THE IMPACT OF CORRUPTION ON ECONOMIC GROWTH IN DEVELOPING COUNTRIES

AN ECONOMETRIC ANALYSIS

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Erasmus University Rotterdam

Faculty of Social Sciences

Msc. International Public Management & Public Policy

Author: Daniel Agale-kolgo

Supervisor: Prof. A.G. Dijkstra

Second Reader: Prof. M. Onderco

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ERASMUS UNIVERSITEIT ROTTERDAM

ABSTRACT

Although many of studies find a negative link between corruption and economic growth, there is still no general agreement to that effect. As a contribution to the ensuing debate, a cross-sectional data for 101 developing countries over the period 2009-2015 is used to investigate the impact of corruption on economic wellbeing in developing countries. Specifically, a multiple regression analysis is conducted to ascertain the impact corruption has on economic growth. Several confounding factors such as GDP per capita, investment, inflation, trade openness and political stability are controlled for. Transparency International's corruption perception index is used as the measure of corruption whereas the growth rate of GDP is used as the measure of economic growth. This study hypothesizes that a high level of corruption will result in a decrease in economic wellbeing. However, the results of this do not provide any robust evidence in support of the hypothesis as the obtained coefficient for corruption is insignificant. It is also discovered that the level of investment and the initial level of GDP per capita have significant influences on economic growth.

Key words: Corruption, Economic Growth, Developing Countries, Cross-sectional Data, Multiple Linear Regression, Econometrics, Neo-classical Economic Theory.

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CHAPTER 1: INTRODUCTION

1.0 MOTIVATION

Corruption is a global problem that manifests in varying degrees in different parts of the world (World Bank, 1997). The negative socio- economic effects of corruption have received increased attention over the past few decades in both advanced and developing countries. Major international organizations including the International Monetary Fund (IMF), the World Bank (WB) and Transparency International (TI) have shown keen interest on the consequences of corruption on economic wellbeing especially in developing countries. The World Bank identifies corruption as "the single greatest obstacle to economic and social development" (World Bank, 1997) because it subverts the rule of law and weakens the institutional framework needed for the acceleration of economic growth. In 1996, James D. Wolfensohn, president of The World Bank at the time publicly declared corruption as a "cancer" and called for a collective effort to fight it wherever it is found. This assertion was reechoed by Jim Yong Kim, president of the World Bank Group who described the costs of corruption as thus;

> "*Every dollar that a corrupt official or a corrupt business person puts in their pocket is a dollar stolen from a pregnant woman who needs health care; or from a girl or a boy who deserves an education; or from communities that need water, roads, and schools. Every dollar is critical if we are to reach our goals to end extreme poverty by 2030 and to boost shared prosperity.*" (World Bank, 2013).

Jim Yong Kim in his speech referred to corruption as "public enemy number one" in developing countries (World Bank, 2013). The International Monetary Fund (IMF) declared that; "Many of the causes of corruption are economic in nature, and so are its consequences…" (IMF, 2008). Similarly, Transparency international notes "nine out of ten developing countries urgently need practical support to fight corruption" (Transparency International, 2003).

Although it is consistently claimed by the International Monetary Fund (IMF), World Bank (WB) and Transparency International (TI) that corruption negatively affects economic growth, these claims are yet to be agreed upon by economists. In other words, the claim that corruption hinders economic growth does not fully reflect the findings from the theoretical studies and empirical evidence from the field. Although common wisdom suggests corruption is an impediment to economic growth, some studies have discovered that corruption is not always bad for economic growth (Leff, 1964; Bailey, 1966). There is therefore an apparent gap between the perceived negative impact of corruption on economic growth and the evidence on the actual impact of corruption on economic growth. As a

matter of fact, some theorists argue that corruption in certain circumstance could be beneficial to economic activity (Leff, 1964).

The two main divergent schools of thought; the moralist and the revisionist schools of thought in the corruption-economic growth relationship debate have over the past decades made interesting findings in the field. The revisionists, the younger of the two schools of thought, believe that corruption per se might not be bad for economic growth. The revisionists argue that, more attention ought to be paid to the context in which corruption occurs and to what ends. Revisionist theorists argue that corruption may accelerate economic growth when it plays the role of providing channels through which certain harmful administrative barriers could be avoided (Huntington 1968, Bailey 1966, Méon and Weill 2010). In circumstances where corruption is used as a tool to overcome rigid administrative barriers, as Leff (1964) succinctly puts it, corruption tends to "grease the wheels" of economic growth. Corruption in this sense promotes efficiency because, bureaucrats can overcome issues such as red-tapism and other rigid administrative procedures. Corruption allows firms to circumvent certain cumbersome regulations that impede rapid decision-making necessary for accelerating business. The other school of thought; the moralists are of the view that corruption is indeed detrimental to economic growth. Mauro (1995) earlier on mentioned that the impact of corruption on economic growth is greatly determined by its effects on investment. Per Mauro, corruption negatively affects investment in developing countries. Corruption is also identified by Jain (2001) as a major cause of misallocation of resources. This is because the approval of government funds will no more be based on the economic value but rather based on the expected benefits corrupt official hope to receive from the approval of government funds. Moralists maintain that once corruption is used to escape rigid institutional procedures, corrupt officials only develop an extra motive to institute further administrative obstacles to ensure that they continue benefiting from payments. The moralists are therefore of the view that corruption tends to "sand the wheels" of economic growth.

Correspondingly, the empirical evidence on the economic consequences of corruption is inconclusive. The findings from researches on the economic impacts of corruption are divergent and therefore contributing to the uncertainty. While some empirical researches provide evidence in support of the greasing effect of corruption on economic growth (Méndez and Sepúlveda, 2006; Swaleheen and Stansel, 2007; Heckelman and Powell, 2008), majority of studies (Mauro, 1995; Tanzi and Davoodi, 1998; Ehrlich & Lui, 1999; Abed & Davoodi, 2002; Gyimah-Brempong, 2002) found corruption to be pernicious to economic growth.

In all, the evidence on the economic consequences of corruption is still inconclusive (Svensson 2005). Notwithstanding the fact that a majority of the evidence appears to support the idea that a high level of corruption leads to a low level of economic growth, the World Bank's statement about the negative socio-economic impacts of corruption in developing countries provides a strong impetus for more empirical investigations on the concept of corruption and its economic effects in developing countries. Besides, the mixed results from recent studies on the economic impacts of corruption provides further motivation for this thesis.

1.1 AIM AND RESEARCH QUESTIONS

Economists and policy makers have to a large extent remained uncertain about what impact corruption really has on economic development. This thesis aims at contributing to the existing empirical body of knowledge by empirically investigating the effect corruption has on economic growth in developing countries. The emphasis is placed on developing countries in Asia, Latin America and Africa because of the apparent limited amount of studies on the impact of corruption on economic wellbeing especially in these developing regions.

There are several questions concerning the relationship between corruption and economic growth that still need to be answered. But for the purposes of this study, the main question of interest is as follows;

> Does corruption grease or sand the wheels of economic growth in developing countries?

In an attempt to answer the above-mentioned question, this research will also attempt to answer the following sub-questions;

1. What are the theories and evidence from previous studies supporting the argument that corruption is detrimental to economic growth?
2. Does the evidence from this study support the claim that corruption has a negative impact on economic growth?

1.2 STUDY DESIGN

In attempt at answering the central research question, this study will rely on the results of the empirical analysis of the data that will be collected. It also is expected that the interpretations of results and the conclusions that will be drawn from the empirical study are theory-driven. In ensuring that this study is theory-driven, first, a hypothesis will be deduced from the relevant theories and empirical evidence on corruption and its impact on economic growth. The hypothesis will in turn be tested through an empirical analysis. In effect, in attempting to answer the question whether corruption greases or sands the wheels of economic growth, this study must rely on both the results from the empirical analysis of the data and the testing of hypothesis in the fourth chapter as well as on the literature that will be reviewed in the second chapter.

With respect to the two sub-questions, the first one will be answered through a thorough consultation of the relevant theories of corruption. The consultation of the theories will be carried out in the second chapter. An emphasis will be placed on the theories explaining certain channels through which corruption affects economic growth; thus the literature review will discuss the impact of corruption on growth through certain channels such as investment, bureaucratic efficiency and economic inequality. The second sub-question will also be answered through the review of the empirical studies in chapter two.

As earlier on noted, the main aim of this study is to establish whether corruption has a negative or positive impact on economic growth. This implies that this research will be working with two main variables. That is, this research will investigate whether the treatment of one variable causes a variation in another when measured. This study therefore assumes an X-oriented explanatory approach by trying to find out whether one independent variable X has any impact on another dependent variable Y. In the case of this research, the independent and dependent variables are corruption and economic growth respectively. Thus, does an increase in corruption result to an increase or decline in economic growth? The unit of analysis in this research is countries. A non-experimental large N design is used for this study. A non-experimental design is chosen for this research because, in studies where countries are the units of analysis like this one, it is impossible for the researcher to exercise control over the "application of the independent variable" and "to measure the dependent variable before and after the exposure to the independent variable" (Buttolph Johnson & Reynolds, 2008). Besides, it is impossible to put countries into different groups (Control & Experimental) as it is done in an experiment. The relationship between corruption and growth will be tested through a quantitative

analysis of the collected data. An initial bivariate correlational analysis between corruption and growth will be conducted. This will be followed by a multiple regression analysis where other independent variables are statistically controlled for. The control variables are included in the regression model to ensure that whatever inferential statements that will be made later are robust. Growth of Gross Domestic Product (GDP) will be used as the dependent variable in the regression analysis as the measure of economic growth. The main independent variable will the Corruption Perception Index (CPI) representing the level of corruption in a country. Possible control variables include level education (primary school completion rate), the level of economic stability, population growth rate, life expectancy and the initial GDP. However, the full model will be determined after the literature review. Data for the variables will be collected from the World Bank, IMF and Transparency International.

1.3 RELEVANCE

A research is said to be of societal relevance when it promotes an understanding of a social and political issue affecting people. The theoretical importance of this research is highlighted by the testing of theories on corruption and its economic consequences. By doing so, this study will be contributing to the theoretical and empirical discourse through its findings. Corruption has been identified as a major obstacle to the economic transformation of many countries especially in developing countries where corruption levels are relatively high (World Bank, 1997). In the light of the negative consequences corruption has on developing countries, efforts and mechanisms are being put in place curtail it. It is often argued that corruption adversely affects healthcare delivery, education, commerce among others. Corruption has been identified by the IMF as a major cause of the widening of the poverty gap in developing countries and yet there hasn't been a significant amount of studies on corruption in developing countries. This relatively low amount of studies on corruption in developing countries is perhaps the result of weak institutional recordkeeping mechanisms which is a common challenge in developing countries. This research will therefore not only contribute to the body of knowledge on corruption and its impact on growth in developing countries but also this research will contribute to minimizing the uncertainty surrounding the concept of corruption and its perceived negative impact on economic growth specifically in developing countries.

1.4 STRUCTURE OF THESIS

This first chapter introduced the research topic by giving the background upon which this research is conducted. The motivation for this study, objective and research questions were also outlined in the subsections of this first chapter.

The second chapter will be dedicated to a thorough review of the most relevant literature on corruption and economic growth. This chapter will begin with a review of theories of corruption. Subsequently, a review of empirical evidence on the impact of corruption on economic growth will be conducted and summarized. The hypothesis that is to be tested will then be formulated based on the theories and empirical studies that have been reviewed.

In the third chapter, the research design of this study will be presented in detail by comparing alternative research designs in other to arrive at the best alternative suitable for testing the theories used in this study. The regression model will also be introduced in the third chapter. Details on the sample will be given and the control variables to be included in the model will be presented and operationalized.

The fourth chapter will be dedicated to the analysis, presentation and interpretation of results from the data analysis. The interpretation of the results will be driven by the theories that we consulted in the literature.

In the fifth and final chapter, the central research question will be answered. Conclusions will be made from the findings of the study while bearing in mind the limitations of this research. This chapter will also present the academic and policy implications of the findings of this study.

CHAPTER 2: REVIEW OF LITERATURE

2.0 INTRODUCTION

The aim of this chapter is to present a review of the theoretical and empirical literature with regards to the impact of corruption on economic growth. Firstly, since the meaning of corruption is still a subject of dispute, an attempt will be made to give the reader a better understanding of the concept of corruption by attempting to define corruption; and a couple of underlying theories explaining the concept of corruption. Secondly, theoretical studies on how corruption affects economic growth will be presented. The empirical evidence on the impact of corruption will be presented in the third part whereas in the fourth and final part, the hypothesis to be tested in this research will be formulated. The formulation of the hypothesis will be based on the results from the theoretical and empirical studies consulted in the third and fourth parts of this chapter respectively.

2.1 UNDERSTANDING CORRUPTION

It may appear trivial to define corruption, but its relevance should not be underestimated. This is because an activity regarded as corruption in one country may not be regarded as such in another country (Gyimah-Brempong, 2002). Corruption means different things to different people depending on their cultural background, discipline and political leaning (Gyimah-Brempong, 2002). The concept of corruption is not only complex but it is also difficult to define and provokes rigorous debate among scholars. As a result, many scholars such as Jain (2001) begin their studies with an attempt to define the concept of corruption because how corruption is defined actually ends up determining what gets modelled and measured (Jain, 2001).

Transparency International defines corruption as "the misuse of entrusted power for private gain". Corruption is categorized into grand, petty and political. Grand corruption refers to misuse of entrusted power at a high level of government. Grand corruption has a distortionary impact on the functioning of the central government and enables leaders to benefit at the expense of the public good. Petty Corruption is the everyday abuse of entrusted power by public officials at the low level of government. It usually occurs when ordinary citizens try to access certain public goods such as education, health, security, and transportation. Petty corruption often occurs in the form of ordinary citizens having to pay bribes to public officials before they are allowed access to the services of public institutions which under normal circumstances should cost less or be free of charge. Political corruption as the name suggest occurs when political decision-makers manipulate policies and

institutional rules in the allocation of resources to sustain their power or wealth at the expense of ordinary citizens.

Corruption is a complex transaction that involves both someone who offers a benefit, often a bribe, and someone who accepts, as well as a variety of specialists or intermediaries to facilitate a transaction (Transparency International, 2013). Leff (1964) regards corruption as "an extra-legal institution used by individuals or groups to gain influence over the actions of the bureaucracy". Leff (1964) implies that corruption is a neutral concept and as such in determining whether corruption is good or bad, one must take into account what corruption is used to achieve. For instance, unlike in cases where certain public officials enrich themselves through corruption, other public officials are to circumvent certain bureaucratic procedures in order to arrive faster at decisions that would have taken a long time achieve and hence corruption in this instance is being used for a good purpose. Nye (1967) asserts that corruption is a behavior that deviates from formal duties as result of the motive for private gains. Such behavior includes "... bribery…; nepotism…; and misappropriation." (Nye, 1967). According to Nye, corruption is committed whenever a public official departs from his or her assigned duty of protecting the public interest. Conventionally, corruption is defined as the misuse of public office for private gain (Svensson, 2005). This definition encompasses the acceptance of bribes during procurement in public institutions; the selling of government property for personal gain as well as the misappropriation of government funds. But Shaxson (2007) criticizes this definition as being too narrow. Frazier-Moleketi (2007) gives a broader definition of corruption; "a transaction or an attempt to secure illegitimate advantage from national interests, private benefit or enrichment, through subverting or suborning a public official or any person or entity from performing their proper functions with diligence and probity" The definition acknowledges that corruption is not only associated with the public sector but the private sector as well

Bayley (2005) points out two commonalities in all the definitions of corruption offered by different scholars. These two aspects of corruption are crucial for a better understanding of the concept of corruption. Firstly, corruption is a rent-seeking activity. Personal gain is the main driving force behind the level of corruption. Economic philosophy and practical evidence have it that an individual's actions are significantly determined by his or her interest. But this view is contentious because the possibility that the bureaucrat is selfless exists and not all bureaucrats are corrupt. Secondly, the definition of corruption contains an element of abuse of public authority by public officials with entrusted authority. For a better understanding of the two broad elements of corruption as identified by Bayley

(2005), two theories; the *theory of rent-seeking* and the *principal-agent theory* will be briefly discussed in the subsequent paragraphs in order to better explain the concept of corruption.

Rent-seeking is the pursuit of economic rents. Economic rents according to Tollison (1985) are the surplus returns above the normal levels of returns generated in markets. According to Pindyck & Rubinfeld (2009), *rent-seeking* is based on the creation of surplus rents. Weil (2009) adds; artificial rents resulting from government policies cause rent-seeking behavior. Although rent-seeking is an inevitable element of every political system (Assiotis & Sylwester, 2010), it causes drainage and misallocation of scarce resources (Assiotis & Sylwester, 2010; Shleifer and Vishny, 1993). In short, rent-seeking is the attempt of creating excess income paid to factors of production through the manipulation of social or political activities.

Going by the *principal-agent theory,* the general public is the principal while the agent includes government employees or bureaucrats. An agent is expected to execute his or her functions in a neutral and impartial manner so as to maximize profit on behalf of the principal (general public). But the agent (public official or bureaucrat) has his or her own preferences and is faced with the dilemma to either carry out his or her assigned duties in the interest of the principal (public) or in his or her own interests or a combination of both. The agent is said to have failed in pursuing the interest of principal (public) when the agent misuses his or her capacity as a public official for private gains. The agency problem as it is called occurs because the principal and the agent may not necessarily share the same interests. The core idea underlying the principal-agent theory is the fact that principal and his agent are both looking forward to maximizing their own utility and if this is true, then it would be reasonable to assume that the agent will work towards achieving his own interests other than the interests of the principal (Jensen & Meckling, 1979). Going by this theory, corruption is regarded as the sacrifice of the principal's interest for that of the agent. Similarly, Jain (2001) mentions that when corrupt politicians divert national interests in order to serve their personal interests (to stay longer in power), then the interest of the populace is sacrificed for that of the agent. The principal has an interest in minimizing the failure costs that may result from the diversionary behavior of the agent. Also, the Principal prefers to minimize the costs associated with the monitoring of the agent and the costs of suppressing the corrupt actions of the agent. In other words, the principal-agent theory explains the conflict of interest between a person with entrusted authority and the people entrusting him or her with that authority in whose interest the person with entrusted power is expected to act.

