital flight. Boyce and Ndikumana (2003) saw this as a habit formation effect in that as more private players gain more experience moving capital abroad, they also get better at doing it over and over again. Cerra *et al*. (2006) in a related study on capital flight and economic growth also found a similar result of a positive influence of past capital flight on current capital flight.

Contrary to the above results, Nyoni (2000) in a capital flight study of Tanzania found that past capital flight has a negative effect on current capital flight. Boyce (1992) in a similar study of capital flight in the Philippines found an insignificant effect of past capital flight on current capital flight. Even though these findings are quite contradictory, and the effect far from conclusive, they could have been influenced by the measure of capital flight used, the sample or region studied and the time period. By and large, most of the literature points towards a positive effect.

Rate of return differentials: This is proxied by the difference between an African country's interest rate and the more stable U.S interest rate (US real interest rates minus the African country's real interest rate). This variable has been used in a lot of studies to measure the relative attractiveness of domestic assets to residents' relative to foreign assets. This is the variable that encourages us to test the portfolio choice theory hypothesis that capital flight is driven by mainly higher world interest rates relative to domestic interest rates. On the whole, interest rate differentials do not always have a statistically significant relationship with capital flight (Lensink et al. (1998). This may be an indication that perhaps other determinants like political instability and macroeconomic instability are much better at explaining capital flight. As for the countries in our sample, the motive for capital flight would probably also be driven by the need to hide ill-gotten wealth from the reach of tax authorities encase the prevailing political realities changes.

Macroeconomic Instability: Countries experiencing macroeconomic instability tend to manifest in different ways and can take the following form: Increase in the budget deficit, growing inflation, exchange rate overvaluation, increase in current account deficits, and general government debt. Also, put differently, macroeconomic instability happens when there is an aggregate mismatch between domestic demand and supply.

Exchange rate overvaluation has been consistently found to be a natural factor in the determinants of capital flight in the literature. If a country's currency is overvalued through the exchange rate mechanism today, the natural expectation is that devaluation of the same currency will occur in the future and as a result, this scenario will lead to loss of real income as prices of foreign goods rise relative to domestic goods. To avoid losing out badly, most residents will hold part of their wealth abroad.

High inflation also reduces the real value of the domestic assets and thereby acting as an incentive for residents to hold their assets abroad. This variable has a positive effect on capital flight and has been confirmed by several studies on the determinants of capital flight. Dooley (1988) confirmed the positive effect of inflation on capital flight and on the other hand, Boyce and Ndikumana (2003) in a study of capital flight in developing countries found an insignificant effect of inflation on capital flight. The evidence for this variable is far from conclusive, however, economic intuition and literature suggests that inflation drives capital flight positively. High current account deficits and government budget deficits can also positively affect capital flight and this is because it raises expectations on the part of residents that government will raise taxes in the future so as to help balance its public finances by paying its debt.

Finally, it must be noted that evidence from the above macroeconomic indicators, shows that macroeconomic instability will generally increase the incentives for capital flight (see Lensink1 et al. (1998).

Political Instability: This variable is expected to encourage capital flight because it increases the risks and uncertainty surrounding the policy environment and its outcomes for investors and domestic asset holders. For example, as a result of the perceived high level of corruption and lack of confidence in the domestic political environment, residents would well prefer to hold their wealth abroad when they contemplate the consequences of these factors for the future value of their assets. Researchers that have found positive relationships between capital flight and political instability are: Boyce and Ndikumana (2003) found a positive relationship between capital flight and political risk and Collier *et al*. (2004) found a similar result.

Capital Inflows: Capital inflows generally tend to have positive effects on capital flight. Examples of capital inflows are long term debt, foreign direct investment, aid and remittances. Foreign direct investment, according to Cuddington (1987), may have a positive effect on capital flight because of the inflows of foreign currencies. However, Lensink *et al*. (2000) in a study of 84 developing countries found a contradictory result of an insignificant effect on foreign direct investment. However, Ajayi (1995) have argued that capital inflows such as aid and foreign direct investment to developing countries are a strong contributory factor to capital flight because of the simultaneous occurrence of capital inflows and capital outflows.

External Debt: For so many developing countries, an increase in external debts leads to inflationary financing and will ultimately result in an inflationary tax on the residents in the future. Many empirical studies in the literature have confirmed that there is a positive relationship between capital flight and external debt. What this means is that higher external debt is associated with a higher capital flight. For example, Boyce and Ndikumana (2003) in a study of 30 sub-Saharan African countries over the 1970-1996 period, found that on average, 80 cents out of every one U.S dollar borrowed in a given year by a sub-Saharan African country left the region as capital flight. Similarly, Chipalkatti and Rishi (2001) in a study of capital flight in India found a two-way relationship between capital flight and external debt and concluded that the relationship conforms with the revolving door hypothesis. A financial revolving door hypothesis is where both external debt and capital flight fuel each other by providing capital for reverse flow.

5.4.2 Capital Flight and Economic Growth

On the basis of the literature on capital flight and economic growth, earlier studies empirically give credence to the hypothesis that capital flight is higher when a country's rate of economic growth is low. Pastor (1990), for example, in a study of the USA and Latin American countries finds that the growth rate potential between the two regions is an important determinant of capital flight. Similarly, Nyoni (2000) relates capital flight from Tanzania to the growth rate differential between the United Kingdom and obtains a similar result.

In a study investigating the impact of capital flight on economic growth over the period of 2002-2006 for a large number of 139 countries in the world, Gusarova (2006) employed fixed effects panel regression and the result showed that capital flight has a negative effect on economic growth but its significance was ambiguous because the results were not robust to specifications that accounted for the region or year effects. In the same vein, Cervena (2006) in a recent study investigated the impact of capital flight on long term economic growth for a cross-section of 75 developing countries by performing a pooled cross-section analysis based on fixed-effects models. The Solow growth model is employed while controlling for other important right-hand side variables. The results suggest that countries with a higher capital flight to GDP ratio have experienced slower growth of GDP per capita, and poorer countries suffering severe consequences. Similarly, Lan (2009) studied the effects of capital flight on economic growth in a sample of selected Association of South-East Asian Nations(ASEAN) countries by employing the ARDL Bounds test approach to co-integration with annual time series data spanning 1972-2005, after employing 3 different measures of capital flight the author concluded that on the one hand that capital flight is positively related to higher external debts, higher political instability and as well as a higher budget deficit. On the other hand, the author found a significant negative effect of capital flight on growth in the respective countries in the sample. In a related study, albeit for a different region, Ndiaye (2009) examines the effect of capital flight on economic growth in the Franc Zone (FZ) area from 1970-2010. Three alternative measures of capital flight were also employed in the dynamic panel econometrics analysis used in the study and find that real capital flight from countries in this zone in sub-Saharan Africa significantly reduces economic growth. The results also confirm that domestic investment, credit to the private sector, domestic savings and the quality of institutions all play an important role in explaining the influence of capital flight on economic growth.

Olawale and Ifedayo (2015) in a study of Nigeria, investigates the impacts of capital flight on economic growth between the period of 1980 and 2012 using time series error correction model as their main estimation technique and concluded that, overall, capital flight had a negative impact on the economy. In a more recent paper, Ajayi (2014) takes a broader approach to the analysis and implications of capital flight for economic growth and development in Africa. The paper was purely descriptive and argues that capital flight undermines economic growth because of the resource gap which it exacerbates. This occurs through the ways in which capital flight undermines domestic resource mobilization effort, reduces domestic investment, reduces the tax base and ultimately leads to reduced public investment. The paper also deals with issues of poverty and inequality and pushes the analysis to the frontier of the implications of capital flight for developmental policy.

5.4.3 Capital Flight and Corruption

Evidence from the previous sections of this thesis indicates that there is rich literature on corruption and economic growth and also on the determinants of capital flight both globally and within Africa[31]. In respect to the literature on capital flight and corruption and their impacts on economic outcomes, we are not aware of any research and academic work highlighting the combined effects of corruption and capital flight on economic growth in an econometric sense. Ours will be the first in this regard. However, there are some earlier slightly related works in this respect. Empirical studies by Collier, Hoeffler and Pattillo (2004) have found a significant effect of the black-market premium on capital flight. Anecdotally, corruption has been identified as an important factor that fuels capital flight in the developing world and sub-Saharan Africa in particular. It facilitates both the illegal acquisition and the illegal transfer of private assets. Agents generally tend to find it difficult to fully internalize the costs of corruption in an environment characterized by weak governance, and would rather prefer to hold assets abroad so as to hedge against uncertainty. The only related study on corruption and capital flight that is known to us are: Le and Rishi (2006), the focus of this paper was on whether or not corruption has any effect on capital flight by comparing developing and developed countries at the same but it had less emphasis on African countries. Panel Fixed Effects was employed in the econometric analysis and the paper concludes that there exists a significant positive effect of corruption on capital flight if the other factors contributing to the causes of capital flight are held constant. The second paper is the work by Bouchet and Groslambert (2006). In a purely descriptive scenario, the authors examined the relationships between corruption,

[31] See Mauro (1995) in a seminal paper on corruption and growth, the author analyses a newly assembled data set consisting of corruption, the amount of red tape, the efficiency of the judicial system, and various categories of political stability for a cross section of countries. Corruption was found to lower investment and thereby lowering economic growth. Similarly, Gymiah-Brempong (2002) in a study of corruption, economic growth, and income inequality in Africa also found that corruption decreases economic growth directly and indirectly via decreased investment in physical capital. And as per capital flight, Ndikumana and Boyce (2011) in a study of capital flight from sub-Saharan Africa concludes that capital flight fuels external debts and ultimately leads to bad economic outcomes for SSA countries.

capital leakages and country risk. The drawbacks for both the Le and Rishi (2006) and Bouchet and Groslambert (2006) papers are many: None of the papers focused on Africa, whereas this will be our focus, the problem of endogeneity was not properly addressed in the Le and Rishi (2006) paper, the endogeneity problem is well taken care of in this chapter by our extension of the fixed effects method to GMM. We also carried out this study by the use of hitherto unavailable new data of capital flight unique to African countries (the real capital flight dataset from the Political Economy Research Institute, University of Massachusetts).

5.5 Capital Flight and Corruption: Growth Implications for SSA Countries

It is quite intuitive, and not complex to realize that capital flight process strongly depends on, and also encourages corruption. Given the vast literature that examines the links between corruption and economic growth (Mauro, 1995; Shleifer and Vishny, 1995; Sachs and Warner, 1997; and Keefer, 1995; Acemoglu, 1995; Svensson, 2005), it is imperative to wonder how the presence of capital flight may influence the relationship between corruption and growth. This study aims to address this question by jointly considering the growth implications of the two illegal phenomena. By this, we mean to examine the effect of the interaction between corruption and capital flight on growth for a panel of 25 sub-Saharan African countries from 1986 through 2010 by employing a hitherto unused new estimate of capital flight unique to Africa (The Boyce and Ndikumana dataset on capital flight). This will allow us to establish whether capital flight and corrupt activities complement or substitute each other in the growth process.

$$\boldsymbol{GDPPCG = f(\,GDPPC, COR, RKF, COR\ *RKF, INF, INV, L\,E, PO2, GOV\ EXP, OPEN\ , POP,) - 5.6}$$

The model is further operationalised by extending the traditional cross-section model into a panel data form by specifying its regression format as thus:

$$Y_{it} = \alpha + \beta_1 CORR_{it} + \beta_2 RKF_{it} + \sum_{j=1}^{m} \gamma_j\, X_{j,it} + \delta_t + \mu_i + \varepsilon_{it} \ldots 5.7$$

Additionally, I also run a set of regressions in which I include an interaction term between the corruption variable and the real capital flight variable:

$$Y_{it} = \alpha + \beta_1 CORR_{it} + \beta_2 RKF_{it} + \beta_3 (CORR * RKF)_{it} + \sum_{j=1}^{m} \gamma_j X_{j,it} + \delta_t + \mu_i + \varepsilon_{it}. \ 5.8$$

Where:

Y_{it} *is the growth rate of real per capita GDP of country i in year t*;

$CORR_{it}$ *is a measure of corruption*

RKF_{it} *is a measure of real capital flight* (2010)

$(CORR * RKF)_{it}$ *is the interaction term between corruption and real capital flight*;

$X_{j,it}$ *is a set of explanatory variables*

δ_t *is a vector of common time varying effects*

μ_i *captures unobserved time − invariant country specific effects*; *and*

ε_{it} *is the time varying error term*

By including both a measure of corruption and a measure of capital flight separately, and also by including an interactive term between the two variables, one can study the effects of both of them jointly and also independently. If, as expected, β_1 is negative, it then goes to show that corruption does indeed have a negative effect on economic growth. If β_2 turns out positive (negative), it suggests that capital flight has a positive (negative) effect on economic growth. Finally, if β_3 is negative (positive), it is suggestive of the negative effect of corruption on growth is reduced or increased by capital flight.

The estimation technique or analysis used in this study is panel or longitudinal data from 25 sub-Saharan African countries, over the period 1986 – 2010. Table one in the appendix list all the countries included in the analysis and the countries are selected based on data availability.

5.6 Estimation Strategy and Methodology

The primary aim of this paper is to investigate empirically how capital flight, on the one hand, impact economic growth, and on the other hand, how the interaction between corruption and capital flight impacts economic growth within an SSA context by employing a new capital flight data set that has not been used in this context before. Additionally, for the first time, we also incorporate the corruption variable into the determinants of capital flight in a panel setting for SSA countries. While so many papers have looked at the relationship between corruption and growth, others have also studied capital flight extensively. However, few have studied and analysed the joint effects of corruption, capital flight on growth by using our measure of capital flight. To the best of my knowledge, this paper is the first attempt at addressing this topic in the context of SSA countries. More so, we use a more up to date data set and we employ pooled Ordinary Least Square (OLS), Fixed Effect (FE), Random Effect (RE) and General Method of Moments (GMM) estimators, which is something that is lacking in much of the previous research related to this topic. The advantage of GMM is that it alleviates the endogeneity problems that other studies of this nature suffer from. In particular, the possibility that both capital flight and corruption variables may be influenced by growth. Why we also think that panel data is the best methodology for this research is because of the heterogeneous nature of the countries within SSA. According to Islam (1995), the disadvantage of cross-sectional analysis is the assumption of treating all countries in a study as if they have or face the same production function and thereby ignoring countries specific characteristics.

This study employed the estimation technique known as panel data from 25 sub-Saharan African countries and over the period of 1986 – 2010. The reasoning behind the number of years and list of countries used in this study were driven by data availability. Given that panel data is widely utilised in this thesis, and without running the risk of repetitions, further detailed discussions at this juncture will not be necessary as this was covered in the previous chapter.

Pooled (OLS) ordinary least squares model is the starting point in the analysis of panel data. It is akin to the standard ordinary least square, however, it differs in the way it is able to capture not just the variations in time or space, but the variation in both of these dimensions at the same time. The pooled OLS model, rather than testing a cross-sectional model for all countries at one point in time or testing a time series model for one country using time series data, pools and tests all countries through time. As a consequence, it helps to create reliable estimates of the parameters. Given its ability to analyse all units (firms, countries, individuals etc.) at the same time, this estimator has become prominent and central to studying comparative quantitative economics. To that extent, an accumulating body of studies in the last 10 years has utilised pooled models to provide answers to classical questions of the discipline. For more details on the subject see, the Econometric Analysis of Cross Section and Panel Data (Wooldridge, 2010), and Econometric Analysis (Greene, 2011) and Econometric Analysis of Panel Data (Baltagi, 2012).

Fixed Effect Model (FEM)

Unlike the pooled OLS, Fixed effects (FE) models take into account country-specific characteristics. It assumes that the intercept is a fixed parameter to estimate and that the intercept is cross-section specific. In the presence of cross-country heterogeneity, the (FE) is always ideal as it allows for unobserved factors that explains growth between two different countries and, therefore, leads to unbiased and efficient results. Some of the drawbacks of the FE model is that it can cost a lot of degrees of freedom by including so many dummy variables, and it has problems with computing the coefficient of time-invariant variables, such as a country dummy, as these variables are dropped in the course of transformation.

$$\boldsymbol{Y_{it} = \beta_0 + \beta_1 COR_{it} + \beta_2 LE_{it} + \beta_3 INV_{it} + \beta_4 INF_{it} + \beta_5 RKF_{it} + \beta_6 POL2_{it} + \beta_7 COR * RKF_{it} + \beta_8 GE_{it} + \beta_9 POP_{it} + \beta_{10} OPEN_{it} + \alpha_i + \mu_{it}} \text{.......}\mathbf{5.9}$$

Where Y_{it} is the GDP per capita growth and i = country and t = time, $\boldsymbol{COR_{it}}$ represents corruption index (ICRG), $\boldsymbol{LE_{it}}$ is for life expectancy, $\boldsymbol{INV_{it}}$represents investment,$\boldsymbol{RKF_{it}}$ $is\ for\ real\ capital\ flight$ $\boldsymbol{POL2_{it}}$ represents polity2, $\boldsymbol{COR * RKF_{it}}$ is the interactive term of corruption and real capital flight, $\boldsymbol{GE_{it}}$ indicates general government final consumption expenditure, $\boldsymbol{POP_{it}}$ is the population growth rate, $\boldsymbol{OPEN_{it}}$ represents a degree of external competitiveness. $\boldsymbol{\beta}$ is the coefficient for each explanatory/independent variable, $\boldsymbol{\alpha_i}$ $(i = 1 \ldots n)$ is the unknown intercept for each country (n *is* country-specific intercepts) and $\boldsymbol{u_{it}}$ is the error term.

Random Effect Model (REM)

On the other hand, the Random Effects (RE) model assumes that the intercept is a random parameter to estimate. The RE saves on degrees of freedom and produces a more efficient estimator of the slope coefficients than the FE model. The RE model is similar to the FE model, in that it postulates a different intercept for each individual, but it interprets these differing intercepts in a new way over the cross-section (Kennedy 2008). The RE model allows the parameters to vary over the cross-section (i.e. country). However, Egger (2004) note that the RE estimates are inconsistent when the regressors are correlated with the error term. Hsiao (2003) suggest that random effects (RE) models are appropriate when we consider the differences i observe in a group of countries to be representative of the total population dataset constituting all countries in the world.

$$\boldsymbol{Y_{it} = \beta_0 + \beta_1 COR_{it} + \beta_2 LE_{it} + \beta_3 INV_{it} + \beta_4 INF_{it} + \beta_5 RKF_{it} + \beta_6 POL2_{it} + \beta_7 COR * RKF_{it} + \beta_8 GE_{it} + \beta_9 POP_{it} + \beta_{10} OPEN_{it} + \alpha + \mu_{it} + \varepsilon_{it} \dots . 5.10}$$

Where: All variables are as defined in the FE section above.

