Received 26 November 2022
Revised 5 February 2023
17 June 2023
Accepted 31 July 2023

Institutional quality and economic growth in Sub-Saharan Africa: a panel data approach

Mohammed Seid Hussen
Department of Economics, Marmara University Goztepe Campus, Istanbul, Turkey and
Economic Growth Team, Frontieri Consulting, Addis Ababa, Ethiopia

Abstract

Purpose – The main purpose of this study is to examine the impact of different dimensions of institutional quality indices on the economic growth of Sub-Saharan African (SSA) countries.
Design/methodology/approach – The study uses a panel data set of 31 SSA countries from 1991 to 2015 and employs a two-step system-GMM (Generalized Method of Moments) estimation technique.
Findings – The study's empirical results indicate that investment-promoting and democratic and regulatory institutions have a significant positive effect on economic growth; however, once these institutions are taken into account, conflict-preventing institutions do not have a significant impact on growth.
Practical implications – The study's findings suggest that countries in the region should continue their institutional reforms to enhance the region's economic growth. Specifically, institutions promoting investment, democracy and regulatory quality are crucial.
Originality/value – Unlike previous studies that use either composite measures of institutions or a single intuitional indicator in isolation, the present study has employed principal component analysis (PCA) to extract fewer institutional indicators from multivariate institutional indices. Thus, this paper provides important insights into the distinct role of different clusters of institutions in economic growth.

Keywords Institutional quality, Economic growth, SSA, Panel data, PCA, System GMM
Paper type Research paper

1. Introduction

Despite its abundant natural resources and decades of foreign aid, Sub-Saharan Africa (SSA) is home to the highest number of poor countries in the world. Out of the 48 countries in the region, 24 are low-income, with a GNI (Gross National Income) per capita of $1,025 or less. In 2018, the average individual in SSA had a GNI per capita income that was seven times lower than the world average [1]. Macroeconomic figures of individual countries also demonstrate a stark disparity. For example, Luxemburg, with a landmass and population size 356 and 317 times smaller than Nigeria, respectively, had a GDP (Gross Domestic Product) per capita that was 48 times higher. Ghana's GDP per capita was higher than Thailand's and comparable to Malaysia's in 1960 but was seven times lower than Malaysia's and four times lower than Thailand's in 2016. In 1960, the average South Korean and Kenyan had the same annual income, but in 2016, the South Korean annual income was twenty times higher [2].

These disparities raise questions about why some countries in SSA have been unable to achieve economic development while others have been successful. Why Kenya, Nigeria and

JEL Classification — C33, O11, O43, O55

Journal of Economics and Development
Vol. 25 No. 4, 2023
pp. 332-348
Emerald Publishing Limited
e-ISSN: 2632-5330
p-ISSN: 1859-0020
DOI 10.1108/JED-11-2022-0231

Ghana are poor, whereas South Korea, Luxemburg and Malaysia rich; why has Kenya grown slowly while South Korea achieved remarkable economic growth; and what explains Ghana's failure and Malaysia's success in terms of economic development? These questions have been debated among economists since Adam Smith's time, though no consensus has been reached.

According to neoclassical (Solow, 1956) and endogenous (Romer, 1990) growth models, capital accumulation, human capital and innovations explain the difference in countries' economic growth. However, why some countries, such as Kenya, Ghana and Nigeria, are not pursuing these growth factors is still unclear. As Bloch and Tang (2004) discussed, these variables result from more profound, underlying factors – the so-called deep determinants of growth.

In the last three decades, institutional factors have received more attention than other deep determinants such as geography, culture and openness. Studies have shown that countries with high-quality institutions that allow private property and free enterprise have experienced an economic "miracle," while countries with poor institutions have seen decades of stagnation and poverty (Acemoglu *et al.*, 2005). For instance, the two Koreas have similar geography and culture, but the institutional framework in the North led to it being 44 times poorer than its Southern counterpart. Similarly, transforming from a fascist economy to a relatively free economy after Second World War helped West Germany become the world's third-largest economy with a US$1.2tn GDP in 1991. Meanwhile, East Germany, located in a similar geographical location and whose culture resembles the West, was able to grow only by 1.3% per annum (Maddison, 2003). These comparisons demonstrate that the institutional framework is crucial to economic growth (Acemoglu, 2008).

