GOVERNMENT EXPENDITURE AND PUBLIC SECTOR CORRUPTION IN KENYA

JOB MUGALAVAI EBOSO

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NOVEMBER 2018

DECLARATION

I declare that this project is my original work and has not been submitted for the award of a degree in any other university or institution.

JOB MUGALAVAI EBOSO

SIGNATURE:…… DATE:……..

This paper is submitted for the award of the degree of Master of Arts in Economics with my approval as the University Supervisor.

DR. LAURA NELIMA BARASA

SIGNATURE:…… DATE:……..

DEDICATION

This project is dedicated to my late father Mr. John Mugalavai Salu, a career public servant whose long experience and insights gave me the motivation for this study. I also dedicate it to my son John Mugalavai whom I hope will be inspired in later years by this work, as well as my mother Ann Dorcas, and siblings Gordon, Sylvia and Whycliffe.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributed Lag Model
CPI	Corruption Perception Index
EACC	Ethics and Anti-Corruption Commission
GDP	Gross Domestic Product
ICRG	International Country Risk Guide
ODPP	Office of the Director of Public Prosecutions
PETS	Public Expenditure and Tracking Survey
PP	Phillips-Perron
QSDS	Quantitative Service Delivery Survey
ROK	Republic of Kenya
VIF	Variance Inflation Factor
ZA	Zivot-Andrews

ABSTRACT

This study aims to establish the relationship between public sector corruption and government expenditure in Kenya. Whereas it is widely agreed in literature that corruption is a constraint to economic development and economic growth, the link between public expenditure and corruption is widely ignored especially in Kenya. The main focus of previous studies has been to link corruption to economic growth or public expenditure to economic growth. By recognizing that corruption influences budgetary composition and it targets sectors that are susceptible to high bribes, this study answers the question of how corruption influences public expenditure. We use a case study of Kenya because on average, it is the 23rd most corrupt country in the world as per Transparency International statistics that range from 1998 to 2017. Equally public expenditure is on the rise. Using time series data that ranges between 1984 and 2016, we analyze six long-run regression models where expenditure in education, defense/military, health, social protection, infrastructure and energy are dependent variables. Corruption, rate of urbanization, government expenditure, real GDP and tax income are used as explanatory variables. We conclude that corruption influences general public expenditure in Kenya. In addition, education and infrastructure sectors are significantly affected by corruption. Other sectors (energy, health, social and defense) are only influenced positively by corruption but this effect is not significant. These results are affirmed by an alternative long-run model, ARDL.

CHAPTER ONE: INTRODUCTION

1.1 Background

This study investigates the relationship between public sector corruption and government expenditure in Kenya. Whereas consensus exists on the adverse effect of corruption in an economy, there is no proper definition of corruption. Corruption is dynamic and as a result the definition one chooses determines the conceptual framework, empirical framework and methodology used to analyze it. We adopt the definition of the World Bank which relates corruption to the misuse of public office for private gain. The public in this case is government and parastatals, while corruption involves engagement of a public official with another party. Corruption can be in four main forms; grand corruption where the political elite use public resources for their individual benefit at the expense of the populace; bureaucratic corruption where appointed bureaucrats exploit the public through petty corruption and their superiors (political elite); legislative corruption where bribes influence voting patterns of Legislators; and state capture where the private sector fuels corruption in government. This study is concerned with the first three forms. Corruption is usually measured in three ways; first through opinion surveys, second through direct measures such as audits and experimental studies and, third through indirect measures such as Public Expenditure Tracking Surveys and Quantitative Service Delivery Surveys.

Several studies have explained determining factors and consequences of corruption. Main determinants of public sector corruption can be categorized into four: demographic and economic factors; judicial and bureaucratic factors; geographical and cultural factors; and quality of political institutions (Tanzi, 1998; Jain, 2001; Aidt, 2011; Jajkowicz et al., 2015; Warf , 2017; Jetter and Parmeter, 2018). Subsequently, the consequences of corruption though largely negative can also be positive. A strand of literature shows that corruption reduces economic growth and in turn economic development (Mauro, 1995; Wei, 1999; Gupta et al., 2002; Saha et al., 2017; Dimant and Tosato, 2018). This is in form of *inter alia* reduced investment (Mauro, 1995; Me´on and Sekkat, 2005; Gyimah-Brempong, 2002), particularly private investment (Mo, 2001), Foreign Direct Investment (Wei, 1999) and reduced returns from public investement (Haque and Kneller, 2015). Corruption also lowers physical capital (Gyimah-Brempong, 2002), human capital (Mo, 2001),

productivity (Gyimah-Brempong, 2002; Lambsdorff, 2003), increases income inequality and poverty (Gyimah-Brempong, 2002; Gupta, Davoodi, and Alonso-Terme, 2002); worsens quality of governance and institutions (Me´on and Sekkat, 2005); catalyzes political instability (Mo, 2001) and reduces sustainable development (Aidt, 2009). On the contrast, literature led by seminal works of Leys (1965), Leff (1964) and Huntington (1968) argues that corruption enhances growth especially in markets with stringent regulations. Corruption also enhances effieciency when institutions are inefficient (Me´on and Weill, 2010; Dreher and Gassebner, 2013).

This study extends the debate on the relationship between corruption and economic growth through the channel of public expenditure. This relationship is widely ignored in literature (Hessami, 2014; Jajkowicz et al., 2015; D'Agostino et al., 2016) yet public expenditure is a significant component of economic growth (Barro, 1990). Corruption tends to influence budgetary composition and will target sectors that are susceptible to high bribes. The major aim of politicians and bureaucrats is to increase shares of public expenditure on high-technology goods where competition is low such as in oligopolistic markets. Thus detection of corruption becomes very difficult to observe and investigate as prices are hardly comparable for innovative products which allows all parties involved (mostly bureaucrats and politicians) to collect more generous bribes.

Empirical evidence shows that corruption reduces expenditure in sectors such as education and healthcare (see Gupta et al., 2001; Mauro, 1998; Delavallade, 2006; Hashem, 2014; Cordis, 2014; Jajkowicz, 2015; Morais et al., 2017; Swaleheen, Ali, and Temimi, 2018). Sectors that increase expenditure due to corruption include military/defense, public service order, culture, fuel and energy (see Delavallade, 2006; Gupta et al., 2001; Jajkowicz et al., 2015; Hessami, 2014). In general, corruption favors expenditure in building and creation of projects as opposed to maintenance and operations.

1.1.1 Corruption in Kenya

Synonymous to the rest of Africa, corruption poses a major development challenge in Kenya. Although there is no Kenya-specific[1] study that assesses the impact of corruption on economic development and growth, caution is given by studies such as Hope (2014; 2017) that corruption is likely to reduce private and public investment, reduce economic growth, contribute to political instability and lead to insecurity in Kenya. Actually, corruption is ranked the third major problem in Kenya after poverty and unemployment (ROK, National Ethics and Corruption Survey, 2016, 2016). In this section, corruption in Kenya is assessed in three-fold: first through opinion surveys; second through scandals and; third through Public Expenditure Tracking Surveys, Quantitative Service Delivery Surveys and audits.

1.1.1.1 Opinion surveys of corruption in Kenya

Kenya has continuously ranked among the most corrupt countries in the world. According to Figure 1, Kenya ranked among the top twenty most corrupt countries in the World before 2006. There was marked improvement after 2006 where it mostly remained above position thirty until 2015. Corruption increased by 29% between 2013 and 2014 and Kenya was the 37th most corrupt country in the world in 2017. On average, Kenya is the 23rd most corrupt country in the World between 1998 and 2017.

All the three primary East African countries- Kenya, Uganda and Tanzania- have a Corruption Perception Index (CPI) of below 4.0 which is below the minimum of 5. Notably, CPI ranges from zero to ten where zero means most corrupt and ten means least corrupt. Tanzania is the least corrupt country in the region followed by Uganda and Kenya respectively. The average CPIs for Kenya, Uganda and Tanzania between 1998 and 2017 are 2.27, 2.49 and 2.82 respectively.

[1] Most studies that include Kenya are panel, such as Me´on and Weill (2010), Me´on and Sekkat (2005), Egger and Winner (2005), Gupta, De Mello, and Sharan (2001), and D'Agostino, Dunne, and Pieroni (2016).

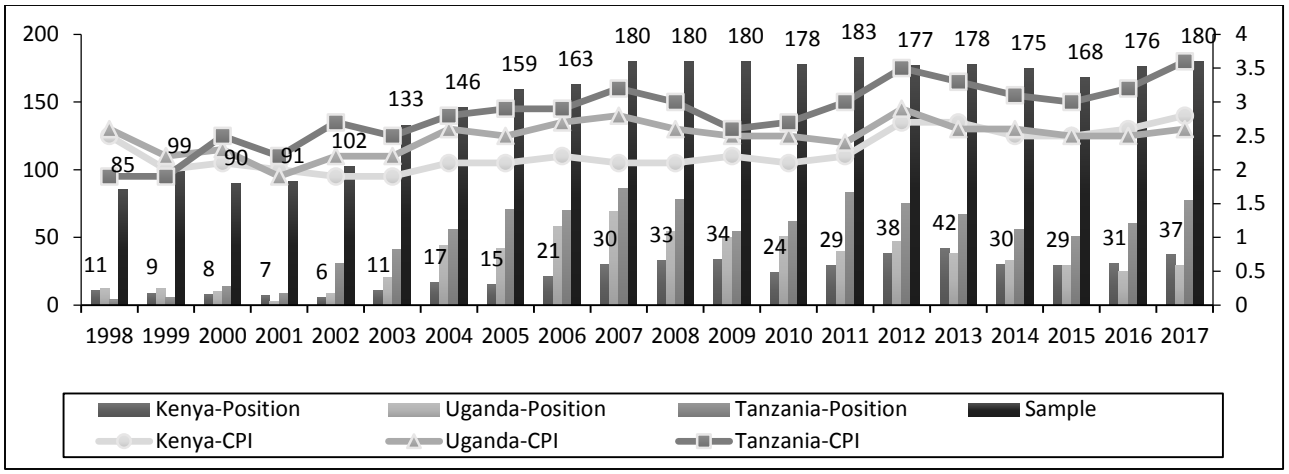

Figure 1: Corruption ranking for Kenya, Uganda and Tanzania and their Perception Indices from 1998-2017

Source: Own computation using Transparency International Data

These results are affirmed by findings of several National Ethics and Corruption Surveys. According to the 2016 survey, 79.3% of respondents believe that corruption is high in Kenya (ROK, National Ethics and Corruption Survey, 2016, 2016). This incidence was 73.9% and 67.7% in the 2015 and 2012 surveys respectively (ROK, 2012; ROK, 2015). In relation to this study, embezzlement of public funds, misappropriation of public funds and abuse of office feature among the highest forms of corruption in all the three surveys.

According to Figure 2, the Ministry of interior and coordination is perceived to have the highest level of corruption. This is followed by the Ministry of Health, Lands, Education, Devolution and Planning, Transport and Infrastructure and Defense. The surveys further indicate that corruption among government agencies is highest in the Police Service while judiciary and parliament also account for a significant portion.

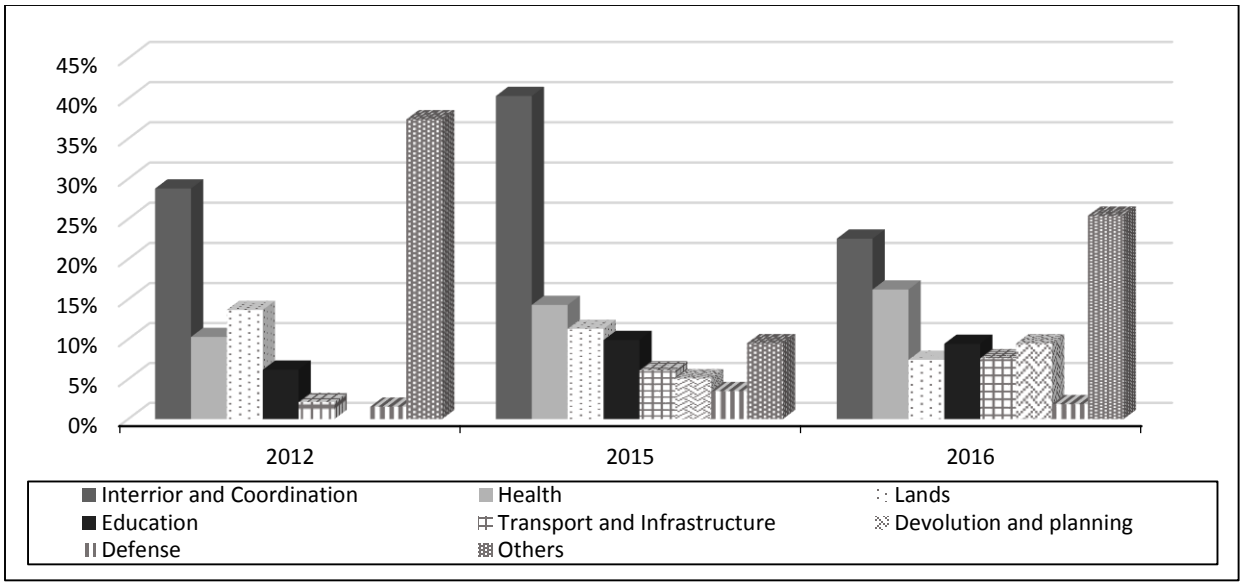

Figure 2: Ministries perceived to be prone to corruption in Kenya (2012, 2015 and 2016)

Source: Own Computation using National Ethics and Corruption Survey (ROK, 2012; 2015; 2016)

1.1.1.2 Corruption scandals in Kenya

Kenya has lost Billions of shillings to embezzlement of public funds. Available records show that major grand corruption scandals occurred from mid 1980s to date. Table 1.1 indicates a list of major corruption scandals with their corresponding amounts in Millions of US dollars. These scandals involve loss of public funds that had been budgeted for.