2.2 CORRUPTION AND GROWTH: THEORY

According to Jain (2001), there are certain channels through which corruption affects economic growth. These channels of transmission include economic equality; investment; and bureaucratic efficiency. This section presents a detailed discussion of how corruption may affect economic growth through these three transmission channels.

Rose-Ackerman (2008) posits that corruption causes social and economic inequality and thwarts efforts intended to alleviate the plight of the poor in society. Conversely, inequality is also found to increase corruption and as such the direction of causality runs both directions (Rose-Ackerman, 2008). When corruption abounds in a society, a few powerful people use their entrusted authority to advance their private gains at the expense of the majority of the population who are often less affluent. Thus when resources meant to be distributed to those who need them in society end up being used for selfish needs of public officials, the gap between the elite and ordinary people increases. According to Mo (2001), corruption creates economic and social inequality because it favors a particular class; mostly the relatively rich class at the expense of the poor. The result is instability as the poor who are often aggrieved tend to search for alternative means of surviving. Instability which can manifest itself in the form of frequent changes in governments or increased crime rates in turn creates uncertainty which scares away investors and reduces productivity thereby reducing economic growth. It is generally agreed in the literature that corruption does have an adverse effect on income distribution because corruption involves the exchange of funds among the well-off in society. This promotes economic inequality because public officials are often the beneficiaries of corruption at the expense of ordinary poor citizens. The elites are those more likely to benefit from corruption and hence corruption creates unfairness in opportunities (Mo, 2000). The unfairness in opportunities promotes unequal income distribution which consequently has an adverse effect on economic growth (Alesina and Perotti, 1996).

There is another school of thought which argues that increasing economic and income inequality does not always have growth-dampening effects on an economy. Petersen (2015) argues that economic inequality can have growth-promoting effects because the higher income class in society accumulate savings that can be used in investments. High capital stock which is achieved through investment activities of this higher income class results in a higher gross domestic product. Petersen (2015) further argues that the increase in economic inequality led to high levels of economic growth in the 1950s and 1960s. Although there is still a significant debate as to whether increasing economic inequality has a

growth-promoting effect or growth-dampening effect on economic growth, a majority of the literature appears to support the latter. That is, inequality as it is often argued hampers economic growth.

Another channel through which corruption harms an economy is through the negative effect it has on investment. According to the World Bank (1986) economic growth is high for countries with a high investment/GDP ratio. Investment is general terms refers to all economic activities that involve the use of resources to produce goods and services. Investment in infrastructure according to Anwer and Sampath (1999) is crucial in developing countries because infrastructure provides producers with the opportunity to use modern technology which directly stimulates economic activity. Investment in education produces skilled and well-trained labour whereas investment in agricultural research and extension services increases agricultural productivity (Anwer and Sampath, 1999). Bardhan (1997) argues that foreign investors are often scared away when bribes are demanded from them by public officials in return for investment permits. Moreover, others argue that corruption in a country represents a major source of uncertainty for firms (Kaufmann, et. al., 2000). The Political corruption or "grand" corruption as it is also called disrupts the decision-making apparatus of public investments projects (Tanzi and Davoodi, 1998). Shleifer and Vishny (1993) mention that specific projects may be favored over others as a result of bribery. Corruption suspends national gains and replaces them with private gains because the approval of projects will be based on their potential for personal gains for corrupt public officials. There is little debate with regards to how corruption affects investment as majority of the existing literature on the topic reaffirms the existing notion that corruption inhibits investment at all levels of an economy.

The existing literature on the effect of corruption on the efficiency of the bureaucracy is divided between the efficiency-enhancing view point and the efficiency-reducing viewpoint (Leff, 1964; Myrdal, 1968). The efficiency-enhancing viewpoint argues that corruption promotes efficiency. The other point of view, the efficiency-reducing view sees corruption as dangerous for efficiency because 'sandy wheels' are deliberately created to attract bribes. Leff (1964) and Huntington (1968) being the pioneers of the efficiency-enhancing school of thought argue that in cases where cumbersome regulations and government indifference to economic growth abound, corruption may play a crucial role in promoting efficiency and bringing about the needed stimulation for economic growth. The efficiency- enhancing school of thought also argues that corruption may provide the kind of market system where corruption ensures that goods and services are allocated based on who is able and willing to pay for them instead of being based on merit, random selection, and politics or even based on

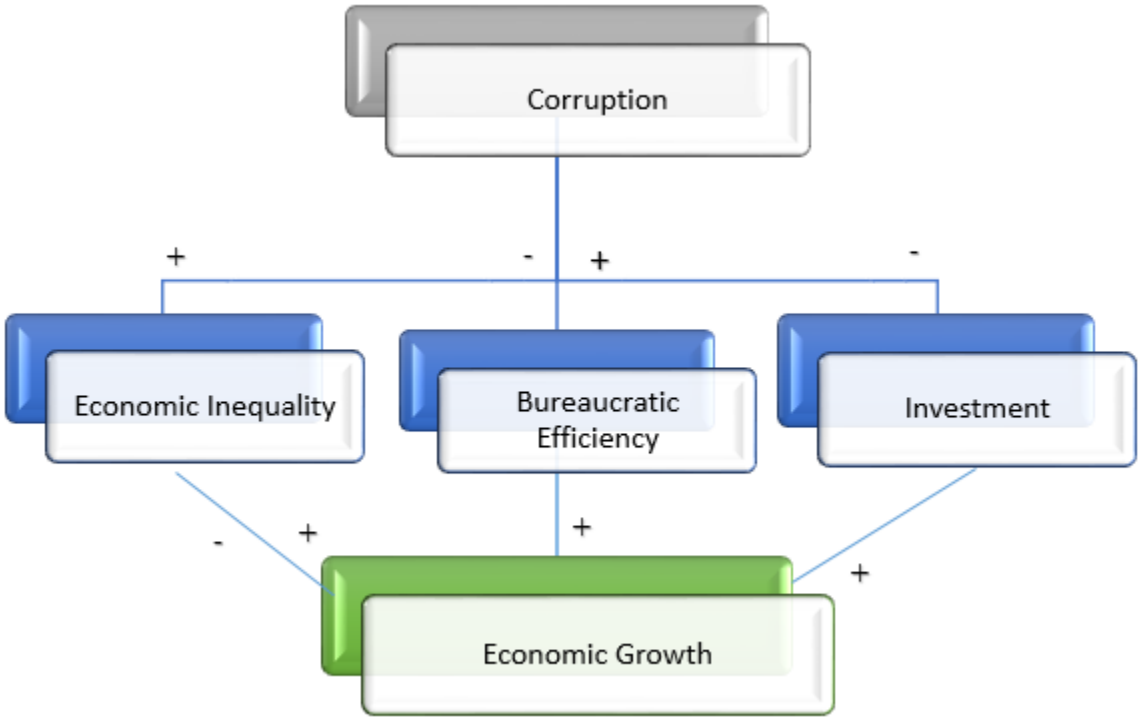
queues as in many cases. Thus, it is argued that corruption ensures the efficient allocation of scarce resources because resources end up in the hands of those who value them the most. According to Leff (1964), bureaucratic corruption in underdeveloped economies stimulates competition among entrepreneurs with its attendant pressure for efficiency. Such competition which is necessary for economic growth is often absent in underdeveloped economies and hence bureaucratic corruption introduces the tendency toward competition and efficiency. Leff (1964) further adds that because the allocation of the limited licenses and favors available to the bureaucrats is based on competitive bidding among entrepreneurs and the principal criteria for allocation being the payment of the highest bribes, the ability of firms to raise revenue either from their reserves or current operations is put at a premium. Firms' ability to raise revenue from their reserves or current operations is largely dependent on their efficiency in production. The introduction of competition and efficiency into an underdeveloped economy serves as a stimulus that is needed for economic growth. Lien (1986) has also argued that bribery and corruption can produce efficient consequences of competitive bidding processes because less expensive firms often emerge winners of contracts. Another argument which is often used in advancing the pro-corruption argument is the fact that corruption reduces administrative delays in government agencies (Huntington, 1968). The "speed money" argument is often used as a justification for corruption in cases where there is excessive red-tapism which often serves as a major obstacle to speedy decisions needed to keep business running (Barreto, 2000).

However, the speed money view does not go uncontested. Myrdal (1968) disagrees with the speed money argument as he argues that when public officials are paid bribes in order to get them to speed up processes, they may create further delays in administrative procedures to collect more bribes. Rose-Ackerman (1978) argues that pro-corruption arguments are based on a narrow definition of goodness, limited point of view and oversimplified understanding of the working mechanisms of the concept of corruption. Bardhan (1997) points out that the efficiency-enhancing argument is severely challenged because it is based on the second-best principle. The speed money argument resulted in fresh attention on queuing models where bureaucrats practice discrimination among their clients with different time priorities. According to Shleifer & Vishny (1993), centralized corruption is more distortionary than taxation because of the element of secrecy associated with corrupt actions. There is often a conscious effort by public officials to avoid being detected or punished when engaging in corrupt practices. Government officials divert investment funds from high value projects in sectors like education and health into unproductive areas like defense where it is easier to collect bribes without easy detection.

The effects of corruption on bureaucratic efficiency can be seen from two perspectives. Firstly, contracts are offered to producers who are willing and able to pay the largest sums in bribes instead of being based on the most efficient producer. This often results in the production of shoddy projects at the expense of the national interest. Secondly, there is the tendency of connivance between corrupt bureaucrats and producers to create barriers in order to keep out new producers so as to keep exploiting their corrupt relationship. It is worth noting that, although some scholars have recommended privatization as mechanism for curtailing the dangers of the administrative discretion and corruption of public officials, there is always the possibility that bureaucrats will use the privatization of state corporations as means of acquiring large rents (Jain, 2001).

Figure 1 is a presentation of the channels of corruption on economic growth as discussed in the previous sections of this chapter.

FIGURE 1: TRANSMISSION CHANNELS



2.3 CORRUPTION AND GROWTH: EMPIRICS

In Mauro's (1995) seminal study, he investigated the impact of corruption and on economic growth using Business International's (1984) corruption index in 67 countries in the period between 1980 and 1983. The cross-country regression analysis revealed that corruption reduces economic growth by causing low investment. It was found that a one standard deviation decrease in the corruption caused a significant increase in the annual growth rate of GDP per capita by 0.8%. But this result was based on a simple regression equation without control variables. After controlling for political stability, investment, GDP per capita Mauro (1995) found that the effect of corruption on growth became insignificant. Mauro's study also highlighted the important role of control variables in a regression model as they are capable of completely changing the results of the regression model. In a later study, Mauro (1996) studied the impact of corruption on investment, government expenditure and economic growth using cross-country data for 101 countries in different time periods. This second study confirmed Mauro's earlier finding that corruption reduced economic growth by distorting government expenditure. Mauro's second study found that corruption has the potential of having an indirect negative effect on growth through the diversion of resources away from the educational sector.

In a cross-country study in the period 1980-1995, Tanzi and Davoodi (1998) investigated the relationship between corruption, government expenditure and public investment. It was found that corruption causes low investment; low government spending on public infrastructure and low government revenues. Another study on the effect corruption on economic growth and its transmission channels was conducted by Mo (2001) in a cross section of 45 countries in the period 1970-1985. It was discovered that a one percent increase in corruption leads to a reduction in growth by 0.7%. Using the ordinary least squares (OLS) and 2 stages least squares methods of analysis, Mo found political instability to be the most important channel through which corruption affects economic growth; accounting for about 53% of the total effect. In order to test the effect of corruption on the transmission channels- investment, human development and political stability, three different regression equations were run for each of the three transmission channels. Mo's (2001) study included population growth; initial GDP per capita; and Political rights. Corruption was also found to have a detrimental effect on human development and private investment.

Ehrlich and Lui (1999) used panel data from 68 countries in the period 1981-1992 to study the relationship between per capita income and corruption. It was found that changes in government size and corruption negatively affected per capita income. Goorha (2000) used the economic model

developed by Shleifer and Vishny (1993) to study corrupt practices in transition economies. It was found that corruption evolved from a more centralized joint monopoly to a decentralized form. The diffusion of corruption results in more corruption and inefficiency in the economy. Gyimah-Brempong (2002) studied the impact of corruption on economic growth in African countries using the dynamic panel estimator method of analysis. It was reported after the study that a unit increase in corruption reduces the growth rate of GDP and per capita income by between 0.75% and 0.9% and 0.39% and 0.41% per year respectively. Comparable results were reported by Abed and Davoodi (2002) who conducted standard multivariate regression analysis on cross-sectional data for 25 countries where they examined the role of corruption in transition economies. The initial results showed corruption to have a negative effect on growth, but the effect became insignificant when they included their structural reform index as a proxy for government failure in the regression model.

Gyimah-Brempong and Camacho (2006) conducted a panel data analysis of 61 countries from Asia, Africa and Latin America in the period 1980-1998 to investigate differences in the impact of corruption on economic growth from a regional perspective. Their regional analysis was made possible by the use of regional dummy variables. The results from the study showed a negative link between corruption and income distribution and between corruption and growth per capita. While it was found that the most significant impact of corruption on income per capita was in Africa, Latin America recorded the highest impact of corruption on income distribution. Aidt (2009) confirmed the sanding effect of corruption on economic growth when he investigated 60-80 developing and developed countries using the ordinary least squares. After controlling for educational level, initial GDP, population growth and the level of investment, it was discovered that there was a strong negative correlation between corruption and economic growth. Ugur and Dasgupta (2011) reviewed 115 studies in a meta-analysis of previous studies on the impact of corruption on economic growth in developing countries. It was reported that corruption adversely affected economic growth through direct and indirect means. Ugur and Dasgupta (2011) confirm that the indirect effects of corruption on growth occur through transmission channels such as investment, public expenditures and human capital.

In contrast, certain studies have discovered a positive relationship between economic growth and corruption under certain conditions. Studies such as Braguinsky (1996) and Swaleheen & Stansel (2007) have supported the assumption made by Leff (1964) and Huntington (1968) that corruption may not always be bad for economic growth. For instance, Podobnik et al. (2008) found a positive

relationship between corruption and economic growth in a panel data analysis for all countries of the world in the period between 1999 and 2004. The empirical results from a study by Méndez & Sepúlveda (2006) in a study using the fixed effects regression for a larger sample in the period 1960-2000 also showed a positive impact of corruption on GDP growth rate.

Swaleheen & Stansel (2007) in a cross-sectional analysis in a panel of 60 countries in the period 1995-2004 found that when economic agents have access to a wide range of economic choices, corruption helps to increase growth by providing an opportunity to avoid government controls. Thus, corruption could perhaps have a positive effect on GDP growth rate in countries with low levels of economic freedom. Heckelman and Powell (2008) in a follow up research based on the findings of Swaleheen and Stansel (2007) investigated the impact of corruption on economic growth in a panel of 83 nations in the period 1995-2005 using a regression analysis. Inter-regional heterogeneity, investment, democracy as well as political and economic institutions (economic freedom) were controlled for in the regression. Contrary to the findings of Swaleheen and Stansel (2007) it was discovered that corruption positively affects economic growth in countries where economic freedoms were most limited.

2.3.1 SUMMARY OF LITERATURE REVIEW

The theoretical and empirical studies presented in this chapter show that there is a significant relation between corruption and economic growth. Most of the empirical studies show that corruption has a negative impact on economic growth (Mauro, 1995; Mauro, 1996; Tanzi and Davoodi, 1998; Ehrlich and Lui, 1999; Abed and Davoodi, 2002; Gyimah-Brempong and Camacho, 2006) as asserted by Myrdal (1968); Bates (1981); Murphy et al. (1993) and Bardhan (1997). Nevertheless, there have been reports of the positive impact of corruption on the growth rate of GDP in some studies. Previous studies have extensively tested the direct effects of corruption as well as the transmission channels on the impact of corruption on economic growth over the past few decades. Presented in Table 1 is a summary of the empirical evidence reviewed in this second chapter.

TABLE 1: SUMMARY OF EMPIRICAL EVIDENCE

Impact of Corruption on Economic Growth

Study	*Type of Data*	*Control Variables*	*Method of Analysis*	*Reported Impact*
Mauro (1995)	Cross-country data of 58 developing countries 1980 and 1985	Red-tape, political stability, Investment, per capita GDP	OLS	Insignificant negative impact
Mauro (1996)	Cross-country data of 101 countries 1980-1985	Government expenditure on Education, Per capita GDP	OLS, 2SLS	Negative
Tanzi and Davoodi (1998)	Cross-country data of all countries of the World 1980-1995	Real per capita GDP, Public Investment-GDP ratio	OLS	Negative
Ehrlich and Lui (1999)	Panel data of 68 countries 1981-1992	GDP Per capita, Population growth, trade, Investment	OLS	Negative
Abed and Davoodi (2002)	Panel data of 25 transition economies 1994-1998	Structural reform factor, Inflation	OLS	Negative
Gyimah-Brempong (2002)	Panel data of 21 African Countries 1993-1999	Investment, Openness	Dynamic Panel Estimator	Negative
Méndez and Sepúlveda (2006).	Cross-section of 84 Latin-American, African and Scandinavian countries 1960-2000	Population growth, Investment, secondary school education, instability	OLS	Positive
Gyimah-Brempong and Camacho (2006)	Panel data of 61 LDCs 1980-1998	Income distribution, Per capita income and Regional dummies	OLS	Negative
Swaleheen and Stansel (2007)	Panel data of 60 countries 1995-2004	Democracy, per capita income, employment	OLS	Positive (conditional on high Economic Freedom)
Heckelman and Powell (2008)	Panel data of 83 countries 1995-2005	Political institutions, Democracy	OLS	Positive (conditional on low economic freedom)
Podobnik et al. (2008)	Panel data 1999-2004 all countries in the world		OLS	Positive
Aidt (2009)	60-80 countries 1970-2000	Initial GDP, Education, Population Growth, Investment	OLS	Negative
Ugur and Dasgupta (2011)	Metastudy	Investment, Population growth, GDP per capita	OLS, 2SLS, 3SLS, GMM	Negative

2.4 CONTROL VARIABLES

Previous sections of this chapter have provided the theoretical and empirical evidence in supporting the argument that economic growth is often influenced by several other factors. The literature shows that the relationship between economic growth and corruption is affected by several other confounding factors that may enhance or inhibit economic growth in different countries. The existence of these confounding factors poses a threat to the internal validity of the relationship between economic growth and corruption. Thus, to ensure the internal validity of this research, several control variables will be added in the main statistical model of this study. The selection of the control variables to be included in the statistical model will be based on the theoretical and empirical studies on economic growth and its relationship with corruption. The choice of control variables outlined below is therefore influenced by the growth theories and empirical studies previously discussed in this chapter.