Over the past three decades, several empirical studies have been conducted to analyze the impact of institutions on economic growth. Early studies (e.g. Acemoglu *et al.*, 2001, 2002; Hall and Jones, 1999; Knack and Keefer, 1995) used a global sample, cross-country data and OLS (Ordinary Least Squares)/IV estimation methods. More recent studies (Afonso and Jalles, 2016; Lee and Kim, 2009; Nawaz, 2015; Valeriani and Peluso, 2011) have used reduced sample multiple institutional variables and panel data analysis. The results of these studies are mixed, leaving the debate open as to which institutional arrangements have the most significant impact on growth and whether the impact varies among sub-samples of countries.

SSA countries have registered an average GDP growth of 5% and real GDP per capita growth of 2% per annum over the last three decades, with improvement in institutional quality. Although this resurgence of economic growth and improvement in institutional quality makes SSA an interesting case study, relatively little research has been done on this realm [3]. The existing few studies (e.g. Amin, 2013; Bräutigam and Knack, 2004; Fosu, 2013; Hashim Osman *et al.*, 2011; Kilishi *et al.*, 2013; Ogbuabor *et al.*, 2020a, b; Onuigbo, 2020) have not explored how different institutional arrangements affect economic growth. Hence, it is worth investigating the extent to which improvements in institutional quality contribute to the region's economic growth and which institutional arrangements matter the most.

The main aim of the present study is thus to contribute to the debate on the nexus between institutions and growth by concentrating on the following questions: a) To what extent does institutional quality matter for the economic growth of SSA? b) Which of the institutional arrangements matters most to stimulate growth in the region? To this end, panel data of 31 SSA countries for the period 1991–2015 are used, and the growth model is estimated using a two-step system-GMM (Generalized Method of Moments) estimation method. The results of the empirical analysis suggest that institutional quality matters for economic growth, but different institutional arrangements have different impacts.

This paper extends the literature in two ways. First, it addresses the problem of instrument proliferation and business cycle effects by using a system GMM estimator and accounting for slow changes in institutional variables with five-year averages. Second, it provides insights into the distinct role of different clusters of institutions on economic growth

by using a PCA (Principal Component Analysis) approach. Except for very few studies (Jellema and Roland, 2011; Siddiqui and Ahmed, 2013; Slesman *et al.*, 2015), institution-growth literature either considers only one indicator or a composite indicator by aggregating various indicators as a measure of institutions. The main limitation of the former approach is that other institutional indicators that could alter the significance of the relationship were excluded. In the latter case, various indicators have been combined based on the subjective decision of the researcher. Third, this study provides additional evidence on the nexus between institutions and growth in the case of SSA, where studies on the topic are rare.

The remainder of the paper is structured as follows. Section 2 discusses the empirical literature concerning the present study. Section 3 provides the empirical methodology and data used for this study. Section 4 presents empirical results and a discussion. Finally, section 5 provides conclusions and recommendations and suggests potential areas for future research.

2. Literature review

The question of why some countries are more economically developed than others has been of interest to economists since the publication of Adam Smith's book. Although several theories have emerged on the causes of income gaps between countries since then, there is less agreement regarding the causes. Adam Smith (1776) believed that the division of labor was the key to a nation's wealth, while Karl Marx (1889) argued that capital accumulation was the driving force of growth in a capitalist economy. Joseph Schumpeter (1942) attributed economic growth to innovation, while Harrod and Domar argued that it was due to savings and investment.