Hausman test is the generally accepted way to choose between fixed and random effects, therefore, we perform this test to help me decide. The Hausman test checks a more efficient model against a less efficient, but consistent model, to make sure that the more efficient model also gives consistent results. The Hausman test tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. If they are (insignificant If P-value, Prob>chi2 larger than.05) then it is safe to use random effects. However, If you get a significant P-value, you use fixed effects. The null hypothesis is not rejected (i.e. the p-value is significant), the FE estimator is used. (Kennedy, 2008).

GMM

The final specification is the Generalised Method of Moments (GMM). This is a technique that thus far has not been used in this kind of study as it relates to SSA countries. The System GMM estimator, originally developed by Arellano and Bover (1995) permits the use of internal instruments. Because of this, several problems associated with the data, like the endogeneity of the right-hand side regressors, the presence of country fixed effects and dealing with the existence of simultaneity bias can easily be solved. This is done by combining an equation in first differences with one in levels. In the first, the first differences of the endogenous variables are instrumented by their lagged levels. Please see chapter 4 for further notes on the GMM estimator.

5.6.1 Data description and economic assumptions

This study, like most empirical research work investigating issues on developing countries, tend to almost always suffer from at least two major drawbacks: The first one is the absence of long-period data for the vast majority of developing countries. The second challenge relates to issues about the quality and reliability of the data because available data for most countries in this cohort is very limited. This invariably means that the results of such analysis should always be interpreted with some degree of caution. We were quite fortunate in that most of the sources of the data used in this study came from very reputable organisations like the World Bank, Political Risk Services (ICRG) and The Polity IV Project. The only hitherto unused data in this kind of study is our proxy for capital flight.

The dataset used in our estimations covers the time period from 1986 to 2010 and it is across 25 sub-Saharan African countries. This is because of the problem of missing values, particularly on the capital flight variable, the study coverage is scaled down to 25 countries. Priority is given to the availability of substantial data points on the capital flight, and the other variables like real exchange rate overvaluation, interest rate differentials bank credit to the private sector. Thus, countries without these are dropped to minimise 'holes' in the data and also to balance the 'trade-off' between sample size, richness and power of the explanatory variables (Barro, 2000). I follow the standard practice and construct 5 non-overlapping 5–year period averages (1986-1990,1991-1995,1996-2000,2001-2005 and 2006-2010), and this is in order to minimize business cycles effects. This ultimately implies a maximum sample size of 125 observations

Dependent Variable – Economic Growth Indicator: Without running the risk of repetition, this variable is as defined in chapter four. Other variables previously defined in chapter four will only have a mention: (**Government Consumption, Openness**, **Population, Life Expectancy, Inflation)**.

Independent Variable: Real Capital Flight: The capital flight variable is expressed as a percentage of GDP. There are different measures and estimates of capital flight known to have been developed in the literature: it ranges from the World Bank (1985) measure, Morgan Guaranty Trust (1986), and Cline (1987). However, we use none of them and rather implemented the capital flight measures from the Political Economy Research Institute at the University of Massachusetts[32], compiled by Ndikumana and Boyce. This estimate suits our purpose because they were created for African countries and also in order to minimize potential biases in narrower measures. Secondly, we also employed the hot money estimates of capital flight from the Global Financial Integrity Group as a robustness check. The [33]Global Financial Integrity data are estimates for three different measures of capital flight: Hot Money Method, Trade Mis-invoicing and the World Bank Methods.

Log of Initial GDP: This was employed to help us formalize the significance of the initial condition in our model and the logarithm (log) of GDP per capita (1986) was used.

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[32] Data are available online at www.peri.umass.edu/africa (Boyce and Ndikumana,2011)
[33] See http://www.gfintegrity.org/report/illicit-financial-flows-from-developing-countries-2004-2013/ for details.

Table 5. 2: Variables' a Priori Expectations

Independent Variables	**Expected Signs with Capital Flight**
Initial GDP Per Capita (1986)	Negative (-)
Life Expectancy	Positive (+)
Investment	Positive (+)
Inflation	Negative (-)
Real Capital Flight	Negative (-)
Polity2	Negative (-)
Corrupt*Real Capital Flight	Negative (-)
Government Expenditure	Positive (+)
Trade/Open	Positive (+)
Population Growth	Positive (+)
Corruption	Negative (-)

5.7 Results

We begin by pursuing a more formal analysis of the importance of these variables in influencing economic growth, both independently of each other and jointly through their interaction in this section by first estimating equation (5.8) with pooled OLS and thereafter both fixed effects and random effects were implemented. A Hausman test was carried out and the result suggests that random effects should be implemented. And to also account for potential endogeneity of the right-side variables, system and difference GMM were implemented. The results are reported in Tables 5.5 to 5.6 respectively.

With respect to our variables of interest, and confirming past studies, we find that overall, the results from the Pooled OLS and Random Effects estimations point towards a significant negative effect of corruption on economic growth at the 5% level of significance, albeit one that is sensitive to the control variables employed. This result is in line with much of the previous literature where it is generally found that corruption has a negative effect on economic growth (Mauro 1995;1997; Tanzi and Davoodi 1997; Wei 2000; Mo 2001; Gyimah Brempong 2002). On the other hand, the result for capital flight is largely positive in all the regressions. Suggesting that capital flight on its own is positively related to economic growth. This positive result of capital flight is quite surprising as it did not conform to our a priori expectations. One plausible explanation of this positive effect, we think, could be attributed to the likelihood that capital flight can sometimes return to the region as part of foreign direct investment after many years. However, the coefficient on the interactive term(β_2) of corruption and real capital flight is negative and statistically significant at 5% level in both pooled OLS and Random Effects estimations. This result confirms our hypothesis that the combined presence of both corruption and capital flight in the economies of countries in our sample are debilitating for economic growth. It also confirms what we think is very important, that the negative impact of capital flight on economic growth is driven by the nature of corruption within the region. The nature of corruption in SSA is majorly driven by big-time political players about

Furthermore, the results for the other control variables from our pooled OLS and Random Effects estimations show that there is a conditional income convergence, a strong and negative statistically significant effect of inflation on economic growth, a positive statistically significant effect of investment on economic growth. The coefficient on population growth is found to be positive but not statistically significant. The coefficient for the polity2 variable is found to be positive and statistically significant at the 5% level. On the other hand, the coefficients on human capital or education (Life Expectancy) are largely insignificant but positive in all regressions and negative in one. This result has been confirmed in previous economic growth literature at cross country level (Benhabib and Spiegel, 1994). This result may be partly due to the specific measure of human capital (life expectancy) employed in this study or the nature and distorted structural composition of the labour force and the inefficient allocation of human capital across sectors in sub-Saharan African countries.

To get a better understanding and insight of our preliminary findings, we now progress to discuss the estimation results from the system- and difference-GMM regressions. Results for GMM regressions are presented in Tables (5.6-5.7) for all the regressions. For all regressions, the Hansen test statistics was insignificant and this means that we can reject the null hypothesis of the endogenous instruments. Similarly, the results from the Arellano Bond (1991) test show that there is no serial correlation. As such the results reported are free from endogeneity and serial correlation.

With respect to the results from our GMM estimations, overall, we can see that our conjecture and hypothesis is supported in every case. The coefficients on corruption are strongly negative and statistically significant at the 1% level in most cases and while the coefficients on the interactive term $Corruption * RKF$ is negative all through the regressions and also statistically significant mostly at the 1% level. This again clearly shows that both types of illegal phenomena have an economic growth-inhibiting effect for countries within sub-Saharan Africa. The results point towards the importance of having a better understanding of the nature and ways in which capital flight and corruption combine to undermine economic growth in SSA countries as this will help with ensuring that governments pursue the right policies to curb capital flight and corruption and encourage sustainable and inclusive growth.

As it patterns to the other control variables from the GMM results, we find the coefficients for the initial GDP to be all negative, and columns 1 and 2 to be statistically significant at both 10% and 1% levels of significance respectively. A negative coefficient of the log initial GDP is normally taken as evidence in the literature of convergence, where poorer countries are catching up with richer countries and this is conditional on other covariates. (see Bhattarai (2004); Barro (1990)). As per the coefficient on our human capital proxy (Life Expectancy) are largely positive in all regressions and insignificant but significant at 5% in column 2 and negative in column 1. The coefficient of the growth rate of the population is positive but remain insignificant. However, the coefficients for both investment and inflation are strongly positive and negative respectively but they remain largely statistically significant at the 1% levels each. Our polity2, final government consumption and trade/open variables all have the right signs. Both the coefficient of polity2 and final government consumption are statistically significant at the 1% and 5% levels respectively.

5.7.1 Robustness Checks

Having found strong support for our thesis thus far, this section will test the robustness of our main results under different specifications. The study undertook two robustness checks. In the first instance, the analysis checks whether the results obtained are sensitive to changes in the period of estimation and by ignoring the business cycle and taking averages over time. To this end, equation (5.8) is re-estimated by using an average of the sample period 1996 to 2010. The sample period under consideration is influenced by the non-availability of data on our new alternative measure of corruption. The results are reported in Table 5.8. Once again, the results obtained are quite similar to our main results with the exception that this time the coefficients for the real capital flight variable is largely negative and significant at the 1% level. If anything, this result is a further confirmation that capital flight has a negative and significant effect on economic growth from our sample of countries in SSA. This implies that capital flight poses a big threat to sustainable economic development in sub-Saharan African countries. The results also confirm previous empirical work on capital flight and economic growth (see Gusarova (2009); Ndiaye (2010) and Boyce and Ndikumana (2011)). However, the only exception to this result is column (2) when capital flight first entered the model. Like in our previous results from (POLS, RE and GMM), capital flight retained a positive and significant effect on economic growth. Secondly, the equations are re-estimated to examine whether the results are sensitive to change in the corruption variable. To this end, the analysis implemented the control of corruption (CC) variable from the World *Governance Indicators* (WGI) database in place of the earlier used ICRG corruption variable. In summary, the results are very robust and corroborate the thesis that capital flight and corruption have a similar effect on economic growth, like in our main results.

Table 5. 3: Summary Statistics of the Main Variables

VARIABLES	(1) Obs	(2) Mean	(3) St.	(4) Min	(5) Max
GDP p.c.growth	125	0.811	3.050	-10.48	8.892
Real Capital Flight(2010)	125	927.5	3,088	-11,114	27,338
Government Exp.	124	14.15	6.364	5.565	42.51
Life Expectancy	125	51.46	5.789	36.12	63.28
Trade/Open(%GDP)	125	62.37	26.41	13.38	150.2
Investment(%GDP)	125	17.68	6.444	3.063	34.52
Population Growth (%)	125	2.633	0.784	-0.580	5.275
Inflation (% GDP)	125	100.7	647.2	-5.111	7,034
Polity2	125	-0.976	5.122	-9	9
Corruption (ICRG)	125	4.069	1.679	0	8.774

Notes: Data on GDP per capita growth, Inflation, Government Expenditure, Life Expectancy, Trade/Open, Investment and Population Growth are all taken from the World Development Indicators Dataset of the World Bank (2015). For these variables, summary statistics are based on average data for the period 1986-2010. Data on Real Capital Flight are taken from the Boyce and Ndikumana dataset at the Political Economy Research Institute, University of Massachusetts, USA. The Polity2 variable is taken from the Polity IV Project.

Table 5. 4: Correlation Matrix for all the important Variables

	GDP pc grow	Log initial G	Investment	Inflation	Life Expecta	LogCorruptio	Real KF	Population	Gov't Exp	Trade/Open	Polity2
GDP pc growth	1										
Log Initial GDP	-0.0509	1									
	0.5726										
Investment	0.2695	0.2594	1								
	0.0024	0.0035									
Inflation	-3668	-0.0507	-0.145	1							
	0	0.5747	0.1066								
Life Expectancy	0.1616	0.4891	0.4513	-0.1333	1						
	0.0717	0	0	0.1383							
LogCorruption	-0.1034	0.0189	0.1767	-0.0353	-0.0093	1					
	0.2572	0.836	0.0515	0.6993	0.9194						
Real Capital Flight	0.1683	0.0149	-0.1747	0.0011	-0.0312	-0.1261	1				
	0.0606	0.8688	0.0513	0.9903	0.7298	0.1662					
Population Growth	0.0635	-0.1375	0.0867	0.1287	0.2003	0.1947	0.0433	1			
	0.4819	0.1264	0.3362	0.1525	0.0251	0.0317	0.6312				
Gov't Expenditure	0.0392	0.2473	0.3439	0.0841	-0.0132	0.3099	-0.0413	0.0246	1		
	0.6658	0.0056	0.0001	0.3533	0.884	0.0005	0.6489	0.7864			
Trade/Open	0.0602	0.3775	0.3027	0.0076	0.0857	-0.0353	0.0386	-0.1323	0.4122	1	
	0.5048	0	0.0006	0.9328	0.342	0.6998	0.6692	0.1415	0		
Polity2	0.223	0.0246	0.0771	-0.0217	0.1444	0.0383	0.0255	-0.1977	0.0715	0.1381	1
	0.0124	0.7854	0.3927	0.81	0.1081	0.6757	0.778	0.0271	0.4299	0.1247	

Table 5. 5: Capital Flight and Corruption: Growth implication for sub-Saharan Africa (SSA), 1986-2010, Panel Data

GDP Growth=DV VARIABLES	(1) **POLS**	(2) **RE**	(3) **RE**	(4) **RE**	(5) **RE**	(6) **RE**
Log Initial GDP pc86	-0.341	-0.666	-0.645	-0.484	-0.453	-0.623
	(0.379)	(0.442)	(0.421)	(0.437)	(0.439)	(0.486)
Life Expectancy	-0.0129	0.0793	0.0622	0.0798	0.0641	0.0611
	(0.0592)	(0.0592)	(0.0583)	(0.0576)	(0.0577)	(0.0632)
Investment	0.0981**	0.0988**	0.112**	0.0935**	0.0942**	0.0746
	(0.0473)	(0.0442)	(0.0440)	(0.0434)	(0.0427)	(0.0479)
Inflation	-0.00463***	-0.00487***	-0.00470***	-0.00476***	-0.00486***	-0.00559***
	(0.00166)	(0.00147)	(0.00146)	(0.00142)	(0.00139)	(0.00158)
Real Capital Flight(RKF)	0.000514**		0.000157**	0.000617***	0.000585***	0.000554***
	(0.000214)		(7.68e-05)	(0.000202)	(0.000199)	(0.000202)
Polity2	0.114**				0.101**	0.0926*
	(0.0486)				(0.0472)	(0.0498)
Corruption*RKF	-0.000114*			-0.000153**	-0.000145**	-0.000136**
	(6.73e-05)			(6.17e-05)	(6.06e-05)	(6.15e-05)
Gov't Exp	0.0817					0.0254
	(0.0496)					(0.0566)
Trade/Open	-0.00231					0.0153
	(0.0108)					(0.0127)
Population Growth	0.326					0.150
	(0.351)					(0.324)
Log Corruption(ICRG)	-0.976	-1.496**	-1.396**	-0.776	-0.617	-0.670
	(0.711)	(0.642)	(0.632)	(0.679)	(0.674)	(0.743)
Constant	1.649	1.408	1.640	-0.656	-0.166	-0.241
	(2.648)	(3.167)	(3.046)	(3.194)	(3.203)	(3.234)
Observations	121	122	122	122	122	121
R-squared	0.247					
Number of id		25	25	25	25	25

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

Table 5. 6: Capital Flight and Corruption: Growth implication for sub-Saharan Africa (SSA), 1986-2010, Panel data (GMM)

GDP Growth=DV VARIABLES	(1) **2S SGMM**	(2) **2S SGMM**	(3) **2S SGMM**	(4) **2S SGMM**	(5) **2S SGMM**	(6) **1S SGMM**
Log initial GDP pc86	-0.316**	-0.737***	-0.263	-0.615	-1.102	-0.388
	(0.158)	(0.131)	(0.222)	(0.479)	(0.925)	(0.294)
Life Expectancy	-0.00536	0.149**	0.0596	0.0696	0.0462	-0.0148
	(0.0207)	(0.0684)	(0.0390)	(0.0469)	(0.0820)	(0.0463)
Investment	0.179***	0.109***	0.159***	0.186***	0.206***	0.102***
	(0.0108)	(0.0148)	(0.0254)	(0.0489)	(0.0635)	(0.0369)
Inflation	-0.00379***	-0.00149***	-0.00389***	-0.00428***	-0.00736***	-0.00460***
	(0.000198)	(3.37e-05)	(0.000571)	(0.000963)	(0.00172)	(0.00130)
Real Capital Flight(RKF2010)		0.000191***	0.000386***	0.000357***	0.000264*	0.000458***
		(1.47e-05)	(4.26e-05)	(7.68e-05)	(0.000136)	(0.000167)
Corruption*RKF(2010)			-7.56e-05***	-7.13e-05***	-4.95e-05	-9.47e-05*
			(8.97e-06)	(1.87e-05)	(3.51e-05)	(5.22e-05)
Log corruption(ICRG)	-2.299***		-1.714***	-1.743***	-2.037**	-1.088**
	(0.148)		(0.492)	(0.616)	(0.826)	(0.550)
Polity2				0.0818	0.110	0.112***
				(0.0555)	(0.0693)	(0.0381)
Gov't Exp.					0.0723	0.0802**
					(0.0448)	(0.0388)
Trade/Open					0.0185	-0.00161
					(0.0166)	(0.00840)
Population Growth					0.167	0.333
					(0.695)	(0.275)
Constant	3.281**	-4.159	-0.634	0.960	3.190	2.047
	(1.482)	(2.795)	(2.199)	(3.516)	(7.345)	(2.046)
Observations	122	125	122	122	121	121

