

Governance and Growth: Additional Evidence from Africa

By

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Abstract

The influence of governance on the growth performance of nations has attracted the interest of researchers in recent times. This paper adds to this branch of literature by examining the linkage between a different measure of governance provided by the Mo Ibrahim index and growth in Africa. A panel data consisting of 53 countries over a 9-year period was used, and pooled regression, fixed effects and random effects estimation techniques were employed. The results reconfirm the position that governance matters for growth. Human development and sustainable economic opportunities are found to matter most among the four components of the Mo Ibrahim governance index. Hence, for African countries to make significant progress in economic performance, sufficient improvement in the Mo Ibrahim governance indicators is imperative.

Key words: governance, economic growth, fixed effects, random effects

1. Introduction

Over the years, in solving the problem of poverty and poor economic growth of developing nations, a lot of emphasis has been placed on the use of basic economic approaches such as the neoclassical and endogenous growth theories. Unfortunately, such approaches have been unsatisfactory in explaining why some countries (such as Zimbabwe, Chad and Somalia) have fallen drastically behind, while others (such as Botswana and Mauritius) have grown faster than others within the same Sub-Saharan African region. To further buttress this, using the neoclassical Solow growth model in cross-country studies, several researchers such as Barro (1997), Sala-I Matin (1997), and Bloom and Sachs (1998) found negative and significant African dummies. Also, Easterly and Levine (2002) came to the conclusion that some other factors different from capital accumulation as suggested by neoclassical growth theory is responsible for growth differences across nations. The suspected implication of this is that a vital component necessary for economic growth has been ignored by such basic economic approaches.

Over the past two decades, the inadequacy of the neoclassical theories has led to a gradual transition from the prescription and application of basic optimal economic policies towards a broader and more encompassing approach with emphasis on the interplay of socio-culture, economics, institutions and politics in addressing the developmental challenges of developing nations in general and Africa in particular. This led to the emergence of various schools of thought on economic growth such as the geography thesis. The geography literature emphasizes the importance of climatic/geographical factors and demography on economic performance. Prominent studies in this area are Fernand (1995), Sachs and Warner (1997), David (1998), and Gallup, Fernanda and Sachs (1998), among others. The paper by Bloom and Sachs (1998) summarized the geography-growth thesis. Bloom and Sachs argued that Africa's poor economic performance is accounted for by its extraordinarily disadvantageous geography. First, the tropical climate poses serious problems particularly to agriculture, such as low photosynthetic potential, high evapotranspiration, low and variable rainfall, highly weathered soils, veterinary diseases and plant and animal pests. Second, the natural environment exposes people to many endemic vector-borne infectious diseases (see Gallup and Sachs [1998] on the impact of malaria on growth). Third, the location of the region puts it at a disadvantage in terms of transport costs. This is due to the great distance from major world markets in the northern

mid-latitudes. And finally, demographic factors that constrain growth in Africa include low population density, low urbanization, ethnic diversity and delayed demographic transition.

Another popular school of thought is the cultural and historical thesis which argues that Africa is put at a disadvantage by its cultural and historical antecedents (Greif, 1994, 1998). There is also the trade thesis and the institutions, policy and governance thesis. The literature on institutions, policy and governance is gaining more prominence (see North, 1992; Hall and Jones, 1999; Rodrick, 2000; Persson, 2002; Abdiweli, 2003; Acemoglu, Johnson and Robinson, 2004; Rodrik, Subramanian and Trebbi, 2004).

Following a similar direction, this paper gives special focus to the place of governance in the economic development of LDCs. While some authors such as Kurtz and Shrank¹ (2007a, 2007b) have argued that there is no enough evidence to show that good governance drives economic growth, the bulk of available literature seems to suggest otherwise; that is, good governance has a positive impact on economic growth (see for example, Ndulu and O'Connell, 1999; Olson, Sarna and Swamy, 2000; Knack, 2002; Gradstein, 2004; Kaufmann, Kraay and Mastruzzi, 2007; Persson and Tabellini, 2009). Knack and Keefer (1995) found that one standard deviation increase in governance indicators would lead to 1.2% points increase in annual growth rate of per capita income. Alesina and Perotti (1996) found that political instability lowers investment in an economy. Globerman and Shapiro (2002) found that quality of governance significantly affects inflows and outflows of foreign direct investment. Scholars such as Hall and Jones (1999), Kaufmann, Kraay and Zoido-Lobato (1999), and Gradstein (2004) all found positive relationships between governance and growth. Therefore, this paper attempts to evaluate the relationship between quality of governance and economic performance from a strictly African perspective. The paper aims at empirically investigating if there is in actual fact a positive relationship between governance and growth, using perhaps for the first time a unique set of indicators specially designed for Africa as provided by the Mo Ibrahim index (subsequently referred to as MOI). In addition to being a wholly African index, the MOI has been able to capture more indicators of governance (it uses 84 indicators grouped into four broad categories—safety and rule of law, participation and human rights, sustainable economic opportunity, and human development) than any other known index of governance, including the World Bank governance indicators.

¹ The argument is actually based on the lack of proper measures of governance not that governance do not matter

Another reason why the MOI is unique is that a particular year's index reflects data from the preceding 2 years, this ensures the greatest possible accuracy. The use of this time-lag makes it more comprehensive than most of the other available indexes.

Thus, this paper provides answers to the following questions; (i) Does the quality of governance really influence the economic performance of nations, specifically that of African nations? (ii) If it does, then what aspect(s) of governance makes the difference in economic performance of African nations i.e. is it safety/rule of law, participation/human rights, sustainable economic opportunity or human development? The quest to answer these questions has consequently led to the following specific objectives:

1. To examine the impact of quality of governance on the economic performance of African nations.
2. To examine the component(s) of governance that has the most significant influence on the economic performance of African nations.