Table 1: Corruption scandals in Kenya and corresponding amounts

Scandal	Time period	Amount (millions of $)
Turkwel Hydroelectric Power Station	1986 - 1990	200*
Goldenberg scandal	1990 – 1999	650
Anglo Leasing	2001	100
Euro Bank	2003	18
Grand Regency	2008	60
Triton Oil	2009	98.7
Maize	2009	1.5
City Council Cemetery Land Scandal	2010	2.83
Kenyan Embassy in Japan	2012	7
Chicken gate	2012 – To date	1.70
National Youth Service	2016 – To date	14*
Total		1,153.73

Source: Franz (2012); Hassid and Brass (2014); AfriCOG (2009);and IMF (2016)

Key: Asterisk (*) means estimated and it is not the actual figure

According to Table 1, public funds worth $1,154 Billion have been lost to corruption from 1986 to date[2]. Furthermore, the Goldenberg scandal which so far is the biggest scandal in Kenya accounted for at least 10% of GDP (Hassid and Brass, 2015). Likewise, annual reports by the current anti-corruption body, Ethics and Anti-Corruption Commission (EACC) indicate that most cases facing investigation are due to abuse of office and embezzlement of public funds.

In relation to corruption, data on capital flights by Ndikumana and Boyce (2010) indicates that the amount of total real capital flight outflow from Kenya between 1970 and 2010 is US$ 4.9 Billion. Muchai and Muchai (2016) while studying the nexus between capital flights and fiscal policy in Kenya, attribute *ceteris paribus* capital flights to be determined by expenditure systems of a country and in turn fiscal policy. This aspect of expenditure structure points to the possibility corruption influencing capital flights.

[2] Other corruption scandals have not been included due to lack of surety of the amounts that have been lost.

1.1.1.3 Public Expenditure Tracking Surveys and Quantitative Service Delivery Surveys and audits

Public Expenditure Tracking Surveys (PETS) and Quantitative Service Delivery Surveys (QSDS) are recent techniques that document delivery of services on the supply side with a major aim of establishing effectiveness and accountability of service delivery. In relation to the subject of this study, when PETS and QSDS show that public expenditure does not generate improvement in service delivery, there might be two explanations. First it might be due to inefficiency in transfer of public funds among public-sector agencies and secondly, it might be due to corruption and wastage.

Most PETS and QSDS in Kenya have been conducted in the Health and Education sector. For instance, in their study of the efficiency of the Secondary Education Bursary Scheme, Oyugi, Riechi, and Anupi (2008) establish that 20% of schools receiving bursaries had non-existent students. In addition, students receiving multiple bursaries in excess of the school fees in 27% of schools. These inefficiencies were mainly attributed to miscommunication between the responsible agencies. PETS and QSDS by Onsomu, et al. (2014), and Gayle and Obert (2013) give more insights on misllaocation of public resources.

Annual audit reports by the Auditor-General also offer more information on the subject of corruption and public-sector expenditure. For instance, only 1.05% of expenditure in 2014/2015 could be approved as having been spent lawfully and effectively by the Auditor General (ROK, 2016). This means that 98.95% of public expenditure was not accounted for and could have been lost to corruption.

1.1.1.4 Anti-corruption in Kenya

In spite of the disturbing status of corruption in Kenya, it should be recognized that a number of anti-corruption measures have been taken. The current supervisory body, The Ethics and Anti-Corruption Commission (EACC), was instituted in 2011. Prior to it, anti-corruption was driven by the Anti-Corruption Police Squad (1992-1995), the Kenya Anti-Corruption Authority (1997-2000), the Anti-Corruption Police Unit (2001-2003) and the

Kenya Anti-Corruption Commission (2003-2010). A number of statutes have also been enacted since the pre-independence period to oversee control of corruption. Starting with the Prevention and Corruption Ordinance (CAP 65) of 1956, Anti-Corruption and Economic Crimes Act of 2003, section six of The Constitution of Kenya 2010, Ethics and Anti-Corruption Commission Act of 2011 and the Leadership and Integrity Act of 2012 among others. Bodies such as the Attorney General and Department of Justice, Office of the Director of Public Prosecutions (ODPP), the Office of the Controller of Budget *inter alia* are also mandated to control corruption.

1.1.2 Public Expenditure in Kenya

Public expenditure in Kenya is on the rise. From Figure 3, expenditure between 2004/2005 and 2017/2018 has increased by 631%. Expenditure has been above one trillion Kenya shillings under the new constitution that was enacted in 2010. It is also under this period that huge investments in infrastructure and energy have been undertaken to spur Kenya towards achieving Vision 2030. Vision 2030 is Kenya's development plan whose aim is to spur Kenya to a middle-income status by 2030. Additionally, public expenditure has in most cases accounted for at least a third of the Gross Domestic Product (GDP) except for the period between 2010 and 2013. Nevertheless, its allocation to GDP has been on a steady increase under the devolution period, from 2012/2013.

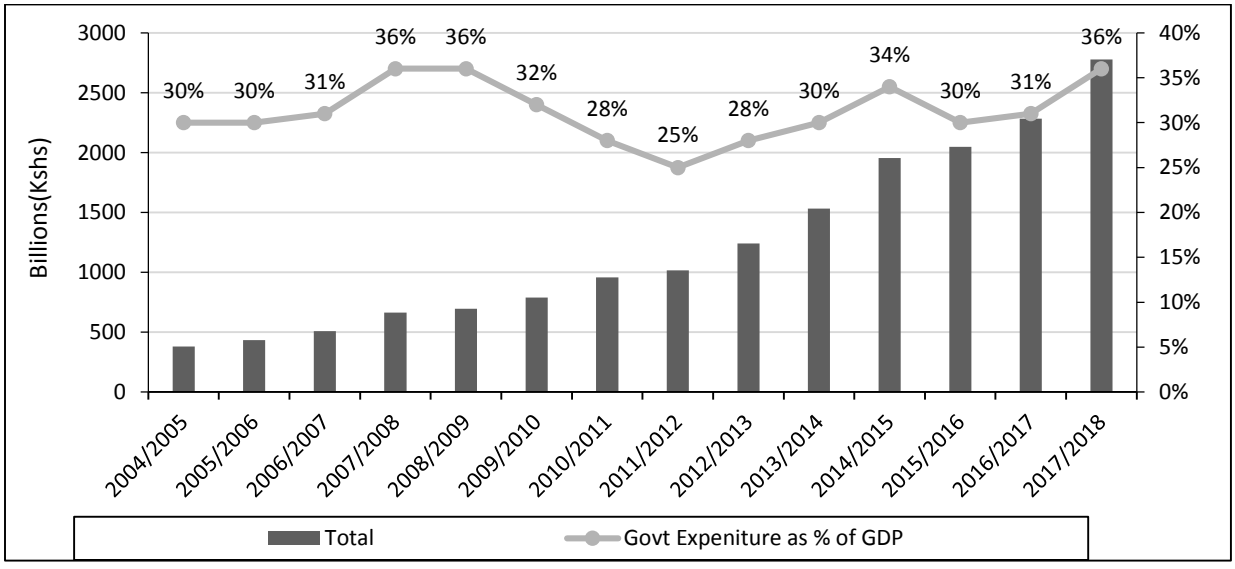

Figure 3: Trend of Public Expenditure in Kenya (2004/2005-2017/2018)

Source: Own Computation using data from several Economic Surveys

Most of government expenditure goes to education as per Figure 4. This is mainly evident in the pre-2011/2012 period when education accounted for more than 20% of government expenditure. However, the period after 2011/2012 has seen a reduction in expenditure on education which has oscillated between 14% and 18%. Expenditure on health has declined after the 2012/2013 period but that of social protection has increased after the 2013/2014 period. Expenditure on transportation, fuel and energy sectors has increased especially after the 2009/2010 period. This can be attributed to the prioritization of development of infrastructure by the government. Synonymously, expenditure on Fuel and Energy has increased in recent years. The average expenditure on defense over the total expenditure between 2004/2005 and 2015/2016 is 5.8%.

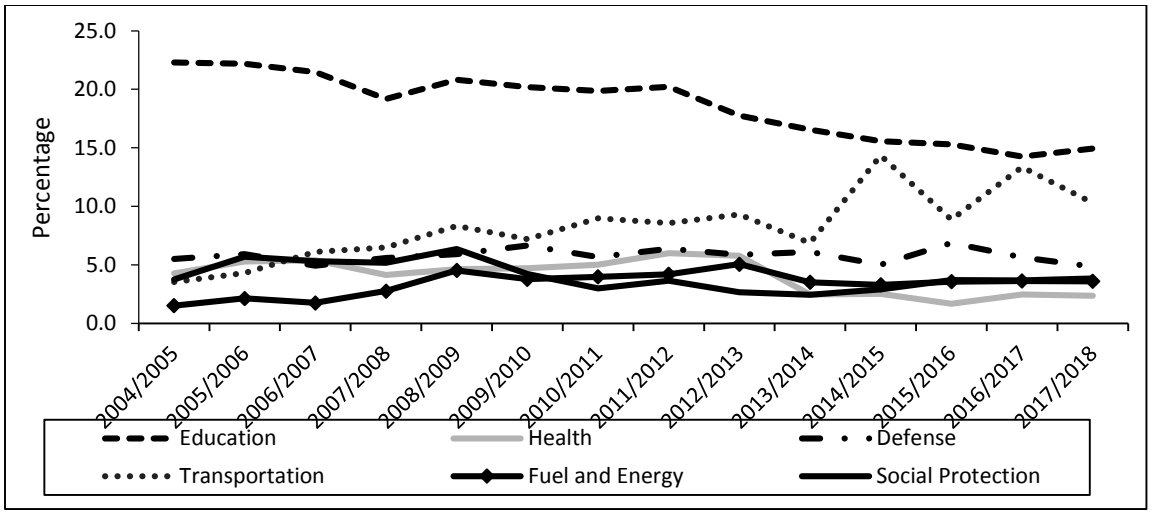

Figure 4: Share of National Government Expenditure among Government Functions (2004/2005-2017/2018)

Source: Own Computation using data from several Economic Surveys

1.1.3 State of Corruption and Public Expenditure in Kenya

Corruption is fairly strongly positively correlated with public expenditure in Kenya as shown in Figure 5. This is based on the correlation coefficient (r) of 0.6776. Hence, a rise in corruption leads to an increase in public expenditure. This finding puts this study into context so as to assess how corruption influences several segments of public expenditure.

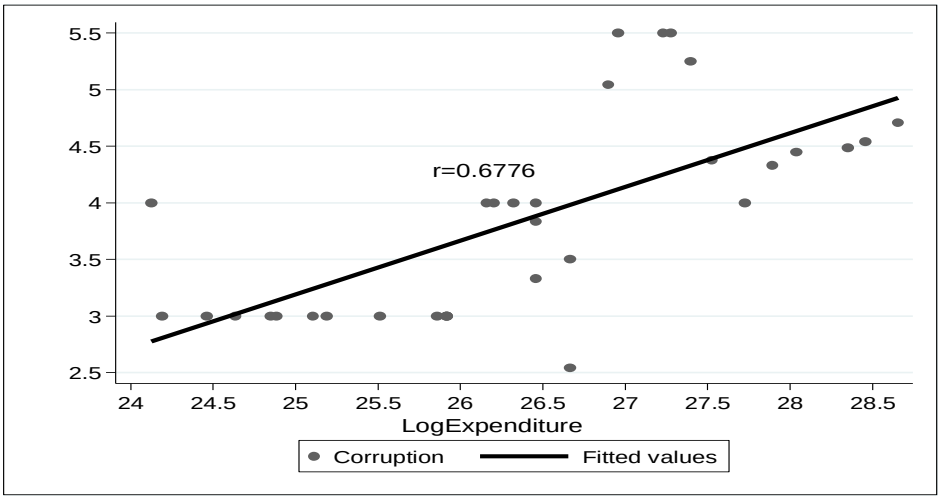

Figure 5: Correlation between Corruption and Public Expenditure in Kenya
Source: Own computation using data from several Economic Surveys (for expenditure) and ICRG (for corruption)

1.2 Problem Statement

On average, Kenya is the 23rd most corrupt country in the world as per Transparency International statistics that range from 1998 to 2017. This is higher than her neighbors Uganda and Tanzania which on average are position 34 and 53 respectively over the same period. Different National Ethics and Corruption Surveys (2012, 2015 and 2016) affirm that corruption is a problem in Kenya. Furthermore, corruption in Public-Sector is becoming a threat in Kenya as shown by the number of scandals and severity of Public Expenditure Tracking Surveys (PETS) and Quantitative Service Delivery Surveys (QSDS). For instance, eleven corruption scandals between 1986 and 2017 have accounted for the loss of $1,153 Billion worth of public expenditure (see Table 1.1). To be specific, the Goldenberg scandal which so far is the biggest scandal in Kenya accounted for at least 10% of GDP (Hassid and Brass, 2015). Furthermore, Kenya lost US$ 4.9 Billion as total real capital flight outflow between 1970 and 2010. This is another leakage of public expenditure to corruption.