Table 5. 7: Robustness Checks to Alternative Measure of Corruption (CC). Capital Flight and Corruption: Growth implication

GDP Growth=DV VARIABLES	(1) **2SGMM**	(2) **2SGMM**	(3) **2SGMM**	(4) **2SGMM**	(5) **2SGMM**	(6) **1SGMM**
Initial GDP pc96	-0.00195***	-0.00159***	-0.00102**	-0.00138**	-0.000944	-0.000303
	(0.000479)	(0.000466)	(0.000474)	(0.000594)	(0.000796)	(0.000305)
Life Expectancy	-0.0278	0.122**	0.138**	0.0425	0.0847	-0.00738
	(0.0832)	(0.0581)	(0.0641)	(0.0750)	(0.134)	(0.0634)
Investment	0.172**	0.0647*	0.0347	0.0696**	0.0346	0.0239
	(0.0685)	(0.0352)	(0.0256)	(0.0281)	(0.0719)	(0.0482)
Inflation	-0.00697***	-0.00189**	-0.00261***	-0.00299***	-0.00309	-0.00344**
	(0.000944)	(0.000927)	(0.000943)	(0.00107)	(0.00197)	(0.00142)
Real Capital Flight(RKF)		0.000159***	-9.61e-05**	-5.81e-05	-0.000192***	-0.000111
		(1.51e-05)	(4.69e-05)	(5.25e-05)	(6.88e-05)	(9.20e-05)
Corruption(CC)	-4.893***	-0.575**	0.0727	0.776	1.399*	0.761
	(0.205)	(0.277)	(0.348)	(0.489)	(0.792)	(0.729)
Corruption*RKF			-0.000339***	-0.000322***	-0.000404***	-0.000353***
			(3.33e-05)	(4.83e-05)	(4.97e-05)	(9.61e-05)
Polity2				0.0534	0.000652	0.0218
				(0.0525)	(0.0405)	(0.0604)
Gov't Exp					-0.0164	0.0587
					(0.127)	(0.0539)
Trade/Open					0.0145	0.0130
					(0.00995)	(0.00907)
Population Growth					2.278***	2.012***
					(0.731)	(0.362)
Constant	-2.350	-5.030**	-5.439**	-0.274	-7.710	-4.363
	(4.128)	(2.549)	(2.532)	(2.950)	(5.843)	(3.302)
Observations	75	75	75	75	74	74
Number of id	25	25	25	25	25	25

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

Table 5. 8 :Robustness Check To A Different Estimation (Diff-GMM)

GDP Growth=DV	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	**Diff-GMM**	**Diff-GMM**	**Diff-GMM**	**Diff-GMM**	**Diff-GMM**	**1S SGMM**
Lag RKF	0.460***	0.139***	0.136***	0.0876	-0.00711	0.384***
	(0.0365)	(0.0453)	(0.0452)	(0.0641)	(0.0975)	(0.0755)
GDP Per Capita	-1.610***	-3.241***	-3.107***	-4.696***	-10.77***	-9.307***
	(0.286)	(0.325)	(0.331)	(0.474)	(0.987)	(0.885)
Log Corruption(ICRG)	488.1	331.3	231.3	609.9	-2,755	867.5
	(491.6)	(526.9)	(542.4)	(1,051)	(2,926)	(1,383)
Log Inflation		209.4	180.2	648.4*	547.6	1,531**
		(139.4)	(139.5)	(344.6)	(872.3)	(606.7)
Log FDI	249.0***	219.2**	249.7**	679.2***	2,590***	3,391***
	(89.98)	(97.65)	(101.5)	(262.3)	(779.0)	(526.8)
Polity2			24.82	-50.04	-734.2	-337.4*
			(44.62)	(91.11)	(687.4)	(195.9)
Log Debt			176.1	-181.7	-360.6	1,163*
			(206.7)	(381.5)	(1,085)	(691.2)
Interest Rate Differential				-16.99	38.10	165.6**
				(28.88)	(124.9)	(65.50)
Real Exchange Rate				-10.74	3.892	0.544
				(7.422)	(20.04)	(12.48)
Bank Credit to Private Sector((dcpsb)					567.6***	509.9***
					(174.1)	(60.01)
Budget Deficit					339.0	784.4***
					(395.7)	(265.5)
Constant						-67,544***
						(11,198)
Observations	452	385	381	173	65	83
Number of id	25	25	25	12	8	9

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

5.8 Portfolio Choice Theory of Asset Allocation

The introduction section and the literature review in this chapter provided reasonable a priori evidence of a high level of capital flight and corruption in SSA. However, in this section, we adopt a standard portfolio choice framework first derived by Zak and Le (2006), similar to the works of Le and Rishi (2006), Collier *et al*, (2001) and Sheets (1995) so as to further explore in greater details the effects of corruption on capital flight within sub-Saharan Africa. Based on this model, capital flight takes place in response to a deteriorating domestic economic climate where the risk-adjusted rate of returns to investment is unfavourable. In what follows, we first elaborate on the theoretical work linking capital flight to portfolio choice. We then identify corruption as a risk that influences domestic investment climate, and hence the decision of economic agents on whether or not to engage in capital flight. It is generally accepted that poor governance fuelled by political instability can be a great contributor to a domestic environment that discourages investment and encourages capital flight. We know from the work of Tornell and Velasco (1992) and also Bhattacharya (1999) proposed a framework that examined a link between political instability and capital flight, however, to the best of knowledge empirical research on the role of corruption on capital flight is somewhat scant. Hermes and Lensink (2000), Le & Zak (2006) in a large study, identified some factors related to political risk, *ceteris paribus,* to be statistically significant causes of capital flight. In this section, we seek to add more insights to the existing literature through testing empirically the relationship between corruption and capital flight. We do so by focusing exclusively on the existence of corruption as just one aspect of poor institutional governance in SSA. Our main research question in this section is: ***"holding other determinants of capital flight constant, is there a significant association between corruption and capital flight in SSA"?***

5.9. Portfolio Choice Theoretical Framework

Several relevant theses have been advanced by past literature as the rationale for capital flight, however, in this chapter, we follow Le and Zak (2006) and employ a model of "portfolio choice framework of asset allocation" first used by Sheets (1995), and subsequently by Collier *et al*. (2001) and Ali and Walters (2011) to help us explain the role of corruption in the capital flight process in SSA countries. Sheets (1995) using a portfolio-choice framework of asset allocation, presents a theoretical model in which capital flight is determined by risk diversification motive with one important incentive like the rate of return differential on investments and relative risk incentive. The incentive, in this case, relates to factors that adversely impact the macroeconomic environment, and as a result, reduce the risk-adjusted returns to domestic investments.

In other words, capital flight would be driven by the difference between the rate of return to investment abroad and in the domestic market. Given that private wealth holders are concerned about the real returns on their investments, the rate of return differential between foreign and domestic assets is considered an important determinant of portfolio decisions. The relative return to investment is captured by the interest rate differential with the expected coefficient being positive since a higher real interest rate differential encourages economic agents from SSA to hold their wealth in foreign assets. The higher the differential, the higher the proportion of portfolio held abroad.

We incorporate the important fact, as documented in the literature, that capital flight tends to persist over time so that countries with high capital flight in the past and present tend to have a high capital flight in the future (Ndikumana and Boyce, 2003, 2011b; Ndikumana et al., 2015). This suggests modelling capital flight as a dynamic process where current capital flight depends on its lags. The specification of the empirical model is motivated by the goal of this study which is to examine the relationship between corruption and capital flight, for this purpose, we include corruption as an explanatory factor of capital flight. The empirical capital flight equation is therefore specified as follows:

$$\boldsymbol{CF_{it} = \beta_0 + risk_{it}\beta' + \gamma return_{it} + \omega Y_{it} + \delta_t + \mu_i + \varepsilon_{it}} \text{--------}\textbf{(5.11)}$$

where: $\boldsymbol{CF_{it}\ stands\ for\ Capital\ Flight\ as\ a\ percentage\ of\ GDP}$.

$\boldsymbol{risk_{it}\ vector\ contains\ distortionary\ policy\ indicators}$.

$\boldsymbol{\gamma return_{it}\ is\ a\ measure\ that\ captures\ the\ rate\ of\ return\ differentials}$.

Y_{it} ***denotes control for the overal level of economic development(i.e. GDP per capita***

δ_t ***is a vector of common time varying effects.***

μ_i ***captures unobserved time − invariant country specific effects; and***

ε_{it} ***is the time varying error term***

5.10 Empirical Strategy (Data, Panel Data, GMM)

Dependent Variable

We use capital flight as our dependent variable and it is expressed as a percentage of GDP. There are different measures of capital flight known to have been used in past studies: it ranges from the World Bank method, developed in 1985; Morgan Guaranty Trust method, developed in 1986, and the Cline method, developed in 1987. We use the capital flight measures from the Political Economy Research Institute at the University of Massachusetts[34], compiled by Ndikumana and Boyce. This estimate suits our purpose because they were created for African countries and also to minimize potential biases in narrower measures. Secondly, we also employed the hot money estimates of capital flight from the Global Financial Integrity Group as a robustness check. The [35]Global Financial Integrity data are estimates for three different measures of capital flight: Hot Money Method, Trade Mis-invoicing and the World Bank Methods.

Other Control Variables

As common in the economic literature, high variations in variables like real interest rates (INT), real exchange rates (EXR), and inflation rates (INF) are clear indications of economic risk. This view is supported by the work of De Gregoria (1993) who maintain that macroeconomic and monetary uncertainty is usually indicated by high variance in real interest rates and inflation rates. Therefore, we expect the signs of the above variables to

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[34] Data are available online at www.peri.umass.edu/africa (Boyce and Ndikumana,2011)

[35] See http://www.gfintegrity.org/report/illicit-financial-flows-from-developing-countries-2004-2013/ for details.

be positive in our regression analysis. Furthermore, Adji *et al*. (1997) also find that the return on investment is grossly reduced when the exchange rate appreciates. Therefore, as a key indicator of market distortions, the variance of the exchange rates variable is hypothesized to have a positive association with capital flight.

Corruption: Our main variable of interest, which is corruption is very hard to measure. This is partly because corrupt activities are quite opaque by nature. Some authors focusing on the individual country study have used court cases or the numbers of actual prosecutions in a region or country as proxies for corruption. However, we do not use this type of data as a measure of corruption mainly because it will not be ideal for empirical cross-country studies like this and besides, such data may only be an indication of how good or bad the judicial system is and is nothing to do with corruption. Like other recent researchers, we use the ICRG measure of corruption that is perception-based and also subjective. However, the reason for using it is motivated by the fact that its coverages include more countries and longer time period across the globe. To that extent, it is therefore suited for cross country studies.

As mentioned earlier, corruption is only one aspect of poor governance. To help us test a broader measure of governance, we also employ the Polity2 variable, which is part of the Polity IV Project, as an additional control variable or regressor. In terms of scores, a score of -10(strongly autocratic) and a score of +10(strongly democratic).

GDP Per Capita: This variable was extracted from the *World Bank Development Indicators of the World Bank*. Higher GDP per capita represents a sign of economic progress and development. It also indicates a high return on domestic investment. Therefore, this variable ought to reduce capital flight as private investors will now be more interested in investing in the domestic market as a result of the expected higher return on investment. A negative sign is expected between capital flight and higher economic growth (Ndikumana and Boyce 2008).

Inflation: This is measured as a percentage change in the consumer price index and it is one of the most important macroeconomic variables that influence capital flight. The data is constructed from the World Development Indicators. A positive relationship is expected between capital flight and inflation, and this is so because high expected inflation would consequently lead to a high reduction in the values of domestic assets when compared to assets held abroad.

Interest Rate Differentials: This is defined and estimated as the US risk-free interest rate minus the domestic interest. This is proxied by the difference in the domestic country's interest rate and U.S. interest rate. This variable is taken from the World Development Indicator (2015) and computed by the author. This would help test the conventional portfolio choice theory assumption that implies that capital flight is driven by higher world interest rates relative to domestic interest rates. A positive relationship is expected between interest rate differentials and capital flight

Polity2: This variable is expected to be negatively correlated with capital flight. However, the relationship can be both ways as political stability, on one hand, reduces capital flight and on the other hand, political instability increases capital flight.

Debt: This is total debt and is taken from the World Development Indicators. It is expected to have a positive relationship with capital flight. Empirical research work by Ndikumana and Boyce (2011) shows that increased foreign borrowing is positively related to capital flight. This can also increase the likelihood of debt crises and thereby worsening the country(s) macroeconomic conditions and investment environment.

Past Capital Flight: This is also sourced from the Boyce and Ndikumana dataset on capital flight (2011). The expected relationship with capital flight is positive. Many empirical studies have reported positive results between past capital flight and real capital flight (Murinde, 2014; Vos 1992), and it tends to persist over time and thereby suggestive of habit formation as private actors gain more experience in capital flight operations.

FDI: This is also known as Foreign Direct Investment and it is included in the study to find out how, and if at all FDI have any effect on capital flight.

Table 5. 9: Variables' a Priori Expectations

Independent Variables	**Expected Signs with Capital Flight**
Past Capital Flight	Positive (+)
GDP Per Capita	Negative (-)
Corruption	Positive (+)
Foreign Direct investment	Positive (+)
Inflation	Positive (+)
Polity2	Negative (-)
Debt	Positive (+)
Interest Rate Differential	Positive (+)
Real Exchange Rate	Positive (+)
Bank credit to Private Sector	Negative (-)
Budget Deficit	Positive (+)

5.11 Empirical Results on Capital Flight

This section presents the results of the empirical analysis on the determinants of capital flight in 25 sub-Saharan African countries based on pooled OLS, Random Effects and GMM models over 1986 to 2010 period. Tables 5.11 to 5.12 contain the results of the three models.

Initially, we estimated all the equations with pooled OLS and then implemented two types of estimator controlling for country-specific effects :(a) fixed effects estimator takes into account that there may be omitted individual country effects that are possibly correlated with the factors explicitly included in the equation and treats these omitted factors as constant; and (b) the random effects estimator, it assumes that any potentially omitted country-specific factors are uncorrelated with those included in the model. We then implemented the Hausman test to choose between the two estimators. The null hypothesis is that the coefficients obtained from the efficient random effects estimator are not different from the ones estimated by the consistent fixed effects estimator. If they are (insignificant p-value, prob>chi2 larger than 0.05), then it is safe to use the random effects. From the test results, we confirm the appropriateness of the random effects model for all the equations across our sample of countries.

Table 5.11 presents our preliminary results from both pooled OLS and Random Effects after controlling for the level of economic development (GDP per capita) and other macroeconomic instability (log of inflation and exchange rate overvaluation) and rate of returns differentials that aided us in testing the portfolio choice hypothesis. In all the specifications in pooled OLS and Random Effects results, the coefficients of GDP per capita have the right negative sign and it is highly statistically significant at the 1% level in the 2 final results of pooled OLS and Random Effect. Implying that the higher the level of economic development in countries within our sample in SSA, the less the incentives for capital flight to occur. This result is in line with economic intuition and much of the literature. It supports the empirical evidence provided by Beja (2006), who found that countries unable to improve economic growth because of weak macroeconomic policies or inefficient economic sectors will discourage investors and can ultimately lead to conditions conducive for capital flight. Turning to our debt variable, the coefficient shows the expected positive sign in all the regressions but only strongly statistically positive in the last 2 full sample results for both pooled OLS and Random Effect. This result indicates that increased total debt either through external borrowing or otherwise provide the fuel and motive for capital flight In SSA countries. It may also reflect the relative riskiness of the economies of the sub-Saharan African countries in our sample. This result is similar to Collier *et al*. (2001) and Boyce and Ndikumana (2008), who found that higher levels of indebtedness are linked to increased capital flight.

The result for the real exchange overvaluation variable as expected from the literature, have the right positive sign but it is not statistically significant even at the 10% level in all the regressions. Generally, a positive and statistically significant result of an overvaluation of a country's exchange rate can lead to capital flight. This is because when a nation's currency is overvalued, there is a certain expectation that the currency will depreciate in the future, and this induces the private investors or savers to shift their portfolio compositions in favour of foreign assets. Empirical examples from previous studies are in Ngeno (2000), Ajayi (1992). On the other hand, the interest rate return differential (This is the return differentials between each country's interest rate and the stable U.S. interest rate), the coefficient is positive and strongly statistically significant at the 1% level for both regressions in OLS and Random Effect. This result concurs with Sheets (1995) and Ajayi (1992), who both found that return differential can act as an incentive for capital flight when the return on domestic instruments is low relative to the world's, then foreign assets can become highly attractive options for domestic economic agents.

The result for net foreign direct investment (FDI) represents a motive for capital flight for both pooled OLS and Random Effect results, and this is because the coefficient on FDI is positive and significant at the 1% level across all the regressions. Implicitly, this connotes that some of the dollars associated with FDI inflow to SSA countries may likely end up as capital flight. The result suggests that governments should pay more attention to FDI and ensure that FDI benefits their economies. These results are consistent with the results of Chunhachinda and Sirodum (2003).

For our main variable of interest, ***corruption,*** in all the specifications in pooled OLS and Random Effects(except with specifications 4 and 5 in RE) results, the coefficient has the right positive sign but it is not statistically significant even at the conventional level. This could well be because of the nature of the estimator at this stage. Pooled OLS and Random Effect are not known to be the best estimation methods because of their limitation and tendency to bias results (especially pooled OLS). A priori expectation is a positive and statistically significant coefficient and therefore mean that the higher the level of corruption the higher the incentives for capital flight to occur.

Consistent with other empirical studies (Ajayi (1992)), Boyce and Ndikumana (2003) and Lawanson (2007), the budget deficit variable has a positive sign in both RE and OLS, however, it is statistically significant in RE at the 10% level but not in OLS. The positive sign suggests that a large government deficit may prompt capital flight. This highlights the motivation of investors to move capital abroad to escape future taxation directly and indirectly via the monetisation of deficits. The result also implies that fiscal mismanagement, and the need for future fiscal adjustment either through formal taxation or inflationary financing clearly reflects the risks associated with the domestic policy environment.