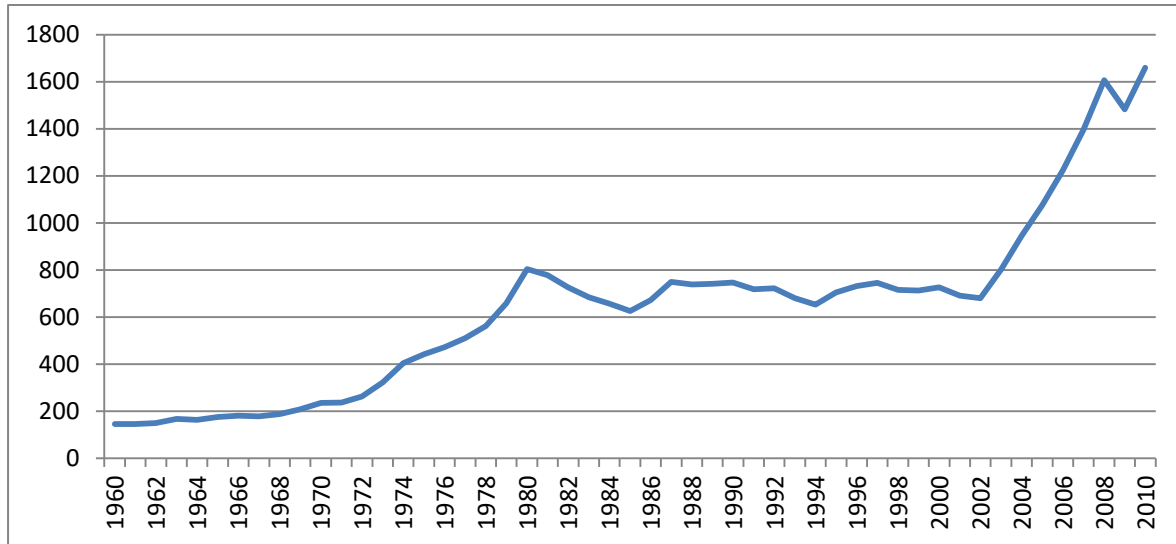
This paper is arranged thus; section one introduces the issues, section two gives an overview of the economic performance and governance across Africa, section three presents the theoretical framework, section four consists of the empirical model, nature and sources of data and estimation techniques, section five presents the empirical results, while section six concludes the paper.

2.1 Economic Performance in Africa

The general measure of economic performance is income per person in an economy over a period of time. Thus, the GDP per capita in current US dollar and growth rate of GDP per capita of Africa are displayed in figures 2.1a and 2.1b. The continent experienced rapid growth of per capita income in the 1970s till late 1970s when there was decline. This decline persisted till the early 2000s when the continent recorded rapid growth. In 2008 to 2009, there was a fall in per capita income, which may be the effect of the global economic downturn. As at 2010, the per capita GDP of Africa stood at about US\$1659.48 which is a significant improvement over previous values. From figure 2.1b, it is clear that Africa's growth is highly volatile. There was sharp growth increase immediately after independence of many countries in the early 1960s. The continent reached its growth peak of about 6.01 in 1963, after which it declined to -0.86 in 1966. There was growth recovery in the 70s till the

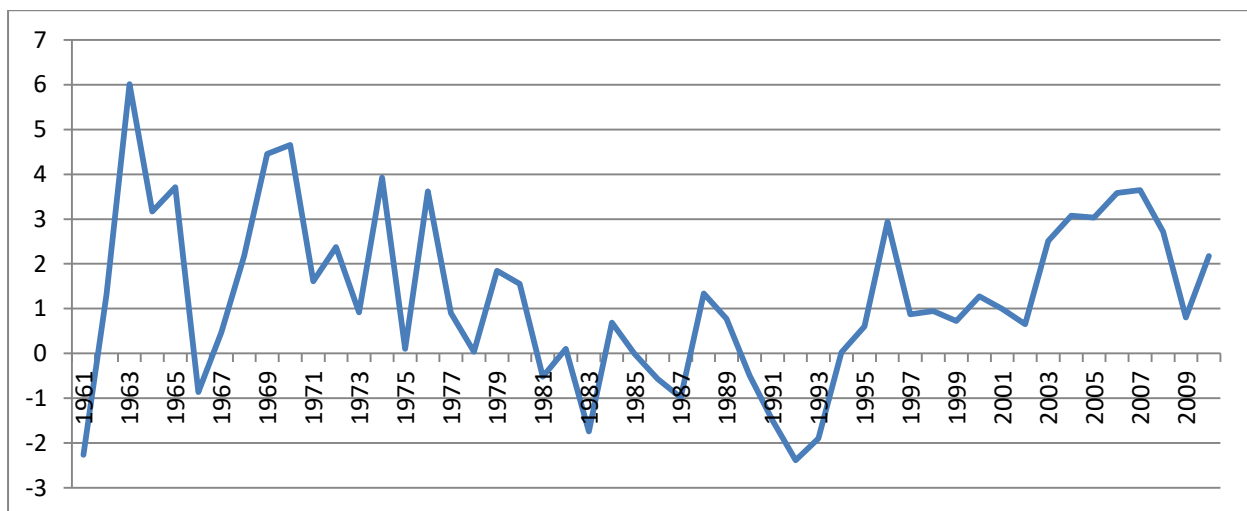
80s when it became mostly negative. The negative growth persisted till the mid-1990s when it picked up once again.