2.4.1 GDP PER CAPITA

Neoclassical economists argue that developing countries have a better potential of growing faster than their developed counterparts because the diminishing returns to capital in developed countries is stronger than in developing countries resulting in convergence (all other factors held constant) as the developing countries catch up with developed countries at similar levels of per capita GDP over time. This catch-up theory has proven to be indispensable because several empirical studies on economic growth found it crucial to control for per capita GDP. Similar to Mauro (1995); Mauro (1996); Tanzi and Davoodi (1998); Ehrlich and Lui (1999), this research sees per capita GDP as a critical control variable which ought to be included in the empirical model.

2.4.2 INFLATION

The stability of prices plays a major role in achieving macroeconomic stability and hence economic growth in any country. Inflation has been discovered as a hindrance to economic wellbeing in several empirical studies. Inflation creates distortions, creates economic instability, resulting in less productive economic activity, low economic growth and hence the need to control for inflation. Despite the lack of consensus as to whether inflation promotes or reduces economic growth, this research includes the rate of inflation in the main econometric model because inflation remains a classic control variable in economic growth models and has been used as a control variable in several empirical studies on economic growth.

2.4.3 INVESTMENT

The interconnection between economic growth and capital formation is a widely studied topic in economic growth theory. Neoclassical economists place a major emphasis on capital accumulation in achieving economic growth because capital is crucial in the creation of capital intensive goods and the consumption of capital intensive goods is often accompanied by an increase in income. It is also argued by neoclassical theorists that an investment in infrastructure in developing countries is important for the achievement of economic growth. This argument is affirmed by the World Bank's statement that countries with relatively higher investment/GDP ratio experience higher GDP growth rates (World Bank, 1989). This important role of investment in achieving economic growth is highlighted by the use of investment as a control variable in most empirical studies previously mentioned in this chapter. This study, following the theoretical and empirical evidence in the literature finds it important to control for investment to ensure that the variation in economic growth is not influenced by investment.

2.4.4 TRADE OPENNESS

The theory of comparative advantage states that a country that wants to trade with another should concentrate in the production of goods and services in which it has a comparative advantage. The specialization in the sector where it is better endowed will increase productivity and boost exports and hence overall economic growth. This neoclassical theory places emphasis on the efficient allocation of factors of production mainly labor and capital. It is argued that international trade enhances economic growth of both trading countries resulting in a positive relationship between international trade and economic wellbeing. This argument is supported by the empirical evidence obtained by Sachs & Warner (1995); Gyimah-Brempong (2002) who discovered that developing countries with open economies achieved higher levels of economic growth than their counterparts with closed economies. This study will include trade openness as one of the control variables to the empirical model of this study.

2.4.5 POLITICAL STABILITY

The interconnectedness of political stability and economic growth is widely agreed among social scientists. This assertion is also widely affirmed by the empirics. A high propensity of government change which is often used as a measure of political instability creates uncertainty with regards to government policies. This uncertainty scares away potential investors or may cause the exit of existing investors in search for more stable political environments (Alesina et. al 1996). De Haan & Siermann (1996) also argue that political instability causes a reduction in the supply of capital and labor which

in turn increase the risk of capital loss. Besides, the establishment of property rights which are crucial in realizing productivity gains become difficult in unstable political environments. It is therefore expected in this research that in countries and periods where there is a high propensity of government change, economic growth is expected to be lower than otherwise.

2.5 CONCLUSION

All in all, the reviewed literature reinforces the existing puzzle as to what effect does corruption have on economic growth. Although it is evident from the consulted literature that several other factors may affect economic growth, this research focuses on one of the possible factors: corruption. Also, many empirical studies appear to support the sanding effect of corruption on economic growth. It is therefore the aim of this research to contribute to the existing body of knowledge by hypothesizing that:

> The higher the level of perceived corruption, the lower the economic growth

This research seeks to study the impact of corruption on economic growth by testing the above stated hypothesis. This hypothesis is made because different researchers have presented different arguments in support of the validity of the argument that corruption has a detrimental impact on economic growth. Chapter three presents the methodological approach that will be used in testing the above stated hypothesis.

CHAPTER 3: METHODOLOGY

3.0 INTRODUCTION

This chapter outlines the methodological framework to be used in attempting to answer the questions raised in this research. The first sub-section will present the research design and the statistical model. The presentation of parameters and the operationalization of the variables will be carried out in the second sub-section. The final part will present the conclusions of this chapter.

3.1 RESEARCH DESIGN

3.1.1 NON-EXPERIMENTAL CROSS-SECTIONAL DESIGN

Choosing an appropriate design for a study is one of the crucial stages of conducting any research since it provides a backbone framework to a study. There are often accompanying consequences of a researcher's choice of one research design over another. A researcher's choice of design should therefore be the most suited for the conceptual topics raised in the study.

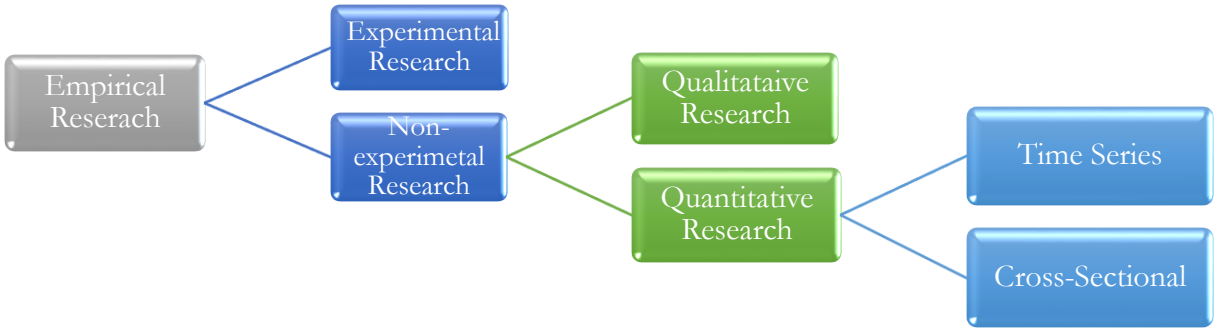
Using an experimental design or a non-experimental design is one of the first questions researchers must answer in choosing an appropriate design for a study. However, the latter is often employed in social science research. According to Beli (2009), variables in the social sciences are often studied as they exist without any manipulation by the researcher. Experimental designs are therefore almost impossible in the social sciences as they involve variables that cannot fulfill the fundamental requirements of experimental research. This research employs a non-experimental design because the variables involved being the perceived level of corruption and the economic growth are beyond the ability of the researcher to manipulate. The researcher is unable to put the countries in to experimental and control groups as required in an experiment. Besides, it cannot be clearly established whether the possible changes in the dependent variable is attributable to the independent variable or to other contaminating variables. There is therefore no treatment on the dependent variable as it is done in an experimental design. The researcher is unable to manipulate the already existing data on the dependent and independent variables and as such must rely on the results obtained from statistical analyses.

There is little debate with regards to whether this research uses a qualitative or quantitative method of research because this study relies mainly on the use of statistical techniques in exploring the relationships among a large number (large-N) of numeric and quantifiable data. Results for quantitative design provide for a high level of external validity (Gschwend & Schimmelfennig, 2007).

A qualitative design on the other hand uses a small number (small-N) of non-numeric observations in conducting an in-depth study of specific variables.

This research will therefore use a quantitative non-experimental research design as it appears to be the most suitable design for achieving the aim of showing general patterns in other to strengthen the external validity of the inferences that will be made from the statistical results (Gschwend & Schimmelfennig, 2007). The next step in terms to finding an appropriate research design for this study is choosing between using a time-series design or a cross-sectional study. A time-series is a research design where the same variables are measured at different time periods with the aim of studying the trend of the variables in question. A cross-sectional study on the other hand involves the measurement of variations among various units at a specific point in time (Kellstedt & Whitten 2013). All measurements for the various sample members in a cross-sectional section are obtained at a specific period of time although the selection may take place over a longer period of time (Sedgwick, 2014).

FIGURE 2: RESEARCH DESIGN



A non-experimental cross-sectional study is preferred to time-series for this study because it allows for the study of variables for a large sample of developing countries at specific point in time. But Kellstedt & Whitten (2013) argue that the threat of low internal validity with this kind of research design always exists because it does not allow for any particularly definitive conclusion as to whether *X* causes *Y* or vice versa based on the results of the study. This is because the time sequence required in showing a causal relationship among variables is lacking in a non-experimental cross-sectional method of study. In an attempt at compensating for this weakness, the dependent variable is measured over a period of five years after the measurement of the independent variable.

3.2 MODEL SPECIFICATION

Jeon (2015) argues that social phenomena are rarely influenced by one independent (predictor) variable and hence the reliance of most social scientist on multiple regression analyses in the past decade. A multiple regression analysis has become a powerful tool among researchers in the social sciences because it allows for the statistical modelling of the relationship between a dependent variable and a set of independent variables (Jeon, 2015).

The existing literature as well the empirical evidence shows several other factors besides corruption that could be influencing economic growth. This means that there is more than one independent variable in the relationship between corruption and economic growth. A multiple regression analysis is therefore the chosen as it appears to be a suited method of analysis for this research. A typical multiple regression equation is expressed as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \beta_n X_n + \mu$$

Where Y = dependent variable
α = constant or intercept
β_1..n = co-efficient
X_1..n = independent variables
μ = error term

Therefore, going by the use of lagged explanatory variable(s) X in the regression equation, the new expression will be as follows:

$$Y_t = \alpha + \beta_1 X_{1(t-1)} + \beta_2 X_{2(t-1)} + \beta_3 X_{3(t-1)} + \ldots \beta_n X_{n(t-1)} + \mu_t$$

Where Y_t = current dependent variable
α = constant/intercept
$\beta_{1..n}$ = co-efficient
$X_{1..n}$ = current independent variable
μ_t = current error term
t = current period
t-1 = lagged period

The main reason for the use of a lagged value of the explanatory variable in this research is that, for the impact of corruption on economic growth to be properly assessed, corruption should have preceded economic growth by a certain period of time. Likewise, the measurement of the other

independent variables will precede the measurement of economic growth. The above stated equation also represents the sequence of interaction between corruption and other factors and their delayed influence of economic growth.

Nonetheless, a major weakness of the statistical model presented above is instability and the risk of obtaining unreliable results due to a low internal validity. This study therefore attempts to limit this challenge to the internal validity of the results by ensuring that the following five classical assumptions of the linear regression model are satisfied.

1. *Normality*: The main variables and their residuals should be normally distributed or approximately normally distributed.
2. *No-Multicollinearity*: Independent variables should not be closely correlated to one another.
3. *Linearity*: When the standardized residuals and the *Y* values are plotted on the *X and Y* axes respectively, the scatter plot must follow a linear pattern otherwise the assumption of linearity is not met.
4. *Normality of Residuals:* The predicted residuals obtained after the regression analysis must be normally distributed.
5. *Homoscedasticity*: Variance around the regression line should be the same for all values of the predictor variable *X*. In other words, the points of the values of X should be approximately the same distance from the regression line.

The approach of estimation of the impact of corruption on economic growth in this study is similar to the empirical studies discussed in the second chapter. A fully developed empirical model is obtained by inserting the variables being studied in this research as separate terms into the theoretical model.

$$G_t = \alpha + \beta_1(Corrupt)_{(t-1)} + \beta_2(GDPpc)_{(t-1)} + \beta_3(Invest)_{(t-1)} + \beta_4(TradeOpn)_{(t-1)} + \beta_5(PolStab)_{(t-1)} + \beta_6\ (Infl)_{(t-1)} + \mu_t$$

Where G_t is the rate of economic growth for individual country being the dependent variable and *Corrupt* is the level of corruption being the explanatory variable. The relationship between G_t and *Corrupt* is confounded by *GDPpc*-GDP per capita, *Invest*-level of Investment in relation to GDP, *TradeOpn*-Trade openness, *PolStab*-Political stability and *Infl*-rate of inflation whereas μ_t is the error term.

3.3 OPERATIONALIZATION

The measurement of concepts is a major challenge in the social sciences because most concepts being studied in the field are often intangible and difficult to measure. There is therefore the need for every social science research to develop specific procedures to ensure that the empirical observations represent the target concept that were intended to be measured. This sub-section is dedicated to the operationalization (ascribing specific definitions to variables) of the variables of this research. The exact definition of each variable is not only necessary for increasing the quality of results of this research, but it also increases the robustness of the design. Furthermore, the population, sample and period of this study will be outlined in this sub-section.

3.3.1 DEPENDENT VARIABLE-ECONOMIC GROWTH

This study uses the annual growth rate of GDP as a measure of economic growth for countries being studied in this research. GDP is the total of gross value added by producers resident in the economy. The GDP Annual Growth Rate is drawn from the World Development Indicators (WDI) published yearly by the World Bank. The WDIs from which the annual growth rate of GDP is drawn is the most accurate and up to date data source on global development which captures global as well as regional and national level estimations (World Bank, 2016). These estimates are carried by credible and officially recognized international sources. The GDP annual growth rate of the World Bank estimates the annual percentage of the growth rate of GDP at market prices on the basis of the local currencies of participating countries. This study will use the average value of the annual growth rate of GDP measured over 5 years. The measurement of GDP annual growth rate over an average period of 5 years is necessary to cater for the volatility of growth.

3.3.2 INDEPENDENT VARIABLE-CORRUPTION

This study uses Transparency International's (TI) corruption perceptions index (CPI) as the measure of corruption. This is because most of the recent studies on the effects of corruption on economic growth have used the CPI as their measures of corruption. Besides, the use of the CPI in this research makes it easy to compare the results with most of these recent studies. Transparency International defines corruption as the abuse of public office for personal gain. The CPI is an annual publication of Transparency International which ranks countries in terms of the extent to which corruption is perceived to exist in the public sector-mainly among public office holders and politicians. Transparency International's reliance on the use of perceptions in measuring corruption is owed to

the fact corruption is an illegal activity that often happens in secrecy and is hard to notice except in the event of a scandal or prosecution. The CPI is a composite index in a sense that is drawn from a range of business and expert surveys conducted by reputable and independent organizations. These expertly and independently conducted interviews ask respondents questions with regards to bribery activity among public officials, embezzlement and kickbacks in public procurement as well as the effectiveness of anti-corruption efforts in an effort to capture both the administrative and political sides of corruption.

A country's CPI score represents the level of perceived corruption in its public-sector apparatus. Each country is scored on a scale of 0-100 where 0 means a country's public sector is perceived as highly corrupt whereas 100 means a country's public sector is perceived as very clean. According to Transparency International (2016), four different steps are involved in calculating the CPI:

1. *Data Sources*: The variety of data sources used in computing the CPI must fulfil certain criteria:
   (a) Must quantify corruption in the public sector.
   (b) Results must be based on valid and reliable methods which rank multiple countries on the same scale.
   (c) Allow for enough variation of scores in order to be able to distinguish among countries.
   (d) The survey must be conducted by a credible institution and expected to be repeated regularly.
2. *Standardized Data Sources*: This is carried out by the mean of the data set and dividing by the standard deviation and the results in the z-scores. The results are then adjusted to have a mean of approximately 45 and standard deviation of 20. This allows the data set to fit the CPI's 0-100 scale.
3. *Computation of the mean*: A minimum of three sources is needed for a country to be included in the Transparency International's CPI. An average of all the standardized scores is computed and rounded up to two whole numbers to obtain the CPI.
4. *Reporting the measure of uncertainty*: To ensure that the variation in the scores of the data are captured for a particular country, the CPI is released alongside the confidence interval and standard error associated with the score.

Table 2 below summarizes the indices used in the computation of the CPI for the year 2016.