The other focus of this study is public expenditure. From Figure 3, public expenditure in Kenya has grown by 631% between 2004/2005 and 2017/2018 and it is projected to increase in future. Further analysis in Figure 4 indicates that much of the public expenditure

is on education although its share has declined in recent years. Hence, more priority has been directed towards the transport, fuel and energy sectors at the expense of social sectors like health and social protection. Perhaps transport, and fuel and energy sectors are deemed faster catalysts of economic growth that will spur Kenya to a middle-income country by 2030.

Considering the state of corruption and expanding government expenditure in Kenya, this study investigates the relationship between public sector corruption and public expenditure in Kenya. Whereas it is widely agreed in literature that corruption distorts economic growth and development, the link between public expenditure and corruption is widely ignored. The main focus of studies has been to link corruption to economic growth or public expenditure to economic growth. This in turn avoids addressing the question of how corruption influences public expenditure yet it is one channel through which corruption affects economic growth. Corruption influences budgetary composition and will target sectors that are susceptible to high bribes. Similarly, public expenditure is a critical determinant of economic growth as it illustrates the priority areas of a government. Therefore, with the aforementioned growing levels of public expenditure and public sector corruption this study will be critical in identifying the budgetary sectors that are prone to corruption besides proposing remedies.

We note that the dominant forms of corruption in Kenya are; embezzlement of public funds, abuse of office and misappropriation of public funds. These are forms of public sector corruption and justify the motivation of this study to focus on public sector corruption. We also note from previous studies that corruption tends to reduce expenditure on education and healthcare while it increases that of military/defense, public service order, culture, fuel and energy. Hence, considering the availability of data, we concentrate on the following sectors; education, defense/military, health, social protection, infrastructure and energy from 1984 to 2016.

1.3 Objectives

The main objective of this study is to establish the relationship between government expenditure and public sector corruption in Kenya between 1984 and 2016. Specific objectives are to:

i. Establish the relationship between government expenditure per budgetary sector and public sector corruption in Kenya.
ii. Establish the influence of public sector corruption on government expenditure in Kenya.
iii. Recommend policies to control public sector corruption in Kenya.

1.4 Significance of the Study

The key contribution of this study is to highlight concerns in literature and consecutively inform policies in twofold. First, it is the only time according to my knowledge that public expenditure is linked to corruption in Kenya. Previous studies either focus on the relationship between public expenditure and economic growth or descriptively shown the status of corruption in Kenya. By concentrating on the nexus between public sector corruption and public expenditure, this study explains one of the major channels of how corruption affects economic growth. This transmission channel is important given that both public expenditure and levels of public-sector corruption are on the rise in Kenya. Second, this study is also significant for purposes of policy. Stakeholders such as policy makers in the government Treasury, Civil Society and Anti-Corruption Agencies need such results to formulate informed policies given that both public sector corruption and public expenditure are increasing in Kenya. By considering the following sectors; education, defense/military, health, social protection, infrastructure and energy, it will be vital to establish the influence of corruption on expenditure in these sectors. These sectors are significant to Kenya's economic growth and development.

1.5 Organization of the Paper

The organization of this study is as follows. Chapter one, which has been covered, is followed by Chapter Two that contains both theoretical and empirical literature review. Chapter Three completes contains the methodology. The Methodology also indicates the

sources of data and diagnostic tests. Afterwards, Chapter Four presents results of data analysis and discusses them. Chapter Five concludes the project with a summary of findings and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This Chapter discusses literature on public expenditure and public-sector corruption. It is composed of three sections; theoretical literature review, empirical literature review and an overview of literature.

2.2 Theoretical Literature Review

Theory generally predicts that corruption thrives under the following four conditions[3]. First, one party (political elites, bureaucrats, administrators etc.) must have discretionary power to influence policies and decisions of resource allocation. Second, there must be economic rents to allow extortion. Third, there must be incentives to corruption where participants believe that it worth engaging in it considering the consequences. Fourth, there must be weak institutions to allow participants to influence rules and regulations.

Therefore, the following theories utilize these tenets to explain the link between public expenditure and corruption:

2.2.1 Agency theory

This is a principal-agent framework where the principal is the citizenry (including interest groups) while the agent is the political-elite. The agent is tasked with making decisions for the principal. The main concern of the agent is to balance between their interest of re-election and that of interest groups whose aim is to influence legislation against the welfare of the majority. This provides room for corruption where the agent can establish policies that benefit them and the small group of people. Fundamentally, the level of public expenditure and in turn corruption in this framework will depend on the strength of political parties, strength of institutions, and severity of punishments. There are also cases where the agent can ignore almost all the interests of the principal and make policies that favor them.

[3]Elaborated by Jain (2001) and Aidt (2011).

2.2.2 Resource allocation theory

This theory links corruption to rent-seeking among policy makers in government. First, it is assumed that economic rents exist and they are prone to extortion. Corrupt government officials seek to maximize bribes by directing resources to sectors that are susceptible to bribes. Ideally, they will prefer directing resources to sectors that need high technology goods in oligopolistic markets and non-competitive markets. Therefore, this framework is easy to enhance corruption because it is difficult to compare prices of high-technology goods which are not widely distributed in nature.

2.2.3 Public choice theory

Public choice theory studies the process through which the political process is used in determining the quantity of goods and services supplied by the government. Hence, the theory is concerned with how the political system makes decisions to allocate resources and redistribute income. These public choices are made officially through elections where each individual is allowed to vote. Based on this, this theory discusses voting mechanisms such as unanimity rule, lindahl voting, majority voting rule and median voter theorem.

However, in line with the subject of this study, public sector corruption is introduced in public choice theory through the concept of logrolling. Logrolling involves vote trading and hence it registers how strongly decision makers feel about various issues so that laws could be passed. This provides a chance for legislators and bureaucrats to influence budgetary allocation even though sometimes their decision might not be for the benefit of the majority. Hence, public expenditure can be pursued only to fulfill interests of the decision makers of which allocation can be made in areas where it is easy to corruption through embezzlement of public funds, misappropriation of public funds, and abuse of office.

2.2.4 Bureaucracy theory

This theory explains situations where the bureaucrats participate in increasing the government expenditure through their own self-fulfilling mechanisms. Generally bureaucrats conduct the business of government without personal or political bias.

However, their motivation is to maximize private utility and obtain utility from pursuing non-pecuniary goals related to bureau (office) size, influence and operation. Since they cannot raise income through exploiting the market like individuals in the private sector, they influence the size of their offices and in turn they obtain the greatest non-pecuniary benefits.

2.3 Empirical Review

Studies have empirically shown that corruption influences public expenditure. Mauro (1998) in his seminal paper tests the impact of corruption on composition of government expenditure using data from a hundred countries for the period of 1970 to 1985. It is established that corruption reduces expenditure on education significantly. This indicates that the education sector lacks attractive rents for corrupt officials. This study uses a Pooled OLS model.

Another seminal study by Gupta et al. (2001) uses data from one hundred and twenty countries (including Kenya) for the period 1985 and 1998. It is established that corruption increases military spending similar to arms procurement as a share of gross domestic product. These results are confirmed by Hudson and Jones (2008) and D'Agostino et al. (2012). The latter study is conducted in fiftythree African countries from 2003 to 2007.

The debate of corruption and military spending is extended by D'Agostino et al. (2016) using a sample of 106 countries between 1996 and 2010. These authors analyze an endogenous growth model that contains corruption and government spending. Ideally the link between corruption and several forms of government spending (military and investment) is tested. First, the relationship between corruption and military expenditure is positive. Secondly, this relationship strongly reduces economic growth. However, Arif et al. (2018) find that the effect of corruption on military spending is more in high-income countries than middle and low-income countries.

Delavallade (2006) evaluates the effects of corruption on the structure of government expenditure among 64 countries between 1996 and 2001. Using a three-stage least squares

method, the author analyses nine equations where the dependent variable is the ratio of individual sector spending on total government spending. The independent variables include corruption and other control variables. It is established that corruption reduces expenditure in the social sectors (education, healthcare and social protection) while it increases expenditure in public services and order, defense and culture, energy and fuel similar to Gupta et al. (2001).

The relationship between corruption and public expenditure has also been tested in OECD countries. Using a sample size of twenty nine OECD countries for the period 1996 to 2009, Hessami. (2014) establish that sectors that are non-competitive, entail high technology goods and involve public procurement increase in expenditure and corruption. That is health and environmental protection sectors. On the contrary, sectors that do not involve public procurement such as religion and culture, social protection and reception, reduce in expenditure. Synonymously, Hashem (2014) assesses the impact of corruption on government expenditure in thirteen Arab countries between 1998 and 2008. Results of the simple linear regression models indicate that corruption increased spending in defense and energy sectors while it reduces expenditure in social sectors of education and healthcare.

In the United States, Cordis (2014) assesses the effect of corruption on spending by state governments. She considers the effect of corruption on the top ten expenditure sectors of state governments. It is established that corruption lowers expenditure in higher education, public welfare and corrections. Sectors that increase due to corruption are unallocated budget items, health, hospitals, community development, housing and natural resources. In contrast, Liu and Mikesell (2014), finds that corruption reduces state expedniture in social sectors such as education and health while state expenditure in sectors such as construction, police and protection increases with an increase in corruption.

Jajkowicz et al. (2015) also tests the impact of corruption on government expenditure allocation in twenty one OECD countries for the period 1998 to 2011. Ten panel regression equations are tested with dependent variables being the natural logarithms of ratios of expenditure of specific sectors. It is established that corruption increases spending in

general public services and defense at the expense of health, education, culture, recreation and religion.

Recently, Swaleheen, Ali, and Temimi (2018) asses the impact of corruption on public spending on education and health among 134 countries. Results from the panel Arellano-Bond GMM model reveal that corruption increases expenditure on health and it reduces expenditure on education. However, corruption reduces expenditure in the sectors for 16 highly corrupt countries.

2.4 Literature Overview

The overall conclusion from the theoretical and empirical literature review is that corruption favors expenditure in building and creation of projects as opposed to maintenance and operations. Furthermore, corruption is prone in sectors that are non-competitive, oligopolistic in nature, demand high-technology goods and have high rents. In this regard corruption reduces expenditure in social sectors such as education, health, religion, recreation and culture while it increases expenditure in sectors such as military, public service and, energy and fuel.

This study seeks to use this basis to establish the stylized facts of corruption and public expenditure in Kenya. From the empirical evidence, none of the studies has covered this subject exclusively for Kenya other than in a panel regression framework. This study also seeks to include the infrastructure sector to the sectors of education, defense/military, health, social protection and energy.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This Chapter presents the methodology of the study. The first section is about the theoretical model, then we proceed to the econometric model. Afterwards, we describe variables, their expected relationship, justification, and sources of data. The last section contains diagnostic tests and robustness check that that are used in this study.

3.2 Theoretical Framework

We rely on Cordis (2013) and Hessami (2010) in constructing the theoretical model. Public-sector corruption influences public expenditure in a two-stage rent-seeking model in which rents are determined endogeneously. The model assumes that public officials control allocation of an exegenous public budget $(G > 0)$. It is also assumes that public officals simultaneously act as rent-setters and rent seekers. They set rents by determining the share of the public budget that goes into industries. Then they seek for rents among firms in indurstries. To elaborate the model, consider thee following which information explains activities that occur at each stage.

In the first stage, a public offical seeks rents through two channels. First, they determine the portion of total budget (G) to be allocated to projects in indurstries. Second, they decide how this allocation is spent in two different industries (A and B). This is noted as (S). It is important to note that the two indurstries are hypothetical and only used for purposes of illurstrating the model.

The allocation of $S \leq G$ determines the amount of rent available in the second stage. As a rent seeker and a rent setter, a public official is faced with two options in determining S. First, the public official is likely to lose an ensuing election if the share allocated to industries for rent-seeking in the second stage is high. This is because the high share of allocation is seen as a misuse of public funds. Hence, the public official risks losing their salary and rents from corruption if they are not re-elected. The second option is for the public official to allocate a low share for rent-seeking in the second stage and in turn get low rents. The second stage entails competition among firms in an industry to ensure public

officials allocate shares,S_j, to them. Therefore, firms bribe public officials in order to receive allocations.

On this basis, it is fundamental to note that the amount of rents received by a public official from each firm depends on the share of allocation in industries and in turn the expected amount of rents. The rent received also depends on the cost of concealing the bribe from the public, C. Hence, a public official receives a share of a payment worth $(1 - C_j)P_j$ where P_j is the total payments by firms in an industry and $0 < C_j < 1$.

Ultimately, the share of spending per industry depends on the relative size of payments to the public official and costs of concealing the bribe. Therefore, S_j becomes:

$$S_j = \left(\frac{(1-C_j)P_j}{(1-C_1)P_1+(1-C_2)P_2}\right)\left(\frac{1}{2} - \frac{I-X}{2LG}\right)G \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textit{Equation 1}$$

Where I is salary of the public official, X is the value of an alternative job if they lose their political job, and L is the share of firms in an industry. It is assumed that $I > X$. Definitions of C_j, P_j and G remain as before. It is explicit from equation 1 that budgetary allocations in industries is directed by the expected rents other than on the basis of public interest. Fundamentally, an increase in concealment cost and number of firms reduces S.

3.3 Econometric Specification

The basis of the econometric model is that natural logarithm of the share of expenditure in a sector over the total expenditure is a function of corruption and control variables. Control variables are variables that affect expenditure other than corruption. These are economic, social and demographic factors such rate of urbanization, ratio of government expenditure to GDP, per capita GDP, and the ratio of total tax revenue to GDP. Related studies that have used these control variables are; Mauro (1998), Gupta (2001), Delavallade (2006), Hessami (2014), Haque and Kneller (2015), Jajkowicz (2015), and Swaleheen, Ali, and Temimi (2018). Inclusion of control variables is important in order to avoid omitted variable bias.