Figure 2.1a Per Capita GDP in Africa, 1960 – 2010, (in current US\$)



Source: Constructed by authors from Africa Development Indicator (ADI), 2011

Figure 2.1b Per Capita GDP Growth in Africa, 1961 – 2010, (in current US\$)

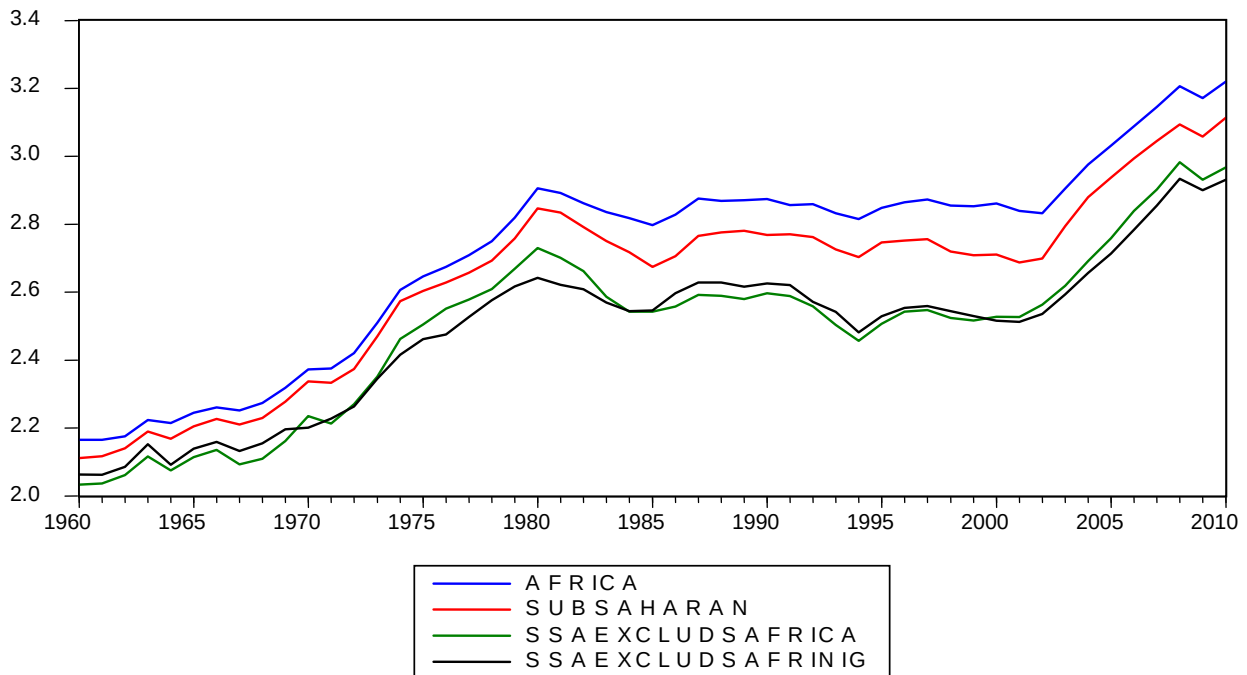


Source: Constructed by authors from Africa Development Indicator (ADI), 2011

Figure 2.2 presents the trend of GDP per capita for the entire continent and sub-Saharan Africa (SSA), a subset of the continent. The continent is made of about 53 countries, while SSA is the entire Africa minus North African countries. As shown in figure 2.2, the economic performance of SSA is below that of the whole continent. This reveals the fact that North African countries are relatively doing better than their sub-Saharan counterparts. If South

Africa is removed from the SSA sample, the per capita income becomes even lower, but if Nigeria is removed from the sample, no difference is made. South Africa is therefore the economic giant of SSA, while Nigeria is the most populous.

Figure 2.2 Per Capita GDP in Africa and SSA, 1960 to 2010, (in current US\$)



Source: Constructed by authors from Africa Development Indicator (ADI), 2011

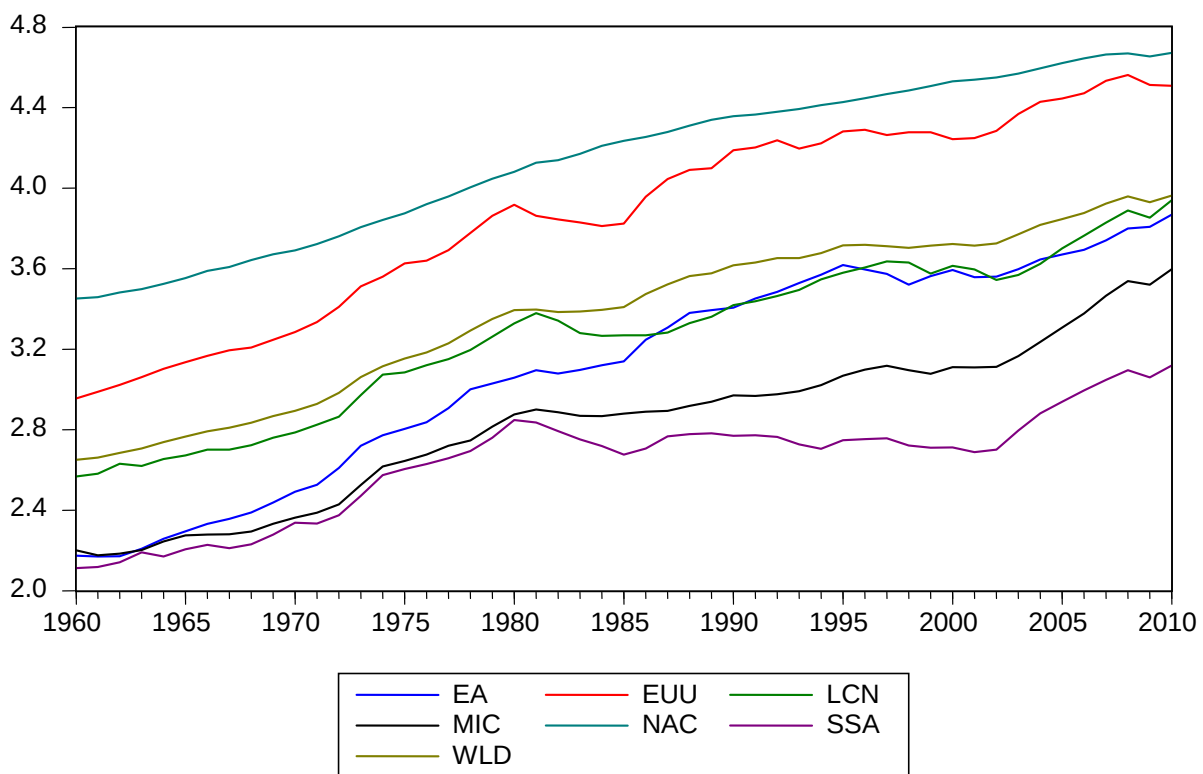
Africa presents Total Africa, SUBSAHARAN is Sub-Sahara Africa, SSAEXCLUDSAFRICA is Sub-Sahara Africa excluding South Africa, SSAEXCLUDSAFRINIG is Sub-Sahara Africa excluding South Africa and Nigeria.