TABLE 2: DATA SOURCES OF CPI 2016

Index/Indicator	Provider	Availability	Scale of Scores	Countries
Governance Ratings 2015	African Development Bank (ADB)	2005	1 (very weak for two or more years) to 6 (very strong for three or more years) and allows for half point intermediate scores (e.g.3.5)	38 African Countries
Sustainable Governance 2016	Bertelsmann Foundation	2009	1 (highest level of corruption) to 10 (lowest level of corruption)	All 41 OECD and EU countries
Transformation Index (Political, Economic, Management) 2016	Bertelsmann Foundation	2003	10 (lowest level of corruption) to 1(highest level of corruption)	129 countries and territories
Country Risk Ratings 2016	Economist Intelligence Unit	1980s	0 (very low incidence of corruption) to 4 (very high incidence of corruption)	129 countries and territories
Nations in Transit 2016	Freedom House	2003	1 (lowest level of corruption) to 7 (highest level of corruption) and allow for half-point and quarter-point intermediate scores (e.g. 3.25)	29 countries and territories
World Competitiveness Yearbook 2016	IMD	1989	0 (the highest level of perceived corruption) to 10 (lowest)	61 countries and territories
Political and Economic Risk 2016	Political and Economic Risk Consultancy(PERC)	1997	0(no problem) to 10 (serious problem)	15 Asian Countries and territories plus USA in 2016
International Country Risk Guide 2016	Political Risk Services(PRS)	1980	0(highest potential risk) to 6(lowest potential risk)	140 Countries
Country Policy and Institutional Assessment 2015	World Bank	2005	1(low levels of transparency) to 6(high levels of transparency)	76 countries
Executive Opinion Survey (EOS) 2016	World Economic Forum	1980s	1(very common) to 7(very common)	134 countries
Rule of Law 2016	World Justice Project	2010	0(low) to 1(high)	113 countries
Varieties of Democracy 2016	V-Dem	1900	0(low) to 1(high)	76 countries

Some scholars criticize the use of the CPI as a measure of corruption. Rohweh (2009) argues that the CPI is a composite indicator because it aggregates a number of existing data. According to Thompson and Shah (2008) the meaning of corruption may vary from country to country and hence it is difficult to tell what the corruption indices actually measure. De Maria (2008) points to the fact that the CPI has been defined to a large extent to serve Western economic interests and narrowly measures the concept of corruption without regard for the specific cultural and historical experiences of African countries. This argument is supported by Duncan (2006) who describes the "Western" definition of corruption as "a specific definition of corruption created and then repeatedly endorsed in the Western literature masquerades as a world applicable definition and forces into oblivion other less powerful constructions of corruption" (Duncan, 2006). Despites the alleged shortcomings in its definition and methods of measurement, the CPI is still often regarded as the most comprehensive index for measuring corruption and is widely preferred in corruption studies. It is regarded as the closest approximation to corruption currently available. It is on this basis that this research chooses the CPI over other indicators as the measure of corruption. Nevertheless, it is worth reiterating that, figures for the CPI, being the measure of corruption range between 0 and 100. A figure of the CPI (100) means a country is very clean (not highly corrupt) and a low figure (0) means a country is very corrupt (not less corrupt). It is against this background that the statistical coefficient of the CPI in relation to corruption is expected to be positive.

3.4 CONTROL VARIABLES

GDP per capita: The level of development of a country in this study is indicated by real GDP per capita in current US dollars. This indicator measures the Gross Domestic Product of a country divided by it population. The impact of this variable on Economic Growth is expected to be negative.

Investment: As an indicator for investment, this research will use the World Bank's Gross Capital Formation as a percentage of GDP. This indicator comprises the amount of money spent on fixed assets in an economy plus the net changes in the level of inventories. Fixed assets in this case include drains, machinery, purchases of equipment, construction of railways, offices, hospitals. Inventories on the other hand refers to all stocks of goods that are reserved by firms in case of fluctuations in production or sales. The values for this indicator are expected to range from 0% to 100%. A high level of investment is expected to positively affect economic growth.

Trade Openness: As a measure of trade openness, this study uses the World Bank's Trade (% GDP) which is defined as the sum of goods and services traded to and from a country measured as a share of gross domestic product. The value for this indicator is computed using the weighted average method and it ranges from 0% to 100% or higher. It is expected in this research that countries with high level of trade openness will achieve higher levels of economic growth and vice versa.

Political Stability: Data for Political stability will be sourced from the WGI database of the World Bank. As an indicator for political stability, the World Bank's Political Stability and Absence of Violence/Terrorism index will be used. This indexed constructed by the World Bank uses several other variables such as internal and external conflicts, political terror scale, armed conflicts, violent demonstrations among others. The values for this variable range from -2.5 to 2.5 where -2.5 means highly unstable and 2.5 means highly stable.

Inflation: Data for the indicator for this variable will be drawn from the World Bank's WDI database. The World Bank measures inflation by the consumer price index which reflects the yearly rate of change in the cost to the average consumer obtaining a basket of goods and services change or are fixed at certain intervals (World Bank, 2016). Countries experiencing hyperinflation may record values higher than the 100% mark. The rate of inflation is expected to have a negative impact on economic growth in this research.

TABLE 3: SUMMARY OF VARIABLES AND INDICATORS

Variable	Indicator	Explanation	Expected Effect	Period	Source
Economic Growth	GDP growth (annual rate %)	Annual growth Gross Domestic Product	Dependent Variable	Averaged 2011 - 2015	World Bank
Corruption	Corruption Perception Index	Level of perceived corruption in the public sector	Positive	2011	Transparency International
GDP per capita	GDP per capita (current US$)	Gross Domestic product of a country divided by its population	Negative	2011	World Bank
Inflation	Inflation (annual rate %)	Annual rate of inflation with consumer prices	Negative	Averaged 2009 - 2013	World Bank
Investment	Capital Formation (% GDP)	Gross Capital formation as a percentage of GDP	Positive	Averaged over period 2009 - 2013	World Bank
Political Stability	Political Stability	Political Stability and absence of violence/Terrorism	Positive	2011	World Bank
Trade Openness	Trade Openness (% GDP)	Sum of trade in goods and services measured as a share of GDP	Positive	Averaged over period 2009 - 2013	World Bank

3.5 SAMPLE & TIME FRAME

The population for the empirical study consists of all 140 developing countries per the World Bank's 2017 classification of world economies. This includes upper middle income, lower middle income and low-income countries. This research is keen on ensuring the external validity of the results by keeping the final sample for the analysis as big as possible. As result of missing values for some of the variables of interest in this study in relation to the countries being studied, 101 countries of the initial 150 developing have been included in the sample (see Appendix III).

The collection of data for the variables being studied is done at distinct time periods. However, the general time frame for all the data used in this study is within the period 2009-2015. The data for the corruption perception index, GDP per capita, political stability, being independent variables in the model are taken in the year 2011 for all 101 countries in the sample. Whereas data for GDP growth rate, the dependent variable is measured over a 5-year average in the period 2011-2015 for all 101

countries in the sample (see Appendix III). The rest of the independent variables – inflation, investment, trade openness are measured over 4-year averages in the period 2009-2013 to cater for the volatility of figures for these variables over time and across countries. Only the most recent possible data are used in this research in order to ensure that results and subsequent conclusions are up to date.

3.6 METHODS OF ESTIMATION

This study uses both descriptive and inferential statistics in the data analysis as in most of the empirical studies that have been consulted in the second chapter. The descriptive statistics of the sample data will be carried out first, followed by the inferential statistics. These distinct methods crucial in this as they offer distinct insight of the sample. The descriptive statistics helps this study to explore the basic features of the sample data. The descriptive statistics form the basis of the inferential statistics by providing measures and summaries about the sample. In other words, the descriptive statistics allows this study to present the sample data in a more meaningful way and allowing for easy interpretation. The inferential statistics on the other hand, enables this study to make judgments and conclusions through analysis of the data.

3.6.1 DESCRIPTIVE STATISTICS

The mean, median, standard deviation, maximum and minimum values of the data for the dependent and independent variables for all countries of the sample will be explored under the descriptive statistics of this study.

3.6.2 INFERENTIAL STATISTICS

The inferential statistics sub-section of this chapter will consist firstly, of the testing of the five classical assumptions of the Ordinary Least Squares (OLS) method of linear regression: 1) Normal distribution of the of the main variables and their residuals, 2) No-multicollinearity, 3) Linear relationship between the dependent and independent variables, 4) Homoscedasticity and 5) No endogeneity. The testing of these classical assumptions of the linear regression is an important step in making sure that the result obtained from the analysis are reliable. Secondly, a multiple linear regression analysis will be carried out using the ordinary least squares method. Both the inferential and descriptive statistics of this research will be carried out using specific commands in STATA.

3.6.2.1 ASSUMPTIONS OF LINEAR REGRESSIONS

a) Normality

First to be tested for the linear regression analysis of this study is the assumption that data for all the variables being studied are normally distributed. The normal distribution is commonly regarded as the most important distribution among statistical theorists because it forms the basis of many statistical tests including testing means and the estimation of confidence intervals (Daya, 2002). The normal distribution, which is sometimes called the Gaussain Curve is the most and widely used distribution is econometrics and statistics. But what does a normal distribution of a variable really mean? A set of data is said to have a normal distribution when most of the data points are relatively similar and having fewer outliers on the lower and higher ends of the data range. A normal distribution is sometimes called a bell curve because of its symmetrical shape around the center and hence reflects the gaussian pattern (Mukherjee et al, 1998). Technically, when the sampling distribution of the mean of a set data has a symmetrical shape or when the distribution of means across the data set is normal, then the data is said to have a normal distribution (Mordkoff, 2011). The center of a normal distribution should be located at its highest point with half of the data located above the mean and the other half below the mean.

Gordon (2006) summarizes the characteristic of a normal distribution as the following:

1) The total area under the curve must be equal to 1.
2) The curve must be symmetrical in a way that the mean, median and mode all fall together.
3) The curve must be bell-shaped.
4) Most of the scores must lie close to the mean with fewer scores on either side further from the mean.
5) Almost all scores must lie within 3 standard deviations of the mean.

Although the normal distribution is regarded is most important in statistics, not all data sets fit this model. Certain data sets are naturally not normally distributed. Furthermore, the method of data collection may alter the normal distribution pattern of a data set that is supposed to fit the normal model. Violations of the normality of a data set can significantly influence the internal validity of results of a data analysis and the significant tests. It is therefore important to ensure that all data sets are naturally normally distributed or transformed into normal distributions before carrying out the analysis. The normality of a data set can be checked by visually inspecting the data plots, kurtosis and the skewness. Besides, outliers may significantly influence the normality of a variable and this can be

checked by visually inspecting the frequency distributions and histograms. Nevertheless, this study places paramount importance on the normal distribution of the errors of the sample data. This means that variables involved should be void of significant outliers that may cause biases in the subsequent analyses. Significant outliers of this sort will have to be excluded from the sample to avoid any imminent biases.

However, the removal of outliers may significantly affect the sample analysis and in such cases transformations such as log, square-root or inverse maybe used to improve the normality of the entire data set without discarding the outliers. It must also be borne in mind that the transformation of the data into a normal distribution may complicate the interpretation of results and should therefore be used in an informed manner. This study will test for the normality using the histograms and statistical methods in STATA.

b) No Multicollinearity

Multicollinearity occurs when two or more predictor variables in linear regression model are highly correlated or can be used to predict one another. In other words, two or more of the independent variables in the model should not measure the same since it could significantly influence the estimation results. This kind of disturbance in the data poses a threat to the reliability of the estimation results of the model. Belsley (1980) states that such high intercorrelations among the independent variables may have significant consequences on estimations and inferences because they may bring about coefficients with wrong signs, high standard errors, unreliable estimation results and implausible magnitudes. Multicollinearity in a linear regression model could occur because of the collection of insufficient data, the inclusion compound variables, inclusion identical variables, improper use of dummies and data collection errors on the part of the researcher.

A simple correlation analysis is often used to check for multicollinearity in a regression model. This study therefore uses the Pearson's correlation analysis to ascertain the linear relationships amount the independent variables of the model being used. The correlation coefficients will be computed using the "**correlate**" command in STATA. The range of the correlation coefficient is -1 to 1 where -1 means there is a perfect negative relationship between two variables whereas 1 means there is a perfect positive relationship between two variables. A coefficient of 0 means no relationship between two variables. With regards to detecting multicollinearity, any value close to -0.8 or 0.8 will be regarded as high correlation and therefore the existence of multicollinearity between or among the independent

variables. Nonetheless, when multicollinearity is detected in the regression model, this study will rely on either of the following remedies:

a) either eliminate one of the independent variables that are showing multicollinearity. This method has the risk of loss relevant variables that may hold significant information and could result in biased coefficients for the rest of the predictor variables in the model that are correlated to omitted variable.

b) or leave the original model as it is although multicollinearity exists. This is because as far as there is no perfect multicollinearity, OLS estimates remain unbiased even under cases of extreme multicollinearity.

c) Linearity

Linearity is assumed under ordinary least squares regression analysis because it allows researchers to establish a causal relationship between a dependent variable and the independent variable(s). Basically, linearity means that the outcome is formulated as a linear function of the predictor variables and the disturbance. Long (2008) adds that the relationship between the dependent variable and independent variable must be constant across all values of the independent variable. That is, a marginal change in the independent variable should bring about a change of the same margin in the dependent variable. There is the risk of underestimating the true relationship when the relationship between the dependent and independent variables is non-linear. The linearity assumption is often checked by examining the residuals; plotting the standardized residuals as a function of the standardized predicted values in scatterplots.

d) Homoscedasticity

The assumption homoscedasticity means that the variance of the error term should same across all values of the independent variables (Weiss, 2008). This means that if the variance of the error term changes across different values of the error term, then homoscedasticity is indicated. Existence of significant homoscedasticity may cause inconsistencies and biases in the estimations of the model. However, slight heteroscedasticity has negligible effect on a regression model (Tabachnick & Fidell, 1996). A visual inspection of the scatterplot of the residuals and predicted residuals on a scatterplot is often enough to check for the assumption of homoscedasticity. Homoscedasticity is not indicated when all the values are situated around the horizontal zero-line in a balanced manner. Whereas the opposite, when the values are located in an unbalanced way around the zero-line with unequal variances indicates heteroscedasticity.

e) Normality of Residuals

This assumption of the OLS regression implies that the residuals obtained from the regression model should be normally distributed. This can be checked by way of histograms, Kernel density plots, normal probability plots or with statistical methods such as Shapiro-Wilk test for normality or Jarque-Bera test for normality.

3.6.2.2 MULTIPLE LINEAR REGRESSION-OLS

The ordinary least squares regression analysis will be carried out once all the above-mentioned assumptions have been checked. A cross-sectional model which was formulated earlier on will be carried between the Economic Growth and Corruption while controlling for investment, inflation, trade openness and political stability. Unlike in the stepwise method, this study uses the forced method where all the independent variables are introduced at the same time.

3.7 VALIDITY AND RELIABILITY

According to Lewis-Beck et. al (2004), the principles of validity and reliability are fundamental when associating theoretical concepts with empirical indicators or when attempting to empirically analyze certain phenomena. Validity as a general term calls to question to the credibility of a research. The credibility of a research in turn depends on its internal and external validity. Internal validity refers to the extent to which the instruments used in a study actually measure what they were designed to measure (Kellstedt & Whitten, 2013). With regards to the validity of this research, most of the indicators in this research: GDP growth, Investment, Inflation, Trade openness, and political stability are direct measures of the variables they represent. It is worth noting that, the corruption perception index(CPI) being the indicator for corruption is a proxy and therefore does not directly measure corruption per se. The corruption perception index measures the perception of corruption but not actual corruption. Questions about the closeness of this proxy(CPI) to concept (corruption) is supposed to represent have ignited considerable debate in the literature on the measurement of corruption. Nevertheless, Rohwer (2009) argues that perception measures like the corruption perception index may reflect the realities of corruption better than objective measures if the surveys used are carefully constructed. In lieu of the controversy surrounding the use of the CPI being a perception index as a proxy for corruption, this research finds it necessary to be cautious when it comes to the interpretation of the results obtained from the analysis. Besides all but the CPI being direct measures of variables being used, this study understands the threat of confounding variables to the cause-effect relationship between economic growth and corruption. As a second method of ensuring internal validity, this research controls for several other factors that may influence the

relationship between the dependent (Economic Growth) and independent (Corruption) variables as was indicated in the theoretical and empirical evidence in chapter 2. The selection of the control variables based on their relevance in the literature reduces the risk of including irrelevant variables that could increase the standard errors. However, the use of a cross-sectional design also challenges the internal validity of this research because it is difficult determine whether the change in the dependent variable is caused by the independent variable or vice versa. This is due to the measurement of all the variables a one point in time. Also, omitted variable bias may occur as a result of the failure to include certain variables that may be relevant to the model.

External validity on the other hand refers to the extent to which the results of this study can be generalized to the entire population. Johnson et al (2008) mention that, external validity is the degree to which results of a study can be generalized to the rest of the world. The generalizability of results is directly proportional to the sample size. 101 developing countries out of the 150 population of countries make up the sample of this study. This large sample size makes it possible to generalize the results to the population and thereby ensuring the external validity of this study.

When the same instruments of measurement to measure the same phenomena used under different circumstances, the same results should be obtained. Otherwise a study has a problem of unreliability. Reliability of a research is the extent to which findings of a study can be repeated in subsequent researches. The concept of reliability is basically about the consistency of results in different conditions (Pennings et al., 2006). All the indicators are annually computed using the same methods. Except for the indicator for corruption(CPI) which is taken from Transparency International, all other variables in this research are taken from the World Bank. With these conditions, similar results can be expected in future studies and hence the reliability of this research is ensured.

3.8 CONCLUSION

The methodological framework was presented in this chapter. The regression equation was presented, and the variables of interest explained and operationalized. The population and sample of countries was also discussed. The descriptive statistics as well as the inferential statistics to be carried out in the main analysis were also introduced and briefly discussed. The last part of this chapter was dedicated to discussing and attempting to address and challenges to validity and reliability of the research model of this study. It is expected that the chosen research design, methods and the variables of this research, and the necessary statistical tests being carried will yield robust results at the end of this study.

CHAPTER 4: ANALYSIS AND RESULTS

In order to enhance the confidence in any statistical research, it is important to carry out a brief exploration of the collected data. It is for this reason that this chapter presents a summary of the dataset used for the empirical investigation in this research. The statistical procedures required to accept or reject the hypothesis of this study will be carried out in this chapter. More so, the assumptions of regression analysis will be presented in relation to the variables before the multiple regression analysis can be conducted and the results of the analysis presented at the end of this chapter.

4.1 DESCRIPTIVE STATISTICS

The descriptive statistics is basically a summary of all variables included in the study in relation to the number of cases, minimum and maximum values, as well as the means and the extent to which the means represent the collected data (the standard deviation). Table 4 shows a summary of the descriptive statistics of all variables of interest in this study. The data consists of 101 cases of developing countries for the variables being investigated in this study. The inclusion of countries in the data set is based mainly on the availability of data for the variables: GDP Growth rate, GDP per capita, Corruption, Investment, Inflation, Trade Openness, Political Stability being the variables being studied in this research. Given the volatile nature of some of the variables being studied, all except Corruption, GDPpc and Political Stability are measured on average terms over 5-year periods.