The Solow (1956) growth model highlighted the significance of saving and capital accumulation in determining the growth performance of countries. The model's main prediction is that less developed countries will grow faster than developed countries, so countries converge in the long run. However, consequent empirical studies did not support this prediction. This led to an extension of the model to include human capital, which was proposed by Mankiw *et al.* (1992). Even with this extension, the Solow growth model was criticized for its unrealistic assumption, so a new wave of empirical studies emerged called the "endogenous growth theory." Although the pioneering work of Arrow (1962) has influenced this line of analysis, this growth model embraces the diverse body of theoretical and empirical works (Lucas, 1988; Romer, 1986, 1990). This growth theory considers human capital, innovations and technology as a source of economic growth.

Although investment and technological differences among countries create differences in income levels, the question of why some countries have more physical capital and better technology than others remains unanswered. It has been argued that growth models hitherto have revealed only the "mechanics" or "correlates" of growth, not the fundamental determinant of growth (North and Thomas, 1973). Although four determinants of growth have been proposed in the literature, i.e. geography or endowment (Sachs, 2003), culture and history (Tabellini, 2010), trade and openness (Dollar and Kraay, 2001; Rodrik *et al.*, 2004), and institutions (Acemoglu *et al.*, 2001), the current debate is focused on the relative importance of geography and institutional factors. Proponents of geography argue that geographical disadvantages cause poverty (Bloom *et al.*, 1998, 2004; Collier, 2008; McCord and Sachs, 2013; Sachs, 2003). Institutional economists point to the influence of institutions in determining countries' growth trajectories (Rodrik *et al.*, 2004).

North (1990) defines institutions as "... the rules of the game in a society or, more formally, are the human-devised constraints that shape human interaction. Consequently, they structure incentives in human exchange, whether political, social, or economic." A pioneering empirical study on the importance of institutions was conducted by Knack and Keefer (1995).

The authors used institutional quality indicators by averaging five ICRG's index for the years 1986–1995 and found a significant and positive coefficient of institutional variable. This was confirmed by Barro (1996), Sala-i-Martin (1997), who also found that political variables such as the rule of law, political rights and civil liberties were important factors in economic growth. Dawson (1998) and Hall and Jones (1999) similarly found that institutional quality had a positive effect on economic growth through total factor productivity (TFP) and investment.

The seminal paper by Acemoglu *et al.* (2001) also concludes that institutions are a significant cause of contemporary cross-country income differences. The author found that settler mortality determines the types of institutions installed during the period of colonialism, which in turn affects economic performance today. Rodrik *et al.* (2004) used the three-stage least square (3SLS) to show that institutional quality has a greater impact on economic growth than other factors.

Employing a panel data approach, Lee and Kim (2009) found that institutions positively impact economic growth, with the effect being higher for high-income countries than for low-income countries. Valeriani and Peluso (2011) confirmed this finding that institutional quality positively impacted economic growth across all 181 countries they studied. Nawaz (2015) also showed that institutions have a higher significant positive impact on developed countries than on developing countries.

Jellema and Roland (2011) attempted to empirically unravel the impact of different institutional variables on economic growth using PCA and found that check and balance, and democratic institutions significantly affect economic growth. Likewise, Siddiqui and Ahmed (2013) employed PCA and documented the positive and significant relationship between institutions and economic growth. In addition, the study underscores the importance of institutional and policy rents rather than political rents and risk-reducing technologies for developing countries. Using panel data, Slesman *et al.* (2015) examined 39 countries from 1983 to 2009 and found that political institutions are the most prominent institutional framework to accelerate economic growth.

Urbano *et al.* (2019) analyzed institution growth over the past 25 years and suggested that institutions are related to growth through entrepreneurship. Muja and Gunar (2019) found a strong causal link between good governance and economic performance in the Western Balkans. Chhabra *et al.* (2023) found that trade and institutions are only short-term complements of economic growth, with good governance being necessary for a positive long-term impact of trade openness.