The model is formally represented as follows:

$$\begin{cases} Ln\left[\frac{EduExp_t}{TotExp_t}\right] = \alpha_1 + \alpha_2 lnCorr_t + \alpha_3 lnGovt_t + \alpha_4 lnUrbR_t + \alpha_5 lnGDPPC_t + \alpha_6 lnTaxR_t + \varepsilon_t \\ Ln\left[\frac{DefExp_t}{TotExp_t}\right] = \alpha_1 + \alpha_2 lnCorr_t + \alpha_3 lnGovt_t + \alpha_4 lnUrbR_t + \alpha_5 lnGDPPC_t + \alpha_6 lnTaxR_t + \varepsilon_t \\ Ln\left[\frac{HeaExp_t}{TotExp_t}\right] = \alpha_1 + \alpha_2 lnCorr_t + \alpha_3 lnGovt_t + \alpha_4 lnUrbR_t + \alpha_5 lnGDPPC_t + \alpha_6 lnTaxR_t + \varepsilon_t \\ Ln\left[\frac{SpExp_t}{TotExp_t}\right] = \alpha_1 + \alpha_2 lnCorr_t + \alpha_3 lnGovt_t + \alpha_4 lnUrbR_t + \alpha_5 lnGDPPC_t + \alpha_6 lnTaxR_t + \varepsilon_t \\ Ln\left[\frac{InfExp_t}{TotExp_t}\right] = \alpha_1 + \alpha_2 lnCorr_t + \alpha_3 lnGovt_t + \alpha_4 lnUrbR_t + \alpha_5 lnGDPPC_t + \alpha_6 lnTaxR_t + \varepsilon_t \\ Ln\left[\frac{EnExp_t}{TotExp_t}\right] = \alpha_1 + \alpha_2 lnCorr_t + \alpha_3 lnGovt_t + \alpha_4 lnUrbR_t + \alpha_5 lnGDPPC_t + \alpha_6 lnTaxR_t + \varepsilon_t \end{cases}$$

…… *Equation 2*

Where $\left[\frac{\mathrm{EduExp_t}}{\mathrm{TotExp_t}}\right]$ is share of government spending on education to total government spending, $\left[\frac{\mathrm{DefExp_t}}{\mathrm{TotExp_t}}\right]$ is share of government spending on defense/military to total government spending, $\left[\frac{\mathrm{HeaExp_t}}{\mathrm{TotExp_t}}\right]$ is share of government spending on health to total government spending, $\left[\frac{\mathrm{SpExp_t}}{\mathrm{TotExp_t}}\right]$ is share of government spending on social protection to total government spending, $\left[\frac{\mathrm{InfExp_t}}{\mathrm{TotExp_t}}\right]$ is share of government spending on infrastructure to total government spending and $\left[\frac{\mathrm{EnExp_t}}{\mathrm{TotExp_t}}\right]$ is share of government spending on energy to total government spending. $Corr_t$ is corruption, $Govt_t$ is the ratio of total government expenditure to GDP, $UrbR_t$ is rate of urbanization, $GDPPC_t$ is per capita GDP while $TaxR_t$ is the ratio of total tax income to GDP. α_1 is the intercept while $\alpha_2, \alpha_3, \alpha_4, \alpha_5 \; and \; \alpha_6$ are coefficients. Ln is natural logarithm.

Therefore, the natural logarithm of ratios of expenditures per sector to total expenditure are the dependent variables. This approach has also been applied by: Delavallade (2006), Hessami (2014) Cordis (2014) and Jajkowicz (2015). Explanatory variables include corruption and four control variables in natural logarithms; urbanization rate, share of government expenditure on GDP, ratio of total tax revenue to GDP and per capita GDP.

3.3 Data Source, Definition and Measurement of Variables

Time series data ranging from 1984 to 2016 is used in this study. This period is informed by availability of data for variables that are presented in Table 3.1. Variables are in three categories; dependent variable (share of expenditure), corruption, and control variables.

Expenditure data for specific sectors of the economy is obtained from several Economic Surveys of Kenya. This contains data of expenditure on education, defense/military, health, social protection, infrastructure and energy sectors. Since it is supposed to be a ratio on total expenditure, data on total expenditure is also be obtained from several Economic Surveys. These ratios are important because they act as the dependent variables of different models.

Data on corruption is obtained from the International Country Risk Guide (ICRG) database. It has the longest running data base on corruption and consequently using it strengthens this paper. The index ranges from 0 to 6 with 6 indicating least corruption and 0 indicates high corruption. However, we reverse this range to indicate 0 as least corrupt and 6 as most corrupt. This is to ease interpretation and studies such as Hessami (2014) have done so. Corruption is included because it is the key variable of study.

Data on control variables; ratio of tax income to GDP, rate of urbanization, ratio of government expenditure to GDP and per capita GDP is obtained from the World Development Indicators database for 2018. Rate of urbanization is included to cater for the effect of demographic distribution in public spending. Ideally, demographic factors are a key consideration in allocation of resources by the government as they indicate the level of demand for public services (Jajkowicz et al., 2015; Delavallade, 2006; Gupta et al., 2001). The ratio of government expenditure to GDP is used as an alternative of dependency ratio which was highly correlated with rate of urbanization. Gupta et al. (2001) has given the same reason for using ratio of government expenditure to GDP. Per capita GDP is included in line with Wagner's rule to indicate society's perefrences as wealth increases (Jajkowicz et al., 2015); Haque and Kneller 2015); Hessami, 2014). Ratio of tax income to GDP is included as a fiscal policy variable Jajkowicz et al (2015).

Table 2 gives a proper description of the data:

Table 2: Variable definition, source and expected sign

Type of variable	Variable name	Variable description	Source	Expected sign
Dependent variables	Expenditure shares	Natural logarithm of ratio of sectorial expenditure on total expenditure. Sectors include education, military, health, social protection, infrastructure and energy.	Economic Surveys from 1984 to 2018	
Independent variables	Corruption	Index rating from 0 to 6 with 0 indicating low corruption and 6 indicating high corruption.	International Country Risk Guide (ICRG) database (Reversed)	Positive or negative depending on sector
	Urbanization	Ratio of urban population to total population.	World Development Indicators (2018)	Positive or negative depending on sector
	Per capita GDP	Natural logarithm of per capita GDP	World Development Indicators (2018)	Positive
	Government expenditure	Ratio of final government consumption expenditure to GDP	Economic Surveys from 1984 to 2018.	Positive
	Tax income	Ratio of tax income to GDP	Economic Surveys from 1984 to 2018.	Positive

3.4 Econometric Issues

Given that this study is a time series one, the following diagnostic tests are conducted to validate results[4] (Discussions are based on (Greene, 2012)).

[4] Diagnostic tests are used to test whether violations of Classical Linear Regression Models exist. The existence of these violations makes results to be unreliable and inefficient.

i. Multicollinearity in which we test whether a perfect linear relationship exists among independent variables. Presence of multicollinearity makes the variance to be inefficient and thereby makes estimators to be biased. Multicollinearity is tested using the Variance Inflation Factor (VIF) method. The criteria is that a VIF of more than 10 indicates presence of multicollinearity and below 10 indicates absence of multicollinearity.

ii. Autocorrelation in which the disturbance term of an observation is affected by or correlated with the disturbance term of another observation over time. The null hypothesis assumes absence of autocorrelation while the alternative assumes its presence. The main problem of autocorrelation is that it tends to make variances inefficient in that an estimator does not obtain the minimum possible variance which in turn makes inferences based on t and F tests inappropriate. We use the Breusch-Godfrey Lagrange Multiplier test.

iii. Unit root in which we test whether the time series is non-stationary or variables have time invariant means, variance sand covariances. It is important to correct for a unit root problem to avoid getting spurious (non-sense) results. We use three tests to detect unit root. That is Augmented Dickey-Fuller test (ADF), Phillips-Perron (PP) and Zivot-Andrews (ZA)[5]. ZA test is used as confirmatory test because it tests for unit root and structural breaks at the same time as opposed to ADF and PP which only test for unit root.

iv. Heteroscedasticity in which we test whether the variance of the error term is constant. A model with a constant variance in the error term is called homoscedastic. Similar to multicollinearity, heteroscedasticity is a problem because it makes estimators unbiased as their variances are not the least possible. Consequently, using this affects conclusions based on the t-test. We use the Breusch-Pagan approach to test for heteroscedasticity. The null hypothesis assumes homoscedasticity while the alternative hypothesis assumes heteroscedasticity. Therefore, the null hypothesis is rejected if the p-values is below 0.05 (in our study) and we fail to reject the null hypothesis if the p-value is greater than 0.05.

[5] Original papers are Dickey and Fuller (1981) for ADF test, Phillips and Perron (1988) for PP test and Zivot and Andrews (2002) for ZA test.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This Chapter presents results and discussions in line with the empirical analysis. The Chapter is organized as follows. Description of data is done in Section 4.2. This is done in a graphical way and in a basic descriptive statistics way. The major aim of descriptive statistics is to portray basic features of our data. Section 4.2 also contains correlation results. After conducting pre-estimation tests (normality, multi-collinearity, heteroscedasticity and autocorrelation), unit-root test and co-integration[6], we discuss regression results in section 4.3. Section 4.4 has results for robustness check using ARDL model and briefly discusses results of post-estimation tests.

4.2 Descriptive Statistics

This is a pre-estimation check of our data. It is meant to understand basic feastures of our data prior to empirical analysis.

4.2.1 Graphical Analysis

Figure 6 portrays trend of variables over time. Apart from Urbanization, other variables depict an upward and downward trend. This is an indicator of presence of non-stationarity among variables. Urbanization has an upward trend. This is an indicator that its unit root has a trend. Conversely, all variables appear to be stationary when we plot their first differences as shown in Figure A.1 in Appendix A.

In addition, we establish that all variables are individually integrated of order one upon conducting formal unit-root tests. Three tests are used, ADF, PP and ZA. ZA test is used as a confirmatory test. Unit root test results are presented in Table A.5 in Appendix A.

[6] Results of pre-estimation, unit root and co-integration tests are in Appendix A.

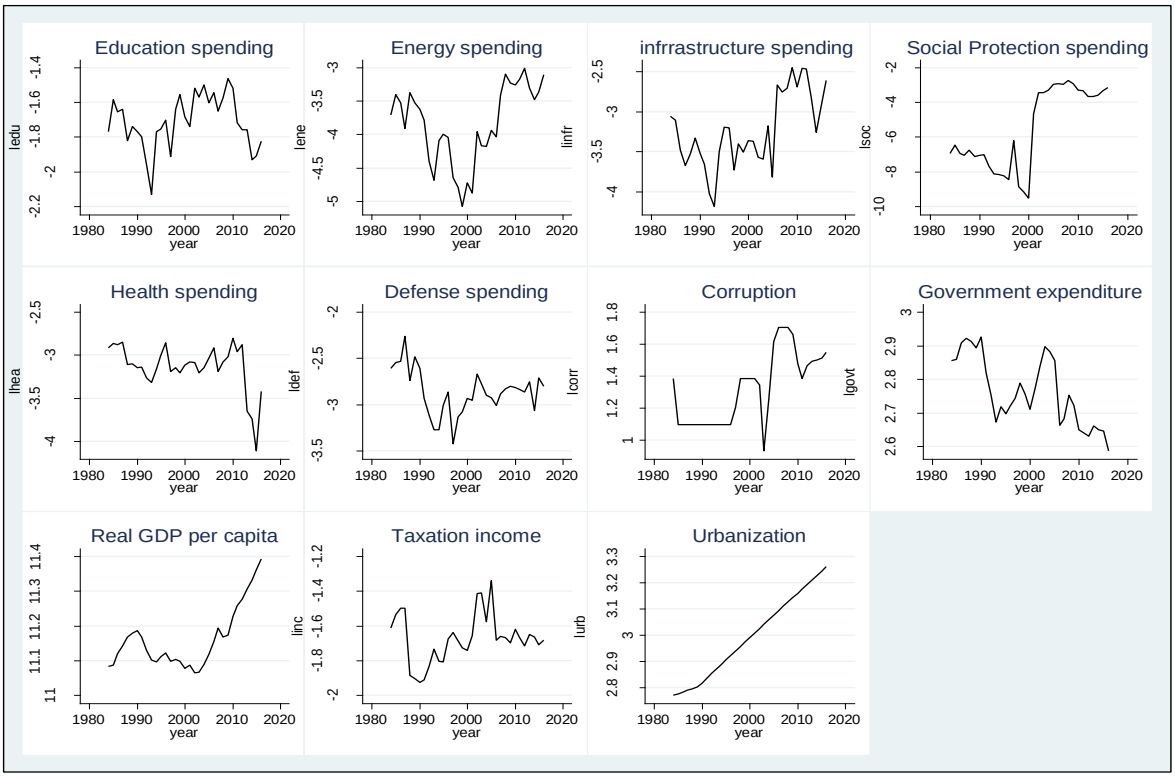

Figure 6: Graphical trend of variables at level

4.2.2 Descriptive Statistics

Table 3 displays the mean, standard deviation, maximum, minimum, skewness, kurtosis and p-values of Shapiro-Wilk test for normality for each variable used in the study.

From Table 3, it can be concluded that the natural logarithms of our variables are not widely dispersed from their means except for social spending. This is based on the values of standard deviation. The minimum and maximum show that there is little variations in distribution of variables except social ependiture. Hence, there is stability among variables over time.