TABLE 4: DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
GDP Growth	101	3.85	4.47	2.87	-8.11	10.30
Corruption	101	2.99	2.86	0.96	1.52	7.02
GDP per capita	101	3782.25	2747.48	3271.18	260.48	13167.47
Investment	101	25.13	24.25	9.18	6.46	57.77
Inflation	101	7.37	5.79	5.98	0.41	37.58
Trade Openness	101	79.89	74.72	30.35	23.73	154.29
Political Stability	101	-0.09	-0.06	1.02	-2.5	1.94

a) GDP Growth

The values for GDP growth rate for the 101 countries in this study are averaged over a period of five years (2011-2015). Table 4 shows that the GDP for the 101 developing countries grew at an average of approximately 3.85%. The positive mean value for GDP growth rate indicates a general growth pattern among the developing countries being studied in this research. The highest growth rates recorded in this period are 10.30%, 10.21% and 8.05% representing Mongolia, Ethiopia and Uzbekistan respectively. South Sudan, Yemen and Central African Republic on the other hand recorded the lowest GDP growth rates with values of -8.11%, -6.76% and -4.67% respectively.

b) Corruption

The main independent variable in this study-Corruption exhibits a relatively small variation with values ranging between 1.52 and 7.02. Also, it can be asserted that the main independent variable is quite evenly distributed across the 101 developing countries. This is confirmed by a small standard deviation of 0.96 as compared to the mean which is equal to 2.99. According to the dataset, Saint Lucia scored the highest value for Corruption Perception Index(CPI) in 2011 with a score of 7.02. Saint Vincent & Grenadines, and Botswana scoring 6.08 and 5.76 respectively. In other words, Saint Lucia, Saint Vincent & Grenadines and Botswana have the least level of perceived corruption. Afghanistan scored the highest level of perceived corruption (1.52) which is followed by Sudan (1.56) and Uzbekistan (1.62).

c) GDP Per Capita

Table 4 shows that data for GDPpc was also taken in the years 2011. The mean GDP per capita for the 101 countries in the data set is $3,782.25 whereas the standard deviation is $3,271.18. Nevertheless, there is a significant difference between the minimum ($260.48) and maximum ($13,167.47) GDP per capita values. It is worth noting that Brazil, Kazakhstan and Malaysia occupy the top three positions with relatively high GDPpc values of $13,167.47, 11634.42 and $10,405.12 respectively. In contrast, the lowest GDPpc values were recorded by Burundi ($260.48), Niger ($342.90) and Ethiopia ($354.85) all of whom recorded values under $500 GDP per head.

d) Investment

The investment values for countries were averaged over the period 2009-2013. Table 4 shows that the minimum investment ratio of GDP is 6.46% whereas the maximum is 57.78%. The 5-year averages of investment, measured as a ratio of GDP reveal a mean investment rate of 25.13% for all 101 countries. It can also be seen from Table 4 that the values for investment deviate at about 19.13% around the mean. An interesting case is Bhutan where the average investment forms almost 60% of

its GDP. Also, high levels of investment with regards to GDP were measured in Timor-Leste (49.03%) and Mongolia (48.76%) where investment made up almost a half of their GDPs. The average investment level with regards to GDP in Guinea-Bissau was particularly low at 6.46%. Cuba and South Sudan also recorded low average investment levels with values of 9.49% and 10.78% respectively.

e) Inflation

For all the 101 countries being studied, the average inflation rate recorded is 7.37% and whereas the standard deviation is 5.99%. It is worth noting that Belarus recorded a relatively high average inflation rate of 37.59%. Similarly, Nigeria (24.83%), Sudan (22.86%), and Iran (20.28%) all recorded average inflation figures of at least 20%. There appears to be a significant contrast in the average inflation figures because the average inflation in Gabon for the same period is 0.41%. Besides Gabon, Morocco (0.42%) and Senegal (0.83%) both recorded average inflation figures below 1%.

f) Trade Openness

The mean trade openness according to Table 4 is about 80%. An indication that countries being studied on an average are taking advantage of the opportunity of trading with other economies and hence trade forms a large proportion of the GDPs. This assertion is confirmed by the significant difference between the maximum (154.29%) and minimum (23.73%) figures for trade openness. It is therefore suspected that the high average figure (80%) may have been as a result of the existence of exceptional cases with relatively high figures on trade openness. A few of such possible cases are Vietnam (154.28%) Panama (142.39%) and Lesotho (138.06%).

g) Political Stability

The summary statistics shown in Table 4 above indicate a general trend of political instability in the 101 developing countries with a mean of -0.09. This apparent instability appears to be confirmed by a small standard deviation (1.02) for the political stability variable in the data. This observation does not come as surprise as political instability in recent times has come to be associated with developing countries (the main focus of this study). For instance, more than 50% of countries in Sub-Saharan Africa experienced political conflicts in different forms in the year 2000 (Jaouadi et.al, 2013). Same can be said about Latin America where armed conflicts, dictatorships and other forms of political crises were common. An outstanding case for this variable is Afghanistan (-2.5) where the political atmosphere can be described as perfectly unstable.

4.2 INFERENTIAL STATISTICS

Following the descriptive statistics is the inferential statistics. In this section, the relevant assumptions that need to be satisfied in order to run and achieve reliable regression results will be tested. Firstly, the assumptions of normality of the variables and no multicollinearity are tested. This will be followed by the multivariate regression analysis after which the tests for linearity, homoscedasticity and normality of the residuals will be carried out. Next will be the presentation and interpretation of the results, and a brief conclusion.

4.2.1 NORMALITY

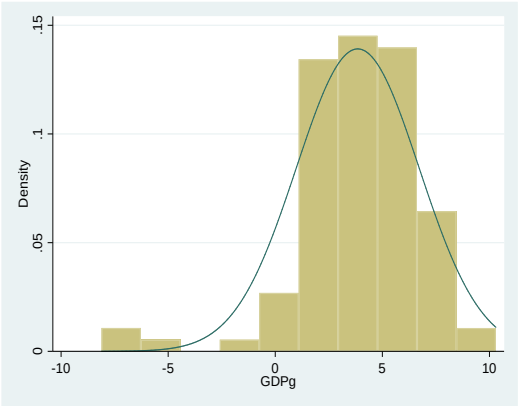
First on the list of assumptions that ought to be tested in order achieve reliable results is the assumption of normality of all the variables on interest in this study. A variable is said to be normally distributed when its data can be displayed in a symmetrical shape or a bell curve (Mukherjee et al, 1998). The commonest way of checking for the normality of a variable is by creating a histogram in order to identify the Gaussian curve. Another way of checking for the normality of variable is to use statistical tests. One of such test which is widely used in empirical studies is the Shapiro-Wilk test for normality. In this test, an obtained p-value is used to check whether or not a variable is normally distributed. A p-value less than 0.05 means the variable in question is not normally distributed whereas a p-value greater than 0.05 means that the variable is normally distributed or in other words, the variable in question has a bell shape. This study utilizes both of methods- the graphical and statistical methods to test for the normality of all the variables-GDP growth rate, Corruption, GDP per capita, Investment, Inflation, Political Stability and Trade Openness.

a) Histograms

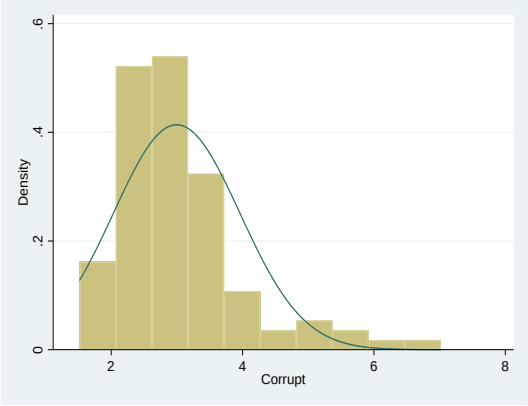
This section uses the frequencies of each variable to create histograms in order to check the normality of the variables. In an event of any variable not displaying a bell curve, the appropriate transformation will be used in other to achieve a shape that is as normal as possible. A common transformation used cases of abnormally distributed variables is the logarithmic transformation. According to Mukherjee et. al (1998) a log-normal transformation helps resolve the problems of asymmetry in the scales of values. Also, a log-normal transformation expands the scale for small values and compresses the scale of large values to reduce asymmetry in cases where the frequencies of a variable are positively or negatively skewed. To determine the best transformation method for the variables that are not normally distributed this study uses the *Ladder* and *Gladder* functions in Stata. The later produces a statistical summary of all the best possible transformation techniques that can be carried out on the

variables being studied whereas the former produces a graphical display of histograms associated with each of the possible transformations displayed in the ladder summary. A combination of both the ladder and gladder functions are used in this research.

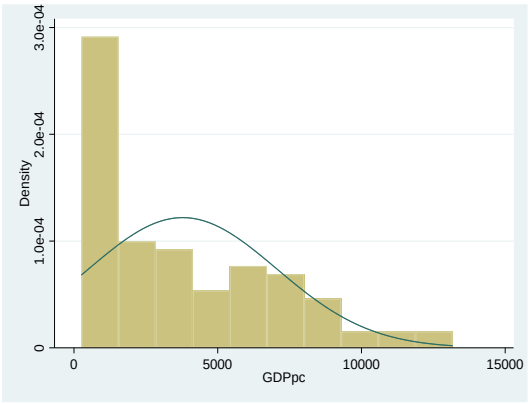
FIGURE 3: HISTOGRAMS WITH GAUSSIAN CURVES



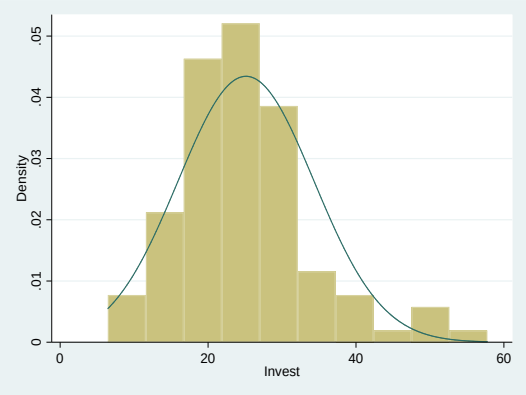
GDP Growth



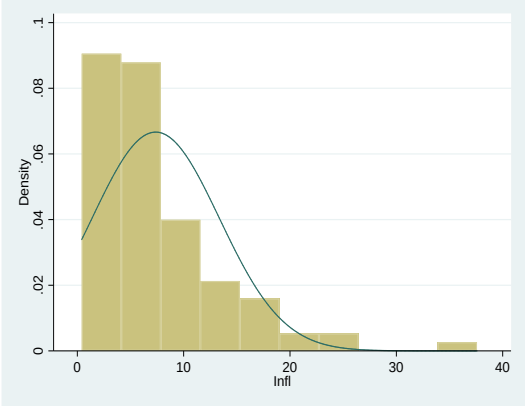
Corruption



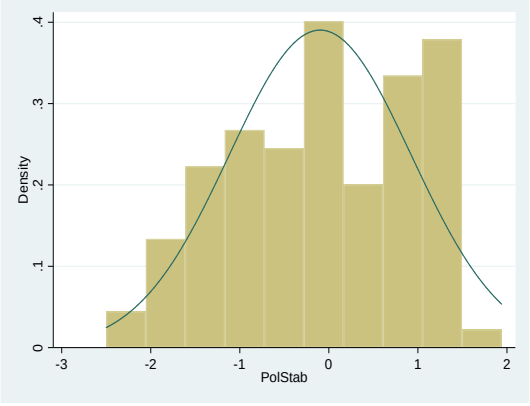
GDP per capita



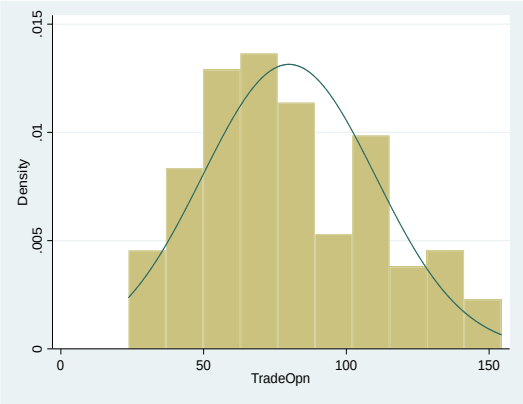
Investment



Inflation



Political Stability



Trade Openness

According to Figure 3, almost all of the variables appear to either be perfectly or slightly skewed to the left or right. This raises a cause for concern with regards to the normality of the variables and therefore a statistical test is required.

TABLE 5: SHAPIRO WILK TEST FOR NORMALITY

Variable	Obs	W	V	Z	Prob>z
GDPg	101	0.90983	7.507	4.474	0.00000
Corrupt	101	0.87308	10.566	5.233	0.00000
GDPpc	101	0.88146	9.869	5.082	0.00000
Invest	101	0.94299	4.746	3.457	0.00027
Infl	101	0.83736	13.541	5.784	0.00000
TradeOpn	101	0.96796	2.667	2.178	0.01472
PolStab	101	0.97075	2.435	1.975	0.02412

The results of the Shapiro-Wilk test confirm that data for all the variables are not normally distributed. The p-values for all the variables are insignificant($p<0.05$). It is worth noting that, it may be impossible to achieve perfect statistical normality in the distribution of certain variables. In such cases, a reasonable amount of graphical normality of the transformed variable is will be sufficient to carry out the analysis. To determine which transformation method is suitable for any variable, one needs to look at the p-values obtained from the ladder and gladder functions in Stata. The transformation technique with the highest p-value is regarded is the best transformation method required to reduce asymmetry in the distribution of the variable of interest.

TABLE 6: LADDER OUTPUT FOR CORRUPTION

Transformation	Formula	Chi2 (2)	P (chi2)
Cubic	Corrupt^3	.	0.000
Square	Corrupt^2	56.90	0.000
Identity	Corrupt	31.02	0.000
Square root	Sqrt (Corrupt)	17.84	0.000
Log	Log (Corrupt)	6.97	0.031
1/ (square root)	1/sqrt (Corrupt)	0.92	0.361
Inverse	1/ Corrupt	4.67	0.097
1/square	1/ (Corrupt^2)	24.57	0.000
1/cubic	1/ (Corrupt^3)	46.25	0.000

It can be observed from the ladder powers in Table 6 that the inverse square-root method of transformation is best method if a normal distribution in the data for Corruption is required. The Log transformation and Inverse transformation methods can also be used.

FIGURE 4: GLADDER OUTPUT FOR CORRUPTION

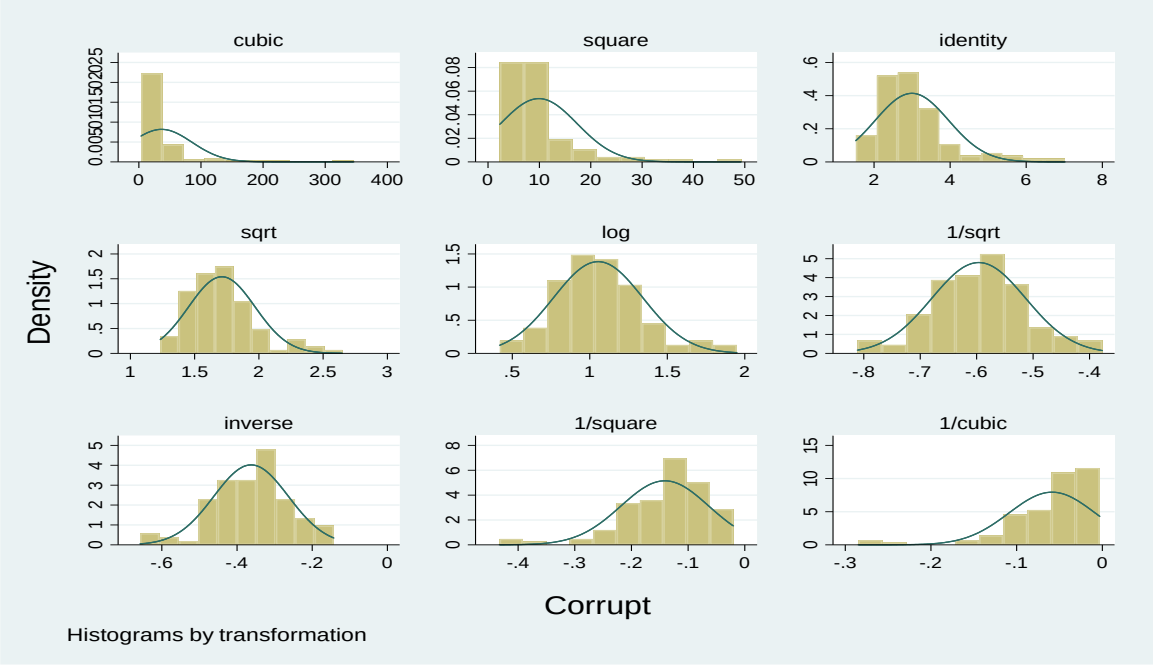
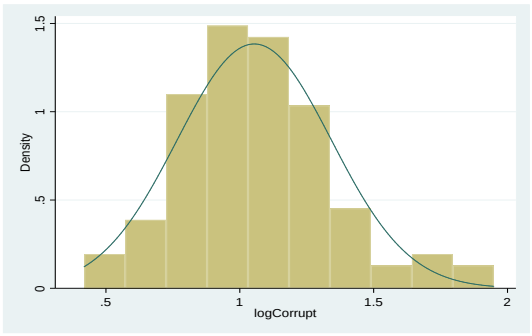


Figure 4 confirms the results obtained from the ladder of powers in Table 6. Inverse square-root appears to be the most suitable method of transformation for achieving normality for the corruption variable. However, the log transformation method is preferred in this study because, it is the most common method of transformation used in previous studies on corruption and economic growth.