Another important institutional variable is polity2 and the coefficient is negative and statistically significant at the 1% level of significance at both pooled OLS and RE models. This result is consistent with the expected sign and this implies that in the context of governance and institution, emphasis on good governance and strong institution within SSA countries will lead to a fall in capital flight. On the other hand, if less emphasis is put on building good governance and strong institution, capital flight will likely persist.

The results for our measure of financial development, which is proxied by the ratio of bank credit to the private sector is positive in both pooled OLS and RE and statistically significant at the 1% level of significance. This result indicates a positive impact of financial development on capital flight and therefore supports the presumption that the development of the financial system, and the ease of conducting a transaction that accompanies it, may facilitate the export of capital.

Table 5.12 reports the results of our system GMM estimation, and with respect to our main variable of interest, the coefficient of the ***corruption*** variable is positive and statistically significant at the 5% and 1% levels of significance for both the final system GMM and difference GMM specifications respectively. However, specifications 1, 3 and 4 do not have the expected right signs but the final 2 full specifications are positive. This implies that corruption is positively associated with capital flight from sub-Saharan African countries in our study. In practice, this means that corruption is an important factor affecting capital flight from these countries. Put differently, it leads to a higher level of capital flight because of the way corruption affects it. This is not entirely surprising, given that in an environment of poor governance and weak accountability, the private economic agent cannot fully internalize the costs of corruption and may choose to hedge against uncertainty by holding assets abroad. This result is consistent with an earlier empirical work of Le and Rishi (2006) who reported a positive effect of corruption on capital flight for a study of 69 countries involving both developed and developing countries.

Looking at the other institutional variable of polity2, the results confirm our earlier finding in our pooled OLS and RE of the negative and statistically significant effect of governance and political stability on capital flight. This result which showed that polity2 is negative and statistically significant at the 1% level implies that poor political stability proxied by the polity2 variable is associated with higher capital flight. Conversely, positive political stability will lead to less capital flight from our sample of countries.

With respect to the other control variables, the FDI variable is positive and statistically significant at the 1% level in all the regressions. This result implies that FDI is associated with a higher outflow of capital flight from sub-Saharan African countries. The reason for this result and interpretation could be because of the nature of most FDI to sub-Saharan African, which most often than not is mostly connected to natural resources exploitation with little or no forward and backward linkages with the wider economy. The result for our main measure of economic development (per capita GDP) reports a strongly negative and statistically significant effect at the 1% level of significance. These results imply that economic growth is an important factor to explain capital flight from SSA member countries. Although in the literature, capital flight may directly undermine economic growth via several channels (see Erbe (1985), Cuddington (1986), Ajayi (1997), Schneider (1991), Williamson (1987) and Dooley *et al*. (1994). This outflow of capital can be activated by both private sectors and government officials. Since investment return is higher in advanced countries, private sectors are interested to invest their additional money in the advanced economy. On the other hand, a corrupt government official may also embezzle public money through money laundering. These results confirm the findings of Murinde, Hermes and Lesink (1996).

Economic growth: As expected, the coefficient of GDP per capita variable has a negative sign, which is statistically significant. This result concurs with the findings of Ajayi (1992) and contradicts the findings of Ngeno (2000), who found the coefficient to be positive and significant. This empirical finding provides some support for the hypothesis that capital flight is higher when a country's rate of economic growth is low. This implies that low economic growth is an indication of low profitability of domestic investment, and therefore capital will tend to flee the country.

The coefficient on the inflation rate variable has a positive sign and this is in conformity with the theoretical expectation. The coefficient is also statistically significant and this result concurs with the findings of Pastor (1990), Olopoenia (2000) and Okit (2000). The result suggests that capital flight over the period may have resulted from the high and rising inflation rates in the country that led to erosion of the real values of assets denominated in domestic currency terms. This may have forced individuals to reduce real holding of the domestic currency in order to protect themselves against inflation tax. Part of their assets holdings is directed to domestic real assets, while the other part finds its way to real investment or deposit abroad. Therefore, empirical evidence supports the hypothesis that high inflation makes assets denominated in domestic currency less attractive compared to those denominated in foreign currency.

Inflation is positively and significantly related to capital flight in the full sample. The results suggest that high inflation erodes the real value of domestic assets, which induces residents to hold assets outside the continent. High inflation may also signal future exchange rate depreciation, which also increases capital flight.

Debts: The results confirm that increased total debt either through external borrowing or otherwise, provides the fuel and motive for capital flight as the coefficient on debt is positive and significant at the 1% level. In all models, the estimated coefficients of total debt are from approximately 95 to 98 per cent, which means that the majority of a dollar of total debt in SSA countries will end up as capital flight. The results also suggest that governments within the region are responsible for ensuring that borrowings benefit their economies and not for the funds end up enriching few individuals. This finding is in line with Boyce and Ndikumana (2002) for sub-Saharan African countries and Beja (2007) for Indonesia, Malaysia and Thailand.

As theoretically expected, the coefficient on the debt variable has a positive sign and which is statistically significant. The result concurs with the findings of Boyce and Ndikumana (2002). This empirical finding implies that the growing foreign debts in the country may increase expectations about exchange rate depreciation and an increase in taxation, which provides a stimulus to hold foreign assets. Finally, we find a consistently positive and significant impact of total debt, suggesting that increased borrowing may fuel capital flight. This finding is consistent with the literature (Ndikumana and Boyce (2003, 2011)).

Interest Rate Differentials:
The coefficient of interest rate differential variable has a positive sign and it is statistically significant. This result concurs with the findings of Ngeno (2000) and Ajayi (1992) that found the coefficient to be positive and statistically significant. The positive sign implies that if financial markets are liberalised, and international capital movement is deregulated then domestic capital may be expected to flow abroad as long as risk-adjusted returns are higher elsewhere. On the other hand, a negative and statistically significant result will have the opposite effect on capital flight. Furthermore, the rate of return differential statistically significant positive effect on capital flight also implies that capital flight may be expected to flow abroad as the risk-adjusted rate of return is higher elsewhere. This result is also in support of the conventional portfolio choice theory assumption that capital flight in SSA countries is driven by higher and stable world interest rates relative to the domestic interest rates.

Real Exchange Rate:
The coefficient on the real exchange rate has the expected positive sign, which is statistically significant. This result concurs with Ngeno (2000) and Ajayi (1992). The result suggests that

the overvaluation of the exchange rate leads to capital flight. When a nation's currency is overvalued, there is an expectation that the currency will depreciate in the future, and this induces the private investors or savers to shift their portfolio compositions in favour of foreign assets. So, as the money supply increases, while foreign exchange earnings decline, the exchange rate become overvalued. People expect the exchange rate to be devalued and hence attempt is made to send their capital out of the country to avoid potential capital loss.

Financial Development: The proxy measure for financial development in SSA countries has a negative coefficient as expected. The coefficient is also statistically significant. However, Collier *et al*. (2001), and Boyce and Ndikumana (2002) using M2/GDP and M3/GDP respectively as a proxy for financial development found the coefficient to be negative and insignificant. This contradiction may be because these other studies used cross country data set. The empirical finding in this study suggests that financial development in SSA countries can reduce capital flight if accompanied by an expansion of opportunities for domestic portfolio diversification.

Budget Deficit: Consistent with other empirical studies (Ajayi (1992)), Boyce and Ndikumana (2003) and Lawanson (2007), the budget deficit variable has a positive sign and is statistically significant in all models at the 5% level of significance. The positive sign suggests that a large government deficit may promote capital flight. This highlights the motivation of investors to move capital abroad to escape future taxation directly and indirectly via the monetisation of deficits. The result implies that fiscal mismanagement and the need for future fiscal adjustment be it through formal taxation or inflationary financing clearly reflects the risks associated with the domestic policy environment.

5.11.1 Robustness Check To Different Specification

The only different result in our robustness check in Table 5.13 is the lagged capital flight, the estimated coefficient on the lagged capital flight (KF_{t-1}) are positive and significant at mostly 1% level. This result conforms with the theoretical expectation and the result equally indicates that there is a tendency for past capital flight to have a positive and significant effect on current capital flight from SSA member countries. The finding suggests that capital flight has a tendency to persist over time. This may reflect a habit formation effect, as capital flight corrodes the legitimacy of capital controls, particularly if the capitalists include government authorities. At the same time, capital flight may contribute to the deterioration of the macroeconomic environment, and in turn fuelling further capital flight. The results from all the techniques support findings from the studies of Ndiaye (2009), Boyce and Ndikumana (2003, 2007), Mikkelsen (1991), and Vos (1992).

Table 5. 10: Summary Statistics for the Determinants of Capital Flight

VARIABLES	(1) **Obs**	(2) **Mean**	(3) **St.Dev.**	(4) **Min**	(5) **Max**
Real capital flight(2010)	125	927.5	3,088	-11,114	27,338
GDP Per Capita	125	957.9	1,416	128.2	8,522
Inflation(%GDP)	125	100.7	647.2	-5.111	7,034
Polity2	125	-0.976	5.122	-9	9
Debt(%GDP)	124	4.768	4.493	0.294	27.36
Corruption(ICRG)	125	4.069	1.679	0	8.774
Budget Deficit	56	-0.918	5.999	-11.78	21.10
Interest Rate Differential	125	-1.725	28.23	-212.8	104.0
Bank Credit to Private Sector(dcpsb)	123	13.29	12.59	0.154	74.71
Real Exchange Rate	60	126.6	62.22	23.73	404.2
FDI Inflows	124	3.818e+08	9.191e+08	-1.706e+08	6.733e+09

Notes: Data on GDP per capita, Domestic Credit to the Private Sector by banks, Inflation, Interest Rate Differentials, Foreign Direct Investment Inflow (FDI), Real and Effective and Exchange Rate are all taken from the World Development Indicators Dataset of the World Bank (2015). For these variables, summary statistics are based on average data for the period 1986-2010. Data on Real Capital Flight are taken from the Boyce and Ndikumana dataset at the Political Economy Research Institute, University of Massachusett, USA. The Polity2 variable is taken from the Polity IV Project.

Table 5. 11: Determinants of Capital Flight (Pooled OLS and Random Effects Results), 1986-2010*(*** p<0.01, ** p<0.05, * p*

Capital Flight=DV VARIABLES	(1) **POLS**	(2) **RE**	(3) **RE**	(4) **RE**	(5) **RE**	(6) **RE**
Lag RKF(2010)	-2.383**	-1.244***	-1.282***	-1.469***	-1.485***	-2.383**
	(0.932)	(0.357)	(0.360)	(0.391)	(0.394)	(0.932)
GDP per capita	-10.86***	-0.242	-0.214	-0.239	-0.238	-10.86***
	(1.829)	(0.340)	(0.344)	(0.350)	(0.354)	(1.829)
Log Corruption	4,832	112.2	153.3	-55.57	-70.32	4,832
	(3,067)	(1,244)	(1,249)	(1,277)	(1,328)	(3,067)
Log FDI	8,151***	951.6***	927.6***	1,016***	1,011***	8,151***
	(1,322)	(304.8)	(307.1)	(322.1)	(326.0)	(1,322)
Log Inflation	4,719***		360.3	301.6	291.9	4,719***
	(1,097)		(454.0)	(459.2)	(472.6)	(1,097)
Polity2	-1,498***			74.13	74.59	-1,498***
	(431.8)			(124.5)	(125.9)	(431.8)
Log Debt	5,639**			654.9	653.3	5,639***
	(2,084)			(566.0)	(570.3)	(2,084)
Interest Rate Differentials	555.5***				2.088	555.5***
	(136.6)				(16.46)	(136.6)
Real Exchange Rate	29.76					29.76
	(21.79)					(21.79)
Bank Credit to Private Sector(dcpsb)	738.8***					738.8***
	(114.8)					(114.8)
Budget Deficit	1,159					1,159*
	(674.6)					(674.6)
Constant	-175,982***	-15,995***	-16,386***	-18,130***	-17,959***	-175,982***
	(31,787)	(6,155)	(6,199)	(6,508)	(6,685)	(31,787)
Observations	21	74	74	74	74	21
R-squared	0.926					
Number of id		25	25	25	25	9

Table 5. 12:Determinants of Capital Flight in sub-Saharan Africa (SSA), 1986-2010, Generalized Method of Moments(GMM)

Capital Flight=DV VARIABLES	(1) **1S SGMM**	(2) **1S SGMM**	(3) **1S SGMM**	(4) **1S SGMM**	(5) **1S SGMM**	(6) **Diff-GMM**
Lag RKF (2010)	-0.772***	-0.912***	-0.667**	-0.657**	-2.383***	-3.635***
	(0.296)	(0.279)	(0.281)	(0.275)	(0.625)	(0.0776)
GDP per capita	-0.383*	-0.344*	-0.340*	-0.333	-10.86***	-4.857***
	(0.205)	(0.199)	(0.206)	(0.205)	(1.227)	(0.242)
Log Corruption(ICRG)	-183.1	60.80	-1,040	-1,280	4,832**	14,569***
	(1,090)	(972.1)	(872.5)	(837.1)	(2,057)	(852.5)
Log FDI	1,316***	1,234***	1,074***	1,028***	8,151***	6,716***
	(234.0)	(213.1)	(215.4)	(211.8)	(886.5)	(370.3)
Log Inflation		590.1*	171.4	124.3	4,719***	5,777***
		(319.9)	(308.1)	(312.8)	(735.3)	(490.8)
Polity2			97.04	92.90	-1,498***	-1,455***
			(81.11)	(78.15)	(289.6)	(74.30)
Log Debt			534.7	555.9	5,639***	1,971***
			(421.1)	(412.8)	(1,398)	(289.8)
Interest Rate Differentials				6.415	555.5***	118.4***
				(10.89)	(91.62)	(22.50)
Real Exchange Rate					29.76**	-22.31***
					(14.61)	(3.949)
Bank Credit to Private Sector(dcpsb)					738.8***	-334.9***
					(77.01)	(53.55)
Budget Deficit					1,159**	2,033***
					(452.3)	(193.7)
Constant	-22,716***	-22,698***	-18,124***	-16,838***	-175,982***	
	(4,955)	(4,405)	(4,242)	(4,151)	(21,315)	
Observations	74	74	74	74	21	12
Number of id	25	25	25	25	9	8

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

Table 5. 13: Robustness Check for the Determinants of Capital Flight in sub Saharan Africa (SSA), 1986-2010

Capital Flight=DV VARIABLES	(1) **Diff-GMM**	(2) **Diff-GMM**	(3) **Diff-GMM**	(4) **Diff-GMM**	(5) **Diff-GMM**	(6) **1S SGMM**
Lag RKF(2010)	0.603***	0.272***	0.270***	0.270***	-0.162	0.412***
	(0.0419)	(0.0506)	(0.0506)	(0.0506)	(0.103)	(0.0997)
GDP per capita	-0.983***	-2.641***	-2.527***	-2.527***	-11.98***	-7.459***
	(0.346)	(0.378)	(0.383)	(0.383)	(1.180)	(1.227)
Log Corruption	298.7	266.1	161.9	185.6	-3,557	662.8
	(595.1)	(580.2)	(592.4)	(588.2)	(2,741)	(1,658)
Log FDI	194.0*	184.4*	210.9*	214.4*	2,688***	3,014***
	(107.1)	(106.0)	(110.1)	(110.3)	(726.3)	(660.0)
Log Inflation		204.4	172.1	169.9	539.9	1,405*
		(152.7)	(152.7)	(154.3)	(812.2)	(733.4)
Polity2			9.703	9.988	-704.5	-308.0
			(47.07)	(47.08)	(640.3)	(235.1)
Log Debt			150.0	148.0	-606.6	843.8
			(228.1)	(228.6)	(990.5)	(819.6)
Interest Rate Differential				0.394	51.31	146.6*
				(4.334)	(116.4)	(80.33)
Real Exchange Rate					2.278	-1.251
					(18.60)	(14.90)
Bank Credit to Private Sector(dcpsb)					602.2***	406.4***
					(162.2)	(79.56)
Budget Deficit					316.4	690.4**
					(368.4)	(322.7)
Constant						-59,650***
						(13,916)
Observations	470	400	395	395	65	83
Number of id	25	25	25	25	8	9

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

5.12 Conclusions

The principal goal of this chapter has been to find out the role of corruption as a determinant of capital flight on one hand, and the individual impact of both corruption and capital flight in the growth process as well as the impact of the interactive terms of corruption and capital flight on economic growth in SSA countries on the other hand. Apart from the many determinants of capital flight known to the literature, no other study has attempted to investigate the direct effect of corruption on capital flight; specifically, the chapter uniquely focused first on the introduction of corruption variable into the capital flight model, and subsequently, the individual and interactive effects between corruption and capital flight in promoting or undermining economic growth in SSA countries were further investigated empirically. But to the best of our knowledge, there are no other existing studies that jointly considered these two types of illegal phenomena in the context of economic growth analysis. The investigation and results we have presented in this chapter are then considered to be a clear contribution that aims to fill this gap in the literature. For this reason, the chapter employed a sample of panel observation for 25 countries over the period of 1986 to 2010. The data for the study were taken from the *World Bank Development Indicators* (WDI, 2015), Boyce and Ndikumana (2010) dataset on capital flight, *Polity IV Project*, *Political Risk Services* (ICRG, 2014), and *Worldwide Governance Indicators* (WGI, 2012). The study also used different estimation techniques like pooled OLS, Random Effects and GMM.

The conclusion that can be drawn from this chapter is that: corruption, our main variable of interest as it relates to the determinants of capital flight is positive and statistically significant. This means that for countries within our sample, corruption is a positive determinant of capital flight. It equally means that corruption encourages capital flight from the region. Furthermore, we also illustrate that corruption and capital flight both have individual and joint effects on economic growth. The corruption variable is found to be consistently negative on its impact on economic growth across all specifications, whereas, as it relates to the individual effect of capital flight, except for the results from the robustness check, which is negative and statistically significant at the conventional levels, our other main results indicate a statistically positive impact of capital flight on economic growth. Finally, the results from the interactive effects of corruption and capital flight, across all specification, is negative and statistically significant on economic growth. This result from the interactive effect indicates that corruption is one of the main drivers of capital flight and shines the light on the nature and type of corruption found in SSA countries which tend to be the by-products of rent-seeking and hence the motivational need to move capital abroad by economic agents.