Expenditure on defense, infrustructure, Real GDP per capita, urbanization, tax income, and government expenditure are postively skewed. This implies that these variables have long right tails as opposed to their left tails. Conversely, expenditure on education, health,

social, endergy and corruption are negatively skewed. This indicates these variables have longer left tails than right tails.

Kurtosis measures the degree of peakedness of a distribution. A normal distribution has a kurtosis of three. From Table 3, only tax income is normal because it has a value of three. Education, defense, health and real GDP Per capita are leptokurtic meaning that they are relatively narrow and peaked at the top in comparison to a normal distribution. Social expenditure, infrastructure, energy, urbanization, corruption and government expenditure are platykurtic meaning that they are flatter than normal distributions. We then interpret results of Shapiro-Wilk test to formally test for normality. The null hypothesis is that a distribution is normal and rejection of this means that a distribution is not normal. Hence, if the calculated p-value is sufficiently lower than 0.05 (5% significance level), we reject the null hypothesis. From Table 3, expenditure on education, defense, energy and infrastructure, and urbanization, pendency and tax income are normally distributed.

Table 3: Descriptive Statistics

Variable	Mean	Std. Dev.	Max	Min	Skewness	Kurtosis	Shapiro-Wilk (Prob>z)
Education spending	-1.711	0.151	-1.464	-2.131	-0.586	3.201	0.321
Defense spending	-2.860	0.243	-2.261	-3.427	0.00364	3.278	0.985
Health spending	-3.138	0.273	-2.805	-4.111	-1.757	6.646	0.000130
Social spending	-5.547	2.308	-2.758	-9.520	-0.167	1.434	0.000540
Infrastructure spending	-3.236	0.462	-2.448	-4.185	0.120	2.218	0.310
Energy spending	-3.846	0.581	-3.009	-5.075	-0.490	2.172	0.0676
Real GDP Per Capita	11.16	0.0884	11.39	11.06	1.171	3.435	0.000570
Urbanization	2.995	0.157	3.260	2.771	0.105	1.701	0.0547
Corruption	1.3219	0.2255	1.7047	0.9328	0.209	1.803	0.28002
Tax income	-1.674	0.142	-1.341	-1.924	0.311	3.005	0.200
Government expenditure	2.763	0.102	2.925	2.587	0.176	1.723	0.0442

Note: n=33

4.2.3 Correlation Matrix

Results from the Correlation matrix in Table 4 indicate that corruption is negatively correlated with expenditure on defense and health. Other budgetary sectors have a positive correlation. Independent variables; urbanization, corruption, GDP per capita, government expenditure and tax income have correlations whose magnitude is below 0.8. This indicates that there is no multicollinearity (Gujarati and Porter, 2009). Actually the highest correlation is between corruption and urbanization, followed by that between urbanization and government expenditure.

Table 4: Results of Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1.Education spending	1										
2.Defense spending	0.356	1									
3.Health spending	0.507	0.212	1								
4.Infrastructure spending	0.378	0.225	0.051	1							
5.Social spending	0.303	0.160	-0.187	0.579*	1						
6.Energy spending	0.101	0.531	-0.030	0.661*	0.573*	1					
7.Real GDP Per Capita	-0.293	0.147	-0.554*	0.559*	0.486	0.670*	1				
8.Urbanization	0.137	-0.180	-0.439	0.644*	0.759*	0.351	0.658*	1			
9.Corruption	0.285	-0.092	-0.181	0.647*	0.633*	0.302	0.437	0.747*	1		
10.Tax income	0.274	0.484	0.348	-0.523	-0.274	-0.158	-0.576*	-0.712*	-0.545	1	
11.Government	0.460	0.221	0.167	-0.005	0.429	-0.015	-0.212	0.220	0.184	0.175	1

*Note: * indicates 5% level of signifcance between variables*

4.3 Empirical Results

This section contains empirical findings and respective discussions that address the first and second objectives. Six equations that are outlined in Chapter Three are analyzed. Before discussing our regression results, it is fundamental to note that several pre-estimation tests were conducted to establish the reliability of our results.

Normality test results in Table A.1 indicate that residuals are normally distributed for all models except for model 5 which has social expenditure as the dependent variable. Whereas this problem should be corrected, we follow Greene (2012, pp. 64-65) and ignore it.

We use the first model to test for multi-collinearity since independent variables are similar for the six models. We find that all values for Variance Inflation Factor (VIF) are less than 10 which indicates that multi-collinearity is absent in our models. Respective results are presented in Table A.2. Table A.3 and A.4 present results for heteroscedasticity and autocorrelation tests respectively. It is established that all models are homoscedastic except model six. In addition, we establish that only the first and third models lack autocorrelation. Therefore, we recommend that robust regressions be conducted for model two, four, five and six, as a remedy for both autocorrelation and heteroscedasticity (Greene, 2012).

Thereafter, we conducted unit root tests. From Table A.5, all variables are individually integrated of order one meaning that they are non-stationary at level but stationary after the first difference. Therefore, the overall insigt from these results is that our variables are co-integrated. The next step involved testing for co-integration using Engle-Granger (EG) Two-step Approach that was developed by Engle and Granger (1987). The first step involves estimating the ordinary least squares equation and obtaining residuals. Residuals are then tested for unit root in the second step. If residuals are stationary, we conclude that variables are co-intergrated or else variables are not co-integrated. Using ADF test, results in Table A.6 indicate that residuals of all models are staionary. Therefore, variables in all models are co-integrated, meaning that they have a long-run relationship. It is on this basis that we interpret long-run multivariate regression results in Table 5. We compliment these results with impulse response functions which demonstrate the response of different forms of expenditure to a shock in an independent variable. We concentrate on the effect of a shock in corruption because it is our variable of interest. Nonetheless, impulse response functions portray the short-run situation while regression results portray the long-run situation.

Table 5: Long-run Multivariate Regression Coefficients

	(1) Education (log)	(2) Energy (log)	(3) Defense (log)	(4) Infrastructure (log)	(5) Social (log)	(6) Health (log)
Corruption (log)	0.247*	0.535	0.219	0.833*	1.832	0.337
	(0.134)	(0.500)	(0.200)	(0.412)	(1.476)	(0.281)
Urbanization (log)	0.605*	-0.918	-0.737	0.541	11.48***	-0.941
	(0.298)	(1.109)	(0.445)	(0.915)	(3.276)	(0.623)
Government expenditure (log)	0.935***	1.691	1.617**	-0.117	10.47***	-0.320
	(0.321)	(1.192)	(0.478)	(0.983)	(3.520)	(0.669)
Real GDP per capita (log)	-0.852**	6.213***	2.297***	1.204	5.182	-1.083
	(0.346)	(1.287)	(0.516)	(1.061)	(3.800)	(0.723)
Tax Income (log)	0.0404	0.616	0.595**	-0.217	3.004	0.349
	(0.185)	(0.689)	(0.276)	(0.568)	(2.033)	(0.387)
Constant	3.142	-74.79***	-30.05***	-19.44*	-124.1***	12.79*
	(3.590)	(13.35)	(5.351)	(11.01)	(39.41)	(7.497)
N	33	33	33	33	33	33
R-squared	0.527	0.559	0.594	0.524	0.756	0.370
Prob > F	0.0007	0.0003	0.0001	0.0008	0.0000	0.0222

*Key: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01*

4.3.1 Corruption and expenditure on education

The first model establishes the determinants of expenditure on education. Of importance to this study is the impact of corruption on expenditure in education. According to results in model 1, an increase in corruption by 1% increases expenditure in education by about 0.25%. Furthermore, corruption is a significant determinant of spending in education. Borrowing from the Impulse Response Function in Figure 7, a shock in corruption increases expenditure on education much faster between the first and second year. This effect slightly declines in fifth year but later increases in the sixth year and shows signs of decay towards the sixteenth year.

Results from Table 5 and the Impulse Response Function place Kenya at unique state compared to findings from other studies. For instance, Mauro (1998) and Delavallade (2006) find that corruption decreases expenditure in social sectors such as education. The insight of this result is that the education sector in Kenya has lucrative rents that inform high budgetary allocation and in turn influence spending in the education sector. A number

of heavy-expenditure reforms have occurred in the education in Kenya. First is the Free Primary Education Program in 2003. Then the Free Secondary Education Program in 2007 and the Laptop Project by the Jubilee Government in 2013. These are heavy expenditure projects that are likely to attract rents.

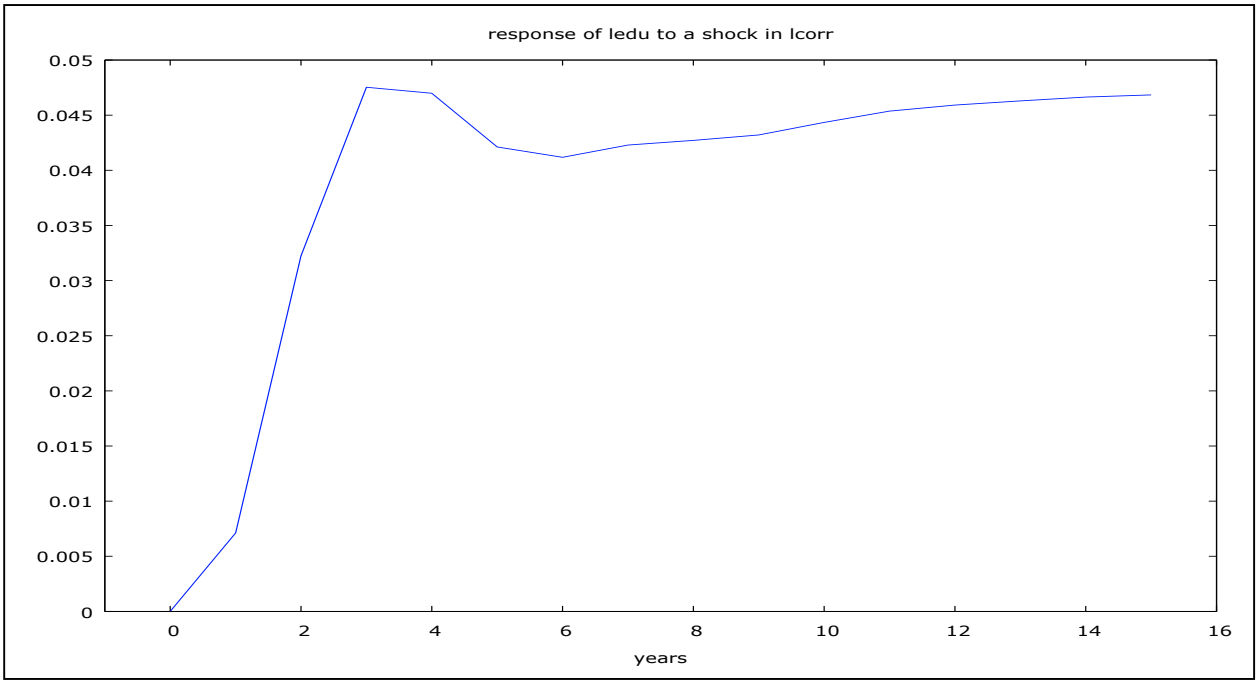

Figure 7: Impulse Response function for education to a shock in corruption

Besides corruption, expenditure on education is significantly affected by urbanization, government expenditure and real per capita GDP. The last factor has a negative effect while the first two have a positive effect. Therefore, an increase in urbanization rate and amount of government expenditure influence an increase in expenditure on education. Conversely, when real per capita GDP increases, individuals can afford education and in turn the government allocates less funds in education sector.

4.3.2 Corruption and expenditure on energy

The second model establishes the determinants of spending on the energy sector in Kenya. Respective results indicate that corruption positively impacts expenditure in the energy

sector. However, not so much can be concluded from this result because corruption is not significant. Instead, we base our discussion on the Impulse Response Function in Figure 8.

According to Figure 8, a shock in corruption does not increase energy spending for the entire period. Energy spending initially increases in the first three years before declining to negative in the fourth year. Afterwards, energy spending reverts to a positive trend from the seventh year and stabilizes from the fourteenth year.