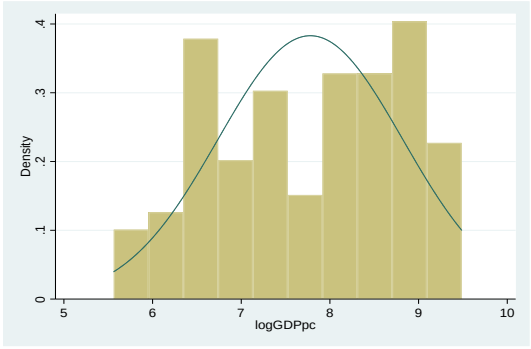
Besides, the use of a log transformation is preferred since it makes the interpretation of the results of the regression analysis a lot easier. The rest of the variables in this study will be transformed based on the obtained results of the ladder and gladder tests. It must be mentioned that; the ladder and gladder functions also include the "**identity**" option. This option means that certain variables are best left untransformed or in other words certain variables should be used in their original "identities" despite the existence of skewness in their distribution since any attempt at transforming them may worsen their asymmetries.

Based on the results of the ladder and gladder outputs obtained with the Stata statistical package and also based on the transformation methods used in previous empirical studies, all the variables in this study except GDP growth rate and political stability were transformed using their natural logs. The results from the ladder and gladder outputs showed that the growth rate of GDP and Political Stability should be left in their original identities. Figure 5 shows the histograms with regards to their normal distributions after the transformations were carried out.

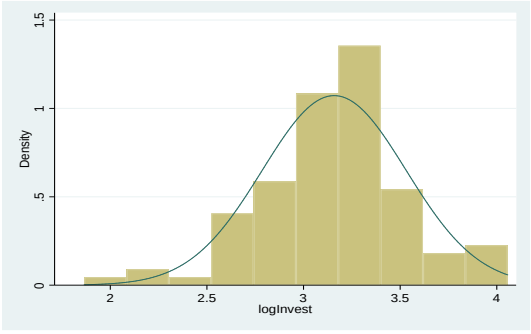
FIGURE 5: HISTOGRAMS OF TRANSFORMED VARIABLES



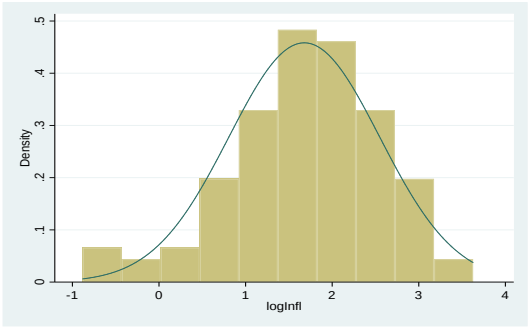
LogCorruption



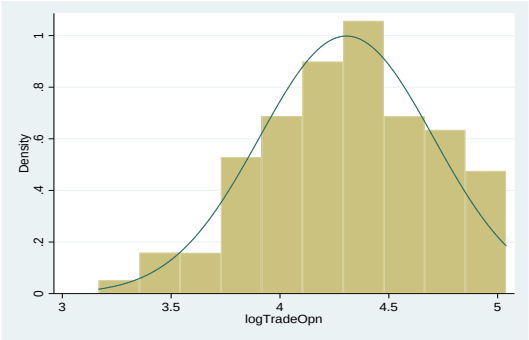
LogGDPpc



LogInvestment



LogInflation

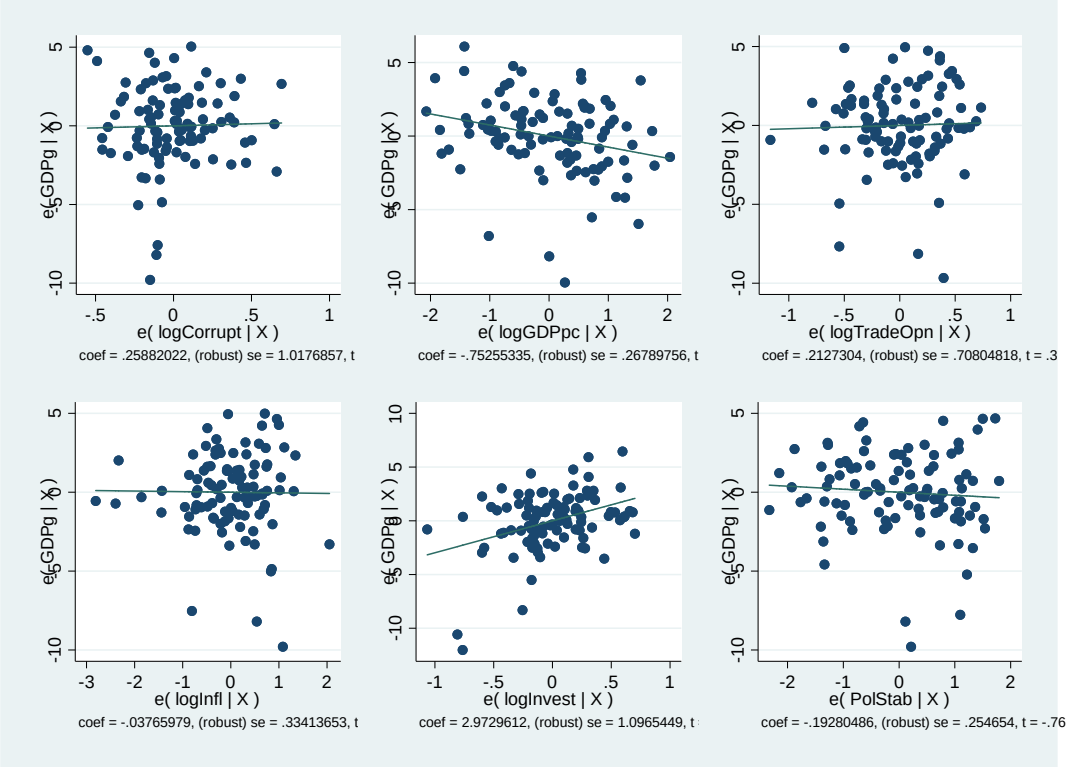


LogTrade Openness

b) Outliers & Influential Cases

The next step after testing for normality and transformations is to check for outliers and influential cases. Outlier are the observations with abnormal distances from other values in a random sample. In a regression analysis, an outlier is an observation with a large residual. An influential case on the other hand refers to any observation that significantly affects the value of the regression coefficients when omitted from the analysis. In other words, when an observation has an undue effect on the results of a regression analysis then it is said to be an influential case.

FIGURE 6: GRAPH MATRIX



The scatter plot matrix in Figure 6 shows the existence of observations with abnormal distances from the rest of the observations in the all of the variables-an indication of the existence of outliers in the sample that should be examined further.

c) Leverage Test

A leverage basically measures the extent to which an observation deviates from the mean of the variable it is representing. Leverages are of immense importance in econometric analysis because of their potential ability of causing biased effects on regression coefficients. In furtherance of the examining of the unusual cases that could potentially affect the outcome of the final regression, the leverages of the variables are estimated by the following mathematical expression:

$$\mathbf{L}=\frac{[2(k)+2]}{n}$$

Where ***k*** is the number of independent variables and ***n*** is the number of observations.

But ***k***=6 and ***n***=101. This implies ***L***= [(2*6+2)/101. Therefore ***L***=0.138613.

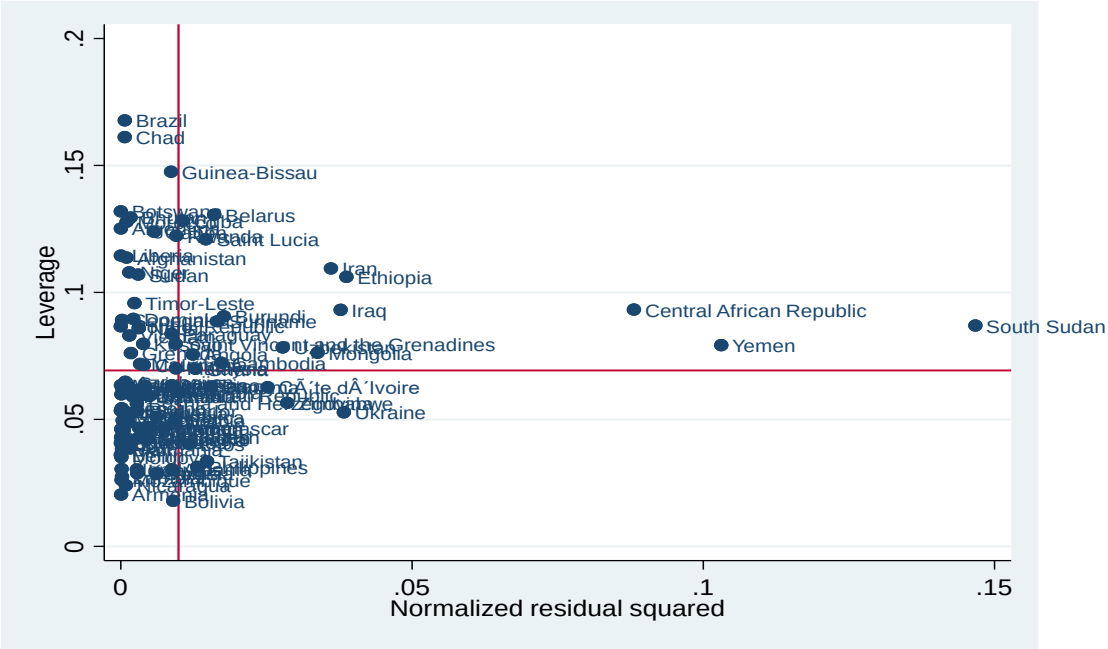
In this case, any observation with a leverage figure higher than 0.138613 should be considered an unusual case and ought to be examined further. The leverages for this study were estimated in Stata using the "**predict lev, leverage**" command. Stata also makes it possible to display observations that have leverages above the cut-off point using the "**display**" command.

TABLE 7: LEVERAGE TEST

Country	Leverage
Brazil	0.1677515
Chad	0.1611814
Guinea-Bissau	0.147547

As can be seen in Table 7, Brazil, Chad and Guinea-Bissau all have leverage figures higher than 0.138613. These points should be given more attention since they could influence the results of the model. Special attention is also given to Central African Republic, South Sudan and Yemen because their normalized residuals squared are high as shown in Figure 7 below.

FIGURE 7: LEVERAGE PLOT



d) Cook's Distance Test

After identifying the potential influential data points, the next step is to attempt to estimate their influence on the regression model. A common method used is the Cook's Distance Test. The Cook's distance ranges from zero and above. A value of zero means little influence. The influence of case increases as the value increases. This test uses a cut of point which is estimated using the formula $(4/n)$ where n represents the number of observations in model. Since n=101, the cut off point for the Cook's distance test will be (4/101) = 0.0396. These values for Cook's distance were estimated in Stata using the "**predict d, cooksd**" command.

TABLE 8: COOK'S DISTANCE TEST

Country	Cook's Distance
Central African Republic	0.1341893
Ethiopia	0.0691009
Iran	0.0668658
Iraq	0.0574163
Mongolia	0.0405444
South Sudan	0.2055575
Yemen	0.1294036

Table 8 above shows that Central African Republic, Ethiopia, Iran, Iraq, Mongolia, South Sudan and Yemen all have Cook's distances higher than the cut-off point (0.0396). South Sudan by far has the largest Cook's distance (0.21) and the largest normalized residual squared and hence is the most

influential case on the regression model. This is followed by Yemen and Central African Republic with Cook's distances of 0.1294 and 0.1341. Nevertheless, since there is no Cook's distance equal to or greater than 1, cases that may be considered very influential do not exist in the model. Therefore, no observation is deleted from the data set. It can therefore be safely concluded that all the observations are normally distributed and that the assumption of normality of all the variables has been achieved.

4.2.2 NO MULTICOLLINEARITY

Another basic assumption of a multivariate regression analysis is that there should be no perfect relations among the variables being studied. Bruin (2006) states that, the existence of highly related variables in a regression model may result in instability of the model. Multicollinearity in a regression model is often checked using the Pearson's Correlation coefficient. The Pearson's correlation coefficient ranges between -1 and 1. -1 means that there is a perfect negative relationship between two variables whiles 1 means there is a perfect positive relationship between the variables in question. A Pearson's correlation coefficient of 0 means that there is no linear relationship between the variables being studied. It must be borne in mind that it is possible for certain variables in the model to exhibit relatively high correlation coefficients. When this occurs, then there is the need to further examine the associations in order to be certain that there are no hidden high associations among the variables. Most previous empirical studies used the Variance Inflation Factors (VIF) of the variables to check whether multicollinearity among the variables may cause biases in the model. The variance inflation factor basically measures the extent to which the regression coefficients in a model are increased as a result of the existence of multicollinearity among the variables. In general terms, any VIF figure greater than one is considered very high and an indication that the regression coefficients are likely to be significantly affected by multicollinearity. Table 9 presents the Pearson's correlation coefficients for GDP growth rate, Corruption, GDPpc, Investment, Inflation, Trade Openness and Political Stability.

TABLE 9: PEARSON'S CORRELATION ANALYSIS

	GDP Growth	Log Corruption	Log GDP per capita	Log Investment	Log Inflation	Log Trade Openness	Political Stability
GDP Growth	1.0000						
Log Corruption	-0.0145	1.0000					
Log GDP per capita	-0.2152	0.4161	1.0000				
Log Investment	0.3734	0.1955	0.1098	1.0000			
Log Inflation	0.0632	-0.3017	-0.2362	0.0349	1.0000		
Log Trade Openness	0.0810	0.1781	0.2095	0.2717	-0.2446	1.0000	
Political Stability	-0.1042	0.1578	0.0559	-0.0721	-0.1704	0.0520	1.0000

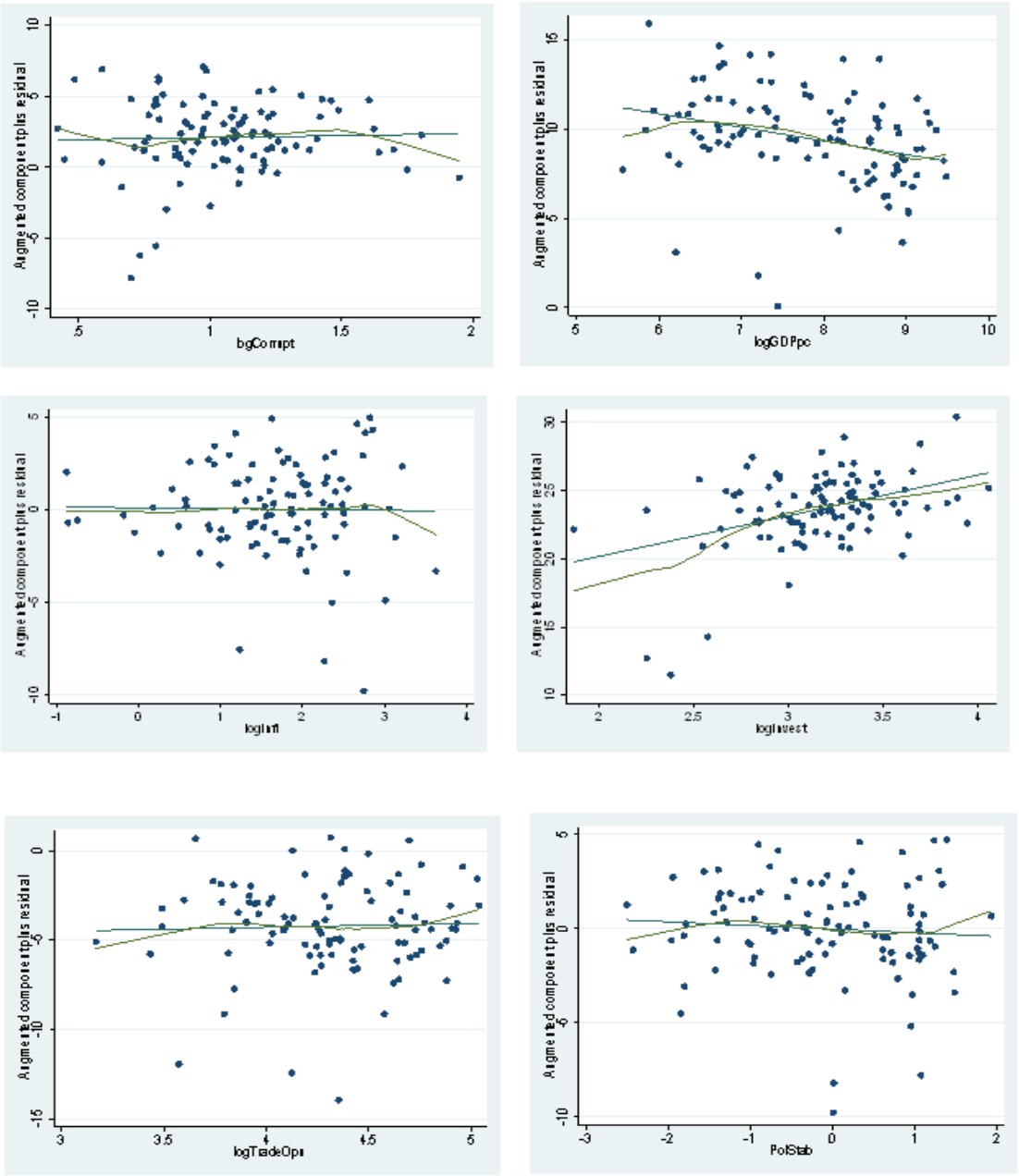
The coefficients of the Pearson's correlation analysis for the variable are generally low. All the coefficients are less than 0.5 and a significant number being under 0.1. Contrary to a positive sign as is expected in the regression results, the correlation coefficient between corruption and GDP growth rate is negative (-0.0145). This indicates that there is a weak negative association between the CPI and GDP growth. In other words, there is a positive association between corruption and economic wellbeing. Investment is by far the variable with highest association with GDP growth rate with a correlation coefficient of about 0.4. This is consistent with the expected effect of investment on GDP growth rate in the econometric model. Inflation and GDP growth rate show a positive association. This association is inconsistent with the theory and for that matter inconsistent with the expected effect it is expected to have on GDP growth rate in the regression analysis. Similarly, the coefficient for Political Stability is about -0.1 which is inconsistent with a majority of the theory. It is assumed that the parameter of no multicellularity among the variables has been satisfied since there is no correlation coefficient equal to or greater than 0.8. There is therefore no need to consult the variance inflation factors of the variables.