2.2 Juxtaposition of Africa and the Rest of the World

Figure 2.3 depicts the juxtaposition of Africa's economic performance with the rest of the world over the period 1960 to 2010. The figure presents the log of per capita income (PCI) of different regions of the world and world average from 1960 to 2010. EA stands for East Asia, EUU is European Union, LCN is Latin America and the Caribbean, MIC is Middle Income Countries, NAC is North America, SSA is sub-Saharan Africa and WLD is the World average. North America is the richest region over the entire five-decade period considered in the figure. Europe narrowed its income gap with North America in the mid-1970s and today, its per capita income stands closely to that of North America. Europe is the second richest region of the world throughout the entire fifty-year period. The per capita income of these two regions stand above the world average. In other words, these two regions are on the

average richer than the rest of the world. Latin America and the Caribbean is the third richest region of the world and had per capita income very close to the world average income. Interestingly, EA, MIC and SSA started at similar income levels in the 1960s. Though East Asia grew faster, the three regions experienced income growth from 1960 to the early 1980s. SSA experienced fall in per capita income in the early 80s and stagnated for two decades. In the period 1985 to 2000s, East Asia grew even faster to converge with Latin America and the World average. SSA began to record some progress in the last decade, however, it still remains the poorest region in the world.

Figure 2.3: Log of Per Capita GDP of different Regions



Source: Constructed by authors from World Development Indicator (ADI), 2011

2.3 Countries' Performance in the Mo Ibrahim Governance Index

As mentioned earlier, the Mo Ibrahim governance index is a measure of quality of governance of Africa countries compiled by Mo Ibrahim Foundation. The index has a minimum score of 0 and a maximum of 100, fifty is the half of the maximum score. Table 1 ranks the nine-year average of the index. Twenty-four countries in the continent scored fifty and above, fourteen countries scored between forty and forty nine, while fifteen countries scored below forty. Coincidentally, countries that have high scores are countries at the top

stratum of economic performance ladder in the continent, and countries with low scores occupy the bottom echelon.

Table 1: Quality of Governance across Africa

High Governance Quality		Middle Governance Quality		Low Governance Quality	
Mauritius	79.4979	Uganda	49.88665	Guinea-Bissau	38.5534
Seychelles	75.75327	Burkina Faso	49.78092	Togo	38.47447
Botswana	75.32779	Gabon	49.6117	Congo, Republic of	38.27803
Cape Verde	73.06445	Swaziland	47.89317	Guinea	37.81202
South Africa	71.82023	Mauritania	47.31198	Cote d'Ivoire	36.24872
Namibia	67.69397	Comoros	47.29175	Eritrea	35.99789
Tunisia	62.61545	Djibouti	46.38024	Zimbabwe	34.13102
Ghana	62.04893	Rwanda	46.37105	Liberia	33.26461
Lesotho	57.88101	Ethiopia	42.85658	Equatorial Guinea	32.68417
Egypt	56.26486	Cameroon	42.44009	Sudan	32.29886
Senegal	56.22631	Sierra Leone	41.98094	Angola	30.61354
Sao Tome and Principe	55.96216	Niger	41.66539	Chad	30.46377
Morocco	55.93408	Nigeria	41.65897	Central African Rep.	29.69993
Benin	55.19431	Burundi	40.51461	Congo, Dem. Rep.	29.02204
Algeria	54.51943			Somalia	9.50104
Madagascar	54.29526				
Gambia, The	54.15496				
Tanzania	53.21567				
Mozambique	52.37251				
Zambia	51.94595				
Kenya	51.59424				
Mali	50.93567				
Libya	50.47029				
Malawi	50.0065				