Chapter Six

Conclusions

6.1 Introduction

We study three topics on corruption, capital flight and economic growth that are of unique importance to countries within the sub-Saharan African region. Even though there is enough scope to consider the three issues independently of one another, it is equally feasible to draw parallels and some links between them. In more specific terms, the thesis has sought to understand the robust determinants of corruption, the potential linkages between capital flight behaviour and public-sector/macro level corruption, together with the effects of these phenomena on economic growth in sub-Saharan Africa. Furthermore, it has aimed to do this both theoretically and empirically through the use of portfolio choice theory, economic growth models and the application of econometric techniques. In a nutshell, this final chapter, apart from containing some policy and research implications, is a reflection on the links between the preceding chapters, the findings, and also the shortcomings of those chapters. It also contains a summary of our scholarly and academic contributions to the literature.

6.2 Summary Findings

Chapter 3 addresses the first question, which relates simply to: "What are the determinants of corruption?". In particular, we try to ascertain by how much confidence we should have in the factors already found in the literature as determinants of corruption and whether these variables are robust or not. Using the Sala-i-Martin variant of Extreme Bounds Analysis (EBA), we assemble a panel data of 31 countries from SSA over the period of 1984-2013 by using 60 variables found by previous studies to be correlates of corruption. In an attempt to assess how some variables help in contributing to a country's perceived level of corruption, we, therefore estimate so many regression models where variables capturing democracy, political stability and, economic development are included. Equally included are variables that capture cultural and predetermined-long historical features, and variables that also measures Oversea Development Aid (ODA) flows and their policy implications. Our results indicate that the following variables of ethnolinguistic fractionalisation, internal conflict, bureaucratic quality, democratic accountability, government stability are some of the robust determinants of corruption in sub-Saharan Africa for the periods of 1984-2013 that we studied.

In chapter four, the second topic we considered in this thesis is "Corruption and Economic Growth with panel evidence from sub-Saharan Africa". We set out primarily to examine the effect of corruption on economic growth over the period of 1984 to 2013. Using the World Bank income level classification, we further investigate if the effect of corruption on economic growth varies across different income levels within the region. Looking at the problem from this perspective is particularly important to understanding how corruption contributes to promote or undermine economic growth in sub-Saharan Africa. Furthermore, we do not believe that the economies and characteristics of the countries within Africa and SSA, in particular, are the same. This is because most previous studies have looked at Africa in a continental context as opposed to SSA exclusively. We take the view that the economies of countries within North Africa are quite unique and different from the economies of countries within SSA. For example, the North African economies tend to fuse or align themselves more naturally to the economies of the countries within the Middle East as against those within SSA. Even some international financial institutions like the World Bank and the International Monetary Fund (IMF) recognise these differences through the grouping of North African countries with countries within the Middle East to form the MENA bloc (the Middle East and North Africa).

Using a perceived measure of corruption (ICRG) and panel data from 31 countries in SSA over a 30 -year period, we implement panel IV and GMM techniques and find, overall statistically significant negative effect of corruption on economic growth in the entire sample of countries. Furthermore, by using the income classification highlighted in chapter four, we also find that there are statistically significant differences in the effect of corruption on economic growth based on income level groupings. The largest impact of corruption on economic growth is found in low-income countries (LIC), this is then followed by low middle-income countries (LMIC). However, the results for the upper-middle-income countries (UMIC), is found to be negative but it is not statistically significant. These results are robust to various specifications and conditioning variables. Our results also have very interesting policy implications for economic growth for the entire region, and more importantly for the low-income countries and lower-middle-income countries in SSA.

Chapter 5 is made up of two parts; the first part contained an empirical investigation into the impact of corruption and capital flight on economic growth when both phenomena may co-exist independently and interactively. In the second part, we introduced for the very first time the corruption variable into the analysis of the determinant of capital flight. The analysis was based on a panel of 25 countries in SSA for the period between 1986-2010. We found strong evidence that corruption and capital flight have both independent and joint effects on economic growth; corruption exhibit a consistently negative effect on growth and that the effect of capital flight on economic growth is mixed, with both negative and positive effects. However, the joint effects of corruption and capital flight through the interactive term is strongly negative. This finding offers some strong support to the argument that the nature of capital flight from sub-Saharan Africa is largely driven by corruption. In other words, economic factors are not the main drivers of capital flight from the region, but rather bureaucratic rent-seeking behaviour which feeds into corruption and makes capital flight very distorting for economic growth in the region. The finding is also consistent with our hypothesis that corruption and capital flight co-existing together have detrimental effects on economic growth for countries within the region. The results were shown to be robust to different specifications, measures of corruption, and estimation methods.

Whilst much has been written on the determinants of corruption and the determinants of capital flight; the level of how much confidence we should have in the former remains debatable, and given the nature of capital flight in developing countries, we believe it is imperative to investigate the role of corruption as a determinant of capital flight. Furthermore, the overall literature shed some light on the understanding of the economics of corruption and capital flight separately, however, much less has been written about the co-existence of both phenomena and on how they may interact with each other and how this interaction may influence economic performance in general and particularly in SSA countries. This thesis has sought to go some way towards filling this gap.

6.3 Academic Contributions

Chapter three of this thesis when compared to other work in the extant literature on the determinants of corruption has some distinct and novel elements. One, we take the view that this is the first study to investigate empirically the determinants of corruption using Extreme Bounds Analysis in SSA countries. Second, this is also the first study to implement EBA in a panel data setting to investigate the causes of corruption. The two known studies, Serra (2006) and Seldadyo (2008), on the determinants of corruption that used EBA in their analysis, did not use panel data. Both studies used cross-sectional analysis and only included Africa as a dummy variable in a worldwide study. This chapter contributes to the literature on the determinants of corruption by extending the EBA analysis to panel data. Third, this is the first work on the determinants of corruption that have examined so many variables as correlates of corruption. It is the largest number of variables ever assembled to test robustness in an SSA setting

Our chapter four in this thesis is different in many vital ways from past research on the effect of corruption on economic growth. First, we take the view that this chapter is very distinct as it provides the first empirical analysis of corruption based on income level classifications in SSA, and as a result, it should present us with a better understanding and insight of the effect of corruption on economic growth within the region. Second, this chapter did not only replicate previous results in the literature on corruption and economic growth but also provides a better explanation of those effects by using recent data sets (1984-2013). Third, in comparison to existing studies which tend to focus more on covering a small period of time like up to five years, we depart from this by covering a long period of data, say (30-year period) that are both cross-section and panel data. Fourth, this chapter contributes to the existing literature on corruption and economic growth by analysing the distribution and nature of corruption within the region (the first of its kind). Fifth, most existing research work on the subject matter focuses on cross-sectional data in a worldwide cross-country study that include Africa as a dummy variable and do not focus on SSA countries exclusively. However, in this study, we clarify things by making that distinction clear by focusing on SSA countries. Sixth, to help us control for the challenges of endogeneity inherent in this kind of study, and also account for time dynamics, we, therefore, employed different econometric techniques in this chapter.

Chapter five analytically explore and empirically test the corruption, capital flight and economic growth- relationship using portfolio choice theory and panel data for 25 SSA countries. This chapter contributes in several ways to the literature on corruption, capital flight and economic growth nexus. First, this chapter empirically tests the effect of corruption on capital flight by introducing corruption as a key determinant of capital flight and the evidence presented from the analysis indicates that corruption is one of the major determinants of capital flight in SSA. Also, no previous study has attempted to quantify the relative contribution or effect of corruption on capital flight in general and particularly in SSA countries. Second, this chapter investigates the independent and combined effects of corruption and capital flight on economic growth. The chapter argues that the presence of the two illegal phenomena of corruption and capital flight exerts some negative influence on economic growth in SSA. This view is in line with anecdotal experience from the region, however, there has been no attempt to link the two together in the literature. This chapter attempts to fill these gaps in the existing literature and give new insights into the corruption, capital flight and economic growth debate. It suggests that the implications of capital flight for corruption-growth nexus may be key. Specifically, the chapter proposes to shift attention to the conceptual and empirical analysis of the implications of capital flight and corruption for economic growth in SSA countries. Third, as a result of the availability of historical data covering several years, we were able to test the very nature of long-term corruption, capital flight relationships, which hitherto has been missing in past work and research. Fourth, this chapter uses a new set of data as a proxy for capital flight in the entire analysis.

6.4 Policy Implications

The policy implications emanating from this research work are discussed in the context of sub-Saharan Africa. The wide-ranging adverse effects of corruption and capital flight on economic growth in SSA countries disclosed in this thesis call for effective policies to curb corruption, reduce capital flight and promote economic growth in the region. Based on the research contributions and findings from this study, this thesis, therefore, provides some suggestions on policy implications.

Following the findings in chapter three, we conclude that the following variables of ethnolinguistic fractionalisation, internal conflict, bureaucratic quality, democratic accountability, government stability are some of the strongest determinants of corruption in sub-Saharan Africa, it then follows that some of the policy implications for government within the region will be to pursue policies to improve democratic accountability, enhance bureaucratic quality and reduce internal conflict through massive investment in human capital through education and investment in capital expenditure as the spillover effects will grow the economy over the mid to long term periods and then ultimately stabilize the polity for the greater good of the citizens.

The policy implications that can be derived from chapter four based on our results is that given the fact that overall, the macro-economic effect of corruption on economic growth in the entire region is growth reducing and the effect becomes worse with the lower-income grouping, it is therefore imperative that governments within the region should embark on broad macroeconomic policies to reduce corruption and encourage economic growth. Nowhere are these broad policy recommendations more needed than in the 18 low-income countries (LIC) and the 8 low middle-income countries (LMIC) in the region. Going by our results, decreasing the level of perceived corruption across all the countries within the region by the same proportion will not only increase per capita GDP but will also increase economic development. It will also assist to bridge income and distributional gaps across the region, as corruption reductions will benefit the poorest countries the most. However, because the measure of corruption we utilise here is, at most, the perception of corruption, our findings should be regarded with caution.

Chapter five which is on corruption, capital flight and economic growth in SSA has some practical and useful policy recommendations for government within the region that will help in reducing corruption, capital flight and promote economic growth. For example, based on our findings that corruption is a strong and positive determinant of capital flight, and that capital flight on its own does not undermine economic growth directly except through its interactive effect with corruption. It then goes to show that corruption is the main driver through which capital flight undermines economic growth in sub-Saharan Africa. It will, therefore, be pertinent for governments in the region to embark on sound macroeconomic reforms and on the creation of quality institutions that can be transparent and strong enough to reduce corruption and by extension capital flight. A relevant example in this scenario can be the establishment of independent anti-corruption agencies across the region to fight corruption. Given that past capital was proven to be one of the determinants of capital flight by virtue of its positive impact on current capital outflows, the government of sub-Saharan African countries must put in place measures to improve the control of corruption. Thus, an effective mechanism for tracking and prosecuting financial crimes should be the utmost priority of the authorities. There is also a need for policy actions that can help minimise the existing degree of misalignment in the region's exchange rate by fixing the rate at a reasonable level with limited control or influence as this will help to close the existing premium gap. Even though most SSA countries' exchange rate policies tend to favour market forces, there may be a need to consolidate present efforts across the region through measures that improve this predisposition. This is linked to trade-faking activities, as misalignment of the currency rate is one element driving misinvoicing of trade transactions, denying the country significant capital. Return on investment is one of the most important factors in determining how and where private capital is held.

In the light of the findings of this thesis, the accumulation of external debt appears to have caused capital flight in SSA throughout the years, hence SSA's reliance on external borrowing needs to be reduced. With the Paris Club and the Bretton Woods Institutions recently agreeing in principle to debt reduction, vigilance must be exercised in not accumulating new external debt, but rather to take advantage of domestic borrowing to finance government expenditure where appropriate. It is recommended that policymakers in SSA nations should devise policies aimed at decreasing the stock of external debt and promoting a consistent rate of economic growth.

The findings in chapters four and five indicate that economic growth is important for reducing corruption and that corruption is the main driver of capital flight within the region. The negative relationship between corruption and per capita GDP indicates that high-income countries enjoying substantial growth are usually in a very strong enviable position to reduce corruption and capital flight significantly. Countries, where unemployment is low and with a well-educated workforce, will have the wherewithal and means to fight corrupt behaviours of a different kind. Therefore, economic growth accompanied by good economic development is necessary and sufficient conditions to fight capital flight and reduce corruption. Since good institutions and leadership matter for economic growth and that without them good governance and policies would be difficult to adequately implement; therefore, to reduce opportunities for corruption and fight capital flight, concerted efforts should be made in the areas of implementation of sound policies that would improve governance quite significantly within the SSA region. Again, given that latitude or geography can sometimes matter for economic growth and development, to reduce contagion, a common development agenda needs to be instituted among member countries to streamline accountability and development projects. This will help reduce the level of corruption in the economy and its effects on capital flight.

6.5 Research Limitations

Despite the fact that this thesis has contributed to knowledge and came to some important conclusions, however, the study also faced some limitations and challenges. One, as a result of inadequate data availability, all the countries in sub-Saharan Africa were not included in the sample size. In any case, the samples we employed in the study were highly representative; 31 countries out of 49 countries in SSA, and all the major countries in terms of size of the economy and population were included. This meant that answering the research questions and achieving our research objectives required that we employed different time-period and sample sizes in the study.

One of the limitations of chapters four and five is its focus on macro and aggregate level effects of corruption and capital flight on economic growth. This was not deliberate but purely due to data availability. An aggregate focus does shed some light on the determinants of capital flight as well as the effects of corruption and capital flight on economic growth. Though the aggregate effects of corruption and capital flight are very useful and informative, however, it cannot explicitly and adequately explain the variations of corruption within a country. It probably would be more appropriate to have a theoretical model with which to model corruption at the micro-level and then observe as this incentivises the behaviours of bureaucrats or government officials in engaging in corrupt activities. Furthermore, as a result of the macro and country-level data used in the study to explain corruption and capital flight activities, the research was unable to investigate sectoral corruption and capital flight in SSA or use data on sectoral corruption and capital flight to explain economic growth. Sectoral analysis of this sort would have shed more light and add richness to the thesis and thereby equipping investors and policymakers with a better knowledge to ultimately inform their judgments. More specifically, such a theoretical framework and use of microdata would have certainly allowed for robust explanations between different policy variables on corruption and capital flight. Furthermore, it could have led to better-targeted policy interventions to the sectors of the economy where corruption and capital flight are more pronounced.

This study also followed the traditional methods of estimating a panel equation where different estimators like Pooled OLS, FE, RE and GMM are estimated and applied to the Hausman test to help us ascertain the estimator that is more significant and consistent. This process can be quite time consuming and sometimes contradictory in terms of outcomes. In that respect, we had to be very careful and patient in presenting the final results to avoid mistakes. In a somewhat technical challenge, the use and applications of advanced econometric/statistical software(s) was very daunting. For example, we spent several months learning how to use ***Stata*** econometric software and interpret the results therefrom appropriately in the hope that it would be good enough to help us complete the thesis. Unfortunately, at the eleventh hour, chapter three (Extreme Bounds Analysis) could not be implemented in ***Stata*** in a panel data format. This meant that we had to use several months to learn how to use new statistical software called ***R***, which was eventually used in implementing EBA in a panel data set of 31 SSA countries over a 30-year period (1984-2013).

6.6 Further Research

The limitation of the study provides an opportunity to conduct further studies analyzing corruption, capital flight and economic growth in general and particularly in SSA countries.

Given that we advanced the literature on the causes of corruption in SSA in chapter three through the implementation of Extreme Bounds Analysis in a panel data setting, we are also mindful of the fact that the EBA methodology is good at addressing issues of correlation and not causation, the challenge of endogeneity could not be directly addressed and still persist. To this end, one area for further research is on how to advance the EBA method to be able to solve the problem of endogeneity.

The way we reviewed the literature on the causes and determinants of corruption in chapter three was through a qualitative method, and given the present state of advances in the use of meta-analysis, this could have been possible by using meta-analysis technique. Therefore, applying this technique in the review of literature can be a future research agenda.

The data on corruption and capital flight used in this study took a macro-based perspective but deriving some comparable and acceptable ways of measuring both variables at the micro-level, if possible, by measuring them based on different sectors of the economy would help researchers and policymakers to compartmentalize the analyses by looking at different sectors and then use the results to target policies accordingly. This can be a very interesting direction for further research.

We would like to reiterate that this study has laid much emphasis on perceived corruption by taking a macro perspective (public sector corruption), nonetheless, corruption also exists in the private sector as well. As sometimes obtainable amongst very senior public-sector bureaucrats, private sector senior managers and staff can equally abuse their power by using it for private gains. This presupposes that private sector actors are not immune to corruption in a society where it is very rampant. Evidence from the literature shows that much of the research work on corruption relates to studies that took a macro perspective and seldom distinguish between corruption in the public and private sectors. The overwhelming consensus from the corruption literature is that macro-level perceived corruption is much more harmful and dangerous to any economy relative to private sector corruption. However, we are unaware of any comprehensive and formal analysis of corruption and capital flight focusing mainly on the private sector. Going forward, investigating the determinants of corruption and capital flight in the private sector may well present some interesting findings.