4.2.3 LINEARITY

The third assumption of linear regression that will be checked by this study is that of linearity. Linearity as its name suggests means that it should be possible to express the relationship between the dependent and independent variable in a linear function. In other words, while holding other variables fixed, the expected value of the dependent variable should be a straight-line function of each of the independent variables. When the assumption of linearity is not satisfied, the linear regression will attempt to fit a straight line to a data set that does not show a straight line. As a matter of fact, the assumption of linearity is very important in a linear regression analysis and ought to be satisfied

because the model may fail to produce any pattern of behavior if the relationship is not linear (Bruin,2006). The simplest way of checking for linearity in a model is by using scatter plots. This study uses augmented component-plus-residual plots(**acprplots**) also known as augmented partial residual plots to identify non-linearities in the data. Figure 8 below shows that there exists a reasonable amount of linearity among the variables being studied in this research. The assumption of linearity has therefore been explored and satisfied.

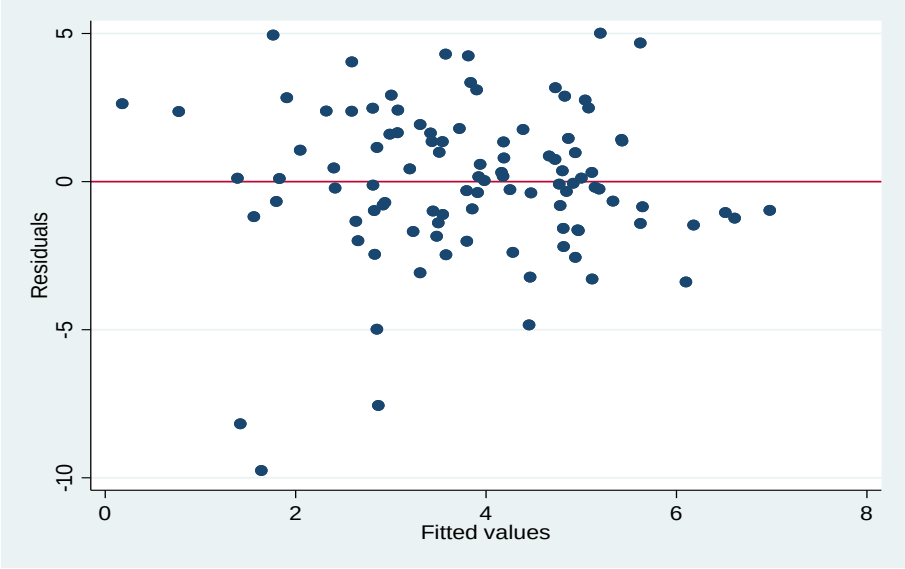
FIGURE 8: AUGMENTED COMPONENT-PLUS-RESIDUAL PLOTS



4.2.4 HOMOSCEDASTICITY

The fourth parameter to be tested is the assumption of equal variances or homoscedasticity. The assumption of homoscedasticity means that different samples have the same variance even if they come from different populations. In ordinary least squares regression analysis, homoscedasticity means the residuals should be well-fitted with the predicted values. Failure to comply with this assumption could significantly affect the regression results or even invalidate them. There are graphical and statistical methods used in testing for this assumption. Graphically, one can test for this assumption by plotting a graph of the residuals and the predicted values. The existence of a clear pattern in the plot will be an indication that the variances of the residuals are not constant and hence the presence of heteroscedasticity. Conversely, the non-existence of a clear pattern indicates the variances are constant and therefore no heteroscedasticity or homoscedasticity is present. As diagnostics for this assumption, this study uses both the graphical and statistical methods. The combination of graphical and statistical methods is necessary since the assumption of homoscedasticity is sensitive to the assumption of normality. It is necessary to conduct both tests in other to ascertain the severity of heteroscedasticity and to decide on any necessary corrections. Firstly, the graphical method is used to check for any clear patterns in the variances after which the statistical method as a validation of any detected pattern in the plot. A commonly used graphical method is to plot the residuals versus the fitted(predicted) values. This is done in Stata by issuing the "**rvfplot, yline(0)**" command. The addition of the yline (0) option to the command puts the reference line at y=0**.**

FIGURE 9: TEST FOR HOMOSCEDASTICITY



It can be seen that the data points indicate a pattern that gets narrower at the right end. Also, some observations are seen in the far bottom left corner. This could indicate heteroscedasticity. This pattern will therefore be further investigated using the Cameron & Trivedi's decomposition of IM-test or the White general test. The white test just like the Breusch-Pagan test which is used in many previous studies tests the null hypothesis that the variance of the residuals is homogeneous. In this case, a very small p-value($p<0.05$) is evidence that the null hypothesis should be rejected and hence the presence of heteroscedasticity in the model.

TABLE 10: WHITE'S GENERAL TEST FOR HOMOSCEDASTICITY

White's test for Ho: homoskedasticity

Against Ha: unrestricted heteroskedasticity

Chi2 (27) = 48.54

Prob > chi2 = 0.0067

Cameron & Trivedi's decomposition of IM-test

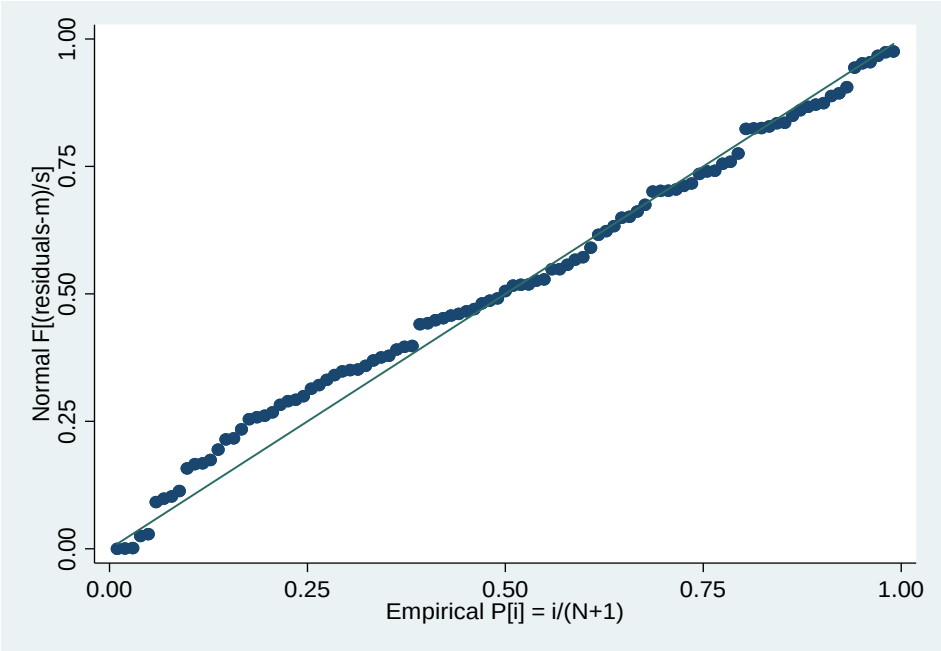
Source	Chi2	Df	P
Heteroskedasticity	48.54	27	0.0067
Skewness	20.71	6	0.0021
Kurtosis	2.56	1	0.1099
Total	71.81	34	0.0002

It can be clearly seen from Table 11 that there is heteroscedasticity in the model. This is evident by the small p-value 0.0067($p<0.05$). This indicates that the heteroscedasticity could threaten the validity of the p-values. To correct this problem, this study will use robust standard errors in the final regression. The Ordinary least squares method assumes that errors are identically and independently distributed and as such the presence of heteroscedasticity may cause biases in the standard errors. The use of robust standard errors relaxes both assumptions. The use of robust standard error is therefore expected to change only the standard errors and significant tests but not the regression coefficient estimates themselves. Stata allows for the usage of robust standard errors through the "**vce(robust**)" command. By so doing, it is assumed that parameter of homogeneity of the variances in the model has been accounted for.

4.2.5 NORMALITY OF RESIDUALS

The last but equally important test to be carried out is the assumption of normality of the residuals. The residuals are basically the differences between the observed responses and predicted responses. The assumption of normality of the residuals is required for ensuring that the p-values for the t-tests and f-test are valid. The residuals in Stata are computed after the regression has been carried out using the "**predict**" command in Stata. The normality of the residuals is then checked using a normal probability plot. The normal probability plot is obtained by using the "**qnorm**" command in Stata.

FIGURE 10: NORMAL PROBABILITY PLOT OF RESIDUALS



The normal probability plot of the residuals displayed in Figure 10 indicates that there is a reasonable level of normality in the distribution of the residuals. It is therefore assumed that the assumption of normal distribution of the residuals has been satisfied.

4.3 REGRESSION RESULTS

Once all the critical assumptions of linear regression have been tested and satisfied, the regression analysis on the cross-sectional data used in this studied will be conducted. Table 12 shows the results of the empirical investigation on the impact of corruption on economic growth. The model controls for investment, GDP per capita, inflation, Trade Openness and political stability; all being confounding variables in the corruption-GDP growth rate nexus. The model includes all the 101 countries in the data set. The results provide information with regards to the regression coefficients,

p-values, F-statistic and the R-squared. The regression coefficients provide information with regards to the association among the variables being studied. The p-values form the basis of the significance tests. The judgement of whether the regression coefficients are significant is dependent on the p-values. The p-value measures the probability of rejecting the null hypothesis when it is true. The regression was carried out at the conventional significance level of 0.05. This means that the study can be 95% sure that the effect on the dependent variable is as a result of the independent variable. The null hypothesis is rejected when the p-value is less than the predetermined level of significance of 0.05. The F-values measures the degrees of freedom of the regression. The concept of degrees of freedom measures the number of values in the model that do not affect the regression results when varied. The F-statistic is often used to measure the level of significance of the entire model. Lastly, the R-squared or the goodness of fit as it is sometimes called measures the extent to which the variation in the dependent variable can be attributed to the independent variable.

TABLE 11: REGRESSION WITH ROBUST STANDARD ERRORS

Number of obs	**=**	**101**
F (6, 94)	**=**	**5.20**
Prob > F	**=**	**0.0001**
R-squared	**=**	**0.21113**

GDP Growth	**Coef.**	**Robust Std. Err.**	**t**	**P>|t|**
LogCorruption	.2588202	1.017686	0.25	0.800
LogGDPpc	-.7525534	.2678976	-2.81	0.006
LogInvestment	2.972961	1.096545	2.71	0.008
LogInflation	-.0376598	.3341365	-0.11	0.911
LogTradeOpn	.2127304	.7080482	0.30	0.765
Pol Stability	-.1928049	.254654	-0.76	0.451
Constant	-.8290162	4.731213	-0.18	0.861

As stated earlier on, this study uses the forced-entry method in which all the variables are introduced in the regression at the same time. Table 12 shows the association between corruption as measured by the CPI and economic growth as measured by the growth rate of GDP. It can be observed from the results that the P-value (0.0001) of the overall F test of the model is less than the predetermined

significant level (0.05). This implies that the chosen model provides a better fit than the intercept only model and therefore the null hypothesis can be rejected. The regression model also has an R-squared of 0.2113 indicating that about 21% of the variation in economic growth is explained by the model. The results indicate that the CPI has a positive effect on GDP growth rate with a regression co-efficient of 0.2588. But this effect is insignificant since there is a high p-value of 0.800 which is greater than the predetermined level of significance of 0.05 It is worth reiterating that, a high value for the CPI as measured by Transparency International means less corruption and a low value means a high level of corruption. Going by this specification, the positive impact of the CPI on GDP growth rate implies that corruption has a negative but insignificant effect on GDP growth rate. This discovery is in line with theoretical arguments and pervious empirical studies. This trend is similar to Mauro's (1995) seminal research on the impact of corruption on economic growth which discovered corruption to be having a negative but insignificant effect on economic growth. Subsequent studies including Tanzi and Davoodi (1998), Gyimah-Brempong (2002), Aidt (2009) and relatively recent study by Ugur and Dasgupta (2011) all discovered that corruption has a negative impact on economic growth.

Furthermore, the results in Table 12 show that GDP per capita has a strong negative association with the growth rate of GDP. The beta value for GDP per capita is -0.7526 which means that a 1% higher level of GDP per capita will result in about 0.8% decrease in GDP growth rate. This impact is very significant with a p-value of 0.006. This association between GDP per capita and GDP growth rate does not come as a surprise because it confirms the theory of convergence which was put forth by neo-classical economists. The neo-classical economists argue that, *ceteris paribus* developing countries tend to grow a lot faster than their developed counterparts because the diminishing returns to capital is stronger in developed countries than in developing countries. It can also be observed from the results in Table 12 that, investment is by far the variable with the strongest association with economic growth with a positive beta value of 2.9729 and significant p-value of 0.008. This implies for every 1% increment in the rate of investment, GDP will grow by a rate of about 3%. This strong positive association between investment on the growth rate of GDP is well in line with the arguments made by The World Bank (1989), Bardhan (1997) and Anwer & Sampath (1999) that countries with high levels of investment experience high level of economic growth.

Table 12 shows that inflation, which is a key control variable in the regression model has negative but weak association with the growth rate of GDP with a coefficient of -.03766 indicating that for every 1% increase in inflation, GDP growth rate will decrease by about 0.04%. But this coefficient is insignificant as the p-value equal to 0.911($p>0.05$). Inflation is known in both theoretical and empirical studies to be detrimental to economic growth and therefore the obtained coefficient does not contradict the existing theories and empirical and therefore consistent with the expected value stated in the third chapter of this research. For instance, Fisher (1993), Barro (1996) and Bruno & Easterly (1998) all found a negative relationship between inflation and economic growth.

Trade openness according to Table 12 also confirms the existing theories and empirical evidence with regards to it association with economic growth. Although insignificant(p-value=0.765) the coefficient for trade openness is 0.2127 indicating a positive association with the growth rate of GDP. Neo-classical theorists argue that trade enhances economic wellbeing of trading countries through the efficient allocation of resources. Besides, the obtained coefficient confirms previous findings in Sachs & Warner (1995) and Gyimah-Brempong (2002) where developing countries that engaged more in trading with other countries achieved higher economic growth than developing countries with that operated closed economies.

Lastly, contrary to the expected effect on GDP growth rate in this research, the beta value for political stability is -0.8290. This implies political stability, per the data set used in this study has negative association with GDP growth rate. But this value is insignificant with a p-value of 0.451. Nevertheless, this unexpected association between political stability and economic wellbeing, although rarely, does occur in reality. For instance, political stability can be achieved through oppression or dictatorships and in both cases, political competition may be significantly stifled. This may create grounds for cronyism and less checks on the ruling authority. In the case of developing countries, being the main subjects of this study, good governance is often difficult to achieve. In other words, political stability does not necessarily bring about good governance. So therefore, although it was not expected, it is not extremely surprising to achieve a negative coefficient for political stability in this research.

As robustness check on the econometric model used in this research, two extra regressions were conducted. The first used all the variables in their original identities except for GDP per capita an Inflation which where both transformed into their natural logs. See appendix I.

In the second regression, countries which were considered as potential influential cases were excluded from the model. See appendix II. The results from both regressions did not indicate any significant differences from the original regression. All the variables in both regressions except Investment and GDP per capita were insignificant.

4.4 CONCLUSION

This chapter presented a step-by-step run up to carrying out the regression analysis and presenting the results. The assumptions of normality and no multicollinearity were first tested, the linear regression carried out and the rest of the tests: linearity, homoscedasticity and the normality of the residuals tested after the regression analysis. The detection heteroscedasticity necessitated a rerun of the regression with robust standard errors. By and large, results obtained from the regression analysis presented in Table 12 were expected. Corruption was discovered to have a negative association with GDP growth rate although this association is insignificant. GDP per capita and Investment were both found to be highly associated with GDP growth rate with both variables registering very significant values. An exception was with the political stability variable for which a negative coefficient was obtained instead. However, certain theories and previous studies prove that it is possible to have a negative (but not significant in this study) association between economic growth and political stability especially when political stability does not translate into good governance which is a major challenge confronting developing countries.

CHAPTER 5: CONCLUSION

It is the main aim of this study to contribute to the existing knowledge on the relationship between corruption and economic growth. To achieve this aim, this last chapter attempts to answer the central research question: *Does corruption grease or sand the wheels of economic growth in developing countries?* Answers to this main question and the other sub-questions that we asked in the initial stages of this study will be presented. There were certain challenges that were encountered during the course of this study and these will be presented. The academic and policy implications of the findings of this research will be presented in the final part of this chapter.

5.1 CENTRAL RESEARCH QUESTION & SUB-QUESTIONS

The central research question of this study cannot be answered without first answering the sub-questions. These sub-questions form the foundation for the central research question in this study and therefore it is only after an attempt is made to answer these sub-questions that an attempt can be made to answer the central research question.

What are the theories and evidence from previous studies supporting the argument that corruption is detrimental to economic growth?

The second chapter of this thesis provided the theoretical arguments and evidence from previous empirical studies on the impact of corruption on economic growth especially in developing countries. Theoretically, a majority of the experts believe that corruption negatively affects economic growth. Myrdal (1968); Rose-Ackerman (1978); Shleifer & Vishny (1993) and Bardhan (1997) all provide different arguments against the "speed money" argument made by Leff (1964) and Huntington (1968) which asserts that corruption may serve as a stimulus for economic growth by promoting competitive bidding among entrepreneurs. On the contrary, most of the theories argue that not only does corruption scare away investors but it also causes income inequality and therefore corruption hampers economic wellbeing. However, this dichotomy appears to have been significantly resolved as most of the empirical evidence appear to support the idea that, with all other factors held constant, corruption does indeed negatively affect economic wellbeing. Notable empirical studies that found corruption to negatively affect economic growth include Mauro (1995); Mauro (1996); Tanzi and Davoodi (1998); Ehrlich and Lui (1999); Goorha (2000); Mo (2001); Gyimah-Brempong (2002); Abed and Davoodi (2002) and Gyimah-Brempong and Camacho (2006). All the above studies, by using different statistical tools provide evidence to the effect that corruption works against economic growth. On the other

hand, Braguinsky (1996); Méndez & Sepúlveda (2006) and Swaleheen & Stansel (2007) present evidence in support of the argument that corruption may promote economic growth. The answer therefore to the first sub-question is: although a majority of the theory and empirical evidence suggest that corruption harms economic growth, a definitive answer cannot be found since there are counter arguments and empirical evidence, although few, that suggest otherwise.