Although the recent resurgence of economic growth and improvement in institutional quality make Africa an interesting case study, empirical studies on the impact of institutions on economic growth are very few. An early example is Naudé (2004), who analyzed the effect of institutions and geography on the economic growth of 44 African countries for the period 1970–1990 using both OLS and GMM estimation methods. The author concludes that both institutions and geography affect the economic growth of African countries. Hashim Osman *et al.* (2011) explored the nexus between institutional quality and economic growth of selected SSA countries for the period 1984–2003 and found that improving institutional quality could help SSA countries to achieve a higher economic outcome. A study by Kilishi *et al.* (2013) also supports the notion that "institutions matter." Akinlo (2016) investigated the relationship between the quality of institutions and output growth for a panel of 30 African countries from 1980 to 2011 and concluded that institutional quality indicators have a significant negative impact on economic growth.

A study conducted by Acheampong *et al.* (2021) on the relationship between economic growth and renewable energy in SSA has demonstrated a bi-directional causality, and institutions can respond to renewable energy and carbon emissions but not vice versa. Moreover, Asamoah *et al.* (2019) found that institutional quality has a positive effect on

economic growth in SSA and can positively affect trade openness and economic growth. Adegboye *et al.* (2020) found that FDI is important for economic development in SSA, but the quality of institutions affects the level of FDI inflow. Doan (2019) confirmed that institutional quality is a key factor for economic development, while Ogbuabor *et al.* (2020b) found that institutional indicators have a negative impact on economic growth in West Africa. Onuigbo (2020) further demonstrated that institutional quality significantly affects Nigeria's short- and long-term FDI–growth relationship. Ogbuabor *et al.* (2020a) similarly found it to have a negative but insignificant impact on economic growth in Nigeria. Anthony-Orji *et al.* (2019) noted that financial stability and institutional quality positively affect financial inclusion in the long run but not in the short run.

In a nutshell, studies on the nexus between institutional quality and economic growth vary depending on the institutional variable included in the model, the number of countries taken as a sample, the sample period taken into consideration, the estimation method employed and the nature of the dataset (cross-section, time series and panel). Therefore, the empirical results of these studies are not uniform.

3. Data and empirical methodology

3.1 Data

The data on macroeconomic variables are derived from the World Bank's World Development Indicators, while institutional variables are from International Country Risk Guide (ICRG) and Polity 4. The study is based on a balanced panel data set of 31 SSA countries from 1991 to 2015. Table 1 presents the list of countries.

The five-year average, rather than annual data, is used to circumvent the business cycle effects and account for the slow change of institutional variables. Therefore, the sample period is divided into five non-overlapping periods.

3.2 Model specification and empirical strategy

To examine the impact of institutional arrangements on economic growth, we followed the standard growth model widely used in empirical growth literature (Barro, 1991; Islam, 1995; Levine and Renelt, 1992; Mankiw *et al.*, 1992) as

$$y_{it} - y_{it-1} = \beta_1 y_{it-1} + \beta_2 INST_{it} + \beta_3 X_{it} + \mu_i + \eta_t + u_{it} \quad (1)$$

where y represent the log of GDP per capita, $INST$ is the measure of institutional quality, and X represents the matrix of control variables for i = 1 . . . N (country) and t = 1 . . . T (time), and $\mu_i = country\ fixed\ effect$ and $\eta_t = period\ effect$

Angola	Ghana	Niger
Botswana	Guinea	Nigeria
Burkina Faso	Guinea-Bissau	Senegal
Cameroon	Kenya	Sierra Leone
Congo, Dem. Rep	Liberia	South Africa
Congo, Rep	Madagascar	Sudan
Cote d'Ivoire	Malawi	Tanzania
Ethiopia	Mali	Togo
Gabon	Mozambique	Uganda
Gambia, The	Namibia	Zambia
		Zimbabwe

Source(s): Author's own work

Table 1. List of sampled countries

This can be written as follows:

$$y_{it} = (1 + \beta_1)y_{it-1} + \beta_2 INST_{it} + \beta_3 X_{it} + \mu_i + \eta_t + u_{it} \quad (2)$$

Or if we assume $\widetilde{\beta} = 1 + \beta_1$, equation (2) can be written as:

$$y_{it} = \widetilde{\beta} y_{it-1} + \beta_2 INST_{it} + \beta_3 X_{it} + \mu_i + \eta_t + u_{it} \quad (3)$$

The baseline estimation of economic growth incorporates three main control variables: secondary school enrollment, domestic savings and population growth as a measure of human capital, physical capital and labor force growth.