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Appendix

***Table A3.1: Sample of Countries in this chapter*.**

1.Angola	**2.Botswana**	**3.Burkina Faso**
4.Cameroon	**5.Congo, Dem Rep**	**6.Congo Republic**
7.Cote d'Ivoire	**8.Ethiopia**	**9.Gabon**
10.The Gambia	**11.Ghana**	**12.Guinea**
13.Guinea Bissau	**14.Kenya**	**15.Liberia**
16.Madagascar	**17.Malawi**	**18.Mali**
19.Mozambique	**20.Namibia**	**21.Niger**
22.Nigeria	**23.Senegal**	**24.Sierra Leone**
25.South Africa	**26.Sudan**	**27.Tanzania**
28.Togo	**29.Uganda**	**30.Zambia**
31.Zimbabwe		

Table A3.2: Data Descriptions and Sources

	Variables	Descriptions	Sources
1	***GDPg***	GDP growth (annual %)	WDI indicators World Bank (2015)
2	***GDPpc***	GDP per capita (current US$)	WDI indicators World Bank (2015)
3	***GDPpcg***	GDP per capita growth (annual %)	WDI indicators World Bank (2015)
4	***Gov't Exp***	General government final consumption expenditure (% of GDP)	WDI indicators World Bank (2015)
5	***Life Expectancy***	Life expectancy at birth, total (years)	WDI indicators World Bank (2015)
6	***Trade (Open)***	Trade (% of GDP)	WDI indicators World Bank (2015)
7	***Investment***	Gross fixed capital formation (% of GDP)	WDI indicators World Bank (2015)
8	***Population***	Population growth (annual %)	WDI indicators World Bank (2015)
9	***Inflation***	Inflation, GDP deflator (annual %)	WDI indicators World Bank (2015)
10	***Prischl (% gross)***	School enrolment, primary (% gross)	WDI indicators World Bank (2015)
11	***Prischl (% net)***	School enrolment, primary (% net)	WDI indicators World Bank (2015)
12	***Secschl (% gross)***	School enrolment, secondary (% gross)	WDI indicators World Bank (2015)
13	***Secschl (% net)***	School enrolment, secondary (% net)	WDI indicators World Bank (2015)
14	***Tertiary (% gross)***	School enrolment, tertiary (% gross)	WDI indicators World Bank (2015)
15	***Interest rate (%)***	Real interest rate (%)	WDI indicators World Bank (2015)
16	***Corruption***	Corruption	ICRG/The PRS Group(2014)
17	***Polity2***	Polity IV Project	Polity IV dataset version 2015
18	***Debt2***	Total Debt	WDI indicators World Bank (2015)
19	***Cor***	Original ICRG Corruption(adjusted)	ICRG/The PRS Group(2014)
20	***ELF***	Ethnolinguistic fractionalization	(La Porta et al., 1999)
21	***ALF***	Average Ethnolinguistic Fractionalisation	(La Porta et al., 1999)
22	***EHII***	Estimated Household Income Inequality Data Set	University of Texas Inequality Projec
23	***Wage***	Wages and Salaries of Workers	WDI indicators World Bank (2015)
24	***Land area (sq. km)***	Land Area (Square KM)	WDI indicators World Bank (2015)
25	***Adult literacy***	Total Adult(% of people 15 and above)	WDI indicators World Bank (2015)
26	***LaborF***	Labour Force(Female % of Total Labour)	WDI indicators World Bank (2015)
27	***Mortality1***	Mortality rate(Under 5 per 1000 livebirth)	WDI indicators World Bank (2015)
28	***Mortality2***	Mortality Rate(infant per 1000 livebirth)	WDI indicators World Bank (2015)
29	***Unemployment***	% of Total Labour Force	WDI indicators World Bank (2015)
30	***Surface area***	Square .Km	WDI indicators World Bank (2015)
31	***Tax revenue***	Trx Revenue(% GDP)	WDI indicators World Bank (2015)
32	***Revenue***	Revenue(excluding grant % of GDP)	WDI indicators World Bank (2015)
33	***Total natural***	Total natural resources rents (% of GDP)	WDI indicators World Bank (2015)
34	***Imports***	Import of Goods & Services(%GDP)	WDI indicators World Bank (2015)
35	***Exports***	Export of Goods & Services(%GDP)	WDI indicators World Bank (2015)
36	***GINI index***	Gini Index World Bank Estimates	WDI indicators World Bank (2015)
37	***Internal conflict***	Internal Conflict	ICRG/The PRS Group(2014)
38	***External Conflict***	External Conflict	ICRG/The PRS Group(2014)
39	***Bureaucratic Quality***	Bureaucracy Quality	ICRG/The PRS Group(2014)
40	***Gov't Stability***	Government Stability	ICRG/The PRS Group(2014)
41	***Dem Acctability***	Democratic Accountability	ICRG/The PRS Group(2014)
42	***MCSP100***	Mobile cellular subscriptions (per 100 people)	WDI indicators World Bank (2015)

43	***MCS***	Mobile cellular subscriptions	WDI indicators World Bank (2015)
44	***FDINBOP***	Foreign direct investment, net (BoP, current US$)	WDI indicators World Bank (2015)
45	***FDINI***	Foreign direct investment, net inflows (% of GDP)	WDI indicators World Bank (2015)
46	***FDINO***	Foreign direct investment, net outflows (% of GDP)	WDI indicators World Bank (2015)
47	***NODA***	Net ODA received per capita (current US$)	WDI indicators World Bank (2015)
48	***Internet***	Individual using the internet(% of Population	WDI indicators World Bank (2015)
49	***LOEnglish***	Legal Origin(English)	(La Porta et al., 1999)
50	***LOFrench***	Legal Origin(French)	(La Porta et al., 1999)
51	***OtherLO***	Other Legal Origin	(La Porta et al., 1999)
52	***Catho80***	Catholics as % of population in 1980	(La Porta et al., 1999)
53	***Prot80***	Protestant as % of population in 1980	(La Porta et al., 1999)
54	***Musl80***	Muslims as % of population in 1980	(La Porta et al., 1999)
55	***Latitude***	Latitudinal distance from the Equator	WDI indicators World Bank (2015)
56	***Nocpm***	Non Catholic Protestants Muslims	(La Porta et al., 1999)
57	***Landlock***	Dummy Variables	(La Porta et al., 1999)
58	***BritCol***	British Colonial Origin	(La Porta et al., 1999)
59	***FrenCol***	French Colonial Origin	(La Porta et al., 1999)
60	***OtherCO***	Other Colonial Origins	(La Porta et al., 1999)

NOTES: As indicated in the subject headings at the top, data used in the study are sourced from different sources.

Figure A3.1: Map of Colonial Powers in sub-Saharan Africa

Figure A3.2: Map of Africa showing the 3 dominant religious faith of Christianity, Islam and Tribal worshippers.

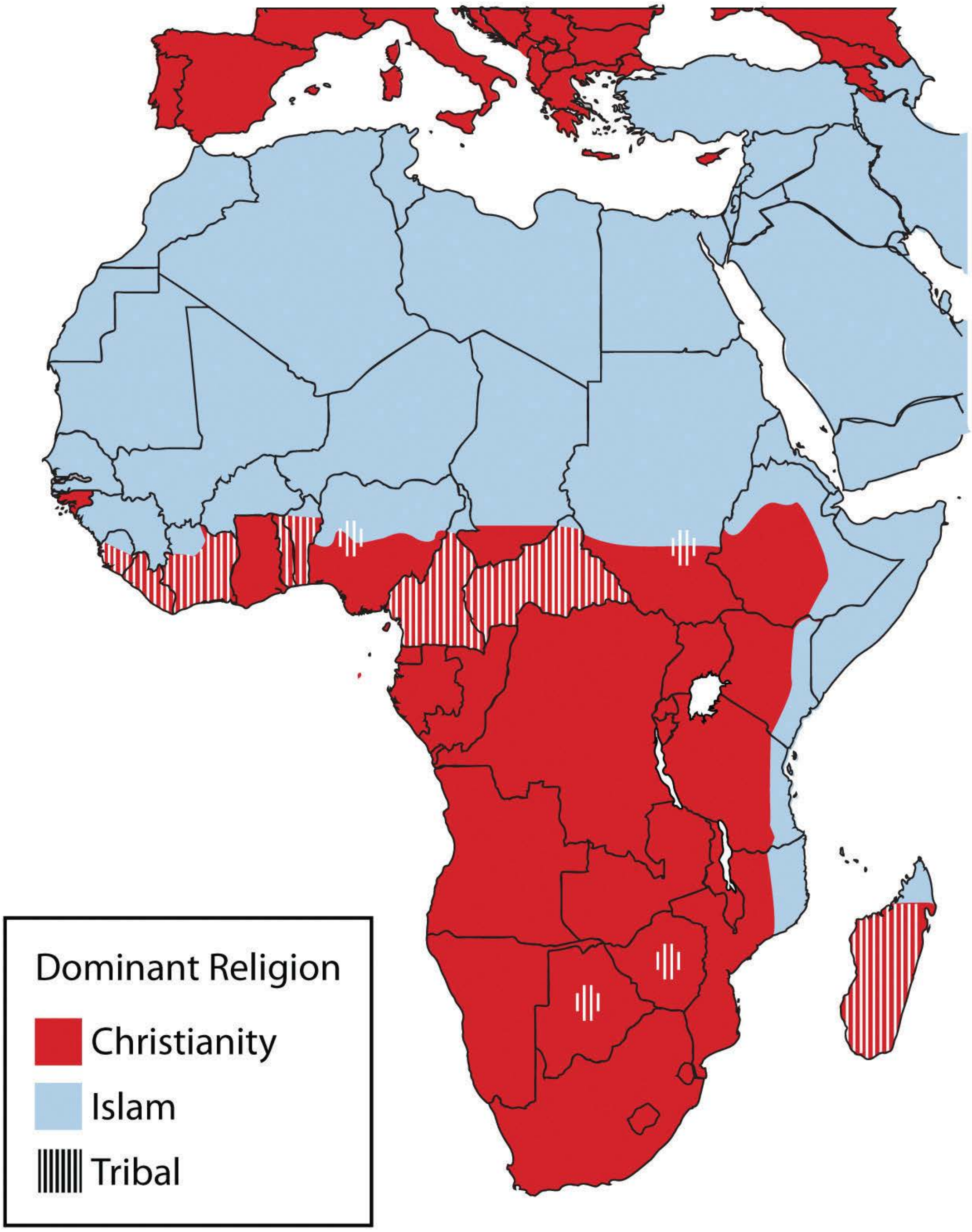

Table A3.3:EBA POLS RESULTS FOR POLITICAL/INSTITUTIONAL VARIABLES

```
Call:

eba(data = dat, y = dv, free = fixed, doubtful = doubt, k = 0:5,

    reg.fun = plm, se.fun = se.robust, index = c("cid", "year"),

    effect = c("time"), model = c("pooling"))


Confidence level: 0.95

Number of combinations: 63

Regressions estimated: 63 (100% of combinations)

Number of regressions by variable:

             (Intercept)                  lngdppc

                      63                       63

        internalconflict         extrenalconflict

                      32                       32

      bureacraticquality             govtstability

                      32                       32

democraticaccountability                  polity2

                      32                       32

Number of coefficients used by variable:

             (Intercept)                  lngdppc

                      63                       63

        internalconflict         extrenalconflict

                      32                       32

      bureacraticquality             govtstability

                      32                       32

democraticaccountability                  polity2
```

```
                       32                        32
Beta coefficients:
                          Type  Coef (Wgt Mean)
(Intercept)               free            3.059
lngdppc                   free            0.001
internalconflict         focus            0.084
extrenalconflict         focus           -0.023
bureacraticquality       focus            0.761
govtstability            focus           -0.071
democraticaccountability focus            0.309
polity2                  focus            0.012
                         SE (Wgt Mean)  Min Coef
(Intercept)                      0.437     1.897
lngdppc                          0.066    -0.184
internalconflict                 0.033     0.021
extrenalconflict                 0.033    -0.072
bureacraticquality               0.063     0.686
govtstability                    0.028    -0.123
democraticaccountability         0.062     0.187
polity2                          0.012    -0.028
                         SE (Min Coef)  Max Coef
(Intercept)                      0.486     4.079
lngdppc                          0.065     0.270
internalconflict                 0.029     0.160
extrenalconflict                 0.032     0.073
bureacraticquality               0.059     0.844
```

govtstability	0.029	-0.002
democraticaccountability	0.065	0.453
polity2	0.012	0.043

	SE (Max Coef)
(Intercept)	0.455
lngdppc	0.076
internalconflict	0.037
extrenalconflict	0.034
bureacraticquality	0.064
govtstability	0.025
democraticaccountability	0.065
polity2	0.012

Distribution of beta coefficients:

	Type	Pct(beta < 0)	Pct(beta > 0)
(Intercept)	free	0.000	100.000
lngdppc	free	50.794	49.206
internalconflict	focus	0.000	100.000
extrenalconflict	focus	78.125	21.875
bureacraticquality	focus	0.000	100.000
govtstability	focus	100.000	0.000
democraticaccountability	focus	0.000	100.000
polity2	focus	25.000	75.000

	Pct(significant != 0)
(Intercept)	100.000
lngdppc	73.016
internalconflict	68.750

```
extrenalconflict                         18.750
bureacraticquality                      100.000
govtstability                            65.625
democraticaccountability                100.000
polity2                                  43.750
                          Pct(signif & beta < 0)
(Intercept)                               0.000
lngdppc                                  46.032
internalconflict                          0.000
extrenalconflict                         15.625
bureacraticquality                        0.000
govtstability                            65.625
democraticaccountability                  0.000
polity2                                  12.500
                          Pct(signif & beta > 0)
(Intercept)                             100.000
lngdppc                                  26.984
internalconflict                         68.750
extrenalconflict                          3.125
bureacraticquality                      100.000
govtstability                             0.000
democraticaccountability                100.000
polity2                                  31.250
Leamer's Extreme Bounds Analysis (EBA):
                           Type  Lower Extreme Bound
(Intercept)                free                0.944
```

```
lngdppc                      free                  -0.313
internalconflict            focus                  -0.038
extrenalconflict            focus                  -0.139
bureacraticquality          focus                   0.571
govtstability               focus                  -0.180
democraticaccountability    focus                   0.059
polity2                     focus                  -0.052
                            Upper Extreme Bound
(Intercept)                              4.970
lngdppc                                  0.420
internalconflict                         0.231
extrenalconflict                         0.140
bureacraticquality                       0.970
govtstability                            0.046
democraticaccountability                 0.582
polity2                                  0.066
                            Robust/Fragile? (mu = 0)
(Intercept)                                 robust
lngdppc                                    fragile
internalconflict                           fragile
extrenalconflict                           fragile
bureacraticquality                          robust
govtstability                              fragile
democraticaccountability                    robust
polity2                                    fragile
```

Sala-i-Martin's Extreme Bounds Analysis (EBA):

- Normal model (N): beta coefficients assumed to be distributed normally across models

- Generic model (G): no assumption about the distribution of beta coefficients across models

	Type	N: CDF(beta <= 0)
(Intercept)	free	0.000
lngdppc	free	49.620
internalconflict	focus	0.541
extrenalconflict	focus	76.081
bureacraticquality	focus	0.000
govtstability	focus	99.494
democraticaccountability	focus	0.000
polity2	focus	15.410

	N: CDF(beta > 0)	G: CDF(beta <= 0)
(Intercept)	100.000	0.000
lngdppc	50.380	52.048
internalconflict	99.459	3.433
extrenalconflict	23.919	69.998
bureacraticquality	100.000	0.000
govtstability	0.506	95.301
democraticaccountability	100.000	0.020
polity2	84.590	29.119

	G: CDF(beta > 0)
(Intercept)	100.000
lngdppc	47.952

internalconflict	**96.567**
extrenalconflict	**30.002**
bureacraticquality	**100.000**
govtstability	**4.699**
democraticaccountability	**99.980**
polity2	**70**

Table A3.4:EBA RE RESULTS FOR POLITICAL/INSTITUTIONAL VARIABLES

```
Call:

eba(data = dat, y = dv, free = fixed, doubtful = doubt, k = 0:5,

    reg.fun = plm, se.fun = se.robust, index = c("cid", "year"),

    effect = c("time"), model = c("random"))


Confidence level: 0.95

Number of combinations: 63

Regressions estimated: 63 (100% of combinations)

Number of regressions by variable:

            (Intercept)                  lngdppc

                     63                       63

       internalconflict         extrenalconflict

                     32                       32

     bureacraticquality             govtstability

                     32                       32

democraticaccountability                  polity2

                     32                       32

Number of coefficients used by variable:

            (Intercept)                  lngdppc

                     63                       63

       internalconflict         extrenalconflict

                     32                       32

     bureacraticquality             govtstability

                     32                       32

democraticaccountability                  polity2
```

	32	32

Beta coefficients:

	Type	Coef (Wgt Mean)
(Intercept)	free	3.383
lngdppc	free	-0.053
internalconflict	focus	0.077
extrenalconflict	focus	-0.023
bureacraticquality	focus	0.964
govtstability	focus	-0.085
democraticaccountability	focus	0.274
polity2	focus	0.013

	SE (Wgt Mean)	Min Coef
(Intercept)	0.421	1.371
lngdppc	0.064	-0.351
internalconflict	0.032	-0.042
extrenalconflict	0.032	-0.097
bureacraticquality	0.062	0.852
govtstability	0.026	-0.128
democraticaccountability	0.061	0.052
polity2	0.012	-0.014

	SE (Min Coef)	Max Coef
(Intercept)	0.422	5.200
lngdppc	0.060	0.321
internalconflict	0.027	0.162
extrenalconflict	0.030	0.117
bureacraticquality	0.058	1.078

```
govtstability                    0.022    -0.032
democraticaccountability         0.062     0.455
polity2                          0.012     0.064
                         SE (Max Coef)
(Intercept)                      0.422
lngdppc                          0.073
internalconflict                 0.030
extrenalconflict                 0.033
bureacraticquality               0.066
govtstability                    0.028
democraticaccountability         0.061
polity2                          0.012
Distribution of beta coefficients:
                          Type  Pct(beta < 0)  Pct(beta > 0)
(Intercept)               free          0.000        100.000
lngdppc                   free         50.794         49.206
internalconflict         focus         12.500         87.500
extrenalconflict         focus         65.625         34.375
bureacraticquality       focus          0.000        100.000
govtstability            focus        100.000          0.000
democraticaccountability focus          0.000        100.000
polity2                  focus         18.750         81.250
                         Pct(significant != 0)
(Intercept)                            100.000
lngdppc                                 90.476
internalconflict                        65.625
```

```
extrenalconflict                              46.875
bureacraticquality                           100.000
govtstability                                 78.125
democraticaccountability                      78.125
polity2                                       28.125
                          Pct(signif & beta < 0)
(Intercept)                                    0.000
lngdppc                                       50.794
internalconflict                               0.000
extrenalconflict                              37.500
bureacraticquality                             0.000
govtstability                                 78.125
democraticaccountability                       0.000
polity2                                        0.000
                          Pct(signif & beta > 0)
(Intercept)                                  100.000
lngdppc                                       39.683
internalconflict                              65.625
extrenalconflict                               9.375
bureacraticquality                           100.000
govtstability                                  0.000
democraticaccountability                      78.125
polity2                                       28.125


Leamer's Extreme Bounds Analysis (EBA):
```