Does the evidence from this study support the claim that corruption has a negative impact on economic growth?

The statistical analysis in the fourth chapter forms the basis for answering the second sub-question of this study. The literature review in the second chapter also provided tips with regards to which statistical tools should be used in carrying out the empirical investigation. The selection of the control variables in the empirical study was mainly based on previous studies which were consulted in the review of the literature on the impact of corruption on economic growth. This study used a cross-section of data to carry out an OLS regression analysis in which several variables; GDPpc, investment; inflation, trade openness and political stability, all chosen based on the literature were controlled for. The regression results revealed a negative effect on economic growth. But this effect becomes insignificant when the p-values and t-values were consulted. Nevertheless, this result is in line with the results obtained in Mauro (1995). The findings of this study also showed that investment and GDP per capita both have a very significant impact on economic growth as they had positives and negatives influences respectively on economic growth. In general, this study is unable to make any decision with regards to the hypothesis of this study that: *a high level of corruption reduces economic growth.* This is because, although corruption was found to negatively affect economic growth, this effect is insignificant.

After attempting to provide answers to the sub-questions above, it is time for yet another attempt at answering the central research question of this thesis.

Does corruption grease or sand the wheels of economic growth in developing countries?

The results from the empirical analysis indicate a negative but insignificant impact of corruption on economic growth. However, the negative trend is consistent with the findings in a majority of the studies consulted before the empirical analysis and the hypothesis of this research. Nevertheless, this trend is weak as it is not statistically significant and as a result, this study is unable to reach any

definitive conclusion with regards to what impact corruption has on economic growth. Per the results of this study, it can only be asserted that corruption may have a negative or positive effect on economic wellbeing in developing countries. All the control variables indicated regression coefficients which are consistent with the theory. Investment indicated a strong positive and significant effect on GDP growth rate; GDP per capita indicated a significantly negative effect; and the rest of the control variables: inflation, Trade openness and political stability had insignificant effects.

5.2 LIMITATIONS AND RECOMMENDATIONS

A few challenges were encountered in the course of this study that would have potentially threatened the end results. Firstly, the definition and measurement of corruption which is the main variable of interest is still a contested issue. As mentioned in the earlier chapters of this thesis, the direct measurement of a clandestine phenomenon like corruption seems almost impossible. The most widely accepted measure of corruption: Transparency International's Corruption Perception Index relies mainly on the perceptions of people with regards to prevalence of corruption. Critiques of the CPI argue that boiling a complex problem such as a corruption in a country down to a number is impossible. Besides, CPI ignores the possible significant role of private sector actors in corruption. With respect to corruption in developing countries, De Maria (2008) argues that corruption in developing countries especially in Africa must be redefined on the basis of daily struggles against diseases, poverty and exploitation (politics of the belly) as opposed to the widely accepted greed-based western approach. De Maria (2008) describes the current widely accepted definition of corruption (the abuse of public office for private gain) as "very western" and "very narrow" which in turn spurs the equally narrow methods used in measuring it. These shortcomings can be addressed by recognizing the local histories and cultures, and local economic conditions as key breeding elements of corruption (De Maria, 2008). In any case, the CPI is still widely regarded by many scholars as the closest approximation to level of corruption in a country. It is argued that people's perceptions on corruption are shaped by their daily experiences while interacting with public officials and institutions. As a matter of fact, the CPI is currently the commonly used measure of corruption in many empirical studies. Therefore, this study believes that the closest approximation possible to the elusive concept of corruption was used.

Secondly, the choice of research design for this study; a quantitative cross-sectional study does not allow for the observation of variations over a longer period of time. A cross-sectional design rather makes it possible to observe a phenomenon at a specific point in time. In other words, it is like taking

a snap shot of a phenomenon. The risk with this design is that the observed effect of corruption on economic growth might differ in a different point in time or in the long run. This design makes it difficult to measure a cause-effect relation between corruption and economic growth. As a means compensating for this shortcoming, time-lags were used. Also, the use of a cross-sectional design limits the extent to which the results of this research can be generalized. The association that was measured among the variables does not imply anything about what the results of the same study would have been if it were to be conducted is a different point in time.

Lastly it was difficult to obtain data with regards to some of the variables being studied. An instance is the exclusion of the level of education from the list of control variables due to the unavailability of data for a significant number of countries that would not have been included in the final data set of this study if the level of education was used. Besides, several countries were not included in the final sample as a result unavailability of data for some of the variables being studied. However, the final sample size; 101 was quite substantial and deemed sufficient to carry out an analysis using the chosen research design.

5.4 ACADEMIC AND POLICY IMPLICATIONS

A conscious effort was made to ensure that data for the countries being studied are collected from officially recognized and easily accessible sources to make it easier for the replication of this study in the future. The consultation of the literature and carrying out of the empirical analysis in this study allowed for the testing of the already existing knowledge on corruption and its effect on economic wellbeing in developing countries. Investment being one of the control variables was discovered to have a very strong influence on economic wellbeing which validates most of the existing literature.

With regards to the implications of this research for policy makers, this study used five control variables in studying the impact of corruption on economic growth all of which were chosen from the literature review. But for the time constraint and unavailability of data for some variables and some countries, this study would have controlled for more variables that are regarded as confounding variables on the corruption-growth relationship. This is an indication that the topic of development is a far more complicated topic that requires a lot more commitment from policy makers and greater political will on the part of governments when attempting to address matters pertaining to corruption and economic growth in these developing countries.

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Appendix I

Regression with untransformed variables except GDPpc and Inflation

Number of obs	=	101
F (6,94)	=	3.32
Prob > F	=	0.0052
R-squared	=	0.1750
Adj R-Squared	=	0.1223

GDPg	Coefficient	Standard Error	t	P>|t|
Corruption	0.399817	0.3176088	0.13	0.900
Log GDP per capita	-0.7210269	0.2874236	-2.51	0.014
Log Inflation	-0.0666622	0.3347021	-0.20	0.143
Investment	0.1205013	0.031226	3.28	0.001
Trade Openness	0.0050282	0.0096449	0.52	0.603
Political Stability	-0.2657668	0.2693884	-0.99	0.326
Constant	6.448694	2.34006	2.76	0.007

Appendix II
Regression results excluding influential cases

Number of obs	=	98
F (6, 91)	=	4.54
Prob > F	=	0.0005
R-squared	=	0.1671

GDPg	Coefficient	Standard Error	t	P>|t|
Corruption	0.340544	0.294968	0.12	0.908
Log GDP per capita	-0.7113025	0.2815451	-2.53	0.013
Log Inflation	-0.079203	0.3703765	-0.21	0.831
Investment	0.1042605	0.0415748	2.51	0.014
Trade Openness	0.0046068	0.0085051	0.54	0.589
Political Stability	-0.2612048	0.2669678	-0.98	0.330
Constant	6.406995	2.822714	2.27	0.026

Appendix III

Data Set

	Country	GDPg	Corrp	GDPpc	Invest	TradeOpn	PolStab	Infl
1	Afghanistan	4.986528	1.52	603.537	17.2729812	52.58006	-2.5	6.182829
2	Albania	1.894	3.05	4437.178	30.5934442	85.11809	-0.28	2.095813
3	Algeria	3.317372	2.9	5432.413	41.7840239	67.53522	-0.37	6.113033
4	Angola	4.739815	2.01	4299.013	14.439435	104.0583	-0.06	9.743441
5	Argentina	1.503502	3.01	12726.91	17.1929741	32.81895	0.2	21.25198
6	Armenia	4.36	2.63	3526.978	28.4822059	69.65199	-0.53	4.663966
7	Azerbaijan	2.23252	2.38	7189.691	20.6872256	76.69581	-1.81	4.139677
8	Bangladesh	6.322628	2.66	835.7893	27.3051285	43.94476	0.3	7.421602
9	Belarus	1.238521	2.42	6519.23	37.8081095	131.8208	0.15	37.58978
10	Benin	4.683622	2.97	825.9428	23.9073263	59.68064	-0.56	3.24968
11	Bhutan	5.468389	5.47	2458.046	57.7741199	107.2562	1.06	6.897812
12	Bolivia	5.488027	2.76	2377.676	18.0969102	78.55975	-0.13	6.811126
13	Bosnia and Herzegovina	1.29341	3.21	5054.325	18.1411348	83.77781	-0.09	0.948624
14	Botswana	4.859445	6.08	7645.215	37.1298877	102.9094	-1.79	6.428403
15	Brazil	1.12703	3.77	13167.47	21.1069562	23.73043	1.25	7.900631
16	Bulgaria	1.550869	3.33	7813.803	23.1775588	113.6803	-0.95	2.693698
17	Burkina Faso	4.794615	3.05	666.8404	28.9301282	55.49193	-1.4	3.883984
18	Burundi	2.712209	1.94	260.4799	27.6949056	46.62019	-1.8	12.68497
19	Cambodia	7.183686	3.45	882.4901	18.8159744	116.2481	1.3	2.522194
20	Central African Republic	-4.68931	2.21	494.3307	13.1290703	35.63729	1.08	3.423081
21	Chad	4.673086	2.04	989.2364	30.7070165	78.28116	-0.16	0.473744
22	Colombia	4.590629	3.45	7227.74	23.3207175	36.52876	-0.55	3.794214
23	Comoros	2.435352	2.41	829.7587	17.317865	69.82696	0.72	2.746705
24	Ivory Coast	6.633226	2.23	1214.704	12.5333995	89.76568	-0.66	3.24734
25	Cuba	2.810143	4.16	6075.924	9.49010351	42.07129	1.34	2.346376
26	Dominica	0.378931	5.17	6986.047	14.3626143	86.77724	1.1	2.372644
27	Dominican Republic	5.057559	2.15	5759.064	24.4767498	56.13993	-1.36	5.147225
28	Ecuador	4.521413	2.65	5223.352	27.6163741	59.65112	-1.44	4.372715
29	Egypt	2.69372	2.86	2747.48	17.2066113	46.16605	-0.77	12.22976
30	El Salvador	1.933735	3.42	3736.587	14.0431561	69.38617	1.06	1.780604
31	Ethiopia	10.21167	2.65	354.8464	26.9486934	38.59406	1.39	16.81925
32	Gabon	5.235076	2.98	10716.2	28.0942488	89.22772	0.35	0.414257
33	Gambia	2.381562	3.51	514.3739	21.7271136	69.15825	-0.75	4.733413
34	Georgia	4.89254	4.13	3725.063	22.9001938	91.13703	0.17	3.234708
35	Ghana	7.71056	3.85	1574.979	26.5247085	81.61768	-1.39	15.39267
36	Grenada	3.109462	3.07	7410.408	19.0756373	74.23934	1.94	1.507541
37	Guinea	2.130573	2.11	614.8694	12.7337524	74.3987	0	12.26282
38	Guinea-Bissau	3.138857	2.2	688.7718	6.45566475	50.47696	0.15	2.499133
39	Guyana	4.498116	2.49	3438.825	23.8555634	134.085	0.95	4.937381

40	Haiti	3.332851	1.8	740.9358	28.0651046	71.08275	0.74	5.709663
41	Honduras	3.490944	2.59	2120.589	22.9607674	113.2116	0.62	5.01816
42	India	6.799226	3.1	1461.672	38.6597108	52.34553	0.95	7.541651
43	Indonesia	5.528004	3.03	3634.277	32.773792	47.56939	-1.33	7.944972
44	Iran	-0.38545	2.72	7729.343	36.6722745	44.39945	-1.85	20.27886
45	Iraq	6.711012	1.8	5854.614	16.5957923	74.71858	1.24	5.08178
46	Jamaica	0.660371	3.34	5103.356	20.7909738	83.40767	1.48	8.440517
47	Kazakhstan	4.72	2.69	11634.42	25.517105	72.43071	-1.24	11.8122
48	Kenya	5.52396	2.24	987.4454	20.6702424	55.28745	-1.1	7.814271
49	Kosovo	3.232693	2.85	3712.614	30.9833693	75.05539	-2.43	2.929699
50	Kyrgyzstan	4.936692	2.12	1123.883	29.8009644	135.2989	-0.3	9.676511
51	Laos	7.794826	2.21	1381.426	28.3417211	79.77542	-1.56	6.185396
52	Lebanon	1.63651	2.49	8734.189	27.7009138	110.2008	-0.43	4.219829
53	Lesotho	4.515056	3.52	1350.678	28.0586836	138.0615	0.67	4.811343
54	Liberia	5.119893	3.19	379.6896	19.4545439	118.2828	-1.29	10.43613
55	Madagascar	2.621423	3.04	454.9635	21.2166798	71.33045	-0.24	7.192665
56	Malawi	4.087971	3.01	512.1254	16.9032213	60.85383	0.08	15.81185
57	Malaysia	5.288409	4.31	10405.12	23.2210607	153.201	0.91	1.856572
58	Mali	3.542719	2.76	835.0889	20.2708076	56.30309	1.06	4.741996
59	Mauritania	4.713789	2.43	1393.262	46.4646805	116.5206	0.62	7.980611
60	Mauritius	3.62946	5.07	9197.027	24.2460483	112.9791	-0.07	1.770017
61	Mexico	2.86352	2.97	9834.473	22.3874744	62.32216	1.06	3.664246
62	Moldova	3.98	2.88	1970.571	23.8277187	122.0598	-0.71	6.505957
63	Mongolia	10.30038	2.68	3769.595	48.7565905	109.6127	0.33	14.36328
64	Morocco	3.97012	3.44	3039.916	34.9183671	78.347	1.04	0.421636
65	Montenegro	1.848053	3.97	7318.742	21.6467926	104.0803	0.61	1.633715
66	Mozambique	4.472189	3.34857	5217.655	31.7496674	100.8459	0.41143	5.191351
67	Namibia	5.512283	4.43	5600.971	24.9773694	108.3029	-0.88	7.186327
68	Nepal	4.209231	2.21	692.1167	35.9502503	45.33936	1.06	11.01573
69	Nicaragua	5.475668	2.53	1682.958	28.1878797	105.0693	-0.3	6.596347
70	Niger	6.009708	2.54	342.9	37.0826469	66.01883	-1.96	3.869349
71	Nigeria	4.704698	2.45	2527.942	15.081785	46.53547	-0.27	24.83137
72	Pakistan	4.007812	2.47	1226.215	15.5015912	32.80396	-0.03	12.81918
73	Panama	7.898581	3.27	9270.723	40.2789947	142.3994	-0.76	5.514351
74	Paraguay	4.964857	2.22	3988.012	15.5063596	99.74464	-1.94	3.987401
75	Peru	4.784994	3.39	5771.566	23.6221783	51.63392	-1.39	3.360246
76	Philippines	5.923889	2.64	2352.518	19.1636372	65.97051	1.06	3.006241
77	Congo Republic	4.017542	2.15	3196.648	25.0499285	138.4537	-0.35	1.187382
78	Romania	2.448627	3.61	9200.278	26.6186761	74.26593	-1	4.603874
79	Rwanda	7.563983	4.98	617.3108	24.4149541	43.7054	-0.46	5.790311
80	Saint Lucia	0.229764	7.02	8270.542	26.6211799	104.3185	1.49	2.694627
81	Saint Vincent and the Grenadines	1.109756	5.76	6183.677	26.5248463	84.28668	0.8	1.307076
82	Senegal	4.090752	2.87	1081.939	25.2567224	71.32938	1.19	0.829997
83	Serbia	0.376869	3.31	6423.292	19.3295069	83.48592	-1.43	7.088364

84	Sierra Leone	4.95473	2.46	445.052	24.7508784	70.56026	0.11	12.25918
85	South Africa	2.197038	4.08	7976.466	20.2324632	59.31438	0.51	6.363203
86	South Sudan	-8.11377	2.01	1706.091	10.7759841	77.74321	0.01	15.59339
87	Sri Lanka	6.148822	3.3	3214.014	32.0910324	50.2495	0.38	9.915181
88	Sudan	2.1068	1.56	1666.858	21.5581528	30.90077	-0.28	22.86428
89	Suriname	1.826864	3.03	8318.977	51.7050214	101.4369	0.97	7.728718
90	Tajikistan	6.99985	2.27	834.5413	19.1799717	80.14574	0.23	10.84715
91	Tanzania	6.846618	2.95	733.4128	28.8977443	50.28823	-0.98	9.694368
92	Thailand	2.934231	3.38	5491.16	25.6505854	131.6078	-1.02	2.341885
93	Timor-Leste	5.377241	2.38	931.046	49.0350177	127.6776	0.94	5.295562
94	Tunisia	1.785562	2.76	4256.913	24.6932483	103.4937	-0.96	3.971409
95	Uganda	5.421334	2.43	574.9403	26.493024	49.47058	-0.07	12.01455
96	Ukraine	-2.12962	2.3	3569.757	20.1148517	97.14882	0.96	10.56362
97	Uzbekistan	8.058504	1.62	1564.967	23.9563078	61.98861	0.85	15.88433
98	Vietnam	5.914499	2.86	1515.48	31.3051904	154.2973	1.11	11.04747
99	Yemen	-6.75678	2.08	1349.42	9.50329238	61.87789	0.02	9.625361
100	Zambia	5.167465	3.2	1644.62	27.8601425	72.78644	-0.95	9.468714
101	Zimbabwe	7.880239	2.23	840.9499	16.1281184	80.03886	-0.90	840.9499