The quality of institutions and economic growth in Africa?

An empirical analysis of the relationship between quality of institutions and economic growth in Africa.

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Abstract

Africa is one of the richest continents on the planet in terms of natural resources, but has the highest poverty rate, fastest growing population and includes many of the world´s most corrupt countries.

There is an ongoing discussion if the quality of institutions affects economic growth, and the applicability of economic institutional theory to the African continent. North and Thomas (1973) argues that indicators such as education innovation, capital accumulation, etc. are not causes of growth itself but rather the growth itself. Instead they suggest that economic institutions are the fundamental reason behind economic growth, since they allow new ideas, and firms and stakeholders to exist in the market. Our research question therefore examines if the quality of institutions can explain the rate of economic growth in Africa?

In this study we used a panel data analysis based on 12 variables including, GDP per capita growth, Rule of Law, Control of corruption, Voice and Accountability, Government Effectiveness, Regulatory Quality, Political Stability and Absence of Violence/Terrorism, Education , Population , Foreign Direct Investment, Gross Capital Formation as well as initial GDP, between year 2003- 2017, to examine the relationship between economic performance and institutional quality in 50 African countries. Our results showed that six out of our six institutional variables had a positive significant effect on economic growth. This supports the theory that institutional quality impacts economic growth.

Key words:
Institutional Quality, Economic Growth, Panel Data Analysis, Africa.

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1. Introduction

In this section we will introduce the essay's background, purpose, research question, the definitions of our institutional variables, scope of the study, limitations and disposition.

1.1 Background

There is a maturing discussion about the impact of institutional quality on economic growth. North (1990) defines institutions as *"rules of the game in society or, more formally, the humanly devised constraints that shape human interaction"*. Most institutions in Africa are considered weak, which in turn maintains the continent in a "poverty trap" (Birdsall, 2007). According to North (1990) institutions are essential when it comes to shaping incentives for economic development which determine a country's potential for economic growth (Acemoglu, et al, 2005, North, 1990). Other economic researchers have also illustrated the importance of institutions in their study on the differences in countries' economic development (Vitola & Senfelde, 2015).

Many East Asian economies in the 1950s resembles how low-income economies in present day sub-Saharan African looks like. Between 1950 and 1985 the GDP per capita income more than quadrupled for countries such as Japan, Hong Kong, Malaysia and Singapore. Currently these Asian countries are classified as higher middle-income developing countries according to the World Bank scheme (Balassa1988). According to Rodrik's (1997) findings the economic growth in East Asian countries is a result of institutional factors. Furthermore, Campos and Nugent (1999) support Rodrik. Their main conclusion is that governance factors such as bureaucracy had a significant role for the improvement of East Asian economic growth in the period of 1972-1995.

There are many explanations behind economic growth. Barro (1996) explains how institutional quality is one of the major drivers towards economic growth, as they facilitate platforms for investment in human and physical capital and therefore affect long-run sustainable growth. This can be further exemplified by Hall and Jones (1999) definition where institutions create an environment where governmental policies stimulate firm's capital accumulation and individual productivity and therefore affect the economy.

Compared to the East Asian economies, it has been acknowledged that Africa lacks in terms of economic development and institutional quality. This makes it interesting to study if the quality of institutions can affect the economic growth in Africa, especially since many progressive Asian countries started off with the same economic standard as Africa's low-income economies (Englebert,P. 2000).

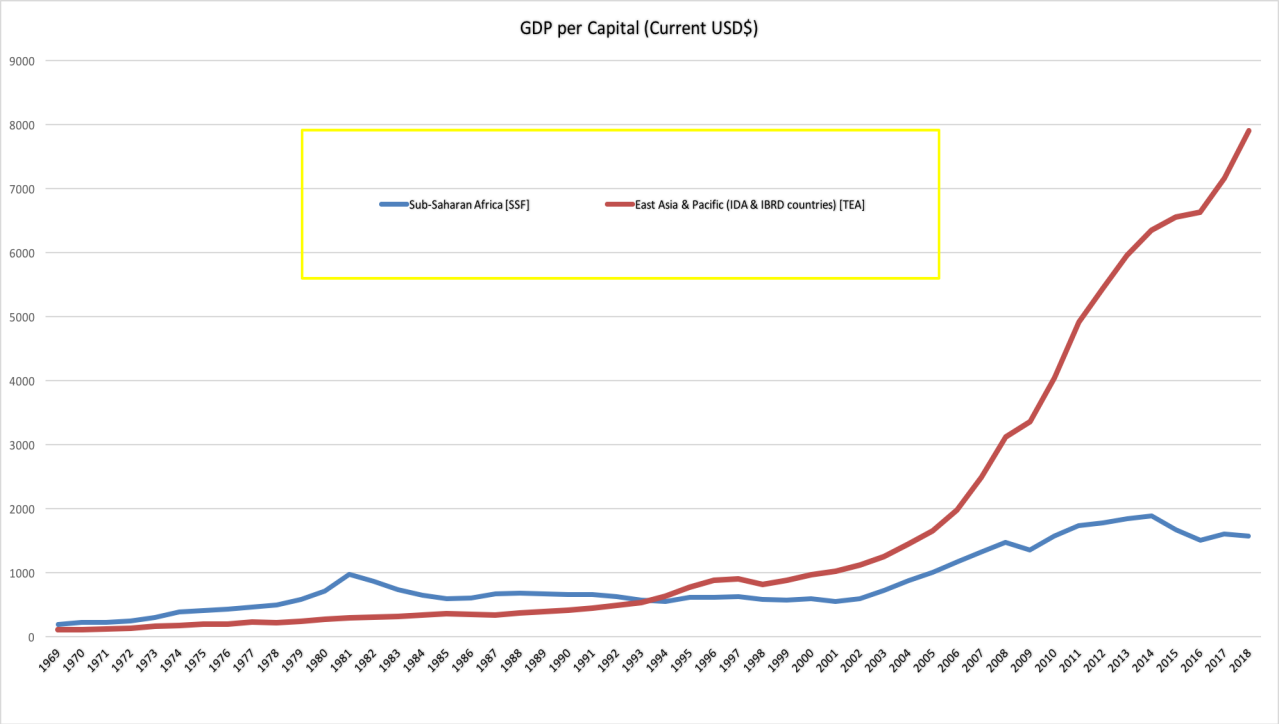

Figure 1. GDP per capita growth in Sub- Saharan Africa and East Asian & Pacific between period 1969-2018 (World Bank, 2019).

Berendsen, Dietz, Nordholt, Veen (2013) explains that, while most East Asian countries in their economic development trajectory, have demonstrated a "turning point" which indicates a stage where the average incomes start to increase and continues to rise, Africa has not reached a turning point. They argued that one of the reasons behind the differences between the East Asian and Sub-Saharan "turning point" are due to institutional quality and policies differences.