	Type	Lower Extreme Bound
(Intercept)	free	0.442
lngdppc	free	-0.470
internalconflict	focus	-0.095
extrenalconflict	focus	-0.156
bureacraticquality	focus	0.737
govtstability	focus	-0.171
democraticaccountability	focus	-0.069
polity2	focus	-0.038

	Upper Extreme Bound
(Intercept)	6.027
lngdppc	0.464
internalconflict	0.230
extrenalconflict	0.183
bureacraticquality	1.206
govtstability	0.023
democraticaccountability	0.579
polity2	0.088

	Robust/Fragile? (mu = 0)
(Intercept)	robust
lngdppc	fragile
internalconflict	fragile
extrenalconflict	fragile
bureacraticquality	robust
govtstability	fragile
democraticaccountability	fragile

polity2	fragile

Sala-i-Martin's Extreme Bounds Analysis (EBA):

- Normal model (N): beta coefficients assumed to be distributed normally across models

- Generic model (G): no assumption about the distribution of beta coefficients across models

	Type	N: CDF(beta <= 0)
(Intercept)	free	0.000
lngdppc	free	79.562
internalconflict	focus	0.774
extrenalconflict	focus	76.370
bureacraticquality	focus	0.000
govtstability	focus	99.941
democraticaccountability	focus	0.000
polity2	focus	13.649

	N: CDF(beta > 0)	G: CDF(beta <= 0)
(Intercept)	100.000	0.017
lngdppc	20.438	51.431
internalconflict	99.226	12.953
extrenalconflict	23.630	66.963
bureacraticquality	100.000	0.000
govtstability	0.059	98.288
democraticaccountability	100.000	1.871
polity2	86.351	29.122

G: CDF(beta > 0)

(Intercept)	99.983
lngdppc	48.569
internalconflict	87.047
extrenalconflict	33.037
bureacraticquality	100.000
govtstability	1.712
democraticaccountability	98.129
polity2	70.878

Table A3.5:EBA (POLS)for Socio-Cultural Results

```
Call:

eba(data = dat, y = dv, free = fixed, doubtful = doubt, k = 0:5,

    draws = 200, reg.fun = plm, se.fun = se. robust, index =
c("cid", "year"), effect = c("time"), model = c("pooling"))

Confidence level: 0.95

Number of combinations: 9948

Regressions estimated: 200 (2.01% of combinations)

Number of regressions by variable:


 (Intercept)      lnGDPpc    loenglish     lofrench

         200          200           65           74

     otherlo      catho80       prot80       musl80

          66           71           74           77

    latitude        nocpm      britcol      frencol

          71           62           74           70

     otherco          elf landareasqkm       laborf

          66           64           59           68

    landlock

          65


Number of coefficients used by variable:


 (Intercept)      lnGDPpc    loenglish     lofrench

         200          200           65           74

     otherlo      catho80       prot80       musl80

          66           71           74           77
```

latitude	nocpm	britcol	frencol
71	62	74	70
otherco	elf	landareasqkm	laborf
66	64	59	68
landlock			
65			

Beta coefficients:

	Type	Coef (Wgt Mean)	SE (Wgt Mean)	Min Coef
(Intercept)	free	2.633	0.590	-1.298
lnGDPpc	free	0.145	0.062	-0.067
loenglish	focus	-0.339	0.188	-2.262
lofrench	focus	-0.385	0.185	-1.161
otherlo	focus	0.108	0.209	-1.042
catho80	focus	-0.008	0.004	-0.062
prot80	focus	0.014	0.005	-0.019
musl80	focus	-0.005	0.003	-0.048
latitude	focus	0.086	0.011	0.051
nocpm	focus	0.001	0.005	-0.046
britcol	focus	0.344	0.186	-0.652
frencol	focus	0.662	0.167	-0.391
otherco	focus	-0.749	0.148	-1.227
elf	focus	-2.211	0.395	-3.180
landareasqkm	focus	0.000	0.000	0.000
laborf	focus	0.045	0.013	-0.010
landlock	focus	-0.063	0.133	-0.396

	SE (Min Coef)	Max Coef	SE (Max Coef)
(Intercept)	0.861	8.063	1.253
lnGDPpc	0.060	0.307	0.061
loenglish	0.280	1.060	0.149
lofrench	0.145	0.693	0.201
otherlo	0.237	1.022	0.254
catho80	0.013	0.032	0.015
prot80	0.009	0.028	0.004
musl80	0.012	0.020	0.013
latitude	0.012	0.121	0.012
nocpm	0.012	0.026	0.014
britcol	0.233	1.683	0.230
frencol	0.287	1.263	0.171
otherco	0.225	-0.313	0.112
elf	0.370	-0.506	0.424
landareasqkm	0.000	0.000	0.000
laborf	0.013	0.079	0.013
landlock	0.142	0.281	0.130

Distribution of beta coefficients:

	Type	Pct(beta < 0)	Pct(beta > 0)
(Intercept)	free	7.000	93.000
lnGDPpc	free	8.000	92.000
loenglish	focus	76.923	23.077
lofrench	focus	79.730	20.270
otherlo	focus	45.455	54.545

catho80	focus	73.239	26.761
prot80	focus	1.351	98.649
musl80	focus	76.623	23.377
latitude	focus	0.000	100.000
nocpm	focus	40.323	59.677
britcol	focus	20.270	79.730
frencol	focus	4.286	95.714
otherco	focus	100.000	0.000
elf	focus	100.000	0.000
landareasqkm	focus	100.000	0.000
laborf	focus	1.471	98.529
landlock	focus	63.077	36.923

	Pct(significant != 0)	Pct(signif & beta < 0)
(Intercept)	76.500	0.000
lnGDPpc	60.500	0.000
loenglish	47.692	41.538
lofrench	55.405	52.703
otherlo	34.848	13.636
catho80	69.014	50.704
prot80	75.676	1.351
musl80	53.247	48.052
latitude	100.000	0.000
nocpm	38.710	12.903
britcol	62.162	9.459
frencol	87.143	0.000
otherco	98.485	98.485

elf	95.312	95.312
landareasqkm	100.000	100.000
laborf	82.353	0.000
landlock	18.462	15.385

	Pct(signif & beta > 0)
(Intercept)	76.500
lnGDPpc	60.500
loenglish	6.154
lofrench	2.703
otherlo	21.212
catho80	18.310
prot80	74.324
musl80	5.195
latitude	100.000
nocpm	25.806
britcol	52.703
frencol	87.143
otherco	0.000
elf	0.000
landareasqkm	0.000
laborf	82.353
landlock	3.077

Leamer's Extreme Bounds Analysis (EBA):

Type	Lower Extreme Bound	Upper Extreme Bound

(Intercept)	free	-2.985	10.519
lnGDPpc	free	-0.184	0.433
loenglish	focus	-2.811	1.353
lofrench	focus	-1.606	1.087
otherlo	focus	-1.506	1.520
catho80	focus	-0.088	0.061
prot80	focus	-0.037	0.047
musl80	focus	-0.071	0.045
latitude	focus	0.028	0.144
nocpm	focus	-0.070	0.053
britcol	focus	-1.108	2.134
frencol	focus	-0.952	1.598
otherco	focus	-1.667	0.012
elf	focus	-3.904	0.326
landareasqkm	focus	0.000	0.000
laborf	focus	-0.035	0.104
landlock	focus	-0.674	0.536

	Robust/Fragile? (mu = 0)
(Intercept)	fragile
lnGDPpc	fragile
loenglish	fragile
lofrench	fragile
otherlo	fragile
catho80	fragile
prot80	fragile
musl80	fragile

latitude	robust
nocpm	fragile
britcol	fragile
frencol	fragile
otherco	fragile
elf	fragile
landareasqkm	robust
laborf	fragile
landlock	fragile

Sala-i-Martin's Extreme Bounds Analysis (EBA):

- Normal model (N): beta coefficients assumed to be distributed normally across models

- Generic model (G): no assumption about the distribution of beta coefficients across models

	Type	N: CDF(beta <= 0)	N: CDF(beta > 0)
(Intercept)	free	0.001	99.999
lnGDPpc	free	1.037	98.963
loenglish	focus	95.644	4.356
lofrench	focus	97.782	2.218
otherlo	focus	30.458	69.542
catho80	focus	94.308	5.692
prot80	focus	0.260	99.740
musl80	focus	92.917	7.083
latitude	focus	0.000	100.000
nocpm	focus	43.315	56.685

britcol	focus	3.845	96.155
frencol	focus	0.005	99.995
otherco	focus	100.000	0.000
elf	focus	100.000	0.000
landareasqkm	focus	100.000	0.000
laborf	focus	0.020	99.980
landlock	focus	68.052	31.948

	G: CDF(beta <= 0)	G: CDF(beta > 0)
(Intercept)	9.389	90.611
lnGDPpc	11.827	88.173
loenglish	75.373	24.627
lofrench	78.778	21.222
otherlo	43.651	56.349
catho80	71.258	28.742
prot80	3.700	96.300
musl80	72.756	27.244
latitude	0.000	100.000
nocpm	37.151	62.849
britcol	21.595	78.405
frencol	5.659	94.341
otherco	99.881	0.119
elf	99.511	0.489
landareasqkm	99.990	0.010
laborf	4.472	95.528
landlock	60.770	39.230

Table A3.6: *EBA Random Effects Results for (Socio-Cultural Variables)*

```
eba(data = dat, y = dv, free = fixed, doubtful = doubt, k = 0:5,
    draws = 200,reg.fun = plm,se.fun = se.robust,index =c("cid",
        "year"), effect = c("time"), model = c("random"))
Confidence level: 0.95
Number of combinations: 9948
Regressions estimated: 200 (2.01% of combinations)


Number of regressions by variable:


 (Intercept)      lnGDPpc    loenglish     lofrench
         200          200           71           72
     otherlo      catho80       prot80       musl80
          71           63           62           76
    latitude        nocpm      britcol      frencol
          70           72           68           61
     otherco          elf landareasqkm       laborf
          71           63           68           68
    landlock
          74
Number of coefficients used by variable:
 (Intercept)      lnGDPpc    loenglish     lofrench
         200          200           71           72
     otherlo      catho80       prot80       musl80
          71           63           62           76
    latitude        nocpm      britcol      frencol
          70           72           68           61
```

otherco	elf	landareasqkm	laborf
71	63	68	68

landlock
74

Beta coefficients:

	Type	Coef (Wgt Mean)	SE (Wgt Mean)	Min Coef
(Intercept)	free	2.322	0.604	-1.621
lnGDPpc	free	0.214	0.064	-0.196
loenglish	focus	-0.412	0.195	-1.902
lofrench	focus	-0.464	0.195	-1.247
otherlo	focus	0.156	0.210	-0.952
catho80	focus	-0.008	0.004	-0.046
prot80	focus	0.012	0.005	-0.016
musl80	focus	-0.006	0.003	-0.034
latitude	focus	0.086	0.011	0.051
nocpm	focus	0.001	0.004	-0.026
britcol	focus	0.389	0.194	-0.710
frencol	focus	0.646	0.159	-0.152
otherco	focus	-0.747	0.142	-1.233
elf	focus	-2.149	0.377	-3.122
landareasqkm	focus	0.000	0.000	0.000
laborf	focus	0.042	0.013	-0.014
landlock	focus	-0.075	0.127	-0.411

	SE (Min Coef)	Max Coef	SE (Max Coef)
(Intercept)	0.794	6.555	0.786
lnGDPpc	0.062	0.468	0.065

loenglish	0.268	0.859	0.146
lofrench	0.199	0.754	0.283
otherlo	0.220	1.266	0.204
catho80	0.013	0.018	0.004
prot80	0.009	0.029	0.004
musl80	0.012	0.013	0.003
latitude	0.011	0.118	0.011
nocpm	0.012	0.019	0.005
britcol	0.227	1.297	0.221
frencol	0.140	1.234	0.176
otherco	0.165	-0.148	0.139
elf	0.345	-0.614	0.428
landareasqkm	0.000	0.000	0.000
laborf	0.015	0.086	0.013
landlock	0.129	0.292	0.122

Distribution of beta coefficients:

	Type	Pct(beta < 0)	Pct(beta > 0)
(Intercept)	free	8.000	92.000
lnGDPpc	free	8.000	92.000
loenglish	focus	80.282	19.718
lofrench	focus	80.556	19.444
otherlo	focus	35.211	64.789
catho80	focus	74.603	25.397
prot80	focus	4.839	95.161
musl80	focus	81.579	18.421

latitude	focus	0.000	100.000
nocpm	focus	36.111	63.889
britcol	focus	20.588	79.412
frencol	focus	4.918	95.082
otherco	focus	100.000	0.000
elf	focus	100.000	0.000
landareasqkm	focus	100.000	0.000
laborf	focus	11.765	88.235
landlock	focus	68.919	31.081

	Pct(significant != 0)	Pct(signif & beta < 0)
(Intercept)	77.000	1.000
lnGDPpc	81.500	3.000
loenglish	57.746	50.704
lofrench	59.722	58.333
otherlo	36.620	12.676
catho80	76.190	58.730
prot80	66.129	0.000
musl80	60.526	51.316
latitude	100.000	0.000
nocpm	38.889	15.278
britcol	76.471	11.765
frencol	78.689	0.000
otherco	95.775	95.775
elf	93.651	93.651
landareasqkm	100.000	100.000
laborf	75.000	0.000

landlock	16.216	14.865

	Pct(signif & beta > 0)
(Intercept)	76.000
lnGDPpc	78.500
loenglish	7.042
lofrench	1.389
otherlo	23.944
catho80	17.460
prot80	66.129
musl80	9.211
latitude	100.000
nocpm	23.611
britcol	64.706
frencol	78.689
otherco	0.000
elf	0.000
landareasqkm	0.000
laborf	75.000
landlock	1.351

Leamer's Extreme Bounds Analysis (EBA):

	Type	Lower Extreme Bound	Upper Extreme Bound
(Intercept)	free	-3.266	8.096
lnGDPpc	free	-0.318	0.597
loenglish	focus	-2.428	1.145
lofrench	focus	-1.645	1.308

otherlo	focus	-1.384	1.666
catho80	focus	-0.071	0.026
prot80	focus	-0.033	0.037
musl80	focus	-0.057	0.019
latitude	focus	0.029	0.141
nocpm	focus	-0.050	0.028
britcol	focus	-1.212	1.737
frencol	focus	-0.519	1.579
otherco	focus	-1.557	0.125
elf	focus	-3.810	0.224
landareasqkm	focus	0.000	0.000
laborf	focus	-0.043	0.111
landlock	focus	-0.663	0.531

	Robust/Fragile? (mu = 0)
(Intercept)	fragile
lnGDPpc	fragile
loenglish	fragile
lofrench	fragile
otherlo	fragile
catho80	fragile
prot80	fragile
musl80	fragile
latitude	robust
nocpm	fragile
britcol	fragile
frencol	fragile

otherco	fragile
elf	fragile
landareasqkm	robust
laborf	fragile
landlock	fragile

Sala-i-Martin's Extreme Bounds Analysis (EBA):

- Normal model (N): beta coefficients assumed to be distributed normally across models

- Generic model (G): no assumption about the distribution of beta coefficients across models

	Type	N: CDF(beta <= 0)	N: CDF(beta > 0)
(Intercept)	free	0.011	99.989
lnGDPpc	free	0.045	99.955
loenglish	focus	97.836	2.164
lofrench	focus	98.924	1.076
otherlo	focus	23.216	76.784
catho80	focus	95.646	4.354
prot80	focus	0.986	99.014
musl80	focus	94.364	5.636
latitude	focus	0.000	100.000
nocpm	focus	41.962	58.038
britcol	focus	2.731	97.269
frencol	focus	0.004	99.996
otherco	focus	100.000	0.000
elf	focus	100.000	0.000
landareasqkm	focus	100.000	0.000

laborf	focus	0.055	99.945
landlock	focus	72.393	27.607

	G: CDF(beta <= 0)	G: CDF(beta > 0)
(Intercept)	10.005	89.995
lnGDPpc	8.834	91.166
loenglish	77.919	22.081
lofrench	81.557	18.443
otherlo	37.448	62.552
catho80	73.548	26.452
prot80	8.730	91.270
musl80	77.622	22.378
latitude	0.000	100.000
nocpm	41.380	58.620
britcol	20.448	79.552
frencol	6.837	93.163
otherco	99.662	0.338
elf	99.649	0.351
landareasqkm	99.937	0.063
laborf	10.614	89.386
landlock	63.839	36.161

Table A3.7:EBA ESTIMATES ECONOMIC VARIABLES

```
Call:

eba(data = dat, y = dv, free = fixed, doubtful = doubt, k = 0:5,

    draws = 7000, reg.fun = plm, se.fun = se.robust, index =
c("cid",

        "year"), effect = c("time"), model = c("pooling"))


Confidence level: 0.95

Number of combinations: 60459

Regressions estimated: 7000 (11.58% of combinations)


Number of regressions by variable:


   (Intercept)        lngdppc        govtexp lifeexpectancy

          7000           6991           1958           1960

     tradeopen     investment          lnpop      inflation

          1984           1902           1891           1996

    prischlnet   interestrate            ehi           wage

          1860           1911           1757           1839

 adultliteracy   unemployment     taxrevenue   totalnatural

          1695           1833           1827           1904

     importsgs      exportsgs        mcsp100          fdini

          1897           1830           1842           1856

          noda       internet

          1867           1872


Number of coefficients used by variable:
```

```
   (Intercept)         lngdppc         govtexp lifeexpectancy
          7000            6991            1958           1960
     tradeopen      investment           lnpop      inflation
          1984            1902            1891           1996
    prischlnet    interestrate             ehi           wage
          1860            1911            1757           1839
 adultliteracy    unemployment      taxrevenue   totalnatural
          1695            1833            1827           1904
     importsgs       exportsgs         mcsp100          fdini
          1897            1830            1842           1856
          noda        internet
          1867            1872
```

```
Beta coefficients:

                 Type  Coef (Wgt Mean)  SE (Wgt Mean)
(Intercept)      free            3.727          7.222
lngdppc          free            0.092          0.661
govtexp         focus           -0.026          0.088
lifeexpectancy  focus            0.043          0.075
tradeopen       focus           -0.015          0.027
investment      focus            0.020          0.055
lnpop           focus            0.511          1.031
inflation       focus            0.009          0.046
prischlnet      focus           -0.031          0.098
```

interestrate	focus	0.001	0.049
ehi	focus	-0.044	0.237
wage	focus	0.006	0.063
adultliteracy	focus	0.045	0.052
unemployment	focus	-0.038	0.097
taxrevenue	focus	0.086	0.094
totalnatural	focus	-0.049	0.028
importsgs	focus	-0.016	0.042
exportsgs	focus	0.009	0.049
mcsp100	focus	-0.016	0.030
fdini	focus	-0.002	0.147
noda	focus	0.009	0.016
internet	focus	-0.125	0.360