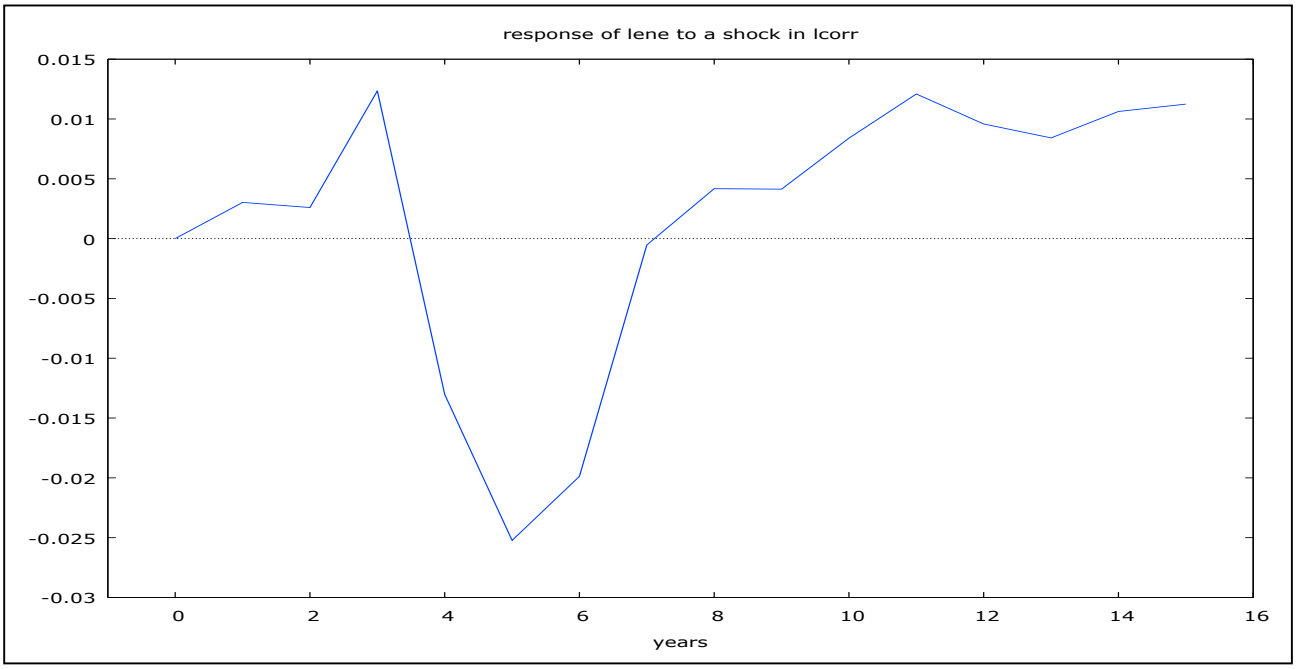

Figure 8: Impulse Response function for energy to a shock in corruption

Considering other variables, we establish that energy expenditure is mainly affected by GDP per capita. This means that the purchasing power of people indicates their demand which in turn determines the allocation of funds in the energy sector.

4.3.3 Corruption and expenditure on Defense

Unlike Gupta et al. (2001), Hudson and Jones (2008) and D'Agostino et al.(2012), corruption only increases expenditure in defense but this relationship is not significant in the long-run (see model 3). This indicates that the defense sector does not offer lucrative

rents for politicians to exploit. However, the Impulse Response Function in Figure 8 indicates that a shock in corruption initially reduces defense spending but it rises after the first year only to decrease and the effect of the shock vanishes after the ninth year. Hence, the shock of corruption on defense is mainly active in the first eight years.

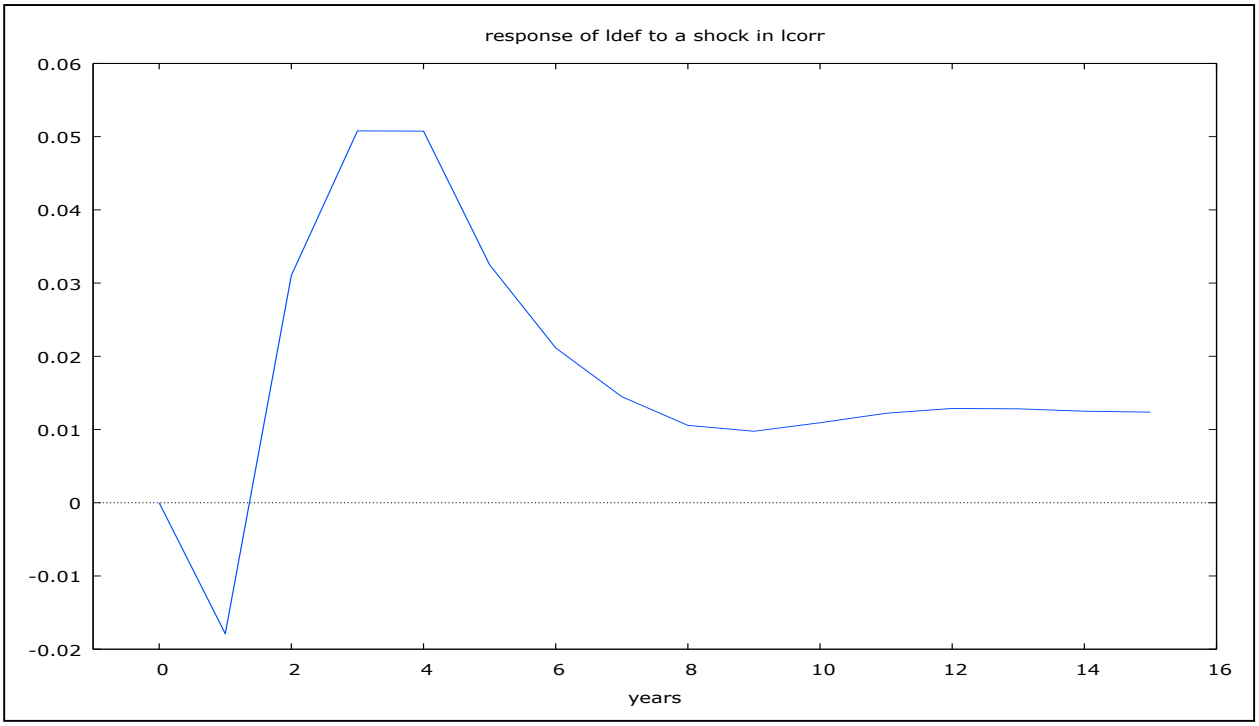

Figure 9: Impulse Response function for defense to a shock in corruption

In general, expenditure on defense is determmined by the amount of government expenditure, real per capita GDP and tax income.

4.3.4 Corruption and expenditure on infrastructure

According to results of Model 4, a 1% increase in corruption significantly increases expenditure on infrastructure by 0.8%. This confirms results by Mikesell (2014) which find corruption as a catalyst of increased spending on sectors such as construction. The case of Kenya can be explained by the increased allocation of funds in sectors such as Roads which aim to drive the country towards attaining Vision 2030. It seems the increase in this allocation also offers avenues for corruption.

Figure 10 shows that the positive influence of a shock in corruption is mainly active in the first year and the reponse of infrastructure is negative to the shock in corruption beyond the third year.

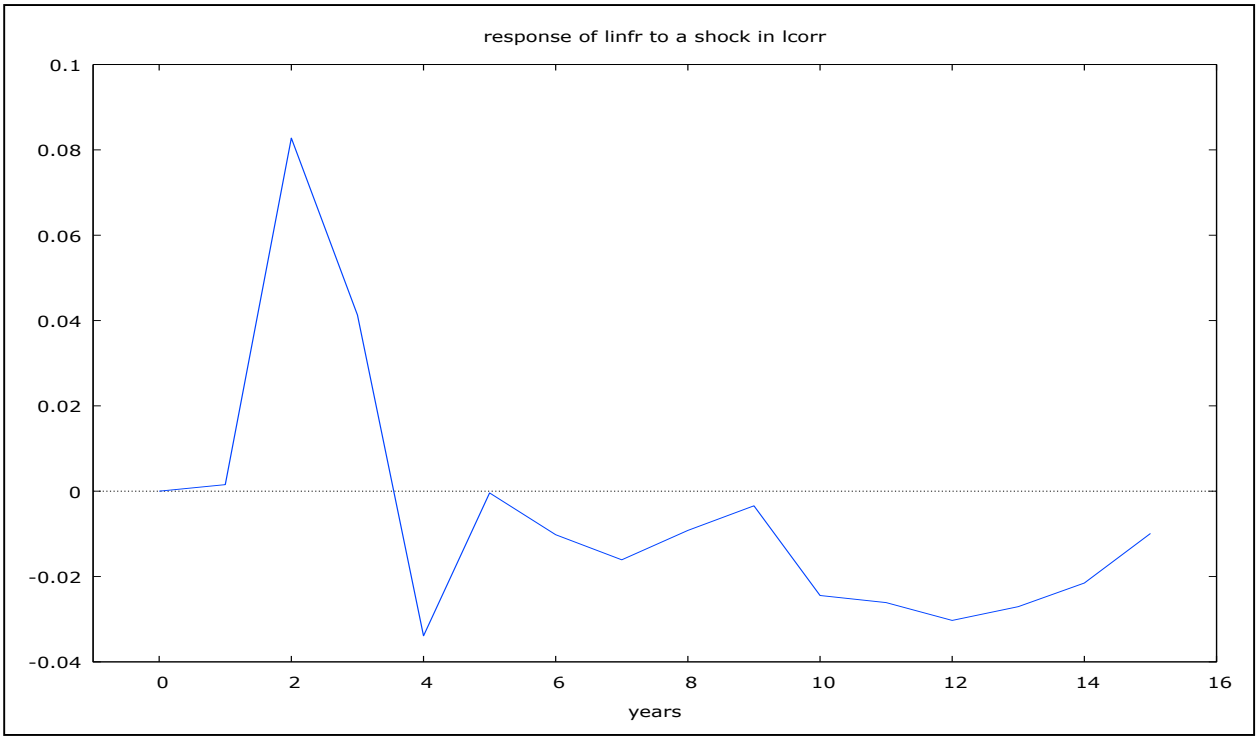

Figure 10: Impulse Response function for infrastructure to a shock in corruption

4.3.5 Corruption and expenditure on Social sector

Corruption though positive on expenditure in the social sector, does not significantly increase expenditure in this sector (see model 5). This has been widely established by studies such as Hessami. (2014) and Jajkowicz et al. (2015) in Arab countries and OECD respectively.

Further analysis from the Impulse Response Function indicates that a shock in corruption initially has a negative effect on social sector spending (see Figure 11). A positive effect from the shock is established after the third period and the shock stabilizes after the thirteenth year.

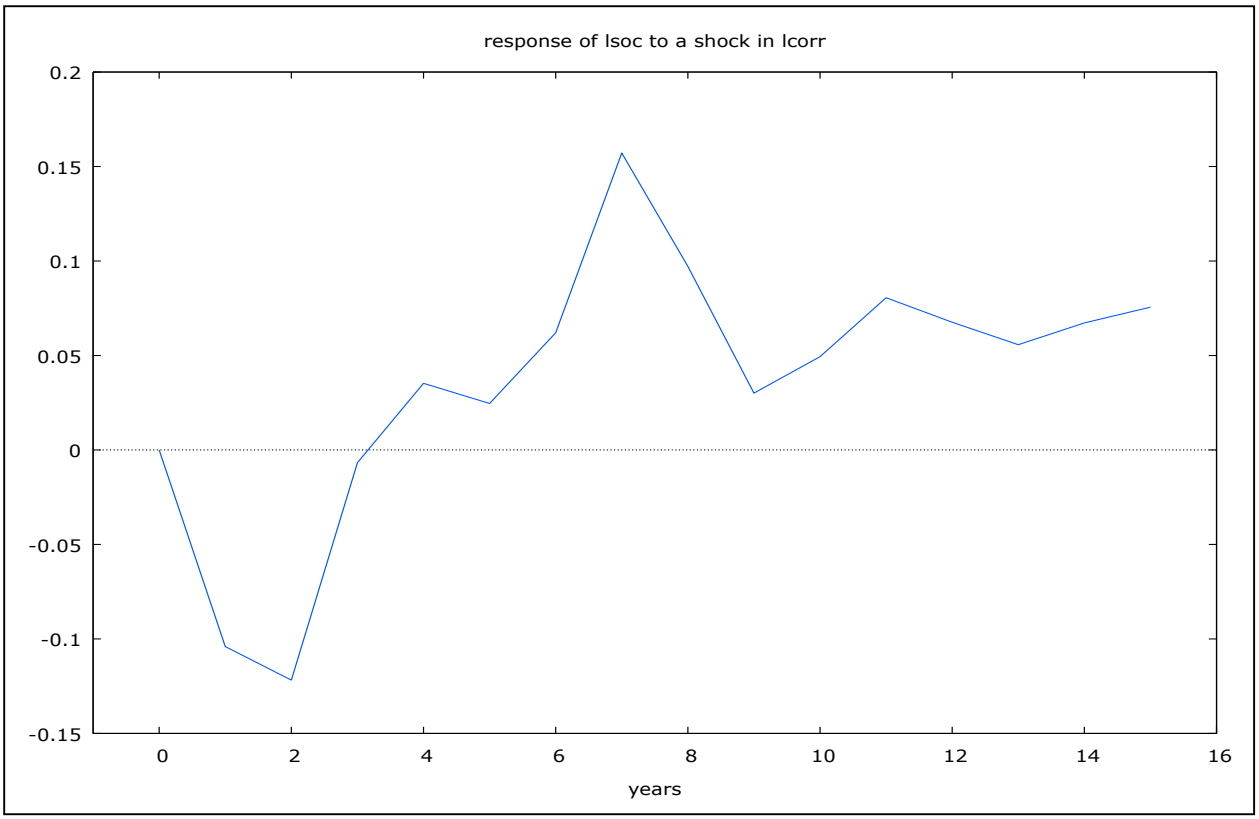

Figure 11: Impulse Response function for social sector spending to a shock in corruption

Expenditure in the social sector is significantly and positively affected by urbanization and the amount of government expenditure at 1% level of significance respectively.

4.3.6 Corruption and expenditure on health

Expenditure on health is not significantly affected by corruption in spite of having a positive sign (see model 6). This indicates that there could be a potential effect of corruption in the health sector contrary to findings by Hashem (2014) and Delavallade (2006) which note that corruption reduces expenditure in healthcare.

A shock in corruption increases expenditure in the first period, before declining in the following period. A major decline occurs after the fourth year but health spending

temporarily recovers between the eighth and ninth year before declining and stabilizing after the fourteenth year.

