ANALYZING INSTITUTIONAL QUALITY AND ECONOMIC GROWTH IN SUB-SAHARAN AFRICA USING SYSTEM GENERALISED METHOD OF MOMENTS (SGMM)

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Abstract

Institutional quality is considered to be an important factor in enhancing economic growth of a country. This study investigates the impact of institutional quality on economic growth in Sub-Saharan Africa using the System Generalized Method of Moments estimation method to a dynamic panel data for 40 Sub-Saharan Africa countries spanning from 2006-2020. The results of the System Generalized Method of Moments indicate that institutional quality has a significant and positive impact on the economic growth in the Sub-Saharan Africa region. The results further revealed that gross capital formation and population have significant and positive effect on economic growth in the region. The study concludes that institutional quality enhances economic growth of Sub-Saharan African countries. The study recommends that governments of the region should encourage independence of institutions to promote economic growth in the region.

Keywords: Economic growth, Gross capital formation, Institutional quality, Trade Openness

Introduction

Economic growth is a significant indicator of economic performance of a country by foreign investors. Hence, foreign investors prefer to invest in countries that have high economic growth. To this end, countries take many policies in order to promote economic growth (Arshad, 2019). Bolton and Khaw (2006) defined economic growth as the rate of growth of the national income of a country, measured by the annual percentage rate of change of country's gross domestic product. According to Weil (2013), economic growth is one of the reasons why advanced countries have become richer and have improved standards of living. Economic growth is one of the vital indicators of economies (Bolton & Khaw, 2006). Therefore, it is not surprising that economic growth has attracted researchers' attention to investigate economic growth determinants, particularly in developing countries. Higher growth rates increase people's wealth and living standards (Weil, 2013).

However, the World Bank (2020) has shown that regions such as Europe and Central Asia (ECA), Middle East and North Africa (MENA), Latin America and the Caribbean (LAC) and Sub-Sahara Africa (SSA) have continued to experience fluctuations in their gross domestic product. For instance, ECA had a GDP (at U.S. dollar) of 18.2 Trillion in 2006, 23.2 Trillion in 2011, 20.46 Trillion in 2016 and 22.13 Trillion in 2020. MENA recorded GDP (at U.S. dollar) of 3.36 Trillion in 2006, 6.09 Trillion in 2011, 5.25 Trillion in 2016 and 4.73 Trillion in 2020. In addition, LAC had a GDP (at U.S. dollar) of 1.91 Trillion in 2006, 3.27 Trillion in 2011, 3.95 Trillion in 2016 and 3.03 Trillion in 2020. SSA recorded a GDP (at U.S. dollar) of 0.967 Trillion in 2006, 1.61 Trillion in 2011, 1.56 Trillion in 2016 and 1.70 Trillion in 2020. It is also clear from the comparison of GDP growth across regions that SSA has been the least successful in terms of growth (World Bank, 2020).

Following this unimpressive growth, the SSA region is unable to achieve the desired GDP growth rates (GDP) needed to reduce poverty, income inequality, unemployment and other socio-economic problems facing the region. Recently, the focus has been on the role played by quality of institutions in influencing economic growth. Experience has shown that good institutions play an important role in stimulating economic performance and growth (Acemoglu, Johnson & Robinson, 2005; Robinson & Acemoglu, 2012)

Studies such as Thorbecke (2013), Iheonu, Ihedimma and Onwuanaku (2017), Parks, Buntaine, and Buch (2017) have advocated for strong institutional quality to guarantee sustainable growth and development. Available statistics from the World Bank (2020) shows that between 2006

and 2020, developed countries have a higher-ranking regarding institutional quality than the average of all African countries. The Sub-Saharan Africa (SSA) consistently had lower rankings than the average for developed countries. The SSA on average performed worse than the developed countries regarding the indicators of corruption control, political stability, voice and accountability, rule of law, regulatory control and government effectiveness (see Table 1). The range of rating the data varies from -2.5 to +2.5. The higher the value of the measurement is, the better the measure of good governance, and vice versa.

Table 1: Indicators of Institutional Quality across Countries 2006-2020

Indicator	Developed Countries	African Countries	Sub-Saharan Africa
Rule of law	1.46	-0.78	-0.7
Control of Corruption	1.65	-0.6	0.62
Regulatory quality	1.31	-0.59	-0.59
Government effectiveness	1.55	-0.68	-0.64
Political stability	0.95	-0.65	-0.71
Voice and accountability	1.0 4	-0.47	-0.5
Average	**1.33**	**-0.63**	**-0.42**

Source: World Bank (2020)

Despite low growth rates (see figure 1.1) and weak institutions (see Table 1.1) in SSA, little has been done to examine the effect of quality of institutions on economic growth in the region. Therefore, this study investigates the impact of institutional quality on economic growth of SSA. Furthermore, objective of the study is to examine the impact of institutional quality on the economic growth of SSA. In line with the above objective, this study tested hypothesis of no significant relationship between institutional quality and economic growth in SSA. The main contribution of this study is thus to explores the direct link through which institutional quality might affect economic growth in SSA countries. Second, this study uses a larger data of 40 countries, 25 years and averages the six institutional quality indicators as opposed to previous studies (see Adelakun, 2011; Anyanwu, Adam, Obi & Yelwa, 2015; Elena, 2014; Godstime & Uchech, 2014; Olure-Bank et al., 2018).

Impact of Institutional Quality on Economic Growth across Sub-Saharan Africa Countries

There is considerable empirical literature on the impact of institutional quality on economic growth across countries with little in the SSA. The very few previous studies in the area have reported mix findings. Radzevica and Bulderberga (2018) examined the role of institutional quality in economic growth using the Generalized Method of Moments on a panel of 113 countries from 2006 -2016. The results revealed that government effectiveness, regulatory quality, tax burden, monetary freedom, financial freedom, trade freedom, strength of auditing and reporting standards, efficacy of corporate boards, and strength of investor protection has positive effect on economic growth.

Similarly, Epaphra and Kombe, (2018) investigated the effect of institutions on economic growth in Africa over a period of 1996-2016. The study used Generalized Methods of Moment (GMM), Fixed Effects (FE) and Random Effects (RE) models and found that institutional quality appears to be the most significant factor in explaining real GDP per capita growth in Africa. More so, Nguyen, Su, and Nguyen (2018) examined institutional quality and economic growth: the case of emerging economies for a period of 2002-2015. The study used System Generalized Method of Moments (SGMM) and Findings show significant positive impacts of institutional quality on economic growth. The institutional quality has negative effects on foreign direct investments (FDIs) and trade openness on economic growth.

Yildirim and Gokalp (2016) analysed impact institutions on economic performance of Turkey for a period of 2000-2011 employing OLS. The finding shows that institutional indicators such as the integrity of the law system, regulations on trade barriers, restriction of foreign investments, and the share of the private sector in the banking system have a positive effect on the macro-economic performance. Judiciary independence, government expenditures, transfers and subsidies, civil freedoms, the black-market exchange rate, collective bargaining and political stability have negative impact on the macro-economic performances.

Kilishi, Mobolaji, Yaru and Yakubu (2013) examined institutions and economic performance in sub-Saharan Africa: A Dynamic Panel Data Analysis. The study used Blundell Bond System Generalized Method of Moment (GMM) estimators. The findings show that institutions in sub-Saharan African have significant effect on economic performance particularly regulatory framework and government effectiveness.

The major shortcomings of the previous studies by Hoinaru, Buda, Borlea, Vaidean, and Achim (2020), Epaphra and Kombe, (2018), Sule

(2020) and Yildirim and Gokalp (2016) was reliant on OLS, FE and RE method of estimations in drawing their conclusion. Furthermore, their studies were conducted outside the SSA region and were not up to date. In addition, the one conducted by Carraro and Karfakis (2018) in the region used only 11 countries of the SSA and employed OLS. This study improves on the previous studies by employing Generalized Method of Moments which is a more robust technique of estimation that take care of the issue of endogeneity to draw inferences. It also improves on the scope by extending it to 40 countries in SSA, as well as increasing the span to 2020.

Theoretical Framework

The theoretical framework of this study is rooted in the endogenous growth theory. This theory proposes that the introduction of new accumulation factors such as investment in human capital, knowledge and innovation will induce self-maintained economic growth. Endogenous growth economists believe that improvements in productivity can be linked to a faster pace of innovation and extra investment in human capital. The basic assumption in this approach is that increase in workers 'productivity through improved education and on-the-job training improves output. This supports the human capital theory which postulates that education and healthcare of workers ensure greater productivity.

Research Methodology

Most of the existing studies conducted on the impact of institutional quality on economic growth were based on panel data pooled OLS, fixed/random effect models or Least Square Dummy Variable (LSDV) models. Also, with a small time series and a large panel entity, according to Nickell (1981) demeaning the dependent and independent variables using the Fixed Effects Model (FEM) can result in correlation between explanatory variables and error term. Possible drawbacks of FEM, OLS, and LSDV can be handled by using the system Generalized Method of Moments (GMM). Besides handling endogeneity problems, GMM particularly two-steps result in efficiency gains compared to OLS and 2SLS (Roodman, 2009a; 2009b). This works when independent variables are strongly exogenous. Endogeneity test is performed and the results reveal the presence of endogeneity, hence OLS and 2SLS cannot be applied. System GMM is also appropriate in circumstances where the number of time periods are less than the number of entities (Arellano & Bond, 1991; Blundell & Bond, 1998) or where a lagged variable of the dependent variable is used as one of the regressor (Arellano & Bover, 1995; Elhorst, 2010). With a dataset containing 40 countries, 15 years (2006-2020) and a lagged variable, GMM is appropriate.

Model Specification

In line with the model of Arshad (2019), the simple dynamic panel data model is estimated to evaluate the impact of institutional quality on economic growth.

$$Y_{it} = \alpha Y_{it-1} + \Omega Insq_{it} + \sum_{i=1}^{n} X_{it}\beta + V_{it} \quad \text{(i)}$$

Where Y_{it} is the annual real GDP per capita, Y_{it-1} is the lagged value of the annual real GDP per capita, INSQ represents institutional quality, **X** represents the control variables including gross capital formation, government spending and trade openness.

Therefore, the model for the study is, specified as follows:

$$lngdppc_{it} = \beta_0 + \beta_1 lngdppc_{it-1} + \beta_2 lngcf_{it} + \beta_3 lngovs_{it} + \beta_4 trop_{it} + \beta_5 insq_{it} + \mu_{it} \quad (ii)$$

Where: $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$

GDPPC is Gross domestic product per capita, INSQ is Institutional quality, GCF is Gross capital formation, GOVS is Government size, TROP is trade openness and the subscript i and t index countries and time respectively. Moreover, μ_{it} is an error term that contains country specific effect and time specific effects.

The choice of these control variables was guided by previous studies from the region and other developing countries with common economic and institutional quality patterns similar to the SSA (see: Wanjuu, 2015). Also, consistent with previous studies using a dynamic model specification (wong., 2015), we included a lag of the dependent variable.

Data, Measurement and Sources

This study uses 15years data (2006-2020) from 40 Sub-Saharan Africa countries. The choice of the study period 2006 to 2020 is mainly justified by the availability of data on World Bank database. The annual data on GDP per capita (based on 2010 U.S. dollar constant prices), Gross capital formation, Government expenditure and Trade openness (sum of exports and imports of goods and services % of GDP) were obtained from the World Development Indicators. For the purpose of this thesis, the institutional quality (INSQ) is proxied by averaging government effectiveness index, regulatory quality index, control of corruption, political stability, rule of law, and voice and accountability (Balach et'al, 2016; Ogu, 2023).

These variables are summarized in Table 2, which provide the definition and source of all key variables with their units of measurement.

Table 2: Summary of Variables Annual Data from 2006 - 2020

Variable	Expected Sign	Source	Measurement
GDP per capita	+	WDI	Constant US$
Gross capital formation	+	WDI	Constant US$
Government size	+	WDI	Constant US$
Trade Openness	+	WDI	Constant US$
Institutional Quality	-	WGI	Scores

Source: World Bank (2020)

Empirical Results and Discussion of Findings

In line with the objectives of the study, two methods of analyses were employed. They include descriptive statistics and inferential statistics (econometric techniques). The descriptive statistics employs tables to assess the trend of institutional quality in Sub-Saharan Africa while econometric analysis uses GMM technique to evaluate the impact of institutional quality on economic growth in the SSA.

Descriptive Statistics

Before estimation of the model, the researcher examined the descriptive statistics of the variables. The descriptive statistics gives a quantitative summary about the behaviour of the variables in model. Table 3 presents a descriptive statistic of all the variables used for the study. The essence of this is to indicate the level of disparity among the variables.

Table 3: Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
GDPPC	600	7.027	1.271	0.611	9.93	-1.124	8.878
GCF	600	21.429	2.388	6.622	25.218	-3.339	20.469
INSQ	600	-0.608	.584	-1.698	0.854	0.535	2.825
TROP	600	0.781	0.431	0.213	4.416	3.782	28.434
LNGOVS	600	32.944	1.25	21.966	24.534	-2.938	20.549

Source: Researcher's computation (2022) using E-views 10.0

Table 3 shows that between 2006 – 2020, the average Gross domestic product per capita (GDPPC), Gross capital formation (GCF), Institutional quality (INSQ), Trade openness (TROP) and government size (lngovs) variables is 7.027, 21.429, -0.608, 0.781 and 32.944 respectively. This indicates that the variables exhibit significant variation in terms of magnitude, suggesting that estimation at levels may introduce some bias in the results.

The standard deviations of the variables are 1.27, 2.39, 0.58, 0.43 and 1.25 representing GDPPC, GCF, HDI, INSQ, TROP and GOVS respectively. These results show that for all variables, the standard

deviations are lower than the mean and median. This clearly shows that there are significant variations in the value of the variables used in the empirical work of this thesis.

The values of skewness of GDPPC, GCF, INSQ, TROP and GOVES are -1.12, -3.34, 0.54 3.78 and -2.94 respectively. This means that none of the variables used in this thesis presents skewness that is equal to the skewness of a normal distribution of zero (0.0). The variables used in this study are, therefore, skewed and are not symmetric but asymmetric.

A further analysis of the data contained in Table 3 shows that the Kurtosis of the 5 variables used in this thesis is higher than the normal Kurtosis values of 3.0. The Kurtosis of the variables is 8.89, 20.47, 19.90, 28.43 and 20.55 for GDPPC, GCF, TROP and GOVS respectively. This clearly demonstrates that the peak of the statistical distributions of the variables is higher than a normal distribution. This type of distribution is called leptokurtic.

This clearly show that the above descriptive statistics are not normally distributed. Thus, the variables used in the thesis are not normally distributed for several reasons, which are: (i) the mean and the median are significantly different, (ii) the values of skewness of the variables used in the study are higher than zero and (iii) the Kurtosis of the variables are more than 3.0. The implication is that the data used in the analyses of this thesis are not normally distributed.

Correlation Analysis

In an attempt to explore the relationship between dependent variable GDPPC and explanatory variables (GCF, GOVS, TROP, INSQ) used in the study, the study carried out correlation analysis using Pearson Product Moment Correlation (PPMC). Whereas the descriptive output tells us about each set of data (that is. the mean, standard deviation, Jarque-Bera, probability, and number of values for each variable), the correlation matrix output tells us how the variables are related. This is necessary because the independent and dependent variables need to be tested for multicollinearity.

Table 4: Correlation Matrix

VARIABLES	LNGDPPC	LNGCF	LNGOVS	TROP	INSQ
LNGDPPC	1.000000				
LNGCF	0.639907	1.000000			
LNGOVS	0.749989	0.455903	1.000000		
TROP	-0.220815	-0.135418	-0.238108	1.000000	
INSQ	0.065177	0.160266	-0.340340	0.110284	1.000000

Source: Computed by author (2021) using E-Views 10.0

Table 4 presents the correlation matrix for the variables in the model; an incidence of strong correlation among the independent variables may violate

the working assumptions of our estimation technique and hereby produce an unrealistic result. Here, we test for the likely occurrence of multicollinearity among the independent variables using the pairwise correlation matrix. The table indicates a positive weak correlation between trade openness and other independent variables in the model. An overall consideration of the result of the correlation coefficients indicates that multicollinearity is not a considered as problem in the model to be estimated.

The matrix result showed that there exists a positive relationship between GCF, GOVS, INSQ and GDPPC with a coefficient of 0.64, 0.75, 0.06 and 1.00 respectively while, a negative relationship exists between TROP and GDPPC. The implication of a positive relationship between two variables is that both of them move in the same direction. This means when one of the variables moves upwards, the other also would be found to move upward. This means that gross capital formation, government spending and institutional quality affect Gross Domestic Product per capita positively. The implication is that, as these variables increase, GDPPC increase by one unit. On the other hand, negative relationships exist between trade openness and Gross Domestic Product. It means that TROP and GDP move in oppose direction.

Conclusively, the result showed that the variables are independent of each other and can be included and used in the regression analysis as independent variables without getting spurious results.

Estimation Results for Institutional Quality and Economic Growth

This section tries to examine the institutional quality model using averaging of the six indicators as a proxy for institutional quality. The estimated result is reported in table 5

Table 5: Estimation Results for SSA using INSQ and GDP per capita

	(1)	(2)	(3)	(4)
VARIABLES	POLS	FEM	DIFF. GMM	SGMM
L.lngdppc	0.547***	0.0830***	-0.426	0.183***
	(0.0479)	(0.0129)	(0.558)	(0.0572)
Lngcf	0.286***	0.379***	0.277**	0.340***
	(0.0214)	(0.0231)	(0.117)	(0.0331)
Lngovs	-0.0677***	-0.00274	-0.00141	-0.0438
	(0.0170)	(0.00487)	(0.00676)	(0.0279)*
Insq	0.189***	-0.00396	0.121	0.400**
	(0.0542)	(0.0852)	(0.131)	(0.052)
Trop	0.205*	-0.220**	-0.222	0.147
	(0.112)	(0.0863)	(0.272)	(0.165)
AR(1)			0.76	0.03

AR(2)			0.34	0.53
Sargan Test			0.78	0.00
Hansen Test			0.36	0.23
R-squared	0.803	0.934		
Number of id		40	40	40

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: **Source**: Researcher's computation (2021) using Stata

Based on the Bond (2001) second Rule of Thumb where the coefficient of the lagged dependent variable of the Diff. GMM lies below that of the fixed effect estimate, system generalized method of moments is the most prefer. The SGMM estimated result in table 5 shows that institutional quality has a significant and positive effect on economic growth in SSA at 10%. A one percent change in institutional quality leads to a 0.40% in economic growth in the short-run at 10% significant level. This finding lends support to the outcomes reported in previous studies (see Kilishi *et al.*, 2013; Radzevica *et al.*, 2018; Valariani *et al.*, 2011).

In addition, the SGMM result further demonstrate that gross capital formation has a significant and positive effect on GDP per capita at 1%. A percentage change in gross capital formation is associated with a 0.34% increase in GDP per capita in the short-run in SSA at 1% significant level. More so, the SGMM result revealed that government size has a significant and negative effect on economic growth at 5%. A one-unit increase in government size leads to a 0.4% decrease in economic growth in the short-run at 1% significant level. Hence, government size and economic growth exhibit inelastic relationship holding other variables constant.

The empirical results in Table 5 revealed that the index of overall institutional quality has positive sign and it is statistically significant. Institutional quality exerts positive and significant impact on economic growth SSA. It implies that lower level of institutional quality is associated with lower level of economic growth. Institutions provide incentives and penalties, which in turn play important role as catalyst and pave the way for rapid economic growth. Institutional quality may influence the economic growth of the country through the proper allocation of resources which is related in supplying public goods and services. Better resource allocation decisions may increase the functioning of the market. If allocation of resources is efficient, it will enhance economic growth. Better institutional quality increases economic performance by reducing the level of corruption and improving the check and balance. Better quality of institutions is supposed to be well equipped with updated information relating to current market situations which can enhance investment level and higher investment enhances economic growth. High quality of institutions also creates an

environment which is business friendly and very conducive to foreign investment. As a result, higher inflows of foreign direct investment lead to an increase in economic growth (Balach & Law, 2015).

Quality institutions are crucial to rapid economic growth because they shape the incentives of key economic actors in society; in particular, they influence investments in physical and human capital and technology, and the organization of production (Besley & Persson, 2010; Lopez-Cazar et al. 2021). Quality institutions not only determine the aggregate economic growth potential of an economy; they can also determine the distribution of resources in the future. Johnson and Robinson (2005) argued that economic institutions are the fundamental cause of economic growth. Economic institutions are the main factors explaining differences in the growth rate and income across countries.

Furthermore, following Mehlum et al. (2005) we again distinguish between producer-friendly institutions (where rent-seeking and production are complementary activities) and grabber-friendly institutions, where rent-seeking and production are competing activities. More natural resources push aggregate income down when the institution is grabber-friendly, while more natural resources raise aggregate income when the institution is producer-friendly. Based on the result of the long run system generalized method of moments, the Sub-Saharan African countries are likely grabber-friendly.

Conclusion and Recommendations

The study examines the impact of institutional quality on economic growth of Sub-Saharan Africa using System GMM technique to analyse the panel data spanning from 2006-2020. The estimated results show that there exists a positive and significant relationship between gross capital formation, population, institutional quality and GDP per capita in SSA. The positive and significant effects of these variables promote economic growth in the region. Based on the finding, the study concludes that institutional quality impact positively on economic growth of Sub-Saharan African countries. In view of the above, the study recommends that priority should be given to improving the quality of institutions by removing barriers, strengthening regulations and property rights, and providing incentives for investors to invest, innovate and take active roles in building the economy. In addition to this, there should be a prioritization of strong industrial and trade policy frameworks that encourage and support economic growth through creating a favourable institutional environment in Sub-Saharan African countries.

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APPENDIX I

LIST OF 40 SSA COUNTIRES INVOLVED IN THE STUDY

S/NO	NAME OF COUNTRY	S/NO	NAME OF COUNTRY	S/NO	NAME OF COUNTRY	S/NO	NAME OF COUNTRY
1	Angola	11	DR Congo	21	Lesotho	31	Nigeria
2	Benin	12	Congo Brazabil	22	Liberia	32	Rwanda
3	Botswana	13	Cote D'Ivoire	23	Madagascar	33	Senegal
4	Burkina Faso	14	Equitorial Guinea	24	Malawi	34	Sierra Leone
5	Burundi	15	Gabon	25	Mali	35	South Africa
6	Cape Verde	16	Gambia	26	Mauritania	36	Tazania
7	Cameroon	17	Ghana	27	Mauritius	37	Togo
8	Central Africa	18	Guinea	28	Mozambique	38	Uganda
9	Chad	19	Guinea Bissau	29	Namabia	39	Zambia
10	Comoros	20	Kenya	30	Niger	40	Zimbabwe