1.2 Purpose

The aim of this research is to empirically investigate the impact of the quality of institutions on economic performance in Africa. The research was inspired by the topic used by Iheonu, Ihedimma and Onwuanaku (2017) who studied institutional quality and the effects on economic performance in West Africa. We have expanded the study to include 50 African countries, and use somewhat different explanatory variables and the period 2003-2017.

1.3 Research question

Can the quality of institutions explain the rate of economic growth in Africa?

1.4 Definition

Institutional quality; There is no single definition that defines the quality of institutions. Some description used by organizations and authors are as wide as "structures that matter most in the social" (Duffield, 2007). While other definitions narrow down to specific focus areas such

as "the manner in which power is exercised in the management of a country's economic and social resources for development" (World Bank, 1992). We have chosen to work with three definitions (World Bank 2019):

"The capacity of the government to effectively formulate and implement sound policies ". This is measured through the variables:

Government Effectiveness: which capture the degree of independence from political pressure, quality of civil and public service. It also looks at the quality and implementation of policy formulation as well as the accountability for such policies by the governments.

Regulatory Quality: Captures the regulations that promotes or permits private sector development. This is determined through government's ability to implement and formulate the different regulations.

"The respect of citizens and the state for the institutions that govern economic and social interactions among them". This is measured through the variables:

Rule of Law: Measure the confidence level the negotiators have in the existing policies, rules and laws of the society. In particular this focus on the quality of policies, the court system, property rights, contract enforcement and the likelihood of crime.

Control of Corruption: Capture big and small scale of corruption where the private interest, form the elites and the state is exercised in the form of public power (World Bank, 2019).

“The process by which governments are selected, monitored, and replaced.” This is measured through the variables:

Political Stability and Absence of Violence/Terrorism:
Examine the possibility of a government to be overthrown or destabilized by terrorism and violence.

Voice and Accountability: capture citizens’ ability to express themselves freely through actions such as choosing government, free media and associational freedom.

1.5 Scope

The scope is limited to study 50 African countries during the time period of 2003-2017. The reason behind the selection of time period as well as the African countries (excluding Eritrea, South Sudan, Somalia and Djibouti) are based on the available data from the World Bank. This study uses a Panel data methodology to see if institutional quality can affect economic

growth. Williamsson (2000) divides institutions in two categories, formal and informal rules. We will look at formal rules that are constrained by laws, according to certain procedures that are established by institutions.

1.6 Limitations

In our study we do not account for external chocks, such as the financial crisis that occurred in 2008. It is important to mention this since the time span for our study expands from 2003-2017. Up to 40 percent of African economies are based on informal economy which is not accounted for in the GDP per capital growth measurement. Because of this our results will be interpreted with some caution.

1.7 Disposition

Chapter two describes theories and economic models used in our thesis. Chapter three presents previous studies related to the subject of our study. This section serves as a clarification point of the findings from previous researchers within the subject. The methodology as well as selection of methods and data will be presented in chapter four. In chapter five our empirical data including our regression model as well description of variables will be shown. In chapter six we present our empirical results. In chapter seven we compare empirical result from four of our countries. Chapter eight will consist with analyze and discussion. Lastly chapter nine will consist of the study's conclusions and conclude suggestions for future study.

2. Theory

This chapter presents common institutional and economic growth theories and models.

2.1 Exogenous Growth Theory

Robert Solow (1965) developed a growth model in 1956 built on neoclassical theory that is widely known in macroeconomics. The Solow model explains how exogenous factors such as capital accumulation, labor and technology progress contributes toward growth over time, which helps us determine countries different economic growth. The basis of the model is to determine if capital accumulation is one of the reasons behind long-run growth, thus capital stock is dependent on foreign and private investment and on how much the population saves each year (Hall and Papell, 2005).

This can be explained by the neoclassical core model in the aggregate production function:

$$Y = F(A, K, L,) \quad (1)$$

Where *Y*-Gross Domestic Product dependent on the exogenous variable; *L*- labor; *K*-capital and *A*-measures productivity (Hall and Papell, 2005). The Solow model function however differ from the aggregate production function though (K) capital is converted to an endogenous variable though agents can now over time, accumulate tools buildings and machines (Jones, 2017).

The Cobb-Douglas production function is the most common function used to estimate a more specialized production function:

$$Y = K^{a}L^{1-a} \quad (2)$$

The Cobb-Douglas production function explain whether an economy has increasing, decreasing or constant returns to scale. An increase in capital accumulation will only enhance growth in the short-run due to diminishing returns, while a deprecation returns to scale will cause a decrease in the capital stock. As the model follows the principal of transition dynamics, the economy increases until steady-state. A poor country will grow rapidly until it reaches steady-state, but once steady-state has been reached the country will have a negative growth rate (Jones, 2017).

The disadvantage with the Solow model is that capital increase in the short-run and does not guarantee GDP per capita growth in the long-run. In order to explain this Romer developed the endogenous growth theory including technology to explain long-run growth (Jones, 2017).

2.2 Endogenous Growth Theory

Endogenous growth theory developed in 1980s focuses on explaining long-run growth as an outcome of internal factors such as innovation and investment in human capital, unlike the exogenous growth theory where technology is treated as external factors (Todaro and Smith, 2011). Romer (1990) one of the contributors of the endogenous growth theory developed the Romer model where he highlights technical progress by dividing the world of economic goods by ideas and objects. Ideas contains knowledge or instructions that are required in order for the objects to be used. An example of objects is raw material such as silicon, petroleum and trees etc. By using ideas objects can be design into goods such as paper, oil, and cellphones. Ideas are non-rivalrous meaning that they will not be reduced when other people use them and therefore reinventions are not required. Objects on the other hand, are rivalrous, and therefore their worth and usefulness reduces each and every time.

The production model can be used to explain new ideas and consumption of goods.

$$Y_t = A_t L_{yt} \quad (1)$$

Equation (1) contains the production function of output where: *Y* denotes output, *A* existing ideas and Lyt labor. This equation states that by using existing ideas and labor output is produced. This equation also has constant return to labor since new workers can use the existing ideas due to nonrivalry

$$\Delta A_t + 1 = \underline{z} A_t L_{at} \quad (2)$$

Equation (2) also contains the production function however for new ideas where; $\Delta A_t + 1$ stands for change in stock of ideas during period *t*, $\underline{z}$ productivity parameter and Lat workers. Since new ideas have been implemented this equation therefore has an increasing return on both labor and ideas.
Because the total stock of ideas are the drivers for output per person in the Romer model, they increase proportionally to ideas (A);

$$y_t = Y_t / \underline{L} = A_t(1-\ell) \quad (3)$$

Overall the Romer model represent a theory for sustainable long-run growth in GDP per capita which the Solow-model could not explain. Nonrivalry of ideas implies that total stock of ideas is critical to GDP per capita. Therefore, new ideas produced by researchers and improvement in these ideas will contribute toward long-run growth (Jones, 2017).

2.3 Institutional theory

North and Thomas (1973) argue that indicators such as education innovation, capital accumulation, etc. are not causes of growth itself but rather the growth itself. They suggest that economic institutions are the fundamental reason behind economic growth, since they allow new ideas, firms and stakeholders to exist in the market. Acemoglu, Johnson and Robinson (2005) stresses the importance of economic institutions as they create economic incentives, by structuring the market economy and property rights. According to them an economy without property rights minimize the incentive to invest in human and physical capital, as well as to adapt to eve more efficient technologies, which in result affect the economy negatively. Economic institutions also make sure that resources are allocated efficiently in the market to determine the revenues and the remaining right of control. Acemoglu, Johnson and Robinson (2005) therefore argue that economic institutions are the major source for the economic differences between countries.

North (1993) implies that uncertainty always will exist in a market due to the fact of imperfect information concealing knowledge from its actors, resulting in higher transaction cost. *"Institutions are the rules of the game in society or, more formally, the humanly devised constraints that shape human interaction."* (North 1990)
Using this information, North emphasized the importance of economic institutions to reduce both uncertainty amongst traders and transactions cost, to achieve a perfect market.

Whether it is social, economic or political, institutions create incentives for human change in a society as they provide structure. This definition is quite broad and therefore Williamson (2000) divides institutions in two categories:

- Formal rules: are constrained by laws, according to certain procedures that are established by institutions.

- Informal rules: are behavioral norms and morals that are important when agreements are made between a seller and a buyer.

Vitola & Senfelde (2015) classifies institutions into three categories as political institutions, value institution and economic institutions. Political institutions ensure political stability and comprise of the juridical power and the de facto political power that is political independent. These institutions ensure political competitiveness and constraints on politicians. Value institutions are informal and characterized by norms and values and therefore stresses the importance of trust, openness and knowledge sharing in order for the economy to operate smoothly. Economic institutions are defined by the level of corruption, rule of law and the regulation framework. Market perfection and property rights are mentioned as the most important structure for economic institutions. Markets perfections create decentralized

organizations that allocate resources efficiently while property rights give incentive for physical and human capital investments (Vitola & Senfelde, 2015). For instance, if an economy's property rights are not clearly defined, and upheld by the state, it is less likely that such economy will create physical and human capital accumulation or investment.

An example of this is the West and East Germany where the country moved in divergent paths, where one part of the country prospered through market economy and private property, while the other suffered under collective ownership and central planning (Acemoglu, et al, 2001).

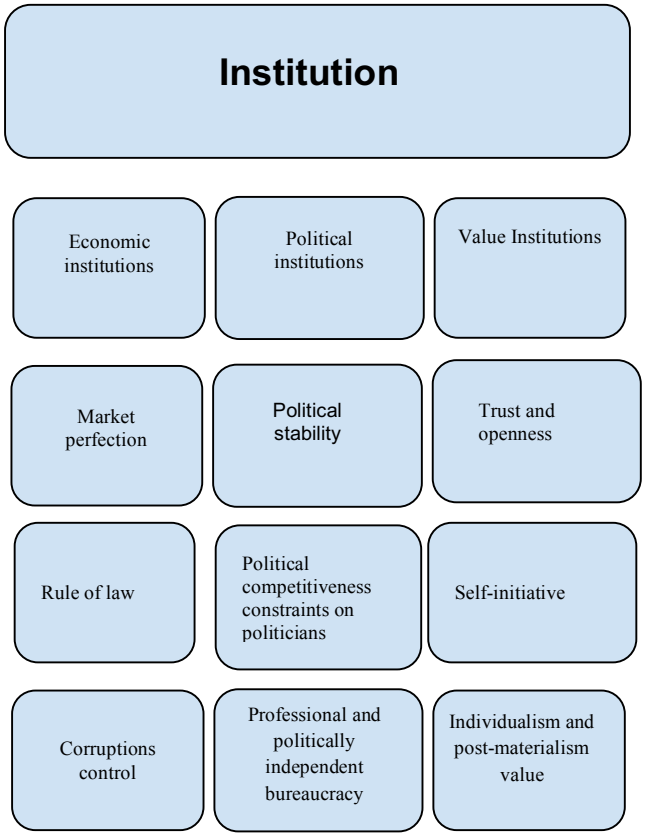

Figure 2. Economic, political and value institution (Vitola & Senfelde, 2015)

It is not simple to distinguish a strong institution from weak, as there are various factors which might hinder weak institution to function under different circumstances. Acemoglu et al. (2001) therefore explain their theory using three premises that highlights colonial history's strong influence on countries existing institutional quality differences.

1. Colonized countries experienced different types of colonization policies and institutions. On the extreme hand site, European powers such as Belgium, set up "extractive sites" in countries like Congo, where their main objective was to transfer as much resources as possible from colonies to the colonizer. In these cases, no private property protection or government expiration was introduced. In other colonies, such as The United States the colonizers had a resettling vision for the country and

therefore replicate European institutions (Neo- European state) but with an emphasis on supervision against governmental power and property rights.

2. Settlement feasibility were used as the core strategy by the colonizers when determining the extractive state and Neo-European states. Colonizers did not want to settle in environments exposed to non-favorable diseases causing high mortality rate.

3. Colonial past still determines the current institutions quality even though countries have gained independence.

Acemoglu et al. (2001) finding shows that there is a high correlation between European settlement in colonies and the mortality rate as well as between today's institutions and earlier institutions. They therefore argue that the difference in colonial experience could be a source affecting institutional difference.

3.Previous studies

Hoeffler (2002) tested the hypothesis assumptions that growth theories such as the Solow-model lack the necessary economic institutional aspects to fully explain economic growth. To test this, he used a dynamic panel data following two steps. The first step included using GMM coefficients as estimators in order to calculate residual to examine if the Solow model could account for the growth performance in Africa. The second step involved estimating if the variation in growth could be estimated by making Africa into a dummy variable. His major findings indicated that Africa's low growth experience could not be accounted for by basic models as the Solow growth model using the GMM coefficients estimators, due to biases and weaknesses of the instrument. In the second step the African dummy coefficient was noted as insignificant. Hoeffler (2002) concluded that if the specific effect from the unobserved countries, could be accounted for, as well as the investment endogeneity, the Solow model cannot account for the low growth grate of Sub-Saharan Africa. He instead recommended future study to focus on the continent's high population growth and low investment which were found to be one of the explanations to Africa's low performance. His descriptive statistic indicated that Africa was the region with the highest population growth, which in return limited the saving rate potential. In addition, Hoeffler (2002) raises the issue of poor policy as the explanation of Africa's growth failure. As a solution, in order for Africa to catch up with the rest of the world, Hoeffler (2002) indicate the importance of comprehensive economic policy reforms to provide the right incentives in order to increase foreign and domestic investment, as well as reduction in population growth.

Kaufman, Kraay and Zoido-Lobatón (1999) studied the perception of governance by using more than hundreds of perceptions of governance constructed by 18 organizations. They address how these perceptions are narrowed down to six different clusters including; rule of law, corruption and graft, regulatory framework, political stability/lack of violence, government effectiveness, voice and accountability used to capture selection of government and institutional quality. Rule of law for example include perceptions of the judicial credibility and effectiveness, incidence of crime etc., represented in indicator that measure how rule of the society is abide by agents. Kaufman, Kraay and Zoido-Lobatón (1999) used a cross-sectional methodology to examine over 300 governance indicators from different sources with over 150 countries spanning from 1990 to 1998. Their major finding suggested that objective governance indicators are helpful. However, they provide few alternatives to measure subject data including certain governance dimension that for example address country-specific in-depth government diagnoses that can be used to improve policy countries.

Asghar, Qureshi and Nadeem (2015) also studied GDP growth in the context of institutional quality on economic growth in 13 Asian developing countries, using a panel data for the period 1990-2013. Variables chosen for the study was GDP growth as the dependent variable and political institution quality, economic institution quality, Trade Openness, labor etc. as explanatory variables. Findings from the study showed that economic and political institutional quality separately were not statistically to explain economic growth, however when both variables were used together, they showed a significant and positive result. Another variable that also showed a positive relationship was Labor. Trade Openness on the other hand showed a negative significant effect, indicating that a reduction in growth would emerge when Trade Openness increased. This result is somewhat contrary to conventional wisdom (of Ricardo's comparative advantage theory). Overall Asghar et al supply empirical evidence that in order to increase growth, improvement in the quality of all institutions needed to occur.

Alexiou, Tsaliki and Rasha Osman (2014) investigated if institutional quality and other economic independent variables contributed to economic development in highly underdeveloped Sudan, during the period of 1972-2008. Unlike the other chosen studies, Alexiou, Tsaliki and Rasha Osman (2014) try to address country-specifics in more depth, analyzing Sudan's long-run and short-run relationship between economic growth and institutions. The study used time-series where real GDP per capita was used as dependent variable and institutional quality (political freedom index), trade openness, government spending etc. as explanatory variables. Results from the study showed that institutional quality had the most important significant effect on economic development in Sudan. The country had low political freedom due to inherited institutional set up from the colonial past which was shown in the analysis. Considering that institutional change is a long-term event,

the study implied that in order for Sudan to improve its economic growth, policymakers needed to focus on developing the institutions.

Hashim Osman, Alexiou, & Tsaliki (2011) studied the relationship between economic performance and institutional quality in 27 different Sub-Saharan countries during the 1984-2003 timespan. They used a panel data analysis with four indicators to describe institutional quality comprising of socioeconomic conditions and ethnic tension, government stability, policy variables and corruption. Their results showed social economic factors and government stability had a positive significant on the economy and are therefore crucial for growth performance. On the other hand, corruption had an insignificant effect on economic growth. Their findings contrast Knack and Keefer, 2002 results on how ethnic tension might affect economic growth. They therefore suggest that ethnical tension have multidimensional of factors that affect economic performance. Nevertheless, policy variables and other control variables had an insignificant effect on the economic performance. Their study showed that once the institutional variables was added the relationship between growth and good police and macroeconomic variable was insignificant. They suggested that the fundamental of economic theories might not fully be explained in poor regions such as them in Sub-Saharan Africa. For long-run economic development Osman, Alexiou, & Tsaliki (2011) suggest that enhancing institutional qualities such as rule of law is necessary.

Asif & Majid (2018) used Pakistan as a case study to investigate the impact of macroeconomic indicators and institutional quality defined by using political risk indicator including the International Country Risk Guide (ICRG) index on the country's foreign direct investment during the period of 1984-2013. Other indicators such as natural resources, GDP per capita were also used. Their results showed that both foreign direct investment and institutional quality had a positive effect on economic growth in the long-run and short-run. According to Asif & Majid (2018) foreign direct investment has a critical role for economic development. However, it is controlled by the institutional quality and natural resource that exists in the country. Therefore, economies with better institutions and property rights and less political risk will perform better.

Iheonu, Ihedimma and Onwuanaku (2017), studied how West African economic performance was impacted by institutional quality by using a panel data of 12 West African countries from 1996 to 2015. In their study they used 4 out of 6 Worldwide Governance Indicators consisting of, Control of Corruption, Rule of Law, Regulatory Quality and Government Effectiveness, to measure institutional quality. The result showed that all indicators of institutional quality had a positive significant on economic growth. However, when using the panel two-stage least method only Government Effectiveness was significant.

In table 3.1 below we summarize the previous studies of importance for our empirical work.

Table 3:1 Previous studies summary

Author	Duration	Method used	Number of countries	Major findings
Hoeffler (2002)	1960-1990	panel data	85	Poor policies are the blame behind Africa's economic performance.
Kaufman, Kraay and Zoido-Lobatón (1999)	1990-1998	Panel data	150	Effective governance had a positive effect on growth. governance indicators provide few alternatives to measure to address country-specific in-depth government diagnoses, that can be used to improve policy countries.
Asghar, Qureshi and Nadeem (2015)	1990-2013	Panel data	13	Economic and political institutional quality used together, had a significant positive impact on economic growth
Alexiou, Tsaliki and Rasha Osman (2014)	1972-2008	Time series	1	Institutional quality had a significant effect on economic development.
Hashim, Alexiou & Tsaliki (2011).	1984-2003	Panel data	27	Economic theories might not fully be explained in poor regions such as them in Sub-Saharan Africa.
Asif & Majid (2018)	1984-2013	case study	1	Economies with better institutions and property rights, less political risk will perform better.
Iheonu, Ihedimma and Onwuanaku (2017)	1996 - 2015	Panel data	12	Institutional quality had a positive effect on growth

4. Methodology

In this chapter, we present our choice of method and data, introduce our chosen variables and statistical definitions that will be used later in our study.

4.1 Selection of method and data

This study will use panel data as an econometric approach since we are looking at several countries during the chosen time period. Panel data contains a combination of time-series and

cross-sectional, which provides us with a bigger observation for a broader data to be examined (Studenmund, 2017). Our panel data regression will examine if institutional quality (proxy for World Governance Indicators) can affect economic growth in 50 African countries over a time span of 15 years, starting from 2003 to 2017. The data is conducted by the availability and therefore we could not use all 54 African countries, or the year before 2003 in our study, which might have an effect on our results. The African countries that are not included in our study are Djibouti, Eritrea, Somalia and South Sudan due to lack of data. We chose to run all the independent variables in logarithmic form since our dependent variable GDP per capita is expressed in percentage form. This study is based on secondary data collected from The World Bank and Human Development Reports.

4.2 Correlation matrix

The correlation matrix describes various correlation amongst two or more variables and also tests whether multicollinearity exists. If the value of the correlation is above 0,8 it is likely that the variables are highly correlated to each other and can therefore not be distinguished. This makes it harder to estimate the coefficient and the p-value becomes less reliable to the independent variables (Edling, C & Hedström 2003). Table 4.1 shows that The World Governance indicators have a low correlation with GDP per capita when tested separately. The table also indicates that The World Governance indicators are highly correlated with each other. In our regression model we have therefore choose to test them separately since multicollinearity is a problem amongst our institutional quality variables. Six separate models were therefore produced where each model represent one of the six variables. All other independent variables are included in all six models.

In table 4.1 below we summarize the Multicollinearity of GDP capital growth and WGI variables. In section 5.3 a definition list of the abbreviation used can be found.

4.1 Multicollinearity

	GDP capita growth	**COC**	**GE**	**PSA**	**RQ**	**ROL**	**VAA**
GDP capita growth	**1.0000**						
COC	**0.1423**	**1.0000**					
GE	**0.2797**	**0.7802**	**1.0000**				
PSA	**0.3561**	**0.5719**	**0.5401**	**1.0000**			
RQ	**0.1520**	**0.7598**	**0.8058**	**0.5436**	**1.0000**		

ROL	**0.2708**	**0.8397**	**0.8273**	**0.6568**	**0.8433**	**1.0000**	
VAA	**0.0240**	**0.6883**	**0.5810**	**0.5143**	**0.6398**	**0.6641**	**1.0000**

5. Empirical Data

In this chapter, we present our regression models, then introduce The Worldwide Governance Indicator in six models and a variable description. Finally, we report our results.

5.1 Introduction of regression model and variables

In our regression model GDP per capita growth represents the dependent variable.
As we mentioned earlier all our independent variables are used in log and consist; Control of Corruption (COC), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (ROL), Political stability and Absence of Violence, (PSA) Voices and Accountability (VAA), Population (POP), Education (EDU), Foreign Direct Investment (FDI), Gross Capital Formation (GCF), and initial GDP (GDP initial).

5.2 The Worldwide Governance Indicator in six regression models

$$GDP_{it}^{Per\ capita\ growth} = \beta_0 + log\beta_1 COC + log\beta_2 POP_{it} + log\beta_3 EDU_{it} + log\beta_4 FDI_{it} + log\beta_5 CAP_{it} + log\beta_6 GDP_{it}^{initial} + \varepsilon \quad (1)$$

$$GDP_{it}^{Per\ capita\ growth} = \beta_0 + log\beta_1 GE + log\beta_2 POP_{it} + log\beta_3 EDU_{it} + log\beta_4 FDI_{it} + log\beta_5 CAP_{it} + log\beta_6 GDP_{it}^{initial} + \varepsilon \quad (2)$$

$$GDP_{it}^{Per\ capita\ growth} = \beta_0 + log\beta_1 PSA + log\beta_2 POP_{it} + log\beta_3 EDU_{it} + log\beta_4 FDI_{it} + log\beta_5 CAP_{it} + log\beta_6 GDP_{it}^{initial} + \varepsilon \quad (3)$$

$$GDP_{it}^{Per\ capita\ growth} = \beta_0 + log\beta_1 RQ_{it} + log\beta_2 POP_{it} + log\beta_3 EDU_{it} + log\beta_4 FDI_{it} + log\beta_5 CAP_{it} + log\beta_6 GDP_{it}^{initial} + \varepsilon \quad (4)$$

$$GDP_{it}^{Per\ capita\ growth} = \beta_0 + log\beta_1 ROL + log\beta_2 POP_{it} + log\beta_3 EDU_{it} + log\beta_4 FDI_{it} + log\beta_5 CAP_{it} + log\beta_6 GDP_{it}^{initial} + \varepsilon \quad (5)$$

$$GDP_{it}^{Per\ capita\ growth} = \beta_0 + log\beta_1 VAA + log\beta_2 POP_{it} + log\beta_3 EDU_{it} + log\beta_4 FDI_{it} + log\beta_5 CAP_{it} + log\beta_6 GDP_{it}^{initial} + \varepsilon \quad (6)$$

5.3 Definitions of variables

$GDP^{Per\ capita\ growth}$= GDP per capita growth
i = cross sectional index
t = time index.
β_0= Intercept
WGI = Control of Corruption (COC), Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (ROL), Political stability and Absence of Violence, (PSA) Voices and Accountability (VAA)
POP = Population ages 15-64
FDI = Foreign Direct Investment
GCF = Gross Capital Formation
EDU = Education
GDP$initial$ = Initial GDP
ϵ =Error term

GDP per capita growth

Since we are interested in investigating if quality of institutions can affect economic growth in Africa, we have chosen to use GDP per capita growth as a dependent variable. It is the most suitable choice, as it measures a country's total gross domestic product produced annually, divided by the population size to determine the average income of a country. In addition to that GDP per capita growth also include the living standard for each person, meaning that a higher GDP per capita growth results in better living standard. In our model the variable is expressed in constant US ($) and collected from The World Bank from the period 2003-2017. When using GDP per capita a problem that may occur is that the informal sector is not included causing misleading actual GDP per capita. In a report from the International Monetary Fund (IMF) the Sub-Saharan countries has an average of 40 percent working in the informal economy.

Log initial GDP per capita

We chose to have log initial GDP per capita for the year 2003 as an independent variable to control for conditional convergence in the neoclassical model. Barro (1996) explains that the variable predicts to have a negative correlation with growth and that the catch-up effect is controlled, meaning that developing countries have a faster GDP per capita growth rate than developed countries. We therefore expect the results for Log initial GDP per capita variable to be negative.

Education

In the endogenous growth theory Human capital is a contributor to long-run growth, through investment in ideas and innovation. Therefore, we chose to use the education index as a proxy for human capital, meaning that the improvement of objects and ideas will increase if the country's education rate is higher. According to Romer (1990) new ideas are non-rivalry and therefore have a positive impact on growth in the long-run. We expect the results for our education variable to be positive. Data for the independent variable is collected from Human Development Reports (HDR) for all countries and years.

The Worldwide Governance Indicator

In our study we used the worldwide Governance Indicator (WGI) is used when measuring countries institutional quality. The index includes 6 different dimensions of governance including;

Control of Corruption
Government Effectiveness
Political Stability and Absence of Violence
Regulatory Quality
Rule of Law
Voice and Accountability

These variables are used to describe how countries utilizes institutions and governments, as well as how governments are elected, monitored and governed. The worldwide governance indicator can be measured in two different ways (Kaufman, Kraay and Zoido-Lobatón, 1999). Either in percentage form, with a raking from 0 to 100, where the higher value represents a better outcome, or by using standard normal units ranging from -2.5 to 2.5. Our variables will use the percentage form and the data is collected from the World Bank (World Bank, 2019) and we expect the result to be positive.

Control of Corruption

Control of corruption capture the degree that power is taken advantage of in both large and small scale in society, in order to gain benefits privately.

Government Effectiveness

The Government Effectiveness variable measure the quality of the civil service, public service as well as the ability to not experience political pressure when exercising these services. Government effectiveness also incorporate quality of formulation and the commitment and credibility from the government to implement policies.

Political Stability and Absence of Violence

This variable measures the probability of political instability, motivated violence, terrorism and destabilization.

Regulatory Quality

Regulatory quality measure the government ability to formulate and implement policies and regulations that impact the public and private sector positively.

Rule of Law

This variable measures the degree individuals and companies trust and obey the laws and rules in their society. Rule of law emphasizes the law enforcement, contract management, property rights and the likelihood of crime and violence.

Voice and Accountability

Voices and accountability capture the quantity of citizens that are able to influence the government. This includes freedom in choosing their government as well as freedom of speech and unbiased media.

Foreign Direct Investment

Foreign Direct Investment (FDI) represents all investments made by an investor from one economy making an investment in another economy, giving them a degree of influence over the management of an enterprise in another economy. It is important to highlight the

limitations of the Foreign Direct Investment variable, as it does not account for the whole picture of the economy's international investments, for example capital that is raised locally is not reported in the data set, even though they function as an investment financing in numerous developing countries. North (1993) and Asif & Majid (2018), suggest that foreign direct investment has a critical role for economic development. We therefore expect the variable to have a positive result. The variable is measured as the sum of FDI to GDP ratio and examines whether GDP per capita growth is affected by an increase in foreign investments. Data for all countries and years are collected from The World Bank database (World Bank, 2019).

Gross Capital Formation

This variable is recognized as a measurement of investment and is expressed as a percentage of the GDP. While gross domestic product (GDP) focuses on the expenditures from consumption by the government and households. Gross Capital Formation accounts for the public and private investments in fixed assets, inventor changes as well as net purchases of valuables.

The neoclassical growth model implies that the saving rate is equal to the investment rate. A higher savings rates therefore automatically result in a higher investment (Barro, 1996). According to Robert Solow (1965) private investments and savings are not the only factor influencing the capital stock growth. His model instead shows how exogenous factors such as capital accumulation contributes toward growth over time depending on if it has increasing, decreasing or constant returns to scale. We therefore believe that the variable can either have positive or negative impact on the dependent variable. In our study the data for Gross Capital Formation will be collected from the World Bank.

Population

Population represents total population between the ages 15-64 and is the ratio of the total population. It accounts for all residents in a country regardless of citizenship and legal statues. It is important to have a ratio of the population through different age groups have different impacts on a country's; infrastructure, environment, economy consumption etc. (World Bank, 2019). According to Solow-model a high population rate will lead to an increase in labor force which promotes economic growth. But this is not accurate in all cases depending if the increase in population of a country entails in high cost for the expansion, this can be shown in several undeveloped countries. We therefore believe that the variable can either have positive or result. Data for all countries and years was collected from The World Bank (Jones, 2017).

Table 5:1 Expected results and description of theories

Variables	Theory	Expected results

Worldwide Governance index	Institutional theory	+
Gross capital formation	Solow model	+/-
Education	Romer model	+
Population	Romer/Solow	+/-
Foreign Direct Investment	Institutional theory	+
Initial GDP	Barro (1996)	-

6. Empirical Results

This section will present our results based on our dependent and independent variables.

6.1 Regression models

In table 6.1 below we summarize the empirical results from our six regression models.

Table 6:1 Regression models (Fixed effect)

Model	**1**	**2**	**3**	**4**	**5**	**6**
POP	0.228	-0.001	-0.009	0.078	0.036	-0.061
	(0.192)	(1.00)	(0.958)	(0.656)	0.831)	(0.723)
EDU	0.496	0.458	0.480	0.475	0.448	0.442
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FDI	0.008	0.008	0.008	0.007	0.007	0.008
	(0.003)	(0.002)	(0.003)	(0.007)	(0.004)	(0.001)
CAP	0.005	0.006	0.006	0.006	0.006	0.007
	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)	(0.000)
GDP initial	0.598	0.635	0.627	0.613	0.609	0.648
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
COC	0.018					
	(0.009)					
GE		0.016				
		(0.020)				
PSA			0.020			
			(0.000)			
RQ				0.031		
				(0.000)		
ROL					0.042	
					(0.000)	
VAA						0.026
						(0.002)

Obsv	694	699	699	699	699	699
R-squared	0.797	0.790	0.793	0.793	0.799	0.791
Adj. R-squared	.780	0.772	0.775	0.775	0.782	0.773

p-values in parentheses

Population

Our population variable has both negative and positive coefficient ranging from a value of -0.001 to 0.228 percentage points. This is in line with the Solow model that indicates that an increase in population can both have a positive and negative impact on economic growth. In all our six models however, the p-value of population is greater than 0.05, meaning that we cannot reject the null hypothesis and therefore not make a firm conclusion.

Education

For all six models the p-value is less than 0.05 and therefore we can statistically say that education has a positive relationship with GDP per capita growth. In our results the coefficient for education is positive and ranges from 0.442 to 0.496. This means that we can statistically say that a 1 percent increase in education leads to a GDP per capita growth increases ranging between 0.442 to 0.496 percentage points.

According to the Romer model education will lead to improvement in new ideas which in fact contribute to sustained long-run growth. In our case the results from our education variables corroborates that hypothesis.

Foreign Direct Investment

Foreign direct investment has a positive coefficient ranging from 0.07 to 0.08. For all six models the p-value is less than 0.05 and therefore we can statistically say that foreign direct investment has a positive relationship with GDP per capita growth. This means that we can statistically say that a 1 percent increase in foreign direct investment leads to a GDP per capita growth increases ranging between 0.07 to 0.08 percentage points.

Capital

Our Capital coefficient ranges from 0.05 to 0.07. For all six models the p-value for capital is less than 0.05 and therefore we can statistically say that capital has a positive relationship with GDP per capita growth. We can therefore statistically say that a 1 percent increase in capital leads to a GDP per capita growth increases ranging between 0.05 to 0.07. This is in line with the Solow model which agrees, that capital can either have a positive or negative impact on GDP per capita growth.

GDP initial

GDP initial coefficient is positive in all our models and ranges from 0.598 to 0.648. For all six models the p-value for GDP initial is less than 0.05 and therefore we can statistically say that

GDP initial has a positive relationship with GDP per capita growth. We can therefore statistically say that a 1 percent increase in GDP initial leads to a GDP per capita growth increases ranging between 0.598 to 0.648 percentage points. This result support Barro's (1996) convergence theory based on the neoclassical model.

Control of corruption

Control of corruption is only used in model number (1) and has a positive coefficient. The p-value for GDP initial is less than 0.05 and therefore we can statistically say that control of corruption has a positive relationship with GDP per capita growth. If control of corruption increases with 1 percent, it will lead to a 0.018 percentage points increase in GDP per capita growth.

Government effectiveness

Government effectiveness is only used in model number (2) and has a positive coefficient. The p-value for GDP initial is less than 0.05 and therefore we can statistically say that government effectiveness has a positive relationship with GDP per capita growth. If government effectiveness increases with 1%it will lead to a 0.016 percentage points increase in GDP per capita growth.

Political stability and absence of violence

Political stability and absence of violence is only used in model number (3) and has a positive coefficient. The p-value for GDP initial is less than 0.05 and therefore we can statistically say that Political stability and absence has a positive relationship with GDP per capita growth. If Political stability and absence of violence increases with 1 percent it will lead to a 0.02 percentage points increase in GDP per capita growth.

Regulatory quality

Regulatory quality is only used in model number (4) and has a positive coefficient. The p-value for GDP initial is less than 0.05 and therefore we can statistically say that Regulatory quality relationship with GDP per capita growth. If Regulatory quality increases with 1 percent, it will lead to a 0.031 percentage points increase in GDP per capita growth.

Rule of Law

Rule of law is only used in model number (5) and has a positive coefficient. The p-value for GDP initial is less than 0.05 and therefore we can statistically say that Rule of law relationship with GDP per capita growth. If Rule of law increases with 1 percent, it will lead to a 0.42 percentage points increase in GDP per capita growth.

Voice and Accountability

Voice and Accountability is only used in model number (6) and has a positive coefficient. The

p-value for GDP initial is less than 0.05 and therefore we can statistically say that Voice and Accountability relationship with GDP per capita growth. If Voice and Accountability increases with 1 percent, it will lead to a 0.026 percentage points increase in GDP per capita growth.

All our world governance variables are in line with the institutional theory that implies the institutions have an impact on the economic growth.

Lastly our R-square had a value between 0.790-0.799 while our Adjusted R-square had a value ranging from 0.772 to 0.782. This means that are used variables in our model explains approximately 77 to 78% of the GDP per capita growth.

7. Comparing countries

In this chapter we will compare two countries with the highest value of control of corruption and two countries with the lowest value, to get a clearer picture on how institutions affect GDP per capital growth.

Out of all our world governance index variables corruption had the highest maximum value in the descriptive statistic (appendix A). We therefore choose to use it as an instrument in order to get a clearer picture on how institutional quality affect economic growth individually, in different African countries. The instrument is from 0 to 100, where the higher value represents a better outcome.

In table 7.1 below we use two countries with the highest value of control of corruption and two countries with the lowest value, to compare themselves with each other.

Table 7.1 Comparing countries

Countries	**Mean Control of Corruption**	**Mean GDP per capita**
Botswana	80.337	8,804
Cabo Verde	77,110	8,070
Chad	4.050	6,723
Equatorial Guinea	0.956	9,663

Out of all 50 African countries that we tested Botswana had the highest control of corruption value, meaning that it is the least corrupted. Botswana also has a stable GDP per capita growth (appendix B). According to the institutional theory when institutions are strong, they

tend to promote economic growth which supports our result. Even though Botswana has the lowest corruption of all the four countries, GDP per capita growth is the second highest of all four countries.

Cabo Verde had the second highest corruption value according to the data set from The World Governance Index. The GDP per capita growth for Cabo Verde is slightly less than Botswana.

Equatorial Guinea had the lowest value in corruption, meaning that it is the most corrupt country out of all countries we tested. Even though the corruption is high, Equatorial Guinea has the highest GDP per capita growth which does not support the institutional theory. This means that there must have been other factors that affected growth in Equatorial Guinea. In 1995 significant oil offshore was discovered in Equatorial Guinea which can explain the rate of economic growth. Since the corruption rate is very high and the GDP is high, it is likely that the majority of the income from oil is going to the pockets of few people. One thing to notice is that the GDP per capita index fail to measure a country's wealth distribution, we can for example not see that a large proportion of Equatorial Guinea's population still lives in poverty.

Chad has the second lowest value of corruption and the lowest GDP per capita growth of all our four countries. This is in line with the institutional theory, meaning that high corruption might be the cause behind the country's slow growth rate.

Based on the result we got from comparing countries with the highest value of control of corruption and lowest, we can see that there is a relationship between corruption and countries' GDP per capita growth. The lower the corruption the higher GDP per capital growth a country experience. This was true in all our cases expect for Equatorial Guinea's, where other factors such as natural resources might explain the countries high corruption and high GDP per capital rate.

8. Analysis and Discussion

In this section, we will analyze the results based on our regression. We will do this by relating the data from our previous studies and theories to create substance to our discussion.

8.1 Solow and Romer-model

The Solow model explains how exogenous factors such as capital accumulation, labor and technology progress contributes toward growth over time, which helps us determine countries

different economic growth. All our results for capital were significant and had a positive correlation to GDP per capita growth. According to the theory a poor country will grow rapidly until it reaches steady-state, but once steady-state has been reached the country will have a negative growth rate. Since all our coefficients are positive it can be assumed that most African nations has not yet reached its steady-state and that the continent is still experiencing economic growth. This also explains why we can find poor African nations such as Equatorial Guinea with high economic performance.

Both the Solow growth model and the Romer model, uses labor when explaining how it enhance growth either in the short or long run. In our study labor (proxy for population) had a positive and negative insignificant effect on the economic performance. According to Solow's model an increase in labor force can both be positively and negatively. If the labor entails a high cost for the expansion it will result in a decreasing return to scale affecting the GDP negatively, since there is too much unproductive labor. In the Romer model, labor can also have positively or negatively effect on growth depending on the increase of knowledge. Meaning that if the knowledge is low and the labor high, it will affect the GDP per capita growth negatively. It is important however to mention that the Sub-Saharan countries has an average of 40 % working in the informal economy which is not accounted in the GDP per capita. If they were accounted for, our results might have appeared differently.

In our results education has positive significant result on GDP per capita growth in all six models. This supports the Romer model applying that new ideas have a positive impact on growth in the long-run. The more educated people are in a country, the greater likelihood that new ideas and innovation will be developed. In our case the general education rate for the 50 African countries have increased every year between the time periods 2003- 2017.
All our Foreign Direct Investment models have a p-value less than 0,05, also all the coefficient is positive. Our results are both supported by North (1993) and Asif & Majid (2018), stating that foreign direct investment has a critical role for economic development, but it is controlled by the institutions.

In all our model GDP initial had a positive coefficient. This is not in line with the neoclassical theory that expects initial GDP to have a negative impact on the GDP per capita income. When there is a negative correlation between initial GDP and growth, developed countries have a slower GDP per capita growth rate then developing countries.

8.2 Institutional quality

Results for all the World Governance Indicators had a positive significant coefficient, this support the idea that institutions impact economic growth positively. According to Acemoglu, Johnson and Robinson (2005) economic institutions structure the market economy and property rights, which creates an incentive to invest in human and physical capital as well as

new technology. Based on our results we can therefore say that institutions impact economic growth. Without strong beneficial institutions it would therefore be hard to make sure that resources are allocated efficiently in the market and the remaining right of control.
Based on the theory presented in this study our results agree that institutional quality can affect economic growth. Vitola & Senfelde (2015) argues that political and economic institutions ensure economic growth which include our variables; political stability and absence of violence and voices and Accountability, rule of law, control of corruption Government Effectiveness as well as Regulatory Quality. In all our models all these variables had a positive relationship with economic growth.

According to Acemoglu et al. (2001) there is a relationship between European settlement in colonies and today's institutions and earlier institutions. According to statistics from World Governance Index our countries WGI range from 0 to 93. This widespread of different values for the institutional quality, can be explained as a result of European powers choosing to set up different types of colonization policies and institutions that still exist today, depending if they wanted to settle in the country or extract minerals.

9. Conclusion and future studies

The purpose of our study was to investigate if institutional quality can affect economic growth. Based on the findings from our study in the case of the 50 African countries, high institutional quality has a positive effect on economic growth, which supports previous studies and theory.

In all our six regression models, GDP per capita growth had an elasticity between 0.016 to 0.42% units of WGI. This indicates that in most cases a higher rank of world governance indicator will lead to an increase in economic growth. In other circumstances such as in Equatorial Guinea's case, GDP per capita can still be high even though the quality of institution is low. This is because there might be other factors, such as natural resources that affect the countries' GDP per capita. In general, our study found a relationship between institutional quality and economic growth.

For future studies, we would recommend dividing countries into categories such as; developed countries and undeveloped countries to get a better picture of how the growth rate can be affected. Another proposal is to compare institutional quality amongst different continents such as Africa and Asia. Also consider the fact that the Sub-Saharan countries has an average of 40 percent working in the informal economy it would be interesting to investigate how this sector is affected by institutional quality.

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11. Appendix

Appendix A

	Obs	Mean	Std. Dev	Min	Max
CoC	745	3.1222	0.9718	-0.7466	4.4408
GE	750	2.9953	0.9718	-0.0535	4.4034
PSA	750	3.1865	0.9593	-0.7419	4.5406
RQ	750	3.1380	0.8362	-0.7323	4.4266
RL	750	3.0970	0.9738	-0.7466	4.4268
VAA	750	3.2286	0.7806	0.3905	4.3482

Appendix B

Botswana			**Cabo Verde**	
Year	CoC	GDP per capita growth	CoC	GDP per capita growth
2003	84,848	8.611256	74.74747	7.767671
2004	80,487	8.620166	70.7317	7.850018
2005	83,902	8.6459	70.2439	7.902907
2006	80	8.705959	77.07317	7.966548
2007	80,097	8.764165	79.12621	8.095318
2008	82,038	8.803549	78.15534	8.147607
2009	79,435	8.70437	77.51196	8.122772
2010	81,904	8.769479	77.61905	8.125114
2011	79,620	8.814063	78.67299	8.151525
2012	78,199	8.84575	77.25118	8.149581
2013	79,146	8.941992	77.25118	8.144768
2014	78.365	8.970083	79.32692	8.138199
2015	77.403	8.937704	79.80769	8.135803
2016	80,769	8.961514	78.84615	8.16966
2017	78.84	8.969471	80.28846	8.197122

Chad			Equatorial Guinea	
Year	CoC	GDP per capita growth	CoC	GDP per capita growth
2003	4.040404	6.349257	1.010101	9.81155
2004	4.878049	6.601384	.4878049	9.928811
2005	1.463415	6.724728	.4878049	9.895894
2006	4.878049	6.696108	.9756098	9.756843
2007	3.883495	6.694369	2.427185	9.775265
2008	1.456311	6.691206	2.912621	9.81117
2009	2.870813	6.699401	1.913876	9.72604
2010	2.857143	6.793128	1.904762	9.688457
2011	4.739336	6.760321	1.895735	9.552516
2012	3.791469	6.811714	.4739336	9.421108
2013	4.265403	6.833639	0	9.335311
2014	6.25	6.867393	0	8.119192
2015	5.288462	6.862473	0	8.151389
2016	4.807693	6.766436	0	8.205472
2017	5.288462	6.705317	0	8.258332

APPENDIX C

Algeria	*Liberia*
Angola	*Libya*
Benin	*Madagascar*
Botswana	*Malawi*
Burkina Faso	*Mali*
Burundi	*Mauritania*
Cabo Verde	*Mauritius*
Cameroon	*Morocco*
Central African Republic	*Mozambique*
Chad	*Namibia*
Comoros	*Niger*

Congo, Dem. Rep.	*Nigeria*
Congo, Rep.	*Rwanda*
Cote d'Ivoire	*Sao Tome and Principe*
Egypt, Arab Rep	*Senegal*
Equatorial Guinea	*Seychelles*
Eswatini	*Sierra Leone*
Ethiopia	*South Africa*
Gabon	*Sudan*
Gambia	*Tanzania*
Ghana	*Togo*
Guinea	*Tunisia*
Guinea-Bissau	*Uganda*
Kenya	*Zambia*
Lesotho	*Zimbabwe*