Source: computed by authors from the Mo Ibrahim Index of Governance

3. Theoretical Framework

The theoretical framework developed in this paper follows the micro foundation approach to macroeconomic analysis. Consider an economy where all agents have utility function given as:

$$\sum_{t=0}^{\infty} \beta^t U(C_{(t)}) \quad (1)$$

Where U is utility, $C_{(t)}$ is consumption at time t , and $\beta \in [0, 1]$ is discount factor. Firms have access to a Cobb – Douglas production function given as:

$$Y_{(t)} = \frac{1}{\alpha} A_{(t)} K_{(t)}^{\alpha} (G_{(t)} L_{(t)})^{1-\alpha} \quad (2)$$

$$0 < \alpha < 1, \text{ and } \alpha + \gamma < 1$$

Where $Y_{(t)}$ is aggregate output at time t , K is physical capital, L is labour, A is technological progress as it is usually interpreted in the literature and G is vector of governance indicators. This production function is identical to the neo-classical augmented Solow model. Our specification is different from the usual augmented Solow model for two obvious reasons. First, A did not enter the equation as labour-augmenting variable as in the case of the text book version of the model. This is reasonable because technological progress affects both labour and capital. Second, vector of governance indicators is included and it enters as labour-augmenting. It is also reasonable to think of governance as labour-augmenting because governance affects labour either as entrepreneur or as worker directly. It is difficult to trace directly the impact of governance on capital except indirectly through labour.

One of the approaches through which models such as equation (2) are empirically estimated is to express it in per capita form and take the natural logarithms of both sides and then estimate. This is a naive approach, particularly in studies that involve cross-country. Therefore, to do better than this naive approach, the tool of game theory is used to derive the equilibrium behaviour of the economy.

Firms produce Y by combining factors of production as shown in equation (2). Let $K_{(t)}$ be the state variable such that the decision of producers to invest in capital is paramount in the equilibrium. The utility function of the producers can therefore be written as:

$$U = \sum_{t=0}^{\infty} \beta^t Y_{(t)} - (K_{(t+1)} - (1 - \delta)K_{(t)}) - w_{(t)}L_{(t)} \quad (3)$$

Where $Y_{(t)}$ is given by (2), $K_{(t+1)}$ is future capital, δ is depreciation and $w_{(t)}$ is wage rate.

Maximizing (3) gives: $\beta(K_{(t)})^{\alpha-1}A_{(t)}(G_{(t)}L_{(t)})^{1-\alpha} + (1 - \delta) = 1$

Solving for $K_{(t)}$ yields: $K_{(t)} = \left(\frac{\beta(A_{(t)})}{1-(1-\delta)}\right)^{1/1-\alpha} (G_{(t)}L_{(t)})^{\alpha/1-\alpha}$

This is expressed in per capita form as:

$$k_{(t)} = \left(\frac{\beta(a_{(t)})}{1-(1-\delta)}\right)^{1/1-\alpha} (G_{(t)})^{\alpha/1-\alpha} \quad (4)$$

Equation (4) is the equilibrium capital per capita which is influenced by discount factor, technology per capita, depreciation rate and governance.

Expressing equation (2) in per capita term and substituting (4) gives the equilibrium output as:

$$y_{(t)} = \frac{1}{\alpha} a_{(t)}^{2-\alpha/1-\alpha} \left(\frac{\beta}{1-(1-\delta)}\right)^{1/1-\alpha} (G_{(t)})^{2-\alpha(3-\alpha)/1-\alpha} \quad (5)$$

Equation (5) is equilibrium output per capita. It is easy to verify from (5) that:

$$\frac{\partial y_{(t)}}{\partial a_{(t)}} > 0, \frac{\partial y_{(t)}}{\partial \delta} < 0, \frac{\partial y_{(t)}}{\partial h_{(t)}} > 0, \frac{\partial y_{(t)}}{\partial \beta} > 0 \text{ and } \frac{\partial y_{(t)}}{\partial G_{(t)}} > 0 \quad (6)$$

4.1 Empirical Model

From the above framework, it can be argued that empirical estimation of growth regression without governance variables will overestimate the share of capital in output. Though Hoeffler (2002) argued that growth is explained by the traditional Solow model in all economies irrespective of their location, implying that there are no regional specific factors, we expect the model with governance variables to perform better than the Solow model (even the augmented Solow). In other words, economies with good governance such as better property rights, better security of life and property, and efficient legal system will do better than economies where governance is poor and ineffective.

In this background, the hypothesis that governance matters for growth is tested using Solow model as the benchmark. Hence, the first model is estimated with only Solow variables and

then with governance variables included. The results are compared considering the magnitudes of coefficients, the residuals and fits of the models. Generally the panel model estimated takes the form:

$$\ln y_{it} = \alpha + \beta \ln X_{it} + \gamma \ln G_{it} + V_{it} \quad (7)$$

Where $\ln y_{it}$ is log of per capita output (real GDP per capita is used) in country i at time t , X is the vector of explanatory variables in the concept of Solow model. This consists of rate of technological progress g , rate of depreciation δ , rate of population growth n and share of output invested on physical capital Sk_{it} respectively, while G is vector of governance variables. Thus, the estimable models are written as:

- (1) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + u_{it}$
- (2) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + \beta_3 \ln MOI_{it} + u_{it}$
- (3) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + \beta_3 \ln SRL_{it} + u_{it}$
- (4) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + \beta_3 \ln PHR_{it} + u_{it}$
- (5) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + \beta_3 \ln SEO_{it} + u_{it}$
- (6) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + \beta_3 \ln HD_{it} + u_{it}$
- (7) $\ln y_{it} = \alpha + \beta_1 \ln Sk_{it} + \beta_2 \ln(n_{it} + g + \delta) + \beta_3 \ln SRL_{it} + \beta_4 \ln PHR_{it} + \beta_5 \ln SEO_{it} + \beta_6 \ln HD_{it} + u_{it}$

Where MOI is Mo Ibrahim Index of governance, SRL is safety and rule of law, PHR is participation and human rights, SEO is sustained economic opportunity, HD is human development and u is the error term, while other variables are as defined above.