	Min Coef	SE (Min Coef)	Max Coef
(Intercept)	-3884.771	0.000	8806.905
lngdppc	-359.586	0.000	130.743
govtexp	-131.416	0.000	15.446
lifeexpectancy	-2.949	0.000	5.069
tradeopen	-20.136	0.000	2.766
investment	-3.111	0.000	3.393
lnpop	-41.740	0.000	117.434
inflation	-3.578	0.000	2.521
prischlnet	-83.852	0.000	4.147
interestrate	-23.704	0.000	11.326
ehi	-40.407	0.000	130.390
wage	-1.135	0.000	19.944

adultliteracy	-7.376	0.000	39.601
unemployment	-2.159	0.000	0.754
taxrevenue	-10.599	0.000	103.503
totalnatural	-7.721	0.000	0.384
importsgs	-12.033	0.000	3.037
exportsgs	-0.486	0.000	0.990
mcsp100	-0.788	5.873	0.055
fdini	-8.318	0.000	35.591
noda	-0.255	0.572	10.869
internet	-1.751	3.128	8.745

	SE (Max Coef)
(Intercept)	0.00
lngdppc	0.00
govtexp	0.00
lifeexpectancy	0.00
tradeopen	0.00
investment	0.00
lnpop	0.00
inflation	0.00
prischlnet	0.00
interestrate	0.00
ehi	0.00
wage	0.00
adultliteracy	0.00
unemployment	0.00
taxrevenue	0.00

totalnatural	0.00
importsgs	0.00
exportsgs	0.00
mcsp100	0.00
fdini	0.00
noda	0.00
internet	69.15

Distribution of beta coefficients:

	Type	Pct(beta < 0)	Pct(beta > 0)
(Intercept)	free	27.243	72.757
lngdppc	free	22.143	77.857
govtexp	focus	31.410	68.590
lifeexpectancy	focus	22.551	77.449
tradeopen	focus	68.952	31.048
investment	focus	21.872	78.128
lnpop	focus	15.706	84.294
inflation	focus	56.713	43.287
prischlnet	focus	51.022	48.978
interestrate	focus	50.863	49.137
ehi	focus	81.559	18.441
wage	focus	54.976	45.024
adultliteracy	focus	21.357	78.643
unemployment	focus	69.122	30.878
taxrevenue	focus	22.058	77.942

totalnatural	focus	96.113	3.887
importsgs	focus	51.977	48.023
exportsgs	focus	51.366	48.634
mcsp100	focus	90.282	9.718
fdini	focus	66.487	33.513
noda	focus	17.622	82.378
internet	focus	88.248	11.752

	Pct(significant != 0)	Pct(signif & beta < 0)
(Intercept)	29.971	4.029
lngdppc	33.171	2.847
govtexp	24.004	3.115
lifeexpectancy	28.112	1.071
tradeopen	20.665	16.734
investment	20.452	2.208
lnpop	27.393	0.952
inflation	10.521	5.511
prischlnet	26.774	18.333
interestrate	23.496	16.327
ehi	39.727	33.068
wage	3.535	2.066
adultliteracy	6.490	2.183
unemployment	12.275	11.948
taxrevenue	38.588	2.408
totalnatural	65.966	65.756
importsgs	16.131	6.853
exportsgs	19.290	11.585

mcsp100	50.651	50.543
fdini	7.866	5.765
noda	25.121	0.589
internet	49.626	49.626

	Pct(signif & beta > 0)
(Intercept)	26.257
lngdppc	30.511
govtexp	20.940
lifeexpectancy	27.092
tradeopen	3.931
investment	18.402
lnpop	26.600
inflation	5.160
prischlnet	8.763
interestrate	7.221
ehi	6.887
wage	1.523
adultliteracy	4.543
unemployment	0.327
taxrevenue	36.234
totalnatural	0.263
importsgs	9.278
exportsgs	7.705
mcsp100	0.163
fdini	2.101
noda	24.531

```
internet                          0.000
```

Leamer's Extreme Bounds Analysis (EBA):

	Type	Lower Extreme Bound
(Intercept)	free	-14861.401
lngdppc	free	-359.586
govtexp	focus	-131.416
lifeexpectancy	focus	-30.177
tradeopen	focus	-20.136
investment	focus	-4.880
lnpop	focus	-980.039
inflation	focus	-14.840
prischlnet	focus	-174.099
interestrate	focus	-23.704
ehi	focus	-56.629
wage	focus	-29.760
adultliteracy	focus	-21.385
unemployment	focus	-22.630
taxrevenue	focus	-19.091
totalnatural	focus	-7.721
importsgs	focus	-12.033
exportsgs	focus	-15.905
mcsp100	focus	-33.228
fdini	focus	-18.255
noda	focus	-5.384

internet focus -334.907

	Upper Extreme Bound	Robust/Fragile? (mu = 0)
(Intercept)	14906.614	fragile
lngdppc	334.276	fragile
govtexp	24.728	fragile
lifeexpectancy	25.270	fragile
tradeopen	8.008	fragile
investment	4.045	fragile
lnpop	977.453	fragile
inflation	13.628	fragile
prischlnet	173.495	fragile
interestrate	19.618	fragile
ehi	130.390	fragile
wage	29.821	fragile
adultliteracy	39.601	fragile
unemployment	22.533	fragile
taxrevenue	103.503	fragile
totalnatural	2.762	fragile
importsgs	5.464	fragile
exportsgs	15.963	fragile
mcsp100	32.861	fragile
fdini	35.591	fragile
noda	10.869	fragile
internet	337.757	fragile

Sala-i-Martin's Extreme Bounds Analysis (EBA):

- Normal model (N): beta coefficients assumed to be distributed normally across models

- Generic model (G): no assumption about the distribution of beta coefficients across models

	Type	N: CDF(beta <= 0)	N: CDF(beta > 0)
(Intercept)	free	48.511	51.489
lngdppc	free	48.932	51.068
govtexp	focus	52.385	47.615
lifeexpectancy	focus	45.720	54.280
tradeopen	focus	55.041	44.959
investment	focus	43.765	56.235
lnpop	focus	48.377	51.623
inflation	focus	48.469	51.531
prischlnet	focus	50.588	49.412
interestrate	focus	49.891	50.109
ehi	focus	51.762	48.238
wage	focus	49.417	50.583
adultliteracy	focus	45.079	54.921
unemployment	focus	53.781	46.219
taxrevenue	focus	40.005	59.995
totalnatural	focus	79.154	20.846
importsgs	focus	54.612	45.388
exportsgs	focus	48.315	51.685
mcsp100	focus	51.385	48.615
fdini	focus	50.129	49.871
noda	focus	45.789	54.211

internet	focus	50.932	49.068
	G: CDF(beta <= 0)	G: CDF(beta > 0)	
(Intercept)	31.490	68.510	
lngdppc	26.744	73.256	
govtexp	34.602	65.398	
lifeexpectancy	26.707	73.293	
tradeopen	64.846	35.154	
investment	29.102	70.898	
lnpop	22.682	77.318	
inflation	51.251	48.749	
prischlnet	51.022	48.978	
interestrate	50.921	49.079	
ehi	73.796	26.204	
wage	52.339	47.661	
adultliteracy	35.393	64.607	
unemployment	65.206	34.794	
taxrevenue	26.043	73.957	
totalnatural	92.059	7.941	
importsgs	50.503	49.497	
exportsgs	51.220	48.780	
mcsp100	85.105	14.895	
fdini	60.513	39.487	
noda	24.080	75.920	
internet	83.758	1	

Table A3.8

Table A4.1:List of Countries in Chapter 4

List of Lower Middle-Income Countries in SSA ($1,046 to $4,125)		
Cameroon	**Congo Republic**	**Cote d'Ivoire**
Ghana	**Nigeria**	**Senegal**
Sudan	**Zambia**	
List of Low -Income Countries in SSA ($1,046 or less)		
Burkina Faso	**Congo, Dem.Rep**	**Ethiopia**
The Gambia	**Guinea**	**Guinea Bissau**
Kenya	**Liberia**	**Madagascar**
Malawi	**Mali**	**Mozambique**
Niger	**Sierra Leone**	**Tanzania**
Togo	**Uganda**	**Zimbabwe**
List of Upper-Middle-Income Countries in SSA ($4,125 to $12,745)		
Angola	**Botswana**	**Gabon**
Namibia	**South Africa**	

A4.2:Data Sources and Definition of Indicators for Chapter 4.

	Indicator	Source of data
GDPPG	GDP Per Capita Growth	World Development Indicators (2014)
LE	Life Expectancy	World Development Indicators (2014)
POP	Population	World Development Indicators (2014)
CG	Government consumption	World Development Indicators (2014)
INV	Gross capital formation (% of GDP)	World Development Indicators 2014
CPI	Inflation, consumer prices (annual %)	World Development Indicators 2014
PSN	Primary Sch enrollment, secondary (net)	World Development Indicators 2014
Polity2	Polity2 from the Polity IV Project	Polity IV Project
ICRG	Corruption	International Country Risk Guide. PRS (2014)

A5.1:Economic Growth Framework

The model implemented in this chapter assumes a Cobb-Douglas production function of the following form:

$$Y_{it} = (A_0\ A_p\ K_p)^{\propto}\ (A_h K_h)^{\beta}\ (A_l L)^{1-\alpha-\beta} \ldots \ldots (4.1)$$

$Where$:

$Y = Real\ Output, L =$
$Labour, K_p\ and K_h\ are\ the\ phyical\ and\ human\ capital\ stock.$

$A_0\ represent\ an\ overall\ index\ of\ technology\ and\ efficiency\ in\ the\ economy$

$A_p\ , A_h\ and\ A_l\ are\ the\ physical\ and\ human\ capital - augmenting\ and\ labour - augmenting\ technology\ respectively. They\ thereafter\ defined$:

$$A = A_l\ (A_0 A_p^{\propto} A_h^{\beta})^{1/(1-\alpha-\beta)} --- (4.2)$$

$Equation\ (4.1) can\ be\ rewritten\ as$:

$$Y = K_p^{\alpha} K_h^{\beta} (A.L)^{1-\alpha-\beta} --- (4.3)$$

$Where\ A$
$= captures\ all\ the\ factors\ augmenting\ and\ the\ economic\ wide\ levels\ \ of\ technology\ and$

$efficiency. Labour\ and\ labour$
$- augmenting\ technology\ are\ assumed\ to\ grow\ according\ to\ the\ following\ functions$:

$$L = L_0 e^{nt} \ldots \ldots \ldots . . (4.4)\ \ and$$

$$A = A_0 e^{(gt + x\theta} \ldots \ldots (4.5)$$

$where: n = the\ exogenous\ rate\ of\ the\ labour\ force$

$t = time\ index\ \ and\ g = exogenous\ rate\ of\ technological\ progress$

X
$= is\ a\ vector\ of\ policy\ and\ other\ factors\ that\ can\ affect\ the\ level\ technology\ and\ efficie$

$\theta\ is\ a\ vector\ of\ coefficients\ related\ to\ these\ policy\ and\ other\ variables.$

They further assumed S_g and S_h to be the fraction of income invested in physical and human capital. It was also assumed that both types of capital stocks depreciate at the same rate δ.

Therefore, physical and human capital are accumulated according to the following functions:

$$\frac{dK_p}{dt} = s_p Y - \delta K_p \ldots..(4.6)$$

$$\frac{dK_h}{dt} = S_h Y - \delta K \ldots\ldots..(4.7)$$

In the steady state, the levels of physical and human capital per effective labour unit are constant. Therefore, setting $(4.6) and$ (4.7) to zero and solving the resulting equations will yield:

$$k_p^* = (\frac{S_p^{1-\beta} S_h^{\beta}}{n+g+\delta})^{\frac{1}{1-\alpha-\beta}} \ldots..(4.8a)$$

$$k_h^* = (\frac{S_p^{\alpha} S_h^{1-\alpha}}{n+g+\delta})^{\frac{1}{1-\alpha-\beta}} \ldots\ldots(4.8b)$$

Substituting (4.8a) and (4.8b) in (8.3) and taking natural logarithms, will lead to the steady state output per effective labour unit:

$$\mathrm{Ln}(y^*) = -\left(\frac{\epsilon}{1-\epsilon}\right)\ln(n+g+\delta) + \left(\frac{\alpha}{1-\epsilon}\right)\ln(S_p) + \left(\frac{\beta}{1-\epsilon}\right)\ln(S_h) \ldots\ldots(4.9)$$

Where $\epsilon - (\alpha+\beta)$.

They derived an empirical counterpart of equation (4.9) by taking the natural logarithm of $y = \frac{Y}{A.L}$ and substituting for A from equation (4.5):

$$\ln\left(\frac{Y}{L}\right) = \ln(A_0) + gt + x\theta - \left(\frac{\epsilon}{1-\epsilon}\right)\ln(n+g+\delta) + \left(\frac{\alpha}{1-\epsilon}\right) ln(S_p) + \left(\frac{\beta}{1-\epsilon}\right)\ln(S_h) \ldots\ldots(4.10)$$

The terms $\left(\frac{\epsilon}{1-\epsilon}\right), \left(\frac{\alpha}{1-\epsilon}\right) and \left(\frac{\beta}{1-\epsilon}\right)$ in the equations above are the respective elasticities of per capita income with respect to population growth and the fraction of income invested in both physical and human capital. This model predicts that the sum of the elasticities with respect to S_p and S_h is $equal$ to $that$ on $(n + g + \delta)$.

Following Mankiw, Romer and Weil (1992), the transition of actual output per effective labour unit to its steady-state level is approximated by:

$$\frac{d\ ln(y)}{dt} = \omega\{(\ln(y^{*}) - \ln(y)\} \dots \dots \dots .. (4.11)$$

$where$: $\omega = (n + g + \delta)(1 - \epsilon)$is the speed of convergence, y is the actual output per effective unit of labour. Equation (4.11) implies that:

$$\ln(y) = (1 - e^{\omega t})\ln(y^{*}) + e^{\omega t}\ln(y_0) \dots \dots (4.12)$$

Where y_0 is output per effective labour unit at time t_0. Subtracting y_0 from both sides of equation (4.12) and substituting $\ln(y^{*})$ from equation (4.10) gives:

$$\begin{aligned}\ln(y) - \ln(y_0) \\ &= (1 - e^{\omega t})\left\{-\left(\frac{\epsilon}{1-\epsilon}\right)\ln(n + g + \delta) + \left(\frac{\alpha}{1-\epsilon}\right)\ln(S_p)\right. \\ &\left.+ \left(\frac{\beta}{1-\epsilon}\right)\ln(S_h) + x\theta - \ln(y_0) + gt + \ln(A_0)\right\} \dots \dots \dots \dots \dots . (4.13)\end{aligned}$$

Where, T is the length of time under consideration. Finally, they provide for the empirical counterpart of equation (4.13) for the $i - th$ sub-Saharan African countries considered in this study as follow:

Table A5.1:List of Countries in the sample

1. Angola
2. Botswana
3. Burkina Faso
4. Cameroon
5. Congo, Democratic Republic
6. Congo, Republic
7. Cote d'ivoire
8. Ethiopia
9. Gabon
10. Ghana
11. Guinea
12. Guinea Bissau
13. Kenya
14. Madagascar
15. Malawi
16. Mozambique
17. Nigeria
18. Sierra Leone
19. South Africa
20. Sudan
21. Tanzania
22. Togo
23. Uganda
24. Zambia
25. Zimbabwe

Table A5.2:Description of Variables and Sources

Variables	Descriptions	Sources
GDP per capita growth	Growth rate of GDP per capita	*World Development Indicators*(WDI)2015
Log of initial GDP per capita(1986)	Logarithm of GDP per capita	*World Development Indicators*(WDI)2015
Real KF(2010)	Real Capital Flight as a ratio of GDP	www.peri.umass.edu/africa Capital_flight_from_39_African_countries_1970-2010_Dec2012(Ndikumana and Boyce,2012)
Life Expectancy	Proxy for Human Capital	*World Development Indicators*(WDI)2015
Corruption(ICRG)	Corruption	*Political Risk Service(PRS),2014*
Polity2	Political Stability	*Polity IV Project(2012)*
Trade/Open	Sum of export/import for C	*World Development Indicators*(WDI)2015
Pop Growth Rate(%)	Growth rate of population	*World Development Indicators*(WDI)2015
Control of Corruption	Corruption(CC)	*World Governance Indicator*(WGI)2015
Corr*RKF	Corruption*Real Capital F.	ICRG(PRS) &www.peri.umass.edu/africa
Gov't Expenditure	Government Final Exp	*World Development Indicators*(WDI)2015
Investment%(GDP)	Gross capital formation	*World Development Indicators*(WDI)2015
Inflation (%)	GDP Deflator	*World Development Indicators*(WDI)2015
FDI Inflow(%GDP)	Net inflow of FDI(% of GDP)	*World Development Indicators*(WDI)2015
Interest Rate Diff.	Interest rate Differential	*World Development Indicators*(WDI)2015
Real Exchange Rate	Real Exchange Rate	*World Development Indicators*(WDI)2015
Budget Deficit	Government Budget Deficit	*World Development Indicators*(WDI)2015
Financial Develop.	Proxy for Financial development	*World Development Indicators*(WDI)2015
Debt	Government Debt	*World Development Indicators*(WDI)2015