LUND UNIVERSITY
School of Economics and Management

Master programme in Economic Growth, Innovation and Spatial Dynamics

Institutions and Economic Growth in Africa: An Assessment

Lennart Hoedemakers
Egi15lho@student.lu.se

This paper assesses the extent to which cross country empirical data can be used to explain the impact of institutions on economic growth in Africa. It does so by first establishing a theoretical framework on economic growth, focusing particularly on New Institutional Economics, also assessing several other theories that seek to explain economic growth. Having done so this paper analyzes whether institutional change precedes changing levels of economic growth, drawing on the extensive literature to construct a quantitative model. While this paper uses cross-country data and employs proxies for institutional quality that are widely employed in previous studies - such as settler mortality, the ICRG index as well as Kaufmann's Worldwide Governance Indicators - this paper emphasizes that support for the measurable importance of institutions for economic development in Africa is weak, allows for selective data collection and possibly even data manipulation. Thus this paper concludes that research papers that emphasize the importance of institutions - or other 'deeper determinants' of economic growth - warrant thorough assessment of variables used.

Key words: **New Institutional Economics, Africa, Economic Growth, Economic Development**

EKHM51
Master thesis (15 credits ECTS)
June 2016
Supervisor: Christer Gunnarsson
Examiner: Andrés Palacio
Word Count: 15255

Contents

List of Tables

List of Figures

I. Introduction

Understanding the drivers and causes of economic growth has fascinated researchers, policy-makers and economists since Adam Smiths *Wealth of Nations* in 1776. While there are several theories that seek to explain what economic growth entails and how it can be realized, the fact that a large number of countries and people today are excluded from global economic growth indicates that we still imperfectly understand its drivers, how to realize it, or how to utilize economic growth theory more thoroughly in our societies, countries and the international system. While countries thus historically have pursued economic growth, a glance at the global distribution of levels of income and economic development quickly shows that economic development is highly unequal worldwide, with particularly Africa suffering from low levels of economic development and high levels of poverty. And yet, while post-independent Sub-Saharan Africa conventionally is associated with poverty, famine and wars, in the period between 2001-2010, six out of ten of the world's fastest growing economies were in Saharan Africa (Economist, 2011). It is however also in (sub-Saharan) Africa where over 400 million people live under the poverty line ($1,90/day, World Bank 2016), inequality and corruption are widely present and a variety of countries frequently experience decreasing levels of GDP per capita (World Bank, 2016). This continuing presence of both economically successful states as well as widespread economic underdevelopment then presents an interesting query: what is it about countries like Nigeria, Ethiopia and Tanzania that has allowed them to realize such high economic growth rates for the past decade, while countries like Zimbabwe, Madagascar and Sudan fail to do so?

Considerable numbers of papers and academic literature seek to answer this question by analyzing potential drivers and underlying factors of economic growth. Recently a strand of this literature has underlined the importance of institutions in driving economic growth, drawing on the contributions of New Institutional Economics spearheaded by Douglas North, and expanded on by a variety of other scholars such as Acemoglu, Johnson and Robinson, Rodrik, and Sachs and Warner. This literature has suggested institutions as the underlying, deeper determinant of economic growth, influencing it via a variety of mechanisms. These papers underline differing mechanisms and use also different proxies for institutions, with a considerable number of scholars supporting their theoretical framework with empirical data analyzed using cross-country OLS models. While these models seek to quantify and compare global differences in economic development and institutions to identify a potential globally functioning mechanism, there are significant weaknesses to cross country data analyses: these mainly encompass the simplification of complex, dynamic societies to single values - glossing over internal differences - the comparison of small with large countries, as well as a variety of others. Yet the main support for institutions as drivers for economic growth and development rests on studies and papers using cross-country data analyses; this thesis then critically evaluates the usage of cross country data analyses to uncover the impact of institutions on economic growth and development. To do so this paper employs an investigation into the drivers of African economic development, thus trying to evaluate the usage of cross country data analyses for uncovering potential drivers of economic growth. For further reference the research question this paper seeks to answer then is:

To what extent can cross country data analyses assess the economic growth effects of institutions in Africa?

To answer this question this paper first assesses several theories regarding the drivers of economic growth, starting with neoclassical economic growth theory and the Solow model. Having done so this paper distinguishes between "proximate" and "deeper" causes of economic growth, then moving into the considerable literature surrounding the concept of institutions, and its relation to the economic development of countries. This paper thus examines the relationship between institutions and economic growth and development. To investigate both these aspects - the interaction between institutions and economic development, as well as the influence of institutions on changes in the rate of economic growth - this paper draws upon quantitative analysis, employing some basic econometrics to investigate this relationship. It uses a variety of dependent and independent variables, discussing how the interplay of these impacts the results and subsequent implications.

The quantitative analysis of this paper draws on a variety of databases, mainly concerning the political ratings of the International Country Risk Guide, settler mortality data from Acemoglu et al, the Worldwide Governance Indicators compiled by Kaufmann et al., and economic data from the World bank and the Penn world tables. This paper utilizes these different variables to evaluate the explanatory value of these different institutional proxies to assess if and how they impact economic growth through multivariate regression analyses and correlations. Thus having conducted data analyses inspired by leading papers in the field I closely examine the validity of my results, seeking to assess what my data analysis indicates, and whether indeed cross country multivariate regression models allow for the establishment of a clear relationship between institutions and economic growth in Africa. This paper maintains that whereas cross country empirical analysis in Africa can indicate the importance of institutions for economic growth, this correlation is weak, and insufficiently robust to accredit as a credible explanatory factor. Moreover reverse causality is difficult to exclude. Thus this paper argues that the interaction between institutions and economic growth is complex and difficult to reduce to a simple linear relationship; furthermore this paper maintains that cross country data analysis has severe limitations in establishing any relationship between these institutions and economic growh, and should be used with close scrutiny of data and the variables involved.

I.1 Novelty of Research and Contribution to Literature

Considerable literature assesses the drivers of economic growth and development, often drawing on Ordinary Least Squared (OLS) multivariate regression analysis and using varying samples of countries to assess whether institutions can explain either economic growth or economic development. This literature employs a variety of different proxies for institutions, draws on a range of different explanatory variables, and generally arrives at widely diverging conclusions (Durlauf, 2005). While there is also literature that utilizes case-studies to investigate the role of institutions on economic growth (e.g. for Ethiopia, Mulagetta (2008) and Abegaz et al (2015)), the backbone of New Institutional Economics rests on the studies conducted by Acemoglu, Johnson and Robinson, Rodrik, as well as Sachs and Werner, who mainly employ cross country analyses to either support or critique the notion that institutions are important explanatory variables. While

their research certainly provides guidance in the debate regarding institutions and economic growth, they rarely question the validity or robustness of the methodology they employ, rather looking into the particular variables included and their explanatory value. This paper starts along those lines, assessing previous literature and research before moving into a new cross-country analysis of empirical evidence of Africa. With the variables under scrutiny having been inspired by its use by other literature, this paper argues that the establishment of a robust correlation between institutions and economic growth is problematic, and that the employed methodology is limited in its usefulness for this purpose. Thus the main contribution of this paper revolves around the critical assessment of the use of cross-country data analysis as a methodological approach for assessing deeper determinants of growth: while critique is not new and indeed has been noted before, this paper more thoroughly examines the available literature on the topic, in the process critically evaluating the impact of institutions on economic growth and development in Africa.

II. Drivers of economic growth

This section assesses different potential drivers of economic growth

II.1 Neo-classical economics

A variety of theories seek to explain how economic growth can be realized, with the father of modern economics, Adam Smith, stating that *the annual produce of the land and labour of any nation can be increased in its value by no other means, but by increasing either the numbers of its productive labourers, or the productive powers of those labourers who had before been employed*- Adam Smith (1776, p.141). The essence of this point is maintained also in modern economic growth theories - notably neo-classical economics - with proponents of both exogenous and endogenous neo-classical theories still emphasizing these production factors as highly important for driving economic growth. This theoretical framework is supported by extensive empirical evidence, establishing a significant, measurable correlation between physical capital accumulation and economic growth in a variety of research papers (Barro 1991, Hall and Jones 1999). And yet, while production factors are an important driver of economic growth, increasing availability of data led economists to find that economic growth could be attributed to factors other than increases in the labour force or through capital accumulation. Robert Solow in particular contributed to this through the introduction of his growth accounting model, formally including Total Factor Productivity (TFP), based on the standard Cobb- Douglas production function:

$$Y = AK^{\alpha}L^{1} - \alpha \tag{1}$$

In this model Y equals total output, K equals capital, L equals labour and A equals the TFP, with the growth formula then being(Solow 1957, Crafts, 2008):

$$\Delta ln(Y/L) = \alpha \Delta ln(K/L) + \Delta lnA \tag{2}$$

With this Solow showed that large aspects of the growth of modern economies could not fully be explained through capital accumulation or population growth, and hence could be attributed to TFP (Solow, 1957, Crafts, 2008). Yet what exactly TFP entailed remained vague, encompassing technological change, productivity increases, human capital improvements and a variety of other

causes, resulting in it's branding as 'a measure of our ignorance' (Abramovitz, 1956). [1] While production factors are thus important for explaining economic growth, Solow's model indicated that it was often other factors - aggregated under the notion of TFP - that led to economic growth.

III. Economic growth - New Institutional Economics

"Truly among man's innovations, the use of organization to accomplish his ends is among both his greatest and his earliest"" - Kenneth J. Arrow, 1971

Starting with the Solow model Hall and Jones find that physical and human capital can only partially explain the differences in productivity per worker around the world, theorizing that instead this is caused by the 'social infrastructure', or countries' institutions and government policies (Hall and Jones (1998)). This is in line with the main argument from Dani Rodrik, who argues that the Solow decomposition is limited in explaining economic growth, as the accumulation and productivity variables themselves are endogenous, thus failing to account for structural changes in the growth equation (Rodrik, 2003). Instead Rodrik proposes that the variables of the Solow model - capital and labour - should be considered as 'proximate determinants', which themselves are caused by 'deeper determinants'. These deeper determinants are the factors that influence countries' proximate (endogenous) determinants of growth, which Rodrik suggests are trade, institutions and geography (Rodrik, 2003). While Rodrik notes that these deeper determinants are all positively correlated to economic development of countries as measured by their GDP per capita, in a later paper he, Subramanian and Trebbi econometrically assess which of these 'deeper determinants' is most important for economic growth of countries. They find that both for cross country studies and individual country assessments the institutional framework is of primary importance (Rodrik et al, 2004), echoing the earlier point made by Hall and Jones that it is institutions that are an important driver of economic growth. Notably both Hall and Jones as well as Rodrik draw on cross-country instruments to arrive at their conclusions (Hall and Jones (1998), Rodrik et al (2004)).

This then is the essence of the New Institutional Economics (NIE) school, which argues that it is the quality of institutions that can be considered as the most important driver of economic development. It is therefore important to clarify exactly what these institutions entail: like Rodrik this paper adopts Douglas North's (1990) definition of institutions as "the humanly devised constraints that shape human interaction" and "consequently structure incentives in human exchange" (North, 1990, p. 97). With this North refers to both economic and political institutions that decrease transaction costs and facilitate exchange amongst actors in society. His theoretical framework thus centers on the importance of the exchange mechanism (i.e. the market) by facilitating low transfer costs, raising the benefits of cooperating and trading, making actors more likely to increase economic productivity (North, 1990). The purpose of institutions revolves around the facilitation of market-transactions - mainly by ensuring the provision of secure property rights and the rule of law - although the actual form of institutions may require further clarification. Williamson's (2000) four levels of social analysis allow for perspective in assessing both the form and role of

[1] A variety of updates of the Solow model have been introduced in the period since, including specific functions for human capital or other variables, whereas yet there remain a wide variety of other economical theories that seek to explain the drivers of economic growth, differently including factors such as technological progress, innovation, or improvements in human capital.

institutions in society:

- Embeddedness: refers primarily to informal institutions such as customs, culture, traditions and religion, representing the general environment. This embeddedness is subject to only very slow change over a long period of time, and arguably only latently or indirectly influences the behavior of actors.
- The Institutional Environment: while influenced by the former level this represents the more formal rules of the game, including property rights, constitutions and laws. This institutional environment is to a large extent 'constrained by the shadow of the past', although allowing for some 'designer opportunities', over a prolonged period of time, albeit through cumulative change rather than overnight changes.
- Governance: the structures and more tangible organizations that implement and execute policies formed and influenced by the former levels. This includes the legal system, as well as government organizations.
- Resource allocation and employment: the direct interaction between firms, individuals and organizations through exchange and interaction.

While arguably all these levels of social analysis 'shape human interaction' and 'structure incentives in human exchange', NIE mainly concerns itself with the second and third levels, where they come from, how they interact with the other levels of social analysis, and how they change or can be altered over time (Williamson, 2000). This paper follows this approach when referring to institutions, similar to most literature when assessing institutions - this is important, as it relates to how institutions are measured. The implication of this are explored in more detail in the methodology section below, as well as in the discussion at the end of this paper.

It warrants to further dive in the mechanisms proposed by proponents of the NIE school at driving economic growth in countries: New Institutional Economics has been developed in particular by Acemoglu, Johnson and Robinsons (2002, 2005). In a series of papers they propose a mechanism in which political and economic institutions interact with both the allocation of resources and political power, consisting of a hierarchical organization of institutions. Making the important assumption that institutions are endogenous, they argue that it is economic institutions that influence economic growth, seeing as they 'shape the incentives of key economic actors in society'. Moreover political power influences the development of these economic institutions, with political power itself stemming from both political institutions and the distribution of resources. Acemoglu et al. then emphasize the conflict of interest between the different actors in society about influence over institutions, with both the distribution of resources and what they term *de facto* power impacting the standing and influence of actors in society. Thus while economic institutions shape economic outcomes - including the distribution of resources and the aggregate growth rate of countries - they themselves are influenced by political institutions and the distribution of resources in society (Acemoglu et al, 2002, 2005).

Thus they propose a hierarchical, circular system in which economic and political institutions reinforce one another, maintaining that institutions are persistent over time. Furthermore they argue that while the relationship between institutions, political power and the distribution of resources is dynamic, it is previous combinations of political power and institutions that influenced economic institutions, which themselves then again feed into the future distribution of de fact power; the allocation of political power at one moment in time is therefore of crucial importance for

the future/present allocation of political power (Acemoglu et al., 2005). This theory is highlighted by their analysis of the economic development of countries, the institutional framework, and the colonial heritage of these countries. They find a 'reversal of fortunes' following colonization, in which countries that previously were rich and densely settled became relatively poor over time, and vice versa countries that were previously poor and relatively unsettled became rich and developed over time. (Acemoglu et al., 2002, 2005). In another paper they find that also within Europe institutions facilitated - or inhabited- economic development of countries in the 17th Century (Acemoglu et al, 2005b). Based on this empirical evidence Acemoglu et al. then theorize that it is the kind of institutions that allowed or hindered this economic growth, introducing the notions of 'inclusive' and 'extractive' institutions .

Keeping in mind their emphasis on social conflict in their theoretical model, they thus argue that it was the kind of institutions that led to this reversal of fortunes, directly attributable to the colonization of the 16th, 17th ,18th and 19th centuries. They theorize that in previously rich, densely settled areas Europeans introduced economic institutions facilitating the extraction of resources and wealth, while keeping political institutions accessible only to the elite, thus ensuring that a small elite of the population both controlled the distribution of resources and benefitted from political power. Vice versa in areas that were previously poor and sparsely settled Europeans settled in higher numbers, introducing more inclusive political institutions (via input from the settlers in their political systems), similarly setting up institutions that ensured the property rights of the inhabitants. (Acemoglu et al, 2005). Recalling their earlier emphasis of the persistence of institutions the unshackling of so many countries from colonization did not change the institutions, which remained in place - thus contributing to the unsuccessful attempts of many countries in the Global South to develop economically.

It is worthwhile to note that the theoretical model of North and Acemoglu et al. is not the only model of New Institutional Economics; North, Wallis and Weingast (NWW) propose a different mechanism for the interaction of institutions and economic growth. They separate human societies into three different orders, being the primitive social order, the limited access order and the open access order. While the primitive social order represents anarchy and therefore is irrelevant for this analysis, the limited and open access orders are very much so: NWW maintain that the same institutions function differently in these different kinds of access orders; e.g. property rights can function very differently in countries in limited access orders compared to open access orders. Similarly the legal system, while apparently similar in many ways between countries (e.g. former colonies), may function in very different ways after all, with highly differing levels of effectiveness and adequateness - NWW attribute this to the kind of access order the country is in.

With on the one hand limited access orders NWW refer to a close blend of economic and political institutions controlled by a small elite, aimed at limiting violence, the enforcement of secure property rights for the elite and the persistence of the status quo - retaining the relative distribution of resources and political power, occasionally to the extent that a sacrifice of absolute gains is considered acceptable (North et al, 2006). Open access orders on the other hand are more accessible to a larger part of the population, ensure secure property rights for all, enforce contracts and not only resolve conflict between actors in society, but restrain the ability of the state to use violence as well (idem). While NWW also consider the drivers in change between these orders, this is not very well developed in their paper, and is problematic to measure. For this paper it suffices

to acknowledge that the theoretical mechanism of institutions on economic growth - similar to that proposed by Acemoglu et al - is used as a theoretical model; while both these theories are expanded on by other authors, most slightly alter them by including and emphasizing different variables for their cross-country data analyses to investigate the deeper causes of economic growth.

III.1 Institutions and economic growth: empirical evidence

The theoretical models proposed by NWW and Acemoglu et al. then are complimented by a variety of other papers that also use cross country data analysis, including not only the previously mentioned Rodrik (2004) and Hall and Jones (1998), but also a large range of others, including e.g. Bardhan: he adopts Acemoglu et al.'s empirical analysis while expanding it by adding state antiquity and literacy as variables, finding that these are also good predictors of the security of property rights (Bardhan, 2005). Moreover he discusses the persistence of dysfunctional institutions, their sources and their role in inhibiting economic growth: he theorizes that it is fundamental distributive conflicts in society that lead to states' failure in addressing collective action problems, caused primarily by high levels of inequality, drawing on the argument of Engerman and Sokoloff (2002). Engerman and Sokoloff seek to explain how institutions evolved according to the levels of equality: societies with high levels of inequality at the outset of colonization resulted in access to political power and opportunities for only a narrow elite, thus institutionalizing inequality. In this they thus differ from Acemoglu et al., by arguing that property rights may be secure, whereas inequality however will remain persistent and that it is this that limits further economic growth - coming to this conclusion also via cross country analysis (Engerman and Sokoloff, 2002). [2]

The notion then that institutions as deeper determinant drive economic growth and secure property rights is founded on theoretical frameworks such as the one provided by Acemoglu et al (2002), and NWW (2006), and supported by a variety of papers utilizing cross country analysis. To further understand if and how institutions drive economic growth and development, this paper more thoroughly assesses the countries of Africa: it is a continent that especially since independence has experienced large economic and political instability. While especially the 80's and 90's were rough for Africa the turn of the millennium appears to have heralded an era of new growth for many countries on the continent - although certainly not all. (Sachs et al., 2004) The next sections asses whether this newfound growth - or its absence - can be related to institutions, and the extent to which cross-country data analysis provides the results to either support or reject this conclusion.

IV. Economic Growth in Sub-Saharan Africa

Utilizing the data from Angus Maddison, it is remarkable to note that a significant number of countries in Africa were poorer in 2008 then they were at the date of independence, approximately 50 years before. [3] Moreover, while a large number of other African countries had managed to realize economic growth as measured by GDP or GDP per capita, in many cases this economic growth was marginal, contrasting starkly to the growth rates achieved by the West in the same

[2] E.g. using the exclusive access of elites for their own economic performance, raising barriers for new entrepreneurs, blocking challenges to their business and hampering progress that might threaten them or the relative distribution of resources

[3] This is true for Burundi, the Democratic, Republic of the Congo, Rwanda, Sierra Leone, Zambia and Zimbabwe

period, East Asia, or Latin America over the same period (Maddison, 2007). Indeed, Africa between 1980 and 2000 was the only region in the world with negative growth in income per capita (Sachs et al., 2004). And yet since the turn of the millennium there has been an increasing number of countries with consistently high economic growth rates there, with currently 6 out of 10 of the world's fastest growing economies being in Africa (Economist, 2011). The causes for this are complex, dynamic and difficult to comprehend when considering the rather eventful 60 years of recent African political and economic history, including the ambiguous legacy of colonialism, the unfavorable international environment during the cold war, the large number of coups and subsequent political instability, the presence of HIV/AIDS and also the persistence of large scale corruption. Considering both this extreme turbulence in the middle and at the end of the 20th century, and the more recent economic successes of the 21st century, Africa is a fascinating continent to consider. Moreover Africa represents the continent where the largest improvements in development - whether economic, social or humanitarian - still need to be made, thus warranting further investigation in the drivers of this development.

While a considerable aspect of the literature asked why Africa has grown slowly, this paper thus assesses how African economies grew, seeking to identify whether institutions can explain (the lack of) growth that occurred the past few decades. As to what variables drove this growth a lot has been written, with however no clear consensus having emerged over exactly what factors led to the increased African growth after the 90's, and the relative sustenance of this growth. This section then looks into previous literature that similarly assessed the drivers of economic growth in sub-Saharan Africa, touching on a variety of potential drivers, including the legacy of colonialism, low saving rates and insufficient investment, the harmful impact of aid and the previously identified deeper determinants of geography and institutions. Thus this section seeks to cover potential drivers of economic growth in Africa, aiming to include them later in the cross-country assessment of economic growth and development, and assess whether 1) it is indeed institutions that drive economic growth and development, but also 2) whether this can be established using this methodology.

IV.1 Colonization

The colonization of Africa had far reaching consequences, shaping the development of the continent in ways that are noticeable to this very day. While most agree that its colonial history has strongly influenced the current state of Africa, it is extremely difficult to verify how exactly it did so. After all, we do not know - and indeed cannot know - how countries would have developed absent colonization, as this requires a counterfactual. While Ethiopia is the only country in Africa that was never fully colonized, the state of Ethiopia in the late 19th and early 20th century was much more advanced than most other civilizations in Sub-Saharan Africa at the time. [4] This means that there is no suitable candidate for a 'natural experiment', making it therefore necessary to use different approaches to account for the impact of colonization.

Utilizing the data from Angus Maddisson we can try to comprehend how income changed both during and after colonization: drawing on data from 1950 onwards it appears that per

[4] While Ethiopia was conquered by the Italians between 1936 and 1941 this never constituted full colonization, seeing as the countryside was never fully under Italian control, and also the time period was too short for meaningful impacts. Moreover, while Liberia was founded as a free state in the early 19th century for freed slaves, it arguably was set up by the United States, and remained artificially influenced by them

capita income decreased from the late 1960's till the 1990's, with a few noticeable exceptions in the form of Gabon peaking around the mid seventies, and a general rise of Botswana and Mauritius. Disregarding these outliers however, some authors consider the general decrease in income after independence, as well as the general rise in income after the initiation of colonization following the 'scramble for Africa' supportive of the theory that colonization was good for the development of Africa: they maintain that Africa's technology was extremely poor, for example lacking the wheel, the plow and a written script (Heldring and Robinson, 2012, quoting L aw, 1980 and Austen and Headrick, 1983). While this likely was the case in certain areas of Africa, it is important to consider that sub-saharan Africa is a rather large area with a considerable variety of countries, cultures, languages and people, implying that the colonization of e.g. South Africa or Botswana may have had vary different effects than those on e.g. Burundi or the DRC. Considering this point in their analysis, Heldring and Robinson argue that despite the heterogenous impacts of colonization, it was uniformly negative for African economic development, utilizing an extensive empirical overview of countries' economic income per capita, and an assessment of their pre-, during- and after-levels of economic development to do so (Heldring and Robinson, 2012). Indeed, while they maintain that European colonialism brought some benefits through the accelerated introduction of technology, relative stability and increased economic integration, it more importantly resulted in racism, discrimination, inequality and seriously warped many African political and economic institutions", arguably thus negatively impacting the *deeper determinants* of economic growth. Hence Heldring and Robinson maintain that the decline in African economic development post-independence also can be attributed to colonization.[5] Similarly considering how countries in Africa can develop economically, Sachs and others argue that a large number of countries in Africa are stuck in a poverty trap. While they acknowledge that many countries 'fell' deeper into this trap following independence through authoritarian rule and corruption, they maintain that "if it is true that these [African] leaders hanged themselves and their fellow citizens, the rich countries often provided the rope" (Sachs et al. 2004). With this they refer mainly to the legacy of colonialism and the period afterwards, including the intermeddling of the West and the Soviet union in domestic politics, as well as trade restrictions and global trends.

While the African economic development between 1960-1990 over the entire period thus did not result in significant differences in GDP per capita, many of the individual countries did experiences large fluctuations between these years. Moreover, Maddisson's data reveals a modest general increase of GDP per capita after 2000, and significant changes in individual countries' growth rates - begging the question what led to changes in growth rates between 1960-1990, and whether a number of variables can be identified to explain the success of an increasing number of countries since the mid 90's.

IV.2 African Economic Development - Drivers and Factors

Controlling for capital, labour and exports, Augustin Fosu assesses whether political instability impacts economic growth in the period between 1960-1986, finding that the prevalence of political instability - measured by the number of successful coups d'état, attempted coups and other plots

[5] They separate sub-Saharan countries into three groups; 1) those with pre-colonial centralized states such as in what is currently Botswana and Ghana, 2) those with considerable white settlement, such as South Africa, Rhodesia/Zimbabwe, and 3) the remainder, such as Somalia or Chad. They then use counterfactuals to estimate colonialism influenced the development of these different kinds of countries, arguing that in particular for the first two kinds of states it was negative, and potentially so for the 3rd group (Heldring and Robinson, 2012)

to overthrow the government - adversely impact economic growth (Fosu, 1992). This is in line with literature of political science and also economic theory that propose that instability and insecurity negatively impact economic growth. [6] While political instability thus negatively affects economic growth, the literature review reveals that this is not the sole variable that has been found to have a statistically significant in data regressions, and therefore considerable as explanatory in explaining economic growth. Indeed, utilizing growth accounting models Tahiri et al. acknowledge that growth enhancement is negatively influenced by conflicts, however finding that for the period between 1960-2002 the (low) average GDP growth was primarily driven by factor accumulation, with particularly the latter period (1996 - onwards) TFP strongly contributing to this growth. While it is good to recall that the average economic growth of Africa between 1960 and 1990 was very low and primarily driven by a few countries, their argument that it was TFP that drove the growth following 1996 indicates that it could be a variety of factors: Tahari et al. (2004, p.10) theorize that it could *"include good quality institutions, human capital development, a favorable macroeconomic policy environment, trade liberalization, and diversification of the economic base from agriculture to manufacturing and services."*

The quote above illustrates a strong lack of consensus considering the drivers on African economic development, which is underscored by the findings of Badunenko, Henderson and Houssa, who significantly expand the Solow formula with both econometrics and mathematical models, finding that human capital accumulation and efficiency changes contributed to increases in labour productivity and growth in Africa (Badunenko et al., 2014). Approaching the drivers of growth from a different economic perspective, Ghazanchyan and Stotsky correlate growth experiences in Africa with government consumption, private and public investment, as well as exchange rates and the extent of current account liberalization, using various econometric methodologies. While finding that higher private and public investments boost growth, they acknowledge that their findings are insufficiently statistically significant to be considered as key determinants of growth (Ghazanchyan and Stotsky, 2013).

The role of aid on African economic development is also extensively discussed in the literature of drivers of growth, with again no clear consensus appearing as to whether aid has been good or detrimental for countries in Sub-Saharan Africa. Seeing as aid typically was allocated to former colonies with low incomes and a prevalence of economic and political instability, also being influenced by the donators economic and political objectives as well, aid to African countries is differently considered as detrimental or beneficial for the growth process (Collier, 1999). On the one hand opponents maintain that aid can reduce the accountability of countries to their populations and are therefore under less pressure to maintain political legitimacy, thus negatively impacting state capacity and economic growth (Moss et al., 2006). On the other hand proponents maintain that aid - when conditionally allocated - can be used as a tool to incentivize countries to make policy changes, thus (indirectly) inducing economic development (Sachs et al., 2004). Both Collier and Moss however suggest that the effectiveness of aid appears to be policy dependent, as well as influenced by the interaction with the institutional framework (Moss et al., 2006). Extending this argument, it appears that the measured impact of aid on African economic development then depends on the variables considered, and may differ significantly based on the actual mechanisms and situation on the ground.

[6] However one can critique the lack of instrumental variable in testing for this correlation; there may be other variables or drivers that induces this political instability. This is the case for several other variables in this paper, and will be addressed in methodology.

The papers above are by no means exhaustive of the literature on the drivers of growth in the period after independence, or the causes for the absence of growth between roughly 1970-1990. Indeed, in an extensive paper that aims to synthesize and analyze the large variety of econometric tools that have been employed to study economic growth, Durlauf, Johnson and Temple are critical of a variety of conclusions drawn from empirical analysis of growth data. With regard to the potential drivers and causes of economic growth in Africa, Durlauf et al. find that in cross-country growth regressions, no less than 145 explanatory variables have been found as statistically significant, showing the large range of variables considered (Durlauf et al, 2005). [7] This then indicates that it is difficult to reconcile the extensive literature of drivers of economic growth, indicating the need for further clarification and research. However the literature review above does allow for useful deductions: recalling the large although heterogenous impact of colonization on countries the way in which this colonization affected countries even after independence remained relatively untouched. Similarly a considerable number of the variables that drove economic growth using regression analysis are comparable to the proximate causes of Rodrik (i.e. capital accumulation, the interaction of aid and policy implementation, the saving rate as well as governmental investment, consumption and exchange rates as well as (local) political instability), and thus insufficient in fully accounting for the drivers in economic growth in Africa. To therefore more thoroughly understand what drove economic growth in Africa - or the persistent lack of it - we should emphasize the *deeper* drivers of economic growth. The next subsection delves deeper into the deeper determinants, with the methodological section assessing how and whether these deeper determinants then also can be adequately measured using cross country analysis.

IV.3 Deeper causes of economic growth in Africa: Geography and Institutions

Recalling Rodrik's separation of variables into proximate and deeper determinants, it thus pays to assess the deeper determinants of economic growth in Africa, which Rodrik identifies as trade, institutions and geography. According to Rodrik these deeper determinants are exogenous in the case of geography, and 'partly endogenous' in the case of institutions and trade (Rodrik, 2003). This is an important element for Rodrik, as he argues this implies that they are less likely to be affected by other variables (idem.). This section only assesses institutions and geography, acknowledging Rodrik's point that trade - while an important factor - cannot solely account for economic growth, and is much more dependent on other factors such as institutions and domestic policy - it is however included in the methodological section.[8] While naturally both could be important for countries economic developed, there is considerable debate about which of these two then is more important: geography or institutions.

Those who are most critical of institutions, and maintain that geography is most important for

[7] Admittedly already in 1999 Collier and Gunning argued similarly, summarizing the most significant variables in regressions on African growth rates under six headings, being: lack of social capital, lack of openness to trade, deficient public services, geography and risk, lack of financial depth and high aid dependence (Collier and Gunning, cited by Jerven (2009)).

[8] While trade is important, Rodrik claims that this is only the case when it corresponds to institutional changes (as in the cases of Mauritius and China), and arguably a move towards trade in a country must be pre-empted by increased demand for trade, meaning that internal resistance to trade/increased openness must somehow decrease or be overcome - i.e. institutional changes (Rodrik, 2003)

economic development are best represented by Jeffrey Sachs and a combination of his co-authors. In a paper that specifically assesses sub-Saharan Africa, Sachs and Warner test the relationship between a variety of variables and economic growth, finding that poor economic policy, lack of openness and also geographical variables played an important role in the lack of growth in Africa (Sachs and Werner, 1997). They theorize that while institutions and openness also play a role, Africa in particular has structural geographical disadvantages in the form of "landlockedness for no fewer than 14 economies (representing around one third of the African population); a high natural-resource dependence, with the consequent Dutch-disease costs to long-term growth; and (apparently) higher incidence of disease and lower life expectancy, probably linked to the very difficult geographical conditions in tropical Africa. " (Sachs and Werner, 1997). This is also underscored by Collier, who notices that in general Africans tend to live further from the coast or rivers than in the rest of the world, and thus experience much higher transport costs. In combination with the fact that so many countries are landlocked, this is a serious structural disadvantage for Africa (Collier, 1997) [9] In a later paper appropriately called "institutions don't rule: direct effects of geography on per capita income" Sachs emphasizes the prevalence of geography over institutions. Here he utilizes the prevalence of malaria a a new proxy for distance - also controlling for institutions - maintaining that it is geographical distance that can be linked to economic growth (Sachs, 2003).

Responding to Sachs' "institutions don't rule" paper, Rodrik co-authored "Institutions rule: the primacy of institutions over geography and integration in economic development" one year later, similarly assessing the importance of geography, institutions, openness and some other variables on economic growth by utilizing a variety of econometric tools (Rodrik et al, 2004). In this paper they re-emphasize their earlier argument that institutions are the primary driver of economic development in countries, and that whereas there is modest evidence for the direct effect of geography on income, this is significantly less robust than that of institutional quality. [10] These findings are in line with the other main advocates of the new institutionalist school, Acemoglu, Johnson and Robinson: in a series of paper they propose the primacy of institutions in explaining the comparative economic development, arguing repetitively that it was institutions - influenced by settler mortality, and the consequent kinds of institution that developed - that can be considered the explanatory variable in economic development (Acemoglu et al., 2001, 2002, 2005). This is similarly upheld by also the econometrically more advanced paper from Carlos Goes from the International Monetary Fund; controlling for latitude, access to sea, temperature, humidity, ruggedness, language, culture of colonizing power, and other variables he assesses not only the impact of institutions on economic growth between countries, but also the impact within countries (Goes, 2015). Doing so he finds that institutions and economic growth have a *dynamic and bi-directional relationship*, underscoring the complex relationship between institutions and economic growth.

To then understand this relationship between institutions and growth, and particularly so in Africa, it pays to return to Acemoglu et al.'s theoretical framework, complemented by the contributions from Rod Alence (2004): Acemoglu et al. propose that the main reason Africa is so

[9] They theorize this is due to the effect of the long lasting slave trade, which drove populations to safety, away from the waterways. He notes that "typically, growth regressions find that being landlocked reduces a nation's annual growth rate by around half of 1 percent", thus severely hampering growth, especially overtime (Collier, 1997).

[10] For more detailed discussion, see Rodrik et al, 2004

poor is because of the legacy of poor institutions, resulting in the negatively interacting economic and political incentives. Furthermore property rights are insecure, markets fail to function adequately, political systems are incapable of providing basic public goods, and also states are weak (Acemoglu and Robinson, 2010): due to weak institutional checks on the appropriation of public goods, patronage and corruption are fueled, simultaneously harming state capacity (Alence (2004), quoting Bayert 1993 and Ekeh 1975). Moreover, Acemoglu et al.'s proposed extractive theoretical framework of extractive political and economic institutions is further expanded by Alence, who proposes that in Africa governments often have reacted to the interests of politically threatening groups (e.g. because of ethnic-linguistic tensions, see Alesina et al. (2003)), with weak institutions thus often failing to "improve these incentives' alignment with the longer term welfare of broader constituencies" (Alence, 2004). Thus the institutional framework in Africa, grounded in colonial history and influenced by the geographic environment, is considered to be a significant driver in explaining the economic development of Africa over the past decades. While the theoretical framework thus is relatively well established - with a variety of (slightly) diverging theories having been proposed by scholars regarding the exact variable driving the persistence of institutions, the empirical evidence is far less conclusive. To assess whether institutions indeed drive economic growth and development in Africa, as well as to assess the validity of cross country analysis in generating these results this paper conducts a similar cross country assessment of African economic development, drawing on the above described literature for independent and control variables.

V. Methodology and Data

This section describes the methodological approach to the empirical analysis. After firstly describing the econometric model and quantitative approach, the data is discussed in greater detail.

V.1 Methodology

To more thoroughly understand the relationship between institutions and economic growth it is also important to include other potential determinants on growth. After all, better understanding the interaction of several potential drivers of economic growth helps identify a relationship between economic growth and the factors that influence it. Most of the papers described above that seek to understand the relationship between institutions and economic growth and use empirical data employ an econometric model. For this paper a basic version is used, which could be written as follows:

$$LnY_c = \alpha + \beta Inst_c + Control_c^{\gamma} + \epsilon_c \tag{3}$$

In this model the dependent variable Ln Y stands for the natural logarithm of GDP per capita, alpha and beta represent vectors that can be identified, and c represents the countries of the data sample. Moreover *Inst* represents the differing variables of institutions, *Control* refers to the various control variables, and the residual is interpreted as the error term. Small variants of this model are also used in this paper, replacing the independent variable with the natural logarithm of the growth rate of GDP per capita. This paper utilizes GDP per capita as the dependent variable (rather than GDP or GNI) as this allows for an identification of increases in productive capacity caused by structural improvements by accounting for the population growth. It also uses the average GDP per capita growth rate between 1999 and 2014 for all the (African) countries considered.

V.2 Measuring Institutions

"Proleptically, I would say that whether we can measure something depends, not on that thing, but on how we conceptualize it, on our knowledge of it, above all on the skill and ingenuity which we bring to bear on the process of measurement which our enquiry can put to use" The Conduct of Enquiry 1998, p.176 - Kaplan, Abraham[11]

To recall the definition from North, institutions can be defined as "the humanly devised constraints that shape human interaction" and "consequently structure incentives in human exchange" (North, 1990). Yet keeping in mind Williamsons levels of social interactions, and the fact that institutions embody 'deeper determinants' (Williamson (2000), Rodrik (2003)), it can be difficult to measure quantitatively. Regardless, institutions have been quantitatively assessed in the past, albeit through a variety of different indices and methods. This paper draws on several measures of institutions:

ICRG: the International Country's Risk Guide, created by the Political Risk Services group (PRS), used by e.g. Knauf and Kneef (1995), Sachs and Werner (1997), Rodrik (1999), Braütigam

[11]Taken from Raiser, Tommaso and Weeks, "The Measurement and Determinants of Institutional Change: Evidence from Transition Economies" (2001)

and Knack (2004) and others. It comprises 22 variables in three subcategories of risk: political, financial, and economic, with these subcategories consisting of more indices. The ICRG is composed on a monthly basis by experts of the PRS staff by allocating points to the various subcategories for each country after assessing events and actualities, on the basis of a series of pre-set questions for each risk component (ICRG, 2011). One of the advantages of this index is that data is available for a large number of countries (including African ones), for a relatively long period: 1985-2014. Importantly this paper focuses solely on *political institutions*, in order to avoid overlap and co-linearity between the independent and dependent variables, as might be the case when using the economic and financial subcategories. This paper utilizes predominantly the aggregated 12 subcategories, [12] which are (in brackets the value when aggregated):

- Government Stability - 12
- Socioeconomic Conditions - 12
- Investment Profile - 12
- Internal Conflict - 12
- External Conflict - 12
- Corruption - 6
- Military in Politics - 6
- Religious Tensions - 6
- Law and Order - 6 (Used by Rodrik et al. (2004) as the sole indicator of Institutions)
- Ethnic Tensions - 6
- Democratic Accountability - 6
- Bureaucratic Quality - 4

In this paper the ICRG is used solely for cross-country comparisons (both in aggregated form as well as separately), as is done by other literature drawing on the ICRG as a proxy for institutions. The data is taken for 2011 and 1998.

The Worldwide Governance Indicators (WGI): composed by Kaufmann, and used by Rodrik et al (2004), Alence (2004), Khan (2007) and others. Measures the governance for around 200 countries using six indicators, starting in 1996: these indicators are composed of several hundred variables, with the collected data coming from 31 different sources, including survey respondents, nongovernmental organizations, commercial business information providers, and public sector organizations worldwide (Kaufmann, Kraay, Mastruzzi (2010)). These six indicators are:

- Voice and Accountability - captures the extent to which citizens are able to participate in the selection of their government, freedom of speech as well as the freedom of the media.
- Political Stability and Absence of Violence/Terrorism - measures the stability of the government/regime, by assessing the possibility of the government being overthrown or destabilized through violence or unconstitutional means.
- Government Effectiveness - measures the quality of the public service, the civil service as well as the way government policies are planned and properly executed.
- Regulatory Quality - The extent to which the government is able to formulate and implement regulations that facilitate the thriving and development of the private sector.
- Rule of law - captures the quality, independence and enforcement of the legal framework,

[12] While the author has extensively experienced with using the seperated values, the added value of this is relatively low. The only separate subcategories used is the Rule of Law (ROL), as this was used by Rodrik et al. as the sole proxy of institutions - for results see table 8 of the appendix .

including contract enforcement, secure property rights as well as the prevalence of crime and violence.
- Control of Corruption - Captures the perception to which corruptive practices - i.e. the abuse of public resources for private gain - are present in the government and society in general.

The data from the WGI in this paper is taken for 2010 and 1998; its effect on GDP per capita as well as the average GDP per capita growth is measured.

Settler Mortality: introduced by Acemoglu, Johnson and Robinson as an instrumental variable for institutions, this variable is based on the mortality rate of European settlers in the colonies of the 19th century. The data itself has been composed by a historian (Philip Curtin), and reflects aggregated mortality rates of bishops, settlers and soldiers (both on campaign and in barracks). [13] It should be noted that for Africa in particular there is limited data available for this, with moreover a large aspect of the settler mortality of countries simply being copied from their neighboring countries (in fact of Acemoglu et al.' original sample of 64 countries, only 28 are the own source of their own mortality (Albouy, 2006). Considering this rings particularly true for Africa, this paper has used the improved settler mortality rates as introduced by Subramaniam (2007). He responded to the critique of Albouy by supplementing the original data from Acemoglu et al. with historical insurance data, finding that after doing so settler mortality still qualifies as a strong explanatory value. While this paper thus draws on both AJR and Subramaniam for settler mortality data, it's availability in Africa is still very limited; for this reason it is used only sparingly in this paper.

V.3 Control Variables

As illustrated by the literature review above, institutions are far from the only potential driver of economic growth. In order to adequately assess whether it is indeed institutions, and not another variable that drives economic growth, it is essential to include a variety of control variables to account for other potential factors that might drive economic growth, or economic development. For this paper the control variables are:

- Years of Schooling: considering the economic tendency that people with more education receive higher wages, human capital arguably can be considered an important variable in explaining increases in economic growth (Pritchett, 2001). For this paper human capital is measured as the average total years of schooling (primary, secondary or tertiary) of the whole population for the years 2010 and 1995, taken from Barro/Lee, (2012).
- Openness: as argued by Sachs and Werner, and a variety of other economic literature, integration with the world economy (implying the potential of trade) can be essential for growth (Sachs and Werner, 1997). In this model openness is measured in constant, 2005 prices, calculated by summing total exports and imports, and dividing by GDP. Taken from Penn World Tables, version 7.1, measured in constant $2005, and averaged between 1970-2007 based on data availability.
- Geography: as already established in the literature above, there is considerable literature that discusses the importance of geography for the economic growth of countries, notably Sachs in 2003. Partially inspired by his paper I utilize two measures to control for geography:

[13] As described above, Acemoglu et al. suggest that in environments where fewer European settlers died they settled in higher numbers, constructing societies with good or 'inclusive' institutions. These included checks on state power, secure property rights, and the facilitation of market-regulated exchange. Vice versa high settler mortality led in low European settler presence, and the construction of 'extractive' institutions, emphasizing mechanisms that ensured a powerful state with few checks, power concentrated in the elite and exclusive control of resources and economic organs.

- Malaria: Sub-Saharan Africa has a very high proportion of malaria cases that are falciparum malaria (the deadliest kind), with 91% of the deaths caused by malaria being in Africa in 2010 (Center for Disease and Control, 2016). Sachs (2003) and later also Rodrik et al (2004) utilize a measure of malaria risk as a proxy for geographical distance, as they argue that the usual geographical argument emphasizes the importance of several factors (climate, geographical isolation, disease environment), as well as ecological conditions. By using risk of malaria this is combined into one variable, which moreover can be considered as an instrumental variable, as it cannot be caused by low economic growth, or limited economic development (Sachs, 2003). While unable to acquire the data from Sachs, this paper uses the number of cases of Malaria, averaged over six years (1997-2003), and weighed by the average population over the same period (1997-2003). This is done to account for potentially unreported malaria cases; the years have been selected based on data availability, and averaged to account for differences between the different years. Moreover, as successful treatment percentages may differ based on the quality of the healthcare in the respective countries, this paper uses the number of cases, rather than the number of deaths. Data is taken from the World Health Organization for the Malaria cases, and the World Bank Poverty and Equity database provided the data concerning the population during that period.
- Access to sea: in economic literature access to the sea is generally considered to be of high importance for trade, as sea-based transport is significantly cheaper than land-based transport. This means that for land-locked countries it is significantly more difficult to trade or integrate with the world economy, which therefore face significant structural obstacles in realizing economic growth. To account for access to the sea this paper introduces a dummy variable for countries that are landlocked: African countries that are landlocked are marked with a '1', and countries that have access to the sea are marked with a '0'.
- Average Investment Share: this represents the per capita investment (public and privates) in 2005 constant prices. For both developing and developed countries investment remains a crucial component of economic growth, which is confirmed by a variety of empirical studies, establishing a robust relationship between investment (both human and nonhuman) and growth. For example Levine and Renelt (1992) argue that the most explanatory determinant of growth is the GDP investment share (Levine and Renelt, 1992). This is similarly argued by the model from Ghazanchyan and Stotsky (2013), although they admit that it is not sufficiently statistically significant to be considered a key determinant. Regardless it is important to include in this model, with the data taken from the Penn World Tables, version 7.1, measured in constant $2005, and averaged between 1970-2007 based on data availability.
- Natural resources as % of GDP: the presence of natural resources can have an ambiguous effect on their respective countries long term economic growth, as illustrated by the popularly termed concepts of both the *resource blessing* (e.g. extra sources of revenue for governments and countries) and the *resource curse* (Via the Dutch disease as well as the apparent increase in rent-seeking and corruption) respectively. While the exact impact of natural resources on economic growth is controversial, empirical evidence appears to indicate that there is at least some relationship - as illustrated by the remarkable growth of Equatorial Guinea for example. (Solow (2016), Shao and Yang (2014) To test for this natural resources as % of total GDP are used, with data taken from the World Bank.

V.4 Methods of Analysis

This paper utilizes several methods of data analysis. Firstly it displays the data through descriptive statistics to see if general tendencies and trends can be uncovered. This means that a concise table of variables is displayed, which is complemented by graphs to visualize some of the correlational relationships of the variables considered. The author intends to find out whether GDP per capita is correlated with either of the variables under consideration, particularly institutions (as measured by either the WGI of Kaufmann et al, or the ICRG). Yet it also seeks to establish co-linearity of the other variables, and thus whether the theoretical implications of the literature reviewed above (considering the importance of the different variables for economic growth and development) are reflected in the data. Seeing as the theoretical review is far from conclusive, this allows for further knowledge about the drivers of economic growth in sub-Saharan Africa, and whether cross country data analysis can provide for conclusive evidence.

Secondly this paper assesses the interaction of these variables more closely by using multivariate regression analysis. This allows one to understand the interrelationship between the several variables under consideration, acknowledging that they might not just influence the dependent variable under consideration (economic growth and economic development), but also each other. This is widely used in the literature described above, including Acemoglu. et al, Sachs, Rodrik et al, and others. This paper starts by combining all the variables, calculating the R and R squared values in explaining the natural logarithm of the 2013 GDP per capita, thus seeing how different countries' levels of economic development are related to the quality of their institutions, controlling for the control variables. If the results thus reveal high R squared ratios (which indicate how much of changes in the dependent variable can be explained by the independent variables, adjusted for the number of variables), with statistical significance for the institutional proxies - measured by low P-values - this would lend support to the notion that institutions influence economic growth in Africa.To adequately test for this possibility this method will be repeated for several adaptations of the data, disaggregating the proxies for institutions, measuring economic development (GDP per capita) and economic growth (changes in GDP per capita), as well as lagging the variables. The cross-sectional analysis (using all countries in Africa) is not applicable to measure changes overtime, which is a significant limitation, and will be discussed more thoroughly in the discussion.

Thus this paper uses the currently available data for Africa as a way to assess the explanatory power of cross country data analysis of institutions and economic growth. If the data reflects a positive correlation - when statistically significant - that would provide evidence to the notion that it is institutions that are an important explanatory variable for economic growth in Africa. It is however important to note that association or correlation does not mean causation: while this holds true in general for statistical research, this is particularly difficult for institutions:

- The relationship or measured correlation may suffer from reverse causality - this means that there is a possibility that rather than institutions driving economic growth, economic growth in fact drives institutions. While this partially can be addressed by using lagged variables, reverse causality is difficult to adequately measure, other than by instrumental variables (IV); unfortunately these are very difficult to uncover for institutions. While geography could be seen as an IV for many other variables, it already has a dynamic relationship with institutions; both represent 'deeper determinants', with geography likely having impacted the first establishment of institutions, as remarked by Acemoglu, Johnson and Robinson

(2002).

- Data for Africa is often missing, available for relatively short periods and of doubtful quality - in particular the consistency of the data might not be fully reliable. While this provides a difficulty, this is not unsurmountable: utilizing a variety of different proxies from sources that are also extensively used by previous research, think tanks and international organizations - reasonable reliability appears safeguarded. Yet it is good to keep this in mind, which also explains the at times low number of data entries, caused by the removal of missing variables for some countries.
- Proxies rarely perfectly measure the concepts they seek to measure; while this is the case for all variables, this may be particularly valid in the case of institutions. This will be discussed in greater detail in the discussion below.
- As noted by Docquier (2014), a misspecification bias might occur: while this paper tests for a linear relationship, this might not reflect the actual 'technology of transmission' of institutions on development (Docquier, 2014). Instead, the relationship might be more dynamic, features loops, unmeasured changes, or require the interaction of several variables.
- While this paper attempts to control for potential variables that may drive economic growth, there may always be other unobserved variables that impact both the dependent and the independent variables. This means that while this research is indicative of the importance of the values under consideration, it cannot be considered as exhaustive, or conclusive. Regardless it provides important insight into the measurable relationship between institutions and economic growth in Africa.

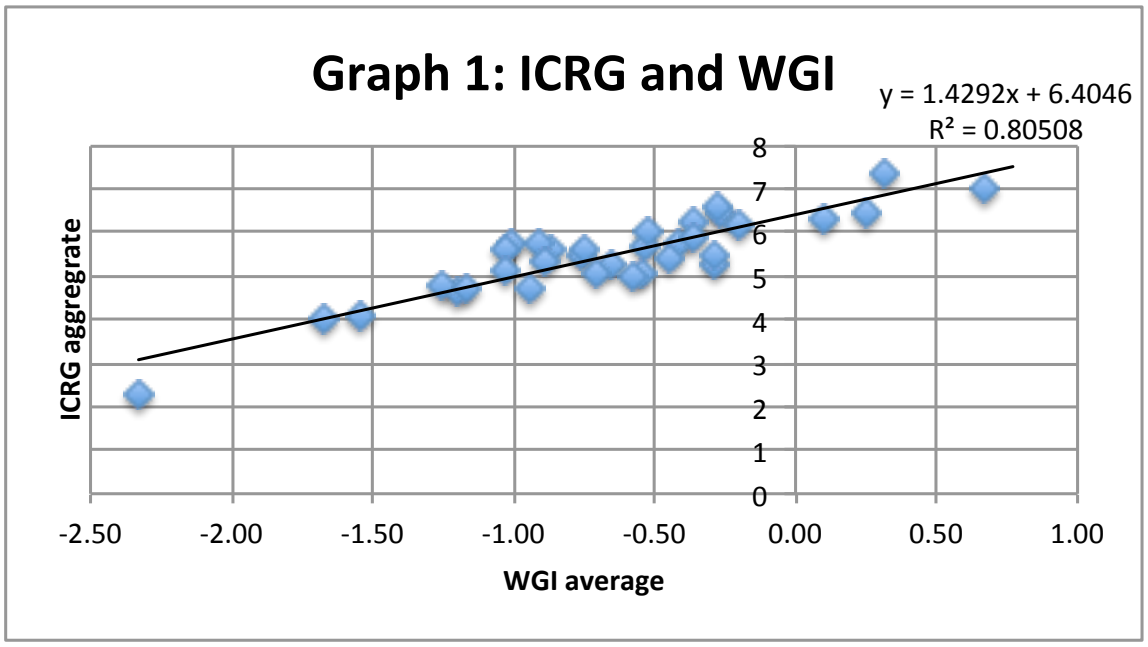
Having noted the difficulty in establishing causality, this paper thus attempts to assess the correlation between political institutions and growth, controlling for a variety of other potentially explanatory factors. The following section presents the results.

VI. Results

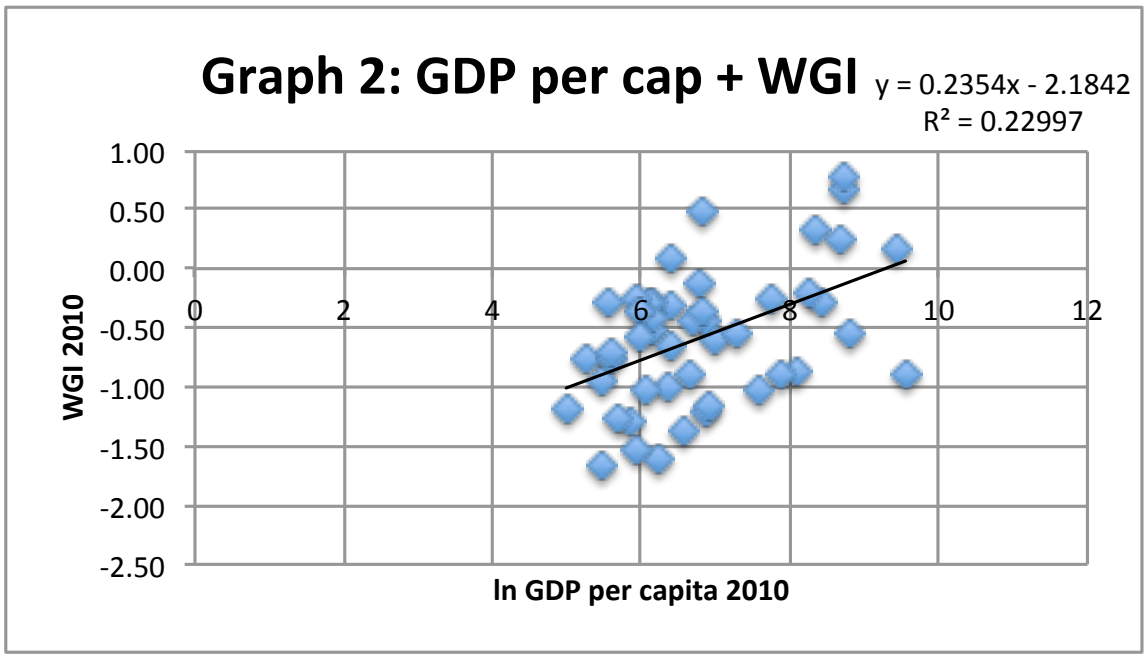
This section presents the results derived from the data as follows: firstly it presents descriptive overviews of the data under consideration, showing some simple scatter plots, collinearity as well as data summaries. Secondly it uses multivariate regression analysis to seek (statistically) significant correlations between institutions and economic development. It does so for all African countries for which data is available, using a variety of different dependent and independent variables to assess the extent to which cross-country data can really support the notion that institutions are the deeper determinant that drives economic growth.

VI.1 Data: Descriptive Statistics

Recalling the methodology section, this paper utilizes several measurements of institutions, being mainly the ICRG (composed of 12 variables) and the Worldwide Governance Indicators (composed of 6 variables), also controlling for settler mortality. These indices have been used before as proxies for institutions, with however different papers utilizing them differently. As this paper seeks to comprehend the potential impact of institutions on economic growth, it is important to first assess the relationship of these different indicators with each other, and with economic development in Africa:

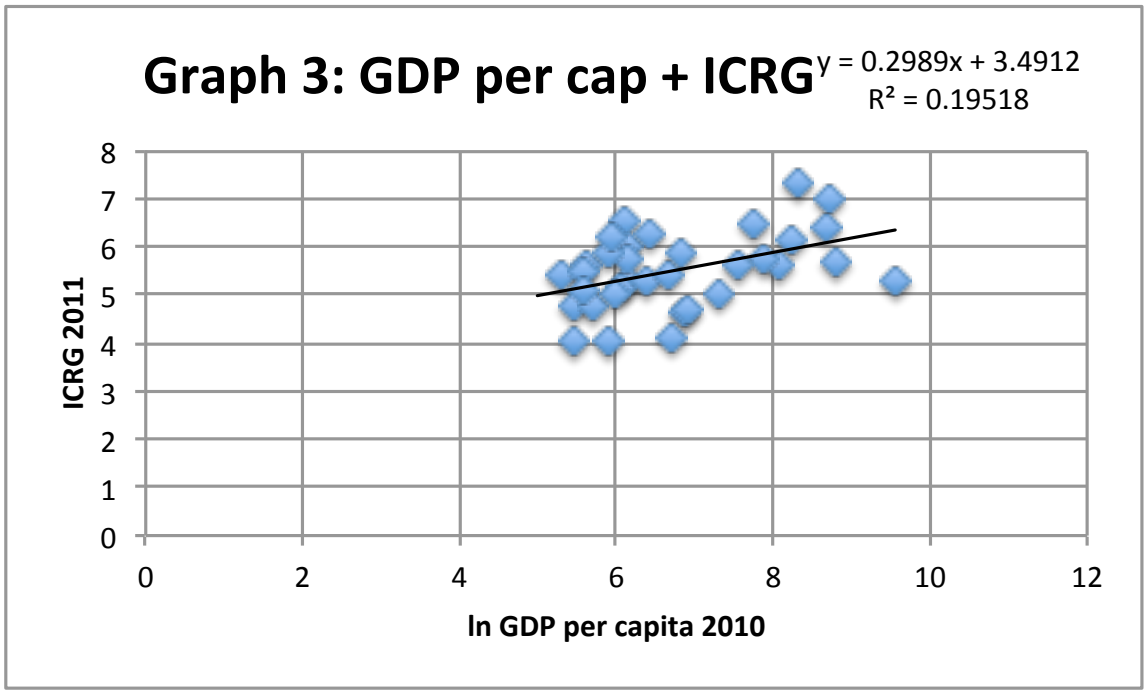


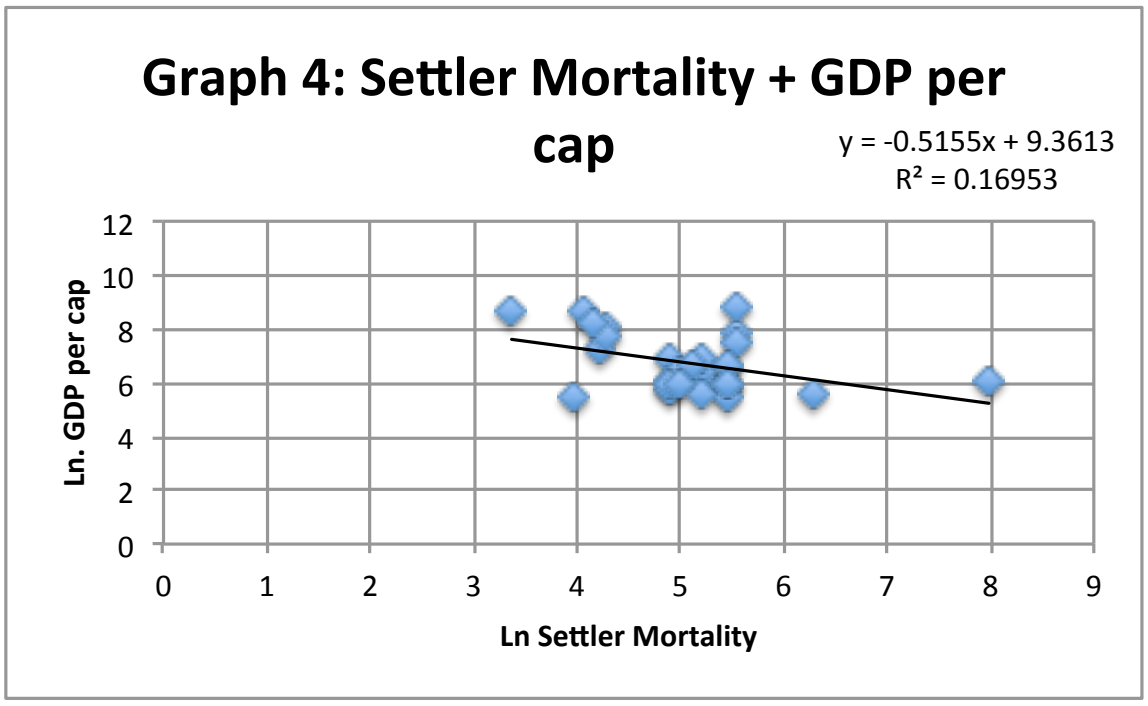
Graph 1 shows a scatterplot of the relationship between the WGI average (composed of the 6 indicators) and the ICRG aggregate (the weighted 12 variables). While the theoretical assessment of these indicators already indicated their similarity, this is also clearly reflected by graph 1: they are highly similar, evident from the high R squared and strong regression line. While this arguably indicates that either measure could be used interchangeably, the analysis of later sections does indicate that the small differences between these two indicators are significant for the results of the data analysis.



Graph 2 shows a scatterplot of GDP per capita (measured as the natural logarithm of the GDP

per capita in 2010) and the aggregate WGI index. It indicates a positive correlation between the WGI and GDP per capita, suggesting that higher levels of income are more likely to correspond to 'better' institutions as measured by the WGI. While this notion is supportive of the proposal that institutions are an important driver of economic growth, this growth fails to show whether it is institutions driving economic growth, or vice versa.





Similar to graph 2, graph 3 shows a scatterplot of another proxy of institutions - the ICRG - and GDP per capita. It shows a positive relationship between institutions and GDP per capita, with the R squared being slightly lower than that of the WGI.

Also graph 4 assesses the relationship between economic development as measured by the logarithm of GDP per capita and institutions, albeit this time proxied utilizing settler mortality as proposed by Acemoglu et al. Here the relationship between settler mortality and economic development is negative, supporting the hypothesis of Acemoglu et al. Yet the R squared is even lower than that of the other two variables (0.17 as opposed to 0.20 and 0.23), with the graph showing a congregation of variables at very similar levels. This shows what was noted before about the data from Acemoglu et al. regarding the limitation of using settler mortality data as a proxy for institutions in Africa: a considerable number of countries has the exact same settler mortality rate, having been copied from one another. This is well illustrated by the fact that The Central African Republic, Chad, The Democratic Republic of Congo, Rwanda, Sudan and Uganda all have the exact same settler mortality (236), despite using the improved variables from Subramaniam (2007). While all these countries are in Central Africa, the enormous geographical distance and considerable climatic differences make the likeliness that these variables have the exact value improbable, distorting the data. Thus while an advantage of using settler mortality as a proxy for institutional quality is that it can be considered an instrumental variable, the quality of the data is at times doubtful.

To further assess the data it is useful to also consider the correlations of the several different dependent and independent variables this paper draws upon, which are illustrated in table 1. It is important to note that these are just the correlations between two variables, without controlling or accounting for their interaction or relationship. Yet table 1 provides insight into the mechanisms and interaction of the variables under consideration:

Table"1: *Table 1: Correlations between variables*

	GDP.growth	GDPCap	ICRG	WGI	NatRes.	inves	open	HC	popMAL
GDP.growth	1	0.443	0.431	0.375	-0.137	0.085	-0.340	0.626	-0.129
GDPCap	0.443	1	0.436	0.063	0.109	0.550	0.148	0.580	-0.354
ICRG	0.431	0.436	1	0.776	-0.192	0.255	-0.027	0.175	-0.017
WGI	0.375	0.063	0.776	1	-0.430	0.065	-0.196	0.103	0.002
NatRes.	-0.137	0.109	-0.192	-0.430	1	0.090	0.773	0.147	-0.069
inves	0.085	0.550	0.255	0.065	0.090	1	0.104	0.333	-0.146
open	-0.340	0.148	-0.027	-0.196	0.773	0.104	1	0.194	-0.097
HC	0.626	0.580	0.175	0.103	0.147	0.333	0.194	1	-0.236
popMAL	-0.129	-0.354	-0.017	0.002	-0.069	-0.146	-0.097	-0.236	1
settler	-0.068	-0.391	-0.006	0.014	0.104	-0.419	-0.126	-0.504	0.387
LL	-0.084	-0.520	-0.125	0.162	-0.100	-0.208	-0.451	-0.499	0.294

Several things are noticeable from table 1 [14]; most of the correlations confirm the theoretical

[14]In this table the variables are abbreviated for aesthetics' sake. *GDP.growth* refers to the Aver-

framework, previous empirical research as well as conventional wisdom - yet interesting differences are noticeable, particularly when looking into the differences between GDP per capita growth versus the GDP per capita value of 2010. The ICRG and WGI indices are relatively strongly correlated (0.78), whereas settler mortality curiously is barely related to the other two proxies of institutions. Moreover, the differences between the proxies of institutions is again illustrated by their differing correlations with GDP per capita - whereas the importance of institutions as a driver for economic development is confirmed by the positive correlation of the ICRG (0.436), and the negative correlation of settler mortality (-0.39), the absence of any correlation between the WGI and GDP per capita economic development in 2010 is noticeable. It is furthermore interesting to note that GDP per capita is also strongly correlated to the average investment, the years of schooling as well as to geography (both negatively correlated to popMal and landlocked countries). Yet when assessing the average GDP growth, the high correlational coefficients of investment, LL, pop Malaria and also settler mortality drop significantly, with only the ICRG, WGI and HC remaining as high values. This appears to indicate that for GDP growth institutions and years of schooling are most important, whereas higher levels of GDP per capita are correlated with increased investment, and potentially that settler mortality and geography were more important historically than they are today - thus influencing current levels of economic development, but less so levels of economic growth.

While this is certainly interesting to note, it is important to mention that table 1 only shows the coefficient of correlation, but not the coefficient of determination, and also fails to account for the statistical significance of these values. This means that these values can be used as an indicator of what relationships are interesting to consider in more detail, but shouldn't be attributed too much importance. To more thoroughly assess the relationships of these variables then this paper also employs OLS via multivariate regression analysis. For further information about the data used as control variables (a data summary including the number of observation, mean, median and quartiles etc.), see Table 6 and Table 7 in the appendix.

VI.2 Multivariate Regression Analysis

Thus having assessed the correlations between the different variables employed in this research, it is now imperative to dive deeper into the drivers and causes of the economic growth and development from Africa, seeking to avoid potential spurious correlations as may have been present in the graphs or table above. This is done via a simple Ordinary Least Squared multivariate regression analysis, analyzing the role of the different variables on economic growth and development while controlling for multicollinearity.

Table 2 below shows the multivariate regression for the variables under consideration. Similar to the simple correlations displayed above in table 1, both expected and unexpected results can be noticed. Column 1 and 2 show the OLS for the variables of the WGI (average from 2010), whereas column 3 and 4 show the OLS for the variables of the ICRG (aggregate from 2011). This

age.GDP.per.cap.growth.1999.2014, *GDPCap* to lnGDPpc2010, *inves* to the average investment share of the economy between 1970 and 2007, *open* to the average openness between 1970 and 2007, *popMal* to the logorithmic value of the percentage of the population that have contracted malaria, *ICRG* to the ICRG aggregate of 2011, *WGI* to the average of 2010, *HC* to the average total number of years attended school, *settler* to the log mortality rate, and *LL* to the dummy variable of being landlocked.

is done to acknowledge that while both may be valid measures of institutions, differences do exist - exposing them allows for increased comprehension. Columns 2 and 4 show the OLS while excluding the variable of human capital and including the value of settler mortality; this is done after experimenting with the data, with the author noting the significantly decreased R squared after removing human capital from the OLS. This is the case in all multivariate regressions used here, and discussed in more detail later. It should be noted that particularly for this table the number of observations is low, limiting the usefulness of the data. Seeing as the settler data is very limited in the number of observations, drives down the total observations and does not appear statistically significant in a variety of measures, it is henceforward only sparingly included in the data analysis.

Most notable of this table then is the lack of statistical significance for any of the variables - excluding only access to the sea (i.e. not being landlocked) and the importance of schooling for GDP per capita development in 2010. This appears to indicate that human capital and access to the sea are the explanatory variables for GDP per capita in Africa, rather than institutions, or any of the other variables.

To further test for this table 3 takes the GDP per capita of 2014 as the dependent variable, rather than the GDP per capita of 2010. This is done to assess whether any of the variables involved might have a lagged impact on GDP per capita: while different lags could be taken, this paper opts to go for a 5 year lag as it allows for time to impact GDP per capita while still being sufficiently close to be conceivably related. [15] The R squared for table 3 generally increases, with also the levels of statistical significance improving for a number of the variables: the statistical significance of access to the sea has increased further, with institutions only becoming statistically significant explanatory values for economic development when education is removed from the regression. While there therefore are differences between table 3 and table 2 - notably the increased statistical significance of institutions when removing education -, these new findings do not support the notion that institutions are the main explanatory variable for economic development in Africa.

[15]Naturally this lag is arbitrary, and may be criticized on a variety of different grounds. Regardless it allows for the possibility that economic development is influenced only with a time lag, thus providing further input and insight into the relationship between institutions and economic growth, whether directly or indirectly

Table"2: *Table 2: Regression Results of Ln GDP per capita (2010)*

	Dependent variable:			
	lnGDPpc2010			
	(1)	(2)	(3)	(4)
WGI..2010.	0.248	0.597		
	(0.325)	(0.454)		
settler		−0.008		0.046
		(0.229)		(0.239)
ICRG.avg.2011			0.244	0.360
			(0.271)	(0.312)
lnmalaria	−0.029	−0.072	0.0002	−0.046
	(0.047)	(0.052)	(0.056)	(0.051)
NatRes.	−0.002	0.010	0.003	0.015
	(0.011)	(0.015)	(0.015)	(0.015)
avg.invest.share	0.035	0.039	0.037	0.043*
	(0.021)	(0.023)	(0.026)	(0.023)
avg.openness	−0.003	−0.002	−0.005	−0.010
	(0.006)	(0.010)	(0.010)	(0.012)
Landlocked	−0.934**	−0.650	−0.906*	−0.765
	(0.328)	(0.472)	(0.481)	(0.497)
Yrs.sch.2010	0.216**		0.208*	
	(0.089)		(0.109)	
Constant	5.778***	6.557***	4.463**	4.251**
	(0.620)	(1.513)	(1.800)	(1.824)
Observations	26	22	21	20
R^2	0.690	0.573	0.626	0.536
Adjusted R^2	0.569	0.360	0.425	0.265
Residual Std. Error	0.739 (df = 18)	0.746 (df = 14)	0.838 (df = 13)	0.721 (df = 12)
F Statistic	5.715*** (df = 7; 18)	2.689* (df = 7; 14)	3.109** (df = 7; 13)	1.976 (df = 7; 12)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table"3: *Table 3: Regression Results Ln GDP per capita (2014)*

	Dependent variable:			
	lnGDPpc2014			
	(1)	(2)	(3)	(4)
WGI..2010.	0.301	0.634**		
	(0.311)	(0.299)		
ICRG.avg.2011			0.245	0.442*
			(0.253)	(0.236)
lnmalaria	−0.021	−0.019	0.003	−0.027
	(0.045)	(0.048)	(0.052)	(0.054)
NatRes.	−0.001	0.001	0.004	0.007
	(0.011)	(0.011)	(0.014)	(0.014)
avg.invest.share	0.034	0.058***	0.035	0.059**
	(0.020)	(0.020)	(0.024)	(0.022)
avg.openness	−0.002	−0.003	−0.006	−0.008
	(0.006)	(0.006)	(0.010)	(0.008)
Landlocked	−0.980***	−0.916***	−0.928*	−0.766*
	(0.314)	(0.323)	(0.449)	(0.429)
Yrs.sch.2010	0.228**		0.220**	
	(0.085)		(0.102)	
Constant	5.807***	6.908***	4.561**	4.179**
	(0.594)	(0.543)	(1.680)	(1.489)
Observations	26	39	21	28
R^2	0.725	0.532	0.661	0.500
Adjusted R^2	0.617	0.445	0.479	0.357
Residual Std. Error	0.708 (df = 18)	0.868 (df = 32)	0.782 (df = 13)	0.860 (df = 21)
F Statistic	6.764*** (df = 7; 18)	6.074*** (df = 6; 32)	3.628** (df = 7; 13)	3.500** (df = 6; 21)
Note:				*p<0.1; **p<0.05; ***p<0.01

Thus table 2 and 3 indicate that it is not institutions that are important for economic development in Africa, but access to the sea and human capital. To test whether this is also the case for economic *growh* however, table 4 and 5 below use a different dependent variable: average GDP per capita growth between 1999 and 2014.[16]

Table 4 below uses the average growth rate of GDP per capita between 1999 and 2014 as the dependent variable, bringing about some noticeable changes in the results of the multivariate regression analysis.[17] First of all, in table 4 institutions appear as the variable that can explain economic *growth* in Africa, with both the WGI and the ICRG revealing high levels of statistical significance for explaining average levels of economic growth in Africa between 1999 and 2014. It is also interesting to note that in stark contrast to tables 2 and 3 access to the sea (measured via the dummy variable of landlockedness) is not statistically significant anymore for economic growth. Moreover, adapting table 2 and 3's approach in removing years of schooling from columns 2 and 4, also this statistical significance has virtually disappeared. While the R squared is rather high when education is included (particularly for column 3, 0.71), this however drops significantly when excluded, particularly for the WGI proxy. It should be noted that this lowered R squared value could also disappear due to the inclusion of significantly more variables by excluding education - the data availability for Africa for educational attainment unfortunately is rather limited. Finally, when using the ICRG as a proxy for institutions, openness is also statistically significant to the 1% level; it is however a rather weak coefficient of determination.

Thus drawing on the data analysis of table 4 it might be maintained that institutions are a strong explanatory variable for economic growth in Africa. Yet it is important to keep in mind that the proxies for institutions in table 4 are the averaged WGI of 2010, and the aggregated ICRG of 2011, and that the dependent variable is the average GDP growth between 1999 and 2014. If one were to establish a relationship between institutions and economic growth then one should take the quality of institutions *before* the actual growth occurred, rather than after. This decreases the chance of reverse causality, and is done in table 5.

[16] This is done because the WGI data is available only from 1998 onwards. While this paper initially also included a dependent variable of average GDP per capita growth between 1980 and 2014 (and only using ICRG data), the added value of this is marginal, and already reflected by table 5

[17] for table 4 the columns are separated along similar lines as in table 3

Table"4: *Table 4: Regression Results of averaged GDP per capita growth between 1999-2014 (1)*

	Dependent variable:			
	Average.GDP.per.cap.growth.1999.2014			
	(1)	(2)	(3)	(4)
WGI..2010.	2.440***	1.635**		
	(0.631)	(0.610)		
ICRG.avg.2011			1.503***	1.233***
			(0.312)	(0.417)
lnmalaria	−0.047	−0.051	−0.032	−0.050
	(0.091)	(0.098)	(0.064)	(0.096)
NatRes.	0.039*	0.036	0.056***	0.037
	(0.022)	(0.023)	(0.017)	(0.024)
avg.invest.share	0.010	−0.014	−0.048	−0.013
	(0.040)	(0.041)	(0.030)	(0.038)
avg.openness	−0.020*	−0.014	−0.058***	−0.045***
	(0.011)	(0.011)	(0.012)	(0.014)
Landlocked	−0.823	−0.251	−1.098*	−0.683
	(0.638)	(0.658)	(0.553)	(0.757)
Yrs.sch.2010	0.025		0.230*	
	(0.173)		(0.125)	
Constant	3.753***	3.410***	−3.952*	−2.052
	(1.205)	(1.105)	(2.068)	(2.629)
Observations	26	38	21	28
R^2	0.544	0.219	0.814	0.481
Adjusted R^2	0.367	0.067	0.714	0.333
Residual Std. Error	1.436 (df = 18)	1.761 (df = 31)	0.963 (df = 13)	1.519 (df = 21)
F Statistic	3.074** (df = 7; 18)	1.446 (df = 6; 31)	8.141*** (df = 7; 13)	3.247** (df = 6; 21)

Note: *p<0.1; **p<0.05; ***p<0.01

Table"5: *Table 5: Regression Results of averaged GDP per capita growth between 1999-2014 (2)*

	Dependent variable:			
	Average.GDP.per.cap.growth.1999.2014			
	(1)	(2)	(3)	(4)
WGI..1998.	1.185*	0.593		
	(0.616)	(0.555)		
settler			0.672	
			(0.715)	
ICRG.1998				0.268
				(0.440)
lnmalaria	−0.045	−0.078	−0.099	−0.014
	(0.110)	(0.106)	(0.118)	(0.115)
NatRes.	0.021	0.016	−0.012	0.028
	(0.027)	(0.024)	(0.030)	(0.034)
avg.invest.share	−0.020	−0.006	0.0004	0.007
	(0.050)	(0.045)	(0.054)	(0.044)
avg.openness	−0.013	−0.007	−0.024	−0.047**
	(0.013)	(0.012)	(0.020)	(0.019)
Landlocked	−1.146	−0.399	−1.379	−1.517
	(0.765)	(0.707)	(1.273)	(0.997)
Yrs.sch.1995	0.321		0.626*	
	(0.240)		(0.331)	
Constant	2.009*	2.426**	−2.326	3.606
	(1.109)	(1.062)	(4.472)	(2.559)
Observations	27	39	17	28
R^2	0.325	0.087	0.444	0.278
Adjusted R^2	0.077	-0.084	0.011	0.072
Residual Std. Error	1.759 (df = 19)	1.909 (df = 32)	1.657 (df = 9)	1.792 (df = 21)
F Statistic	1.308 (df = 7; 19)	0.507 (df = 6; 32)	1.026 (df = 7; 9)	1.349 (df = 6; 21)
Note:				*p<0.1; **p<0.05; ***p<0.01

Similar to Table 4, table 5 also takes the average GDP per capita growth between 1999 and 2014 as the dependent variable, with table 5 however using the WGI and the ICRG of 1998, as well as the averaged total years of schooling from 1995 as explanatory variables. Doing so the statistically significant relationship between institutions - regardless the measure - and averaged economic growth per capita disappears. Moreover the R squared values drop to negligent levels, indicating that the variables used have very little explanatory value for averaged economic growth between 1999 and 2014. These results then, the disappearance of the statistical significance as well as the lowering of the R squared levels to negligent levels, appear to indicate that for Africa cross country multi regression analysis fails to pinpoint one variable that can be considered as the explanatory factor in economic growth.

VII. Limitations and Discussion

VII.1 Limitations to data analysis

Before assessing the implications of the findings it should be noted that there are a variety of limitations to this research paper.

Firstly there are significant gaps in the data availability, limiting the validity of the statistical analysis. While this is not unexpected due to the generally limited data availability of Africa, the author has attempted to address this by utilizing a variety of different data sources, proxies and input. It however remains a limiting factor for this paper, with its implications further evaluated in the discussion and conclusion. There also is the possibility that this paper has failed to include all relevant variables - this possibility however can rarely fully be accounted for.

Secondly, the proxies used are imperfect, particularly so for the important variables, institutions and geography (e.g the % of population that is infected by malaria as a proxy for geography, rather than the risk of contracting malaria as used by Sachs). This is noted extensively by scholars more critical of New Institutional Economics, including the previously mentioned Glaeser et al and Shirley, but also by Morten Jerven. He argues that institutions as an explanatory variable for African economic development should be considered much more critically, especially in the light of the multitude of papers that attribute African economic development - or stagnation - to the 145 different explanatory variables as previously identified by Durlauf. This is discussed more thoroughly in the discussion below.

VII.2 Discussion

From the results above then several important lessons can be drawn with regard to the relationship between institutions and economic growth and development in Africa.

Firstly, while certain findings might indicate that institutions positively impact economic growth or development in Africa (e.g. table 4), the overall assessment indicates that this is highly doubtful using cross-country data as done in this paper (illustrated by tables 2, 3 and 5). The inconsistent statistical significance of the institutional proxies, combined with the low R squared indeed indicate that institutions as measured by the ICRG and WGI cannot be considered as the most important explanatory factor for economic growth - or the lack thereof - in Africa.

Secondly, while institutions as measured by the ICRG and WGI proxies appear to be correlated to levels of average levels of economic growth between 1999 and 2014, this might indicate that economic growth influences the levels of institutions rather than vice versa - at least when measured using the ICRG and WGI proxies. Moreover, for this paper the proxy of settler mortality as proposed by Acemoglu et al. fails to adequately account for economic growth or development in Africa. This may be due to the low number of observations in Africa and restrictions to the data quality - as illustrated by the large prevalence of the same value of settler mortality as noted above. Yet it appears that either institutions are no important explanatory variable for economic growth in Africa, or that the proxies for institutions are considerably flawed. While the first option is possible, this paper argues that it the second option is more likely: the proxies used for institutions here, as well as the methodological use of cross-country data are difficult to reconcile with a thorough empirical assessment of the relationship between institutions and growth.

Indeed, notwithstanding the use of both the ICRG and the WGI in a large number of other papers, including some of the most cited ones (Rodrik, Sachs and Werner, Knaufel and Kneef), both these indices have several significant flaws as proxies for institutions as conceptualized by North or Williamson. Indeed, as Shirley already noted in her assessment and critique on New Institutional Economics, the devil is in the details; she noted in an assessment of NIE that it doesn't adequately explain the institutions that actually facilitate this economic growth, how these institutions can be realized or changed, and what exactly it is about these institutions that facilitate economic development. While NIE has been significantly expanded on since then, her critique that empirical evidence assessing institutional importance for economic development is not conclusive enough still rings true, as also indicated by this paper. This is echoed also by Khan, who similarly investigates the evidence from Sachs, Rodrik and others with regard to the impact of institutions on economic growth. He argues that the statistical correlations between institutions and economic growth these scholars found are rather weak, and only relevant and statistically significant when combined with economically developed countries. He then maintains that this allows for the strong possibility of reverse causality, as he argues that the main mechanism of New Institutional Economics is the adequate functioning of the market (i.e. the facilitation of transfer through secure property rights and a well functioning exchange), which naturally functions better in more economically developed countries (Khan, 2007), findings that are similar to this paper. Moreover this paper was unable to establish a statistically significant relationship between settler mortality and economic growth in Africa; these findings are similar to other scholars' critique of settler mortality as an instrumental variable of institutional quality, notably Albouy (2006). Indeed he emphasizes that the data quality of Acemoglu et al. (2001) is insufficient, and that the relationship between settler mortality and institutional quality lacks robustness (Albouy 2006), findings supported by the OLS analysis above.

Thirdly, the results highlight the potential importance of human capital for economic development in Africa. This is noticeable not only in the tables of the descriptive analysis - showing correlations - but also from the multivariate regression analyses in tables 2 and 3. The empirical data above is suggestive of the notion that human capital is a potential driver of economic development (as illustrated by the findings from table 2 and 3), but less so for economic growth (as illustrated by the lack of statistical significance in table 5). This is naturally an interesting result to consider; possibly this can be attributed to reverse causality - after all institutions and economic development could influence the functioning of the educational system, illustrated by

the numerous cases in Africa where schools are built but insufficiently supplied and teachers are either inadequate or not available. The notion that education is important for economic development is also extensively discussed by Glaeser, La Porta, Lopez de Silanez and Shleifer (2004). They assess the role of institutions on economic growth using 3 data sets - ICRG, Kaufman et al as well as Polity IV, arguing that all 3 measure *outcomes* rather than the 'deep determinants' that are the institutions as proposed by Rodrik, North, Acemoglu et al. and others. Moreover they maintain that the multi regression analysis of these papers cannot transcend reverse causality, and that the correlation found in many ways is caused by economic growth influencing institutions, rather than vice versa. Finally, they propose that it is *initial* human capital - education - that is related to economic growth, especially when including developing countries in their OLS - as this paper has done by focusing on Africa. This notion is further expanded on by Bolt and Bezemer, who also argue that it is not institutions, but initial education (measured by school attendance in the 1950's) that influences economic growth, rather than extractive institutions. (Bolt and Bezemer 2008) Indeed, they show that human capital more adequately explains long term growth, and is more stable over time (idem, 2008). While certainly interesting, the analysis of this paper however does not provide robust results that indicate that either of these variables can be considered the main explanatory variable of economic growth in Africa - rather indicating that cross country data, especially when trying to establish linear relationships between dynamic and difficult to measure variables such as institutions and changes in economic development as measured by GDP per capita - might be problematic. Indeed, it is important to also consider other ways in which institutions might influence the dependent variables, which Przeworski also argues: in his 2014 paper he proposes that it is extremely difficult to conclusively establish what gave rise to economic growth - institutions, or the conditions that gave rise to the institutions themselves (Przeworksi, 2014). While this is true of all variables involved in cross country data analyses (notably also the emphasis on initial levels of education as raised by Glaeser et al as well as Bolt and Bezemer), the inclusion of time or change (e.g. via case studies) could result in more thorough conclusions regarding the importance of institutions on economic growth.

Another important critique on cross-sectional econometrics and its capacity to explain economic growth in Africa is made by Jerven, Pritchett and a variety of other scholars. They note that in cross country analyses all countries are considered as equal - regardless of their size, internal differences and the other simplifications this implies - converting the complexities of the real world to a simplified model, losing a lot in the process. Moreover, whereas New Institutional Economics emphasizes the persistence and stability of institutions, countries' political and economic history is characterized more by instability and multidirectional developments than persistence or stability - as well illustrated by the last 100 years of African history (Jerven 2011, Pritchett 1998). Furthermore, Echoing Khan and Glaeser et al., Jerven also maintains that when assessing for the impact of institutions on economic growth using cross country data '"is essentially explaining the outcome with an effect" (Jerven, 2011). Indeed, he maintains that for adequate explanation time and change need to be included - which could be done by focusing on countries via case studies rather than using cross country data analyyses, as illustrated by the study of Africa in this paper.

VIII. Conclusion and Recommendations

To then draw conclusions from the several sections above it is important to first recall the research question of this paper:

To what extent can cross country data analyses assess the economic growth effects of institutions in Africa?

Overall, this paper critiques the explanatory value of institutions as a driver for economic growth as currently measurable via cross-country data analysis. This is based on the data analysis above, with the results indicating that the most commonly used proxies for institutions - the ICRG, the WGI and settler mortality - are not significantly correlated to levels of economic growth in Africa. Admittedly, a noted weakness of the cross country analysis of this paper is the low number of observations, possibly limiting the validity of the results realized above. Yet while the results of this paper indeed indicate that institutions as they are currently measured are not an explanatory value for economic growth in Africa, this paper goes beyond this notion by also arguing that cross country data analysis is inherently limited as a methodology to establish such a relationship between institutions and economic growth. After all, not only does the data analysis above indicate that the institutional levels preceding economic growth do not relate to economic growth in Africa, one cannot know whether it was institutions that facilitated economic growth, or the conditions that led to the the establishment of these institutions. Moreover, cross country data analysis simplifies complex, dynamic societies to single values, glosses over internal differences, and compares small and large countries as if they were equal. This in combination with the high risk of reverse causality and the noted weaknesses of institutional proxies - arguably measuring outcomes rather than explanatory variables - significantly limit the extent to which cross country analyses of growth in Africa using cross country data analysis can provide robust results.

While these limitation potentially similarly apply to applications of cross-country studies that employ other variables, the limitations of this method for establishing a link between economic growth and institutions is particularly valid because of the conceptualization of institutions as partly endogenous and partly exogenous. Indeed, whereas institutions are portrayed as persistent and stable over time, economic growth is characterized by instability - thus inherently complicating this relationship. Indeed, conceptualizing institutions along the lines of the second and third levels of social analysis as proposed by Williamson complicates efforts of measuring institutions, confounding outcomes with those of explanatory variables. For institutions to adequately account for (changing) levels of economic growth then, change needs to be assessed more closely. To a limited extent this has been done by Acemoglu et al., North et al, and also Greiff and Laitin (2004) - who developed a rather interesting model to incorporate exogenous shocks into endogenous systems. Yet these theories fail to adequately account for measurements of changes in institutions. Accounting for this change in the underlying institutional framework remains restricted to case studies of individual countries, highlighting the difficulty of using cross-country data analysis for this.

It should be noted that this paper does not claim that cross country data analyses are not useful, or should not be used whatsoever - rather they should be carefully applied, and particularly hesitantly employed to establish the importance of institutions for facilitating economic growth.

Moreover this paper does not claim that institutions cannot influence economic development - it argues that institutions, as they are currently conceptualized, are difficult to measure, with cross country data analysis being a limited method to establish any such relationship.

Thus this paper contributes to the existing literature by critically assessing the cross country results of the papers that claim institutions can be considered the explanatory variable for economic growth; while this may depend on the variables included or in the way these variables are proxied, cross country data analysis itself is limited in explaining levels of economic growth. The main recommendation of this research paper then is to seek variables, potential proxies or other indicators that correspond to lagged changing levels of economic growth: if New Institutional Economics indeed fully explains levels of economic growth, or the economic development of a country, changes in the growth or development should have been preceded by (semi-structural) changes in the institutional framework. It is then up to future research to see whether this can be done in ways other than cross country data analyses.

References

[1] Total natural resources rents (% of GDP) | Data | Table.

[2] Africa's impressive growth. *The Economist*, January 2011.

[3] Berhanu Abegaz. Aid, accountability and institution building in Ethiopia: the self-limiting nature of technocratic aid. *Third World Quarterly*, 36(7):1382–1403, July 2015.

[4] Moses Abramovitz. Resource and Output Trends in the U.S. since 1870. *American Economic Review*, 46(2):5–23, May 1956.

[5] Daron Acemoglu, Simon Johnson, and James Robinson. The rise of Europe: Atlantic trade, institutional change, and economic growth. *American economic review*, pages 546–579, 2005.

[6] Daron Acemoglu, Simon Johnson, and James"A. Robinson. Institutions as a fundamental cause of long-run growth. *Handbook of economic growth*, 1:385–472, 2005.

[7] David"Y. Albouy. The colonial origins of comparative development: an investigation of the settler mortality data. Technical report, National Bureau of Economic Research, 2008.

[8] Rod Alence. Political institutions and developmental governance in sub-Saharan Africa. *The Journal of Modern African Studies*, 42(2):163–187, June 2004.

[9] Alberto Alesina, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. Fractionalization. *Journal of Economic growth*, 8(2):155–194, 2003.

[10] Oleg Badunenko, Daniel"J. Henderson, and Romain Houssa. Significant drivers of growth in Africa. *Journal of Productivity Analysis*, 42(3):339–354, December 2014.

[11] Mina Baliamoune-Lutz. DO INSTITUTIONS AND SOCIAL COHESION ENHANCE THE EFFECTIVENESS OF AID? NEW EVIDENCE FROM AFRICA. *Journal of International Commerce, Economics and Policy*, 03(01):1240003, February 2012.

[12] Pranab Bardhan. Institutions matter, but which ones? *Economics of transition*, 13(3):499–532, 2005.

[13] Robert"J. Barro and Jong"Wha Lee. A new data set of educational attainment in the world, 1950âĂŞ2010. *Journal of Development Economics*, 104:184–198, September 2013.

[14] Thorsten Beck and Luc Laeven. Institution building and growth in transition economies. *World bank policy research working paper*, (3657), 2005.

[15] Niclas Berggren, Andreas Bergh, and Christian Bjornskov. The Growth Effects of Institutional Quality, Instability and Change.

[16] Niclas Berggren, Andreas Bergh, Christian Bjornskov, and Svenska institutet fÃűr europapolitiska studier (SIEPS) (Stockholm). *Institutions, policies and growth in Europe: quality versus stability*. Swedish Institute for European Policy Studies (SIEPS), Stockholm, 2013.

[17] Jutta Bolt and Dirk Bezemer. Understanding long-run African growth: colonial institutions or colonial education? *Journal of development studies*, 45(1):24–54, 2009.

[18] Jutta Bolt and Jan"Luiten van Zanden. The Maddison Project: collaborative research on historical national accounts. *The Economic History Review*, 67 (3):627–651.

[19] Laura"Obreja Bracoveanu and others. Correlation between government and economic growth-specific features for 10 Nms. *Journal of Knowledge Management, Economics and Information Technology*, 2(5), 2012.

[20] DeborahÂăA. Brautigam and Stephen Knack. Foreign Aid, Institutions, and Governance in SubâĂŘSaharan Africa*. *Economic Development and Cultural Change*, 52(2):255–285, January 2004.

[21] Paul Collier and Jan"Willem Gunning. Why has Africa grown slowly? *The Journal of Economic Perspectives*, 13(3):3–22, 1999.

[22] Nicholas Crafts. Solow and Growth Accounting: A Perspective from Quantitative Economic History. *History of Political Economy*, 41:200–220, 2009.

[23] Olaf"J. De"Groot. Spillovers of Institutional Change in Africa. *Kyklos*, 64(3):410–426, 2011.

[24] Frederic Docquier. Identifying the effect of institutions on economic growth. In *Institutional Competition between Common Law and Civil Law*, pages 25–40. Springer, 2014.

[25] Steven"N. Durlauf, Paul"A. Johnson, and Jonathan"RW Temple. Growth econometrics. *Handbook of economic growth*, 1:555–677, 2005.

[26] P.B. Eregha and Ekundayo"Peter Mesagan. Oil resource abundance, institutions and growth: Evidence from oil producing African countries. *Journal of Policy Modeling*, March 2016.

[27] Jan Fagerberg and Bart Verspagen. Technology-gaps, innovation-diffusion and transformation: an evolutionary interpretation. *Research Policy*, 31(8):1291–1304, 2002.

[28] Ana"Margarida Fernandes and Aart"C. Kraay. Property Rights Institutions, ty Rights Institutions, Contracting Institutions and Growth in South Asia Macro and Micro Evidence. *Growth and Regional Integration*, page"80.

[29] Augustin"Kwasi Fosu. Political instability and economic growth: evidence from Sub-Saharan Africa. *Economic Development and Cultural Change*, 40(4):829–841, 1992.

[30] Manuk Ghazanchyan and Janet"Gale Stotsky. Drivers of growth: Evidence from sub-Saharan African countries. 2013.

[31] Edward"L. Glaeser, Rafael La"Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. Do institutions cause growth? *Journal of economic Growth*, 9(3):271–303, 2004.

[32] Avner Greif and David"D. Laitin. A theory of endogenous institutional change. *American Political Science Review*, 98(04):633–652, 2004.

[33] Carlos GÃşes. Institutions and growth: A GMM/IV Panel VAR approach. *Economics Letters*, 138:85–91, January 2016.

[34] Robert Hall and Charles Jones. Why do some countries produce so much more output per worker than others? *Stanford University*, Version 4.0, March 1998.

[35] Leander Heldring and James"A. Robinson. Colonialism and economic development in Africa. Technical report, National Bureau of Economic Research, 2012.

[36] Marek Hlavac. Stargazer: Well Formatted Regression and Summary Statistics Tables. R package version 5.2.

[37] Llewellyn"D. Howell. International country risk guide methodology. *East Syracuse, NY: PRS Group*, 2011.

[38] Morten Jerven. The quest for the African dummy: explaining African post-colonial economic performance revisited. *Journal of International Development*, 23(2):288–307, March 2011.

[39] SIMON JOHNSON and JAMES"A. ROBINSON. REVERSAL OF FORTUNE: GEOGRAPHY AND INSTITUTIONS IN THE MAKING OF THE MODERN WORLD INCOME DISTRIBUTION* DARON ACEMOGLU. *Technology*, 1231, 2002.

[40] Daniel Kaufmann, Aart Kraay, and Massimo Mastruzzi. The worldwide governance indicators: methodology and analytical issues. *Hague Journal on the Rule of Law*, 3(02):220–246, 2011.

[41] Mushtaq Khan. Governance, economic growth and development since the 1960s. 2007.

[42] Robert King and Ross Levine. Finance and Growth: Schumpeter might be right. *Quarterly Journal of Economics*, 1993.

[43] Stephen Knack and Philip Keefer. Institutions and economic performance: cross-country tests using alternative institutional measures. *Economics & Politics*, 7(3):207–227, 1995.

[44] Bart Kosko. Fuzzy cognitive maps. *International Journal of man-machine studies*, 24(1):65–75, 1986.

[45] Todd"J. Moss, Gunilla Pettersson, and Nicolas Van"de Walle. An aid-institutions paradox? A review essay on aid dependency and state building in sub-Saharan Africa. *Center for Global Development working paper*, (74):11–05, 2006.

[46] Y"Mulugetta. Human capacity and institutional development towards a sustainable energy future in Ethiopia. *Renewable and Sustainable Energy Reviews*, 12(5):1435–1450, June 2008.

[47] Douglass"C. North. qInstitutionsr. *Journal of Economic Perspec*, 1991.

[48] Douglass“C. North. *Limited access orders in the developing world: A new approach to the problems of development*, volume 4359. World Bank Publications, 2007.

[49] Nathan Nunn and Diego Puga. Ruggedness: The blessing of bad geography in Africa. *Review of Economics and Statistics*, 94(1):20–36, 2012.

[50] CDC-Centers for Disease Control”and Prevention. CDC - Malaria - Malaria Worldwide - Impact of Malaria.

[51] Lant Pritchett. Where has all the educatino gone? *The World Bank Economic Review*, Volume 15, No 3:367–391, 2001.

[52] Adam Przeworski. Democracy and economic development. *Mansfield & R. Sisson (Eds.), The evolution of political knowledge. democracy, autonomy, and conflict in comparative and international politics*, pages 300–324, 2004.

[53] Adam Przeworski. Institutions Matter? 1. *Government and opposition*, 39(4):527–540, 2004.

[54] Martin Raiser, Maria Tommaso, and Melvyn Weeks. The measurments and determinants of institutional Change; Evidence from Transition Economies. *European bank for Reconstruction and Development*, Working Paper no. 60, February 2001.

[55] Danielle Resnick and Nicolas van“de Walle, editors. *Democratic Trajectories in Africa: Unravelling the Impact of Foreign Aid*. Oxford University Press, October 2013.

[56] Dani Rodrik, Arvind Subramanian, and Francesco Trebbi. Institutions rule: the primacy of institutions over geography and integration in economic development. *Journal of economic growth*, 9(2):131–165, 2004.

[57] Jeffrey”D. Sachs. Institutions don’t rule: direct effects of geography on per capita income. Technical report, National Bureau of Economic Research, 2003.

[58] Jeffrey“D. Sachs, Stephen”A. O’Connell, John“W McARTHUR, and Guido SHmidt-Traub. Ending Africa’s Poverty Trap. *Brookings papers on economic activity*, 2004(1):217–230, 2004.

[59] Jeffrey”D. Sachs and Andrew“M. Warner. Sources of slow growth in African economies. *Journal of African economies*, 6(3):335–376, 1997.

[60] Shuai Shao and Lili Yang. Natural resource dependence, human capital accumulation, and economic growth: A combined explanation for the resource curse and the resource blessing. *Energy Policy*, 74:632–642, November 2014.

[61] Mary”M. Shirley. *Institutions and development*. Springer, 2005.

[62] Eyerusalem“G. Siba. Determinants of institutional quality in Sub-Saharan African countries. *rapport nr.: Working Papers in Economics 310*, 2008.

[63] Robert”M. Solow. Resources and Economic Growth. *The American Economist*, 61(1):52–60, 2016.

[64] A.“South. Overall fiscal balance FIGURE 2.34.

[65] Karti Subramanian. The Colonial Origins of Comparative Develompent: New Settler Mortality Data. *Department of Economics, University College. Cork, Ireland. Jannuary*, 2007.

[66] Amor Tahari, Bernardin Akitoby, and Emmanuel"Brou Aka. Sources of Growth in Sub-Saharan Africa. 2004.

[67] Oliver"E. Williamson. The new institutional economics: taking stock, looking ahead. *Journal of economic literature*, pages 595–613, 2000.

IX. APPENDIX

Table"6: *Table 6: Summary results of statistics*

ln.GDP.per.cap	avg.GDP.growth.1970.2007	ICRG.avg.2013	Kaufmann.avg	NatRes.
Min. :5.480	Min. :-3.5181	Min. :3.010	Min. :-2.2900	Min. : 0.00469
1st Qu.:6.406	1st Qu.:-0.1796	1st Qu.:4.800	1st Qu.:-1.0500	1st Qu.: 4.71532
Median :6.958	Median : 0.9448	Median :5.285	Median :-0.6300	Median :10.67032
Mean :7.261	Mean : 1.0942	Mean :5.296	Mean :-0.6512	Mean :16.20086
3rd Qu.:8.073	3rd Qu.: 2.0416	3rd Qu.:5.795	3rd Qu.:-0.3400	3rd Qu.:21.56361
Max. :9.976	Max. : 9.7923	Max. :7.130	Max. : 0.8300	Max. :69.39654

Table"7: *Table 7: Summary of descriptive statistics*

Pop.malaria	avg.invest.share	avg.openness	Landlocked	hc.2007
Min. :0.00000	Min. : 3.675	Min. : 4.278	Min. :0.0000	Min. :1.217
1st Qu.:0.01497	1st Qu.: 7.587	1st Qu.: 51.080	1st Qu.:0.0000	1st Qu.:1.643
Median :0.06816	Median :11.609	Median : 67.698	Median :0.0000	Median :1.921
Mean :0.09316	Mean :12.957	Mean : 72.710	Mean :0.2885	Mean :1.942
3rd Qu.:0.14613	3rd Qu.:17.053	3rd Qu.: 91.363	3rd Qu.:1.0000	3rd Qu.:2.208
Max. :0.37333	Max. :41.247	Max. :161.267	Max. :1.0000	Max. :2.797

Table"8: *Table 8: Regression Results using Rule of Law*

	Dependent variable:			
	lnGDPpc2010			
	(1)	(2)	(3)	(4)
ROL	0.272	0.430		
	(0.297)	(0.458)		
settler		0.005		0.046
		(0.236)		(0.239)
ICRG.avg.2011			0.244	0.360
			(0.271)	(0.312)
lnmalaria	−0.020	−0.064	0.0002	−0.046
	(0.048)	(0.057)	(0.056)	(0.051)
NatRes.	−0.002	0.006	0.003	0.015
	(0.011)	(0.016)	(0.015)	(0.015)
avg.invest.share	0.035	0.039	0.037	0.043*
	(0.021)	(0.024)	(0.026)	(0.023)
avg.openness	−0.003	−0.0003	−0.005	−0.010
	(0.006)	(0.011)	(0.010)	(0.012)
Landlocked	−0.952***	−0.666	−0.906*	−0.765
	(0.324)	(0.524)	(0.481)	(0.497)
Yrs.sch.2010	0.217**		0.208*	
	(0.088)		(0.109)	
Constant	5.829***	6.322***	4.463**	4.251**
	(0.619)	(1.552)	(1.800)	(1.824)
Observations	26	22	21	20
R^2	0.694	0.549	0.626	0.536
Adjusted R^2	0.575	0.324	0.425	0.265
Residual Std. Error	0.734 (df = 18)	0.767 (df = 14)	0.838 (df = 13)	0.721 (df = 12)
F Statistic	5.828*** (df = 7; 18)	2.436* (df = 7; 14)	3.109** (df = 7; 13)	1.976 (df = 7; 12)

Note: *p<0.1; **p<0.05; ***p<0.01