4.2 Nature and Sources of Data

Data used for the purpose of the empirical analysis in this study cover the period 2001-2009 for fifty-three countries in Africa. Studies on growth are divided between using per worker values or per capita values of variables. For example, Mankiw, Romer and Weil (1992) used per worker values, while Islam (1995) and Caselli, Esquivel and Lefort (1996) used per capita values. However, Hoeffler (2002) argued that the choice of per worker or per capita is not sensitive to result, she however used per capita values for the sake of robustness. In this study, per capita values are used. Thus, real GDP per capita which is obtained from Africa Development Indicators (ADI) is used for y .

Aggregate investment to GDP ratio is used for sk_{it} and is obtained from ADI except data for Liberia and Nigeria that were not available. The data for Liberia is obtained from the World Bank databank and that of Nigeria from the Pen World Table 6.3.

Population growth is calculated using data on population aged 16 to 65 obtained from ADI. We use this age bracket because they constitute the working population (not everyone in the economy contributes to output). Following Mankiw, Romer and Weil (1992), Islam (1995), Caselli, Esquivel and Lefort (1996) and Hoeffler (2002), technological progress and depreciation rate are assumed to be constant across countries and that they sum up to 0.05. Therefore, the sum of population growth and 0.05 gives values for $(n + g + \delta)$. Usually because of lack of data and difficulty of measurement, $A_{(0)}$ is ignored in empirical research. One easy way of justifying this is to assume that the initial level of technology is common across countries. Finally, the 2010 Mo Ibrahim Index of African Governance is used as a measure of institutions. This index was computed from four categories of indices—Safety and Rule of Law, Participation and Human Right, Sustainable Economic Opportunity, and Human Development—which are themselves computed from eighty-eight indicators. This seems to be the most comprehensive collection of qualitative and quantitative data that assess governance in Africa.

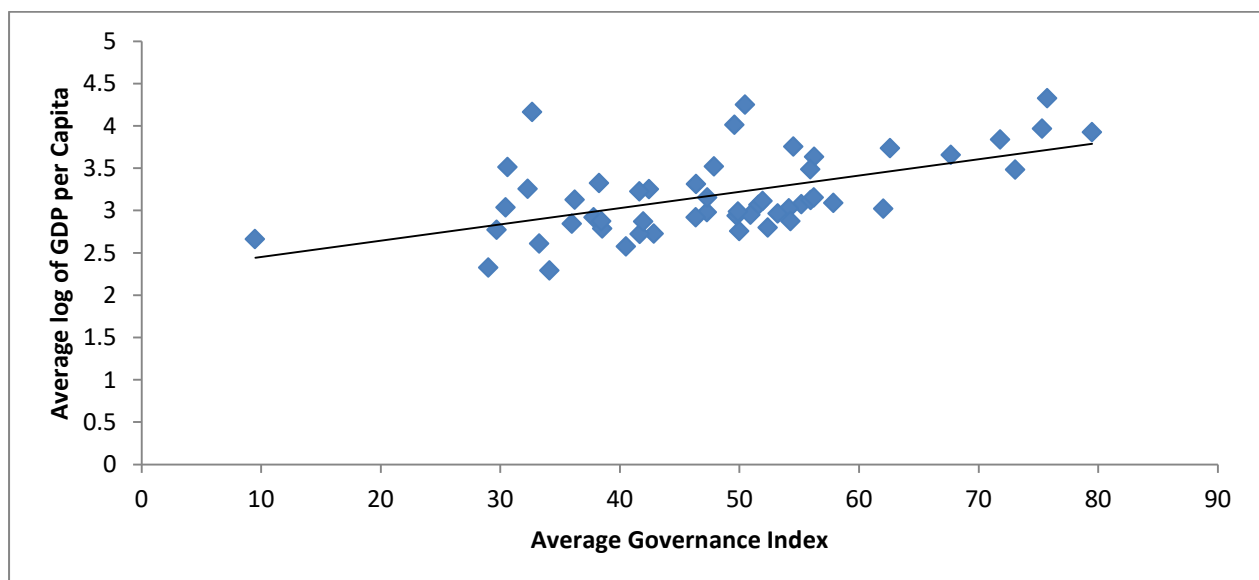
4.3 Estimation Techniques

This study employs different estimation methods including the OLS, fixed effects and random effects estimators. The OLS estimator is consistent only when the orthogonal assumption holds. However, a number of reasons have been adduced for the possible violation of orthogonality assumption in the growth regression. First, the regression disturbance term may include some unobserved country effects that may be correlated with the regressors employed. Second, some of the regressors may be correlated with shocks that affect income per capita. Also, there is possibility of simultaneity biases resulting from the endogeneity of some growth determinants. To overcome these econometric problems, the fixed effects (FE) and the random effects (RE) are employed. The results obtained from these estimators are reported and diagnostic tests are conducted to complement the estimation techniques.

5.1 Presentation of Results

The average GDP per capita is plotted against average Mo Ibrahim governance index to view the nature of relationship between the two. This is displayed in Figure 2.4 which depicts the relationship between governance and economic performance. On the average, there is a positive relationship between them, meaning that economic performance improves with governance. Countries with high quality governance are relatively richer, while countries with poor governance are economically not doing well.

Figure 2.4: Nine-Year Averages of log of GDP per Capita against Average Governance Index



Source: Computed by authors from the Mo Ibrahim Index of Governance and ADI

The empirical results are presented in tables 2 to 5. The descriptive statistics are presented in table 2, and the OLS, fixed and random effects regression results are presented in tables 3 to 5 respectively. In table 2, the mean value of log GDP per capita is 3.1852, while the mean of investment as share of GDP per capita, population growth, the Mo Ibrahim Index, safety and rule of law, participation and human rights, sustainable economic opportunity and human development are 21.7262, 3.8309, 48.1412, 55.8864, 46.7288, 42.9619, and 46.9876 respectively. In table 3 to 5, results of seven models are presented. The results of the baseline model is presented under model 1, model 2 consists of baseline model plus aggregate Mo

Ibrahim Index of governance, in models 3 to 6 each of the components of the Mo Ibrahim Governance Index is controlled for, and in model 7 all the components are introduced into the model simultaneously.

5.2 Discussion of Results

In the OLS results reported in table 3, all the Solow variables in the baseline model are significant and have the right signs. Physical capital has a positive impact on growth, meaning that more accumulation of physical capital would lead to more growth in the economy. On the other hand, population growth has negative influence on growth which implies that rapid growth in population of a nation would retard the growth of such a nation. In model 2 where we controlled for the Mo Ibrahim index of governance, physical capital becomes insignificant, population growth is still significant and negative, and governance index is significant and positive. The result of model 2 is an improvement over model 1 despite insignificant physical capital. This is evident in higher R square and lower root mean squares. In models 3 to 6, we controlled for the four components of the Mo Ibrahim governance index one at a time. Individually all the four except Participation and Human Right (PHR) are significant at 1 percent. Comparing the three models with significant indicators of governance, the model where Human Development (HD) is controlled for has the highest R square and lowest root mean square. In model 7, all the four components were introduced in the same regression and only two came out significant which are HD and PHR, however, PHR has a negative sign. The negative sign of PHR is unanticipated, because it is expected that economic activities increases as participation and human rights improves in a country. Despite the inconsistency in the sign and significance of some components of the governance indicators, it is evident in the results that governance matters in explaining growth in Africa.

In the fixed effects results, physical capital is not significant in the seven regressions. Population growth is significant and positive instead of the negative sign predicted by theory. The aggregate Mo Ibrahim index of governance is significant and the four components are also significant except Safety and Rule of Law (SRL). When the four components are introduced at the same time, only two are significant, these are HD and Sustainable Economic Opportunity (SEO). It implies here that when the effects of individual country differences is controlled for, the behaviour of the growth variables (particularly the Solow variables) depart from their behaviour when countries are pooled together using the OLS estimator. For

instance, physical capital is surprisingly not significant all through and population growth is positively significant when the fixed effects of countries are accounted for. The insignificant physical capital result could be an indication to the fact that many countries have spent so much on capital without significant improvement in economic growth. On the other hand, the positive population growth indicates that an increase in population in many countries in Africa will promote growth instead of retarding it since there is underemployment, that is, less than full employment equilibrium in almost all the countries in Africa. Meanwhile, the fixed effect results also support the relevance of governance in African growth.

The random effects results presented in table 5 show that physical capital, labour proxied by population growth and governance are significant determinants of economic growth in Africa. Physical capital, population growth, aggregate Mo Ibrahim index of governance and the four components of Mo index except SRL have significant and positive impacts on growth.

6. Concluding Remarks

There is abundant evidence in literature that governance positively impacts economic growth. This paper attempts to validate or disprove this position using a measure of governance which focuses on African countries only, and is also more encompassing than other measures of governance available. Three different estimation techniques were used which include OLS, Fixed Effect and Random Effect. The classical Solow model was considered as the baseline model. The results of the baseline mode were compared with control results.

In all the regression results, the aggregate Mo Ibrahim Index of governance was significant and positive all through. This suggests that as countries in Africa improve in the Mo Ibrahim governance ranking, higher economic growth will be recorded in the continent. Among the four components of governance, Human Development indicator HD was significant in all the regressions it was controlled for. Sustainable Economic Opportunity was also significant all through except once in the OLS results when all the four components were simultaneously controlled for. The key conclusion from these analyses is that governance matters for growth, and among the components of governance, Human Development and Sustainable Economic Opportunity matter most.

The Mo Ibrahim governance assessment should be taken seriously by policymakers in Africa and each country should try to improve on the different indicators of this index. Special

emphasis should be given to human development and sustainable economic opportunity. Human development is computed from two broad indicators which are health and welfare on one hand and education on the other hand. These two are made of eighteen indices which include child mortality, incidence of TB, immunisation against measles, immunisation against DTP, social protection and labour, antiretroviral treatment and provision, access to improved water and sanitation, education provision and quality, ratio of pupils to teachers, primary school completion rate, progression to secondary school, and tertiary enrolment rate. Sustainable economic opportunity has four broad indicators which are public management, private sector performance, infrastructure and environment and rural sector. These four indicators comprise of twenty-seven indices which include among others quality of public administration, quality of budget management, bureaucracy and red tape, investment climate, quality of physical infrastructure and environmental sustainability. Significant progress in these indices is imperative for Africa to rewrite its economic performance story.

Table 2: Descriptive Statistics

Variable	Mean	Std Dev.	Variance	Skewness	Kurtosis
Log of GDP per capita	3.1852	0.4738	0.2245	0.6123	2.8822
Investment as share of GDP per capita	21.7262	11.0128	121.2822	0.6951	6.0558
Population growth	3.8309	0.6825	0.4657	-0.5818	3.0825
Mo Ibrahim Index	48.1412	13.6970	187.6083	0.0722	3.3733
Safety and Rule of Law	55.8864	15.9606	254.7393	-0.2063	3.1157
Participation and Human Right	46.7288	17.2719	298.3177	0.0930	2.1085
Sustainable Economic Opportunity	42.9619	13.2990	176.8632	-0.3126	3.7237
Human Development	46.9876	17.6000	309.7603	0.6880	3.3719

Source: computed by authors

Table 3: OLS Result, Dependent variable $\ln y_{it}$

Variables	Model 1	Model2	Model 3	Model 4	Model 5	Model 6	Model 7
$\ln Sk_{it}$	0.1766* (0.0453)	0.0615 (0.0378)	0.0907** (0.0413)	0.1857* (0.0488)	0.0907** (0.0397)	0.0762** (0.0321)	0.1175* (0.0391)
$\ln(n_{it} + g + \delta)$	-0.1923* (0.0354)	-0.1686* (0.0313)	-0.1595* (0.0339)	-0.1937* (0.0357)	-0.2104* (0.0313)	-0.1342* (0.0266)	-0.1420* (0.0289)
$\ln Moi_{it}$		0.5644* (0.0658)					
$\ln SRL_{it}$			0.4037* (0.0563)				0.1562 (0.1131)
$\ln PHR_{it}$				-0.0401 (0.0659)			-0.4003* (0.0644)
$\ln SEO_{it}$					0.3403* (0.0545)		0.0824 (0.0818)
$\ln HD_{it}$						0.6398* (0.0555)	0.6161* (0.0703)
const	3.4020* (0.2130)	1.4918* (0.2789)	1.9360* (0.2693)	3.5311* (0.3059)	2.4750* (0.2237)	1.0605* (0.2388)	1.6413* (0.3179)
R^2							
F Stat							
RMSE	0.1543	0.2978	0.2296	0.1554	0.3017	0.4367	0.5023
No. Obs.	27.79* 0.4369 475	66.13* 0.3986 475	48.12* 0.4175 475	18.10* 0.4371 475	40.15* 0.3975 475	93.97* 0.3570 475	61.85* 0.3366 475

Source: computed by authors

* Significant at 1%, **significant at 5%, ***significant at 10%, Robust standard error in parenthesis

Table 4: Fixed Effect Result, Dependent variable $\ln y_{it}$

Variables	Model 1	Model2	Model 3	Model 4	Model 5	Model 6	Model 7
$\ln Sk_{it}$	0.0098 (0.0082)	0.0043 (0.0082)	0.0087 (0.0083)	0.0079 (0.0082)	0.0068 (0.0082)	0.0083 (0.0081)	0.0040 (0.0082)
$\ln(n_{it} + g + \delta)$	1.0650* (0.0930)	0.9510* (0.0978)	1.0671* (0.0931)	1.0278* (0.0950)	0.9200* (0.1065)	0.8600* (0.1099)	0.6505* (0.1258)
$\ln Moi_{it}$		0.1634* (0.0479)					
$\ln SRL_{it}$			0.0204 (0.0252)				-0.0123 (0.0270)
$\ln PHR_{it}$				0.0504*** (0.0277)			0.0456 (0.0295)
$\ln SEO_{it}$					0.0896* (0.0327)		0.0959* (0.0326)
$\ln HD_{it}$						0.1688* (0.0497)	0.1847* (0.0500)
const	-0.9229* (0.3506)	-1.0948* (0.3499)	-1.0086* (0.3663)	-0.9647* (0.3504)	- (0.3584)	- (0.3491)	-0.4900 (0.3756)
R^2					0.6874***	0.7704**	
F Stat							
$U_i = 0$	0.2652	0.2850	0.2663	0.2709			0.3051
No. Obs.	75.78* 599.11* 475	55.67* 508.67* 475	50.70* 543.73* 475	51.90* 600.66* 475	0.2781 53.80* 500.23* 475	0.2849 55.64* 405.83* 475	30.44* 365.67* 475

Source: computed by authors

*Significant at 1%, **significant at 5%, ***significant at 10%, Robust standard error in parenthesis

Table 5: Random Effect Results, Dependent variable $\ln y_{it}$

Variables	Model 1	Model2	Model 3	Model 4	Model 5	Model 6	Model 7
$\ln Sk_{it}$	0.0280* (0.0088)	0.0151*** (0.0088)	0.0271* (0.009)	0.0233* (0.0088)	0.0171** (0.0087)	0.0192** (0.0085)	0.0097 (0.0084)
$\ln(n_{it} + g + \delta)$	0.3861* (0.0706)	0.2624* (0.0674)	0.3652* (0.0697)	0.3637* (0.0708)	0.1873* (0.0693)	0.1176*** (0.0634)	0.0041 (0.0621)
$\ln Moi_{it}$		0.3092* (0.0480)					
$\ln SRL_{it}$			0.0298 (0.0277)				-0.0315 (0.0277)
$\ln PHR_{it}$				0.0932* (0.0293)			0.0543*** (0.0300)
$\ln SEO_{it}$					0.2121* (0.0311)		0.1694* (0.0302)
$\ln HD_{it}$						0.3931* (0.0437)	0.3475* (0.0433)
const	1.6236* (0.2754)	0.9528* (0.2881)	1.5882* (0.2957)	1.3723* (0.2829)	1.6383* (0.2567)	1.1946* (0.2553)	1.1279* (0.2630)
R^2							
Chi Stat	0.2092	0.2025	0.2006	0.2062	0.1973	0.2055	0.2600
Hausman	47.87*	87.67*	45.98*	59.78*	92.63*	121.26*	169.99*
No. Obs.	125.77*	94.07*	129.30*	109.70*	81.73*	62.28*	24.63*
	475	475	475	475	475	475	475

Source: computed by authors

*Significant at 1%, **significant at 5%, ***significant at 10%, Robust standard error in parenthesis

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