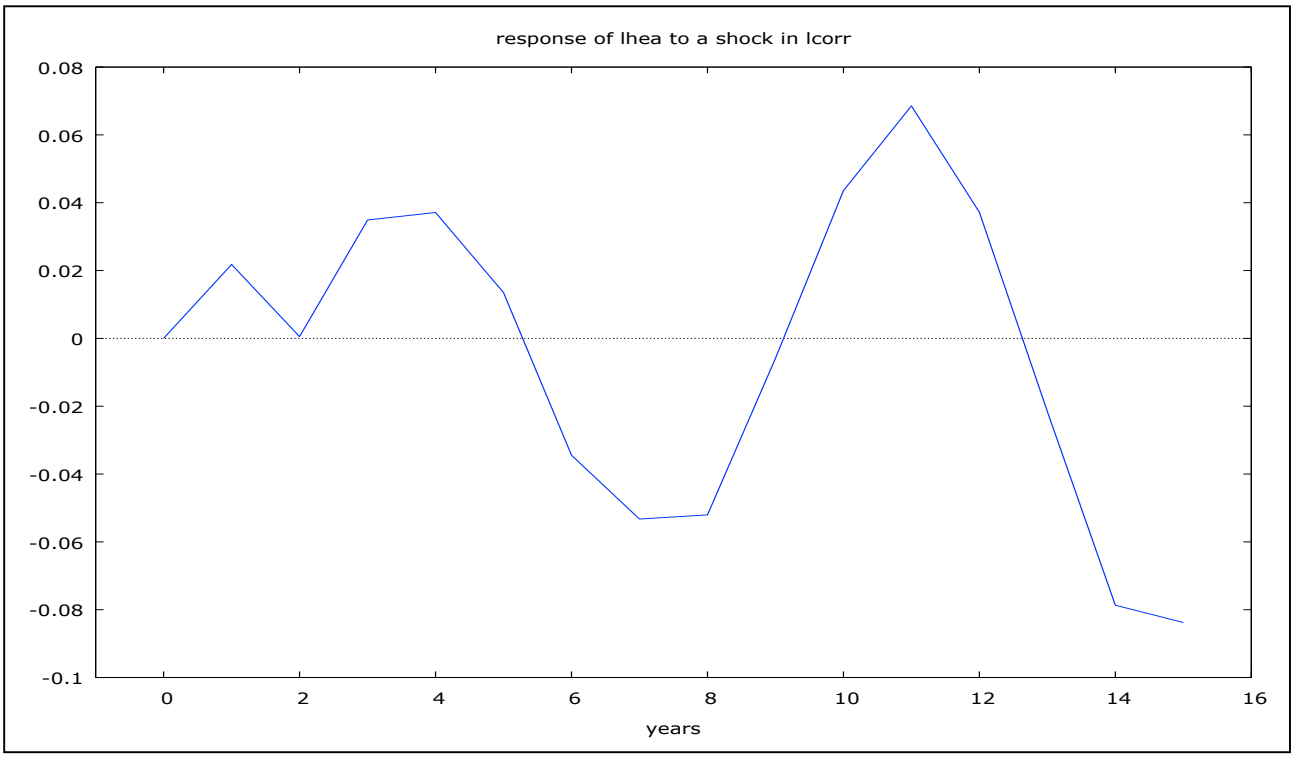

Figure 12: Impulse Response function for health sector spending to a shock in corruption

In general, all models are significant using the p-value of the F-test. For instance, the sixth model has a calculated p-value of 0.02. Comparing this to the critical value of 0.05(5% level), we reject the null hypothesis that a model is not significant and conclude that the model for health expenditure is significant at 5% level. The highest R-squared value is 0.756 while the least is 0.370. This indicates that corruption, government expenditure, real GDP per capita, urbanization and income tax explain about 76% of variations in social expenditure. Consequently, these variables explain 37% of variations in health expenditure.

4.3.7 Robustness Check

This section contains results of an alternative long-run regression approach. The Autoregressive Distributed Lag (ARDL) Modelling Approach is also used to establish a long-run relationship. This approach has an advantage because it determines long-run and short-run relationships for both $I(0)$ and $I(1)$ variables without restricting them to be of the same order of cointegration (Pesaran and Shin, 1999; Pesaran, Shin, and Smith, 2001).

Table 6: Robustness check using ARDL Model

	(1) Education (log)	(2) Energy (log)	(3) Defense (log)	(4) Infrastructure (log)	(5) Social (log)	(6) Health (log)
Corruption (log)	0.376***	1.797	0.177	1.229***	1.432	0.362
	(0.128)	(1.267)	(0.176)	(0.388)	(2.987)	(0.318)
Urbanization (log)	0.488*	-0.790	0.659	0.763	14.489**	-1.149**
	(0.274)	(2.313)	(0.564)	(0.488)	(6.932)	(0.461)
Government expenditure (log)	0.884**	2.846	1.225**	-1.334**	11.779*	-0.895
	(0.329)	(2.329)	(0.483)	(0.558)	(6.637)	(0.761)
Real GDP per capita (log)	-1.34**	5.426**	0.441	-2.103*	1.403	-2.203
	(0.349)	(2.477)	(0.633)	(1`39)	(7.493)	(1.515)
Tax Income (log)	-0.117	0.312	0.065	-1.510***	3.125	0.178
	(0.166)	(1.335)	(0.281)	(0.440)	(3.889)	(0.314)
Constant	8.677	-71.726***	-12.620*	17.355	-93.680	27.122
	(3.489)	25.145	(6.740)	(12.005)	(75.749)	(17.791)
N	32	32	33	31	32	32
ARDL order	(1,1,0,0,0,1)	(1,1,0,0,0,0)	(1,0,1,1,2,2)	(1,2,2,0,0,2)	(1,0,0,0,0,0)	(1,1,0,0,0,0)

*Key: Standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. ARDL order presents the number of lags per variable in a model.*

Basing our analysis on the key variable of this study, corruption, we conclude from Table 6 that corruption affects spending on education and infrastructure significantly. Although corruption has a positive effect on other sectors (energy, defense, social and health), this effect is insignificant. Comparing results in Table 6 with those of Table 5, they show a similar effect in sign though levels of significance vary. Hence, the ARDL results are highly correlated with our initial long-run regression and they are reliable.

Finally, we subjected the long-run regression to parameter stability tests using Cumulative Sum (CUSUM) residuals. From Figure A.2, all plots are within the 95% confidence interval bounds thereby indicating that our parameters are stable.

CHAPTER FIVE: CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

This Chapter presents a summary of findings, gives an overall conclusion and thereby suggests recommendations. Summary and conclusions are mainly guided by the first and second specific objectives; establishing the relationship between government expenditure per budgetary sector and public sector corruption in Kenya, and establishing the influence of public sector corruption on government expenditure in Kenya. Afterwards, recommendations address the third objective.

5.2 Conclusions

The main objective of this study was to establish the link between government expenditure and public sector corruption in Kenya between 1984 and 2016. This was complemented by the specific objectives, namely; to establish the relationship between government expenditure per budgetary sector and public sector corruption in Kenya, to establish the influence of public sector corruption on government expenditure in Kenya, and to recommend policies to control public sector corruption in Kenya.

In addressing the first and second objectives, a long-run regression analysis was used and later an alternative long-run regression model, ARDL, was to assess the robustness of our results. However, it is important to note that prior to running these regressions, we first described our data, then conducted diagnostic tests, followed by unit root tests and then co-integration test. It is based on the co-integration test that we concluded that our variables had a long-run relationship. We discuss respective results based on objective one and two.

We establish that an increase in corruption by 1% increases expenditure in education by about 0.25%. Furthermore, corruption is a significant determinant of spending in education. From the Impulse Response Function, a shock in corruption increases expenditure on education much faster between the first and second year. This effect slightly declines in fifth year but later increases in the sixth year and shows signs of decay towards the sixteenth year.

These results are contrary to earlier studies such as Mauro (1998) and Delavallade (2006) meaning that Kenya's education sector in unique. The positive effect of corruption to education spending in Kenya can be alluded to heavy expenditure government projects such the current Laptop Project that started in 2013.

The effect of corruption on energy expenditure is insignificant in the long-run. As a result energy spending is significantly determined by GDP per capita. From the Impulse Response Function, a shock on corruption first leads to an increase in energy spending that lasts for three years before decreasing. A positive shock re-emerges after the seventh period. This indicates that the effect of corruption on energy spending is inconsistent.

A rise in corruption increases expenditure on defense. However, this effect is not significant thereby contradicting findings of Gupta et al. (2001), Hudson and Jones (2008) and D'Agostino et al (2012) who find a positive and significant effect. This indicates that the defense sector does not offer lucrative rents for politicians to exploit. Although the Ministry of Defense is rated among the highest corrupt as per Figure 2, the type of corruption that occurs could be mainly in taking bribes during the recruitment process. From the Impulse Response Function, a shock of corruption on defense is mainly active in the first eight years.

A 1% increase in corruption significantly increases expenditure on infrastructure by 0.8%. This confirms results by Mikesell (2014) which find corruption as a catalyst of increased spending on sectors such as construction. The case of Kenya can be explained by the increased allocation of funds in sectors such as Roads which aim to drive the country towards attaining Vision 2030. It seems the increase in this allocation also offers avenues for corruption. The Impulse Response Function shows that the positive influence of a shock in corruption is mainly active in the first year and the reponse of infrastructure is negative to the shock in corruption beyond the third year. Hence, corruption influences spending in infrastructure at the infancy stage of the respective infrastructure project. Corruption though positive on expenditure in the social sector, does not significantly increase

expenditure in this sector. This has been widely established by studies such as Hessami. (2014) and Jajkowicz et al. (2015) in Arab countries and OECD respectively. Further analysis from the Impulse Response Function indicates that a shock in corruption initially reduces social sector spending. A positive effect from the shock is established after the third period and the shock stabilizes after the thirteenth year. Hence, the social sector is not affected immediately by corruption and it can be attributed to the lack of lucrative projects that can attract rents.

Expenditure in the health sector is not significantly affected by corruption in spite of having a positive sign. This indicates that there could be a potential effect of corruption in the health sector contrary to findings by Hashem (2014) and Delavallade (2006) which note that corruption reduces expenditure in healthcare. Further analysis from the Impulse Response Function indicates that the effect of a shock in corruption is indeterminate although it starts by increasing health expenditure in the first year then reduces in the second year. The up and down cycle continues before stabilizing after the fourteenth year.

We establish that corruption has a positive influence on government expenditure in Kenya. This is because corruption increases expenditure in all sectors regardless of having some relationships being insignificant. More so, Figure 5 indicates that corruption has a positive correlation with total public expenditure in Kenya.

From our findings in Chapter Four, we conclude that corruption influences general public expenditure in Kenya. In addition, the education and infrastructure sectors are significantly affected by corruption. Other sectors (energy, health, social and defense) are only influenced positively by corruption but this effect is not significant.

5.3 Policy Recommendations

Based on our findings, the government should empower anti-corruption agencies such as the EACC because we have established that budgetary allocation among sectors/ministries is directly linked to corruption. This means that corruption is conceived at budget making

stage by influencing high allocations to certain sectors, mainly education and infrastructure in Kenya.

Specific focus should be put on the education sector and infrastructure. These two sectors have an indication of being prone to corruption from the budgetary stage. More surveillance and accountability of public officials in these ministries should be enhanced. In addition, procurement processes should be transparent and cost-effective to ensure that no money is lost to corruption.

5.4 Areas of Further Research

This study only indicates that corruption affects public spending the chain starts at budgeting stage where more funds are allocated to sectors that have a high affinity to misuse. We specifically identify the education and infrastructure sectors. To continue this debate, future studies should use tools of efficiency analysis to establish the efficiency levels of public spending. Fonchamnyo and Sama (2016) have already done so in the education and health sectors of CEMAC countries. Future studies should also expand knowledge on private-sector corruption because the private sector is also another channel through which public sector corruption is driven.

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APPENDIX

Appendix A

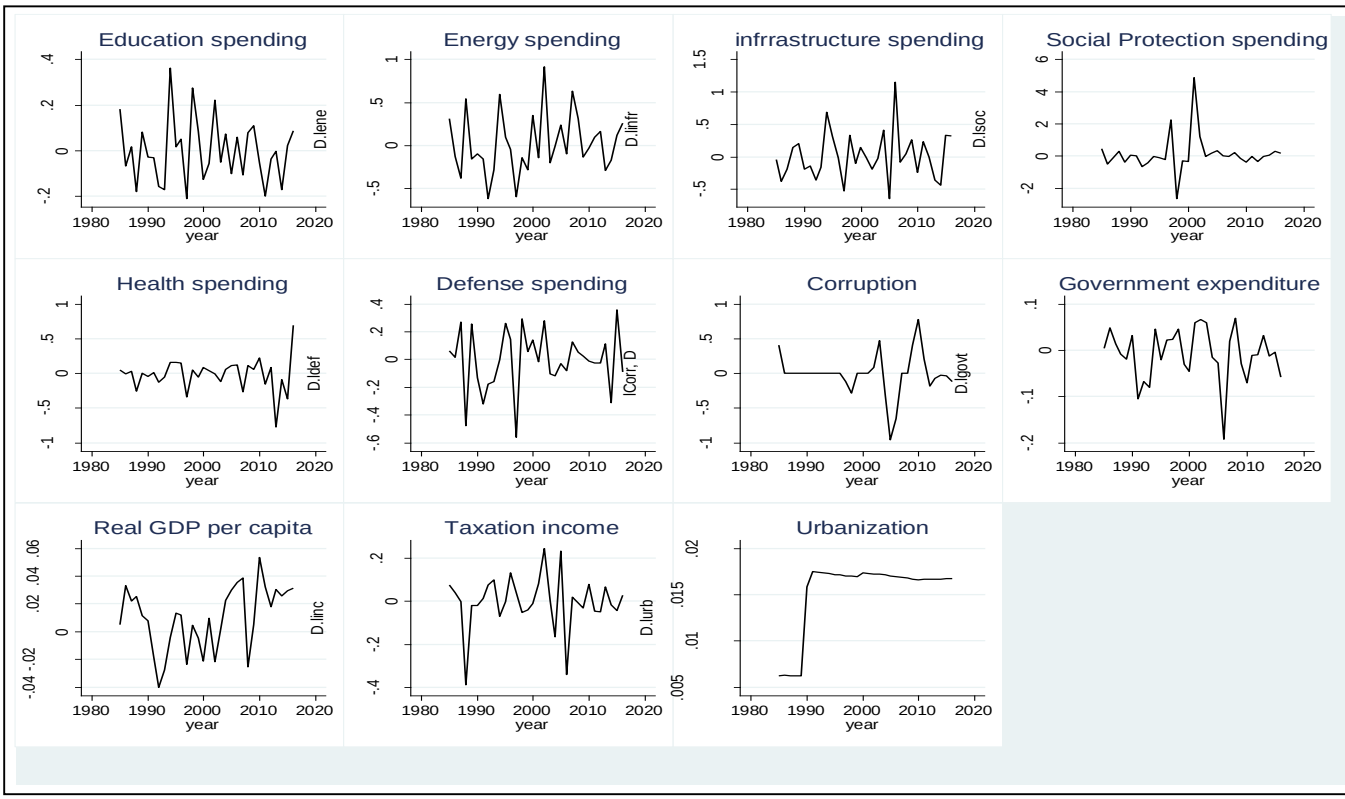
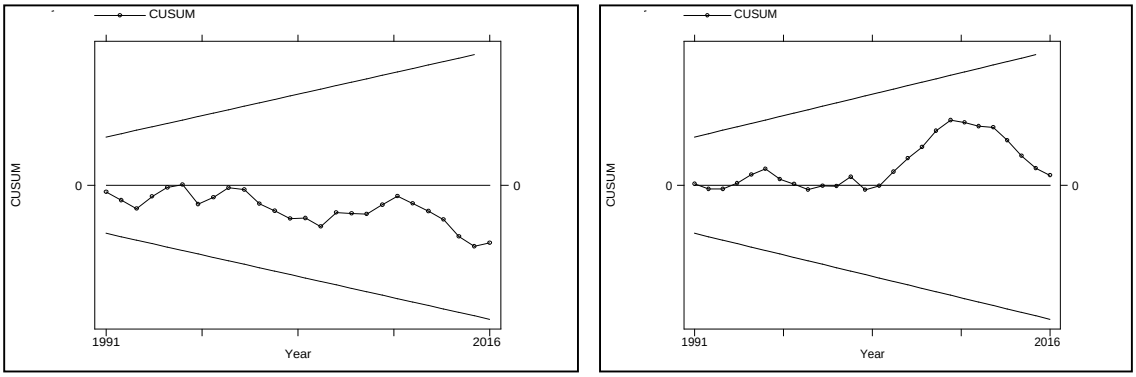


Figure A.1: Graphical trend of variables at first difference



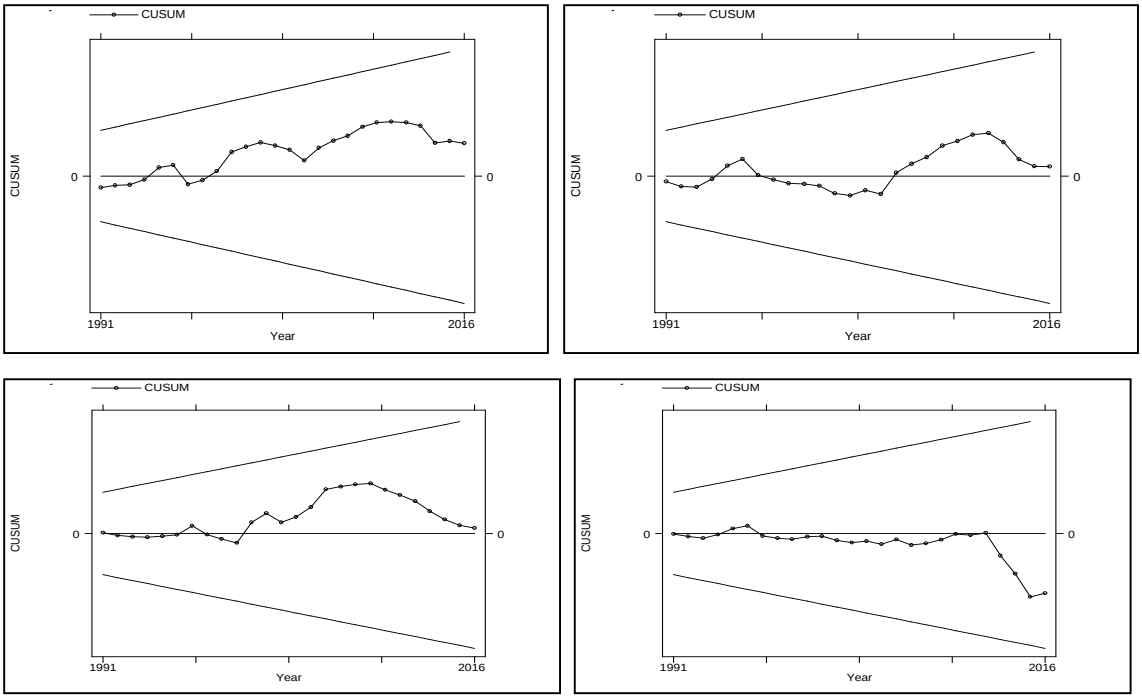


Figure A.2: CUSUM Plots for Equation 1 to 6 respectively

Table A.1: Results for Shapiro-Wilk test for normal

Number	Shapiro-Wilk W Test	Probability value	Comment
Equation 1	0.97416	0.60303	Normal
Equation 2	0.97312	0.57096	Normal
Equation 3	0.92945	0.03375	Normal
Equation 4	0.97374	0.58998	Normal
Equation 5	0.84548	0.00027	Not Normal
Equation 6	0.95501	0.18610	Normal

Table A.2: Multicollinearity Results

Variable	VIF	Tolerance
Urbanization log)	5.50	0.181720
Government expenditure log)	2.66	0.376424
Real GDP per capita log)	2.34	0.427345
Corruption log)	2.30	0.435011
Tax Income log)	1.73	0.579009
Mean VIF	2.91	

Table A.3: Breusch-Pagan test Results

	Chi-square	Probability value	Comment
Equation 1	1.29	0.2564	Homescedastic
Equation 2	0.34	0.5616	Homescedastic
Equation 3	0.09	0.7660	Homescedastic
Equation 4	0.00	0.9920	Homescedastic
Equation 5	0.41	0.5200	Homescedastic
Equation 6	0.5200	0.0000	Hoteroscedastic

Table A.4: Breusch-Godfrey LM test results

Number	Chi-square	Probability value	Comment
Equation 1	0.338	0.5610	No Autocorrelation
Equation 2	11.827	0.0006	Presence of Autocorrelation
Equation 3	0.786	0.3754	No Autocorrelation
Equation 4	5.304	0.0213	Presence of Autocorrelation
Equation 5	7.048	0.0079	Presence of Autocorrelation
Equation 6	6.040	0.0140	Presence of Autocorrelation

Table A.5: Unit Root Test Results

Variables	Test	Lag	Restriction	t-stat/LM-stat	Inference
Education spending log)	ADF	0	Constant, trend	-6.911***	I (1)
	PP	0	Constant, trend	-6.911***	I (1)
	ZA	0	Trend	-7.176***	I (1)
Energy spending log)	ADF	0	Constant, trend	-6.022***	I (1)
	PP	0	Constant, trend	-6.022***	I (1)
	ZA	0	Trend	-6.142***	I (1)
Defense spending log)	ADF	1	Constant, trend	-4.734***	I (1)
	PP	1	Constant, trend	-8.057***	I (1)
	ZA	0	Trend	-8.195***	I (1)
Infrastructure spending log)	ADF	2	Constant, trend	-4.150**	I (1)
	PP	2	Constant, trend	-7.092***	I (1)
	ZA	0	Trend	-7.062***	I (1)
Social protection spending log)	ADF	0	Constant, trend	-5.540***	I (1)
	PP	0	Constant, trend	-5.540***	I (1)
	ZA	0	Trend	-5.876***	l (1)
Health spending log)	ADF	3	Constant, no trend	-2.948**	I (1)
	PP	3	Constant, no trend	-5.79***	I (1)
	ZA	3	No trend	-6.734***	I (1)
Corruption log)	ADF	4	Constant, trend	-3.909**	I (1)
	PP	4	Constant, trend	-5.168***	I (1)

	ZA	1	Trend	-4.727**	I (1)
Urbanization log)	ADF	2	Constant, no trend	-3.349**	I (1)
	PP	2	Constant, no trend	-2.430***	I (2)
	ZA	0	No trend	-68.621***	I (1)
Government expenditure	ADF	0	Constant, trend	-4.611***	I (1)
log)	PP	0	Constant, trend	-4.611***	I (1)
	ZA	0	Trend	-4.672**	I (1)
Real GDP per capita log)	ADF	1	Constant, trend	-3.532*	I (1)
	PP	1	Constant, trend	-3.483*	I (1)
	ZA	0	Trend	-5.224***	I (1)
Taxation income log)	ADF	0	Constant, trend	-6.534***	I (1)
	PP	0	Constant, trend	-6.534***	I (1)
	ZA	0	Trend	-6.788***	I (1)

*Note: *** is 1% significance level, ** is 5% significance level and * is 10% significance level*

TableA.6: Unit Root for Residuals of Equations 1 to 6

Number	Test statistic	1% Level	5% Level	10% Level	P-Value	Comment
Equation 1	-4.941	-4.316	-3.572	-3.223	0.0003	Stationary
Equation 2	-3.088	-3.709	-2.983	-2.623	0.0274	Stationary
Equation 3	-4.766	-3.702	-2.980	-2.622	0.0001	Stationary
Equation 4	-3.897	-3.709	-2.983	-2.623	0.0021	Stationary
Equation 5	-2.800	-3.709	-2.983	-2.623	0.0583	Stationary
Equation 6	-3.322	-3.702	-2.980	-2.622	0.0139	Stationary

Appendix B: Raw data

Year	Income Tax B)	Defense B)	Health B)	Education B)	Social protection B)	Infrastructure B)	Energy B)	corruption	Real GDP Per Capita	Total Expenditure B)	Urbanization
1984	6	2.2	1.7	5.2	0.03	1.4	0.75	2.00	65017.80	30	15.98
1985	7.2	2.5	1.9	6.7	0.051	1.5	1.1	3.00	65351.80	32	16.08
1986	8	3.4	2.4	8.1	0.04	1.3	1.2	3.00	67542.30	42	16.18
1987	8.9	5.2	2.9	9.7	0.044	1.3	1	3.00	69042.90	50	16.28
1988	10	4	2.8	10	0.072	1.8	2.1	3.00	70804.20	62	16.38
1989	12	5.4	2.9	11	0.052	2.3	1.9	3.00	71631.00	64	16.49
1990	14	5.9	3.5	14	0.07	2.4	2.1	3.00	72179.80	80	16.75
1991	17	4.6	3.8	14	0.079	2.2	2	3.00	70864.90	87	17.04
1992	20	5.4	4.6	17	0.057	2.2	1.5	3.00	68089.60	120	17.34
1993	37	6.9	6.5	21	0.054	2.7	1.7	3.00	66233.60	180	17.65
1994	44	6.3	7	28	0.048	5	2.8	3.00	65943.40	170	17.95
1995	48	9	9.1	32	0.049	7.5	3.4	3.00	66840.00	180	18.26
1996	48	10	11	33	0.039	7.5	3.2	3.00	67630.10	180	18.58
1997	56	10	13	46	0.62	7.6	3	2.67	66058.90	310	18.90
1998	55	11	10	47	0.035	8.1	2	2.00	66362.80	240	19.22
1999	53	10	9.2	48	0.024	6.8	1.4	2.00	66049.90	230	19.55
2000	53	14	12	50	0.02	9.3	2.4	2.00	64650.00	270	19.89
2001	63	16	14	55	3	11	2.4	2.00	65285.60	310	20.24
2002	68	21	14	67	9.8	8.6	5.8	2.17	63878.70	310	20.59
2003	77	23	15	78	12	10	5.8	3.46	63985.70	380	20.95
2004	99	21	16	85	14	16	5.8	2.50	65441.50	380	21.31
2005	110	26	23	96	25	10	9.3	0.96	67435.60	480	21.68
2006	130	25	28	110	27	35	9	0.50	69855.20	510	22.05
2007	170	37	27	130	35	42	22	0.50	72614.60	670	22.42
2008	190	41	32	140	44	46	32	0.50	70807.90	700	22.80
2009	230	48	38	180	43	68	31	0.75	71170.20	790	23.18
2010	270	54	55	200	34	61	34	1.63	75075.90	900	23.57
2011	330	62	55	190	38	92	45	2.00	77530.50	1100	23.97
2012	370	73	72	220	33	110	63	1.67	78914.20	1300	24.37
2013	450	94	38	250	38	88	54	1.55	81353.50	1500	24.78
2014	510	98	50	300	57	81	65	1.51	83481.80	2100	25.20
2015	570	140	35	310	76	110	73	1.46	85991.20	2100	25.62
2016	660	130	69	340	90	160	95	1.29	88736.30	2100	26.06

Note: B is Billions.