After using the logarithm of some variables, our baseline model would be expanded as follows:

$$lny_{it} = \widetilde{\beta} lny_{it-1} + \beta_2 INST_{it} + \beta_3 pop_{it} + \beta_4 \ln (school)_{it} + \beta_5 \ln (save)_{it} + \mu_i + \eta_t + u_{it} \quad (4)$$

y_{it-1} in equation 4 represent the lag of the dependent variable GDP per capita to capture the initial real GDP. This variable is useful to test the existence of convergence, as claimed by the neoclassical growth model. In this study, we assume conditional convergence depending on institutional factors. Therefore, if we follow equation 4 specification, as in Islam (1995), a significant $\widetilde{\beta}$ value between 0 and 1 represent conditional convergence [4]. Another control variable included in the model is population growth (**pop**). The neoclassical growth model indicated that population growth has a negative effect on per capita growth, as it leads to a reduction in the capital stock per worker (Bucci *et al.*, 2019). On the other hand, the endogenous growth model suggests that population growth positively impacts economic growth (Peterson, 2017). The empirical evidence for this debate is mixed, with some studies finding positive relationships (Sethy and Sahoo, 2015), negative relationships (Li and Zhang, 2007; Yip and Zhang, 1996) and no statistically significant relationship (Barlow, 1994; Williamson, 2001) between population growth and economic growth. Nevertheless, there is a commonly held view that uncontrolled population growth may retard economic growth, particularly in SSA. Therefore, we expect an inverse relationship between population growth and economic growth.

Saving (**save**) measured by domestic saving as a percentage of GDP has also been considered one of the triggers of economic growth. Many empirical studies also confirm the positive relationship between domestic savings and economic growth, especially in developing countries (see Aghion *et al.* (2016)). Thus, the expected sign of the domestic savings variable is positive. The other growth determinant widely considered an engine of economic growth is human capital (**school**). Previous empirical studies have used school enrollment as a proxy for human capital; thus, following their lead, secondary school enrollment was used in this study. The empirical results of previous studies have demonstrated that countries with higher school enrollment rates generally enjoy faster economic growth (Barro, 2003). The coefficient of human capital, thus, is expected to have a significant positive sign on the economic growth equation.

INST, in equation 4, represents institutional quality. PCA analysis was employed to get a good index of this variable, and three clusters of institutional quality indices were extracted, as briefly discussed below.

3.3 Principal component analysis

In general, prior studies quantified the level of institutional quality in two different ways. In isolation, one strand of literature uses a single institutional indicator collected from an international organization, such as WGI or ICRG, to investigate the nexus between

institutional quality and economic growth. The main drawback of these studies is that the existence of other institutions that could alter the significance of the relationship has been neglected. As Kunčič (2014) indicated, it is difficult, if not impossible, to find one indicator that represents the institutional quality of the economy. Another strand of literature has used a composite measure of institutions by aggregating various institutional measures using either a simple or weighting average. Although these studies have attempted to consider the multidimensional nature of institutions, they have still combined various indicators based on the subjective decision of the researcher.

To address the limitations of the two approaches mentioned above, recent studies have employed statistical methods, more specifically PCA, to retrieve various components of institutions that are uncorrelated to each other using objective measures (Jellema and Roland, 2011; Langbein and Knack, 2010; Siddiqui and Ahmed, 2013; Slesman *et al.*, 2015). The ICRG political risk dataset, which incorporates 12 indicators with different ranges, and polity data were used to construct clusters of institutions. Due to variation in scaling, we first rescaled all indicators to the range of 0–10, where the higher value of the indicators represents the better institutional quality. PCA was performed in each period for all countries.

According to Kaiser (1974), components whose eigenvalues (λ) are greater than 1 should be considered, while components with eigenvalues (λ) less than 1 should be dropped from further analysis. Based on Kaiser's rule, three components are retained, which will be used for further analysis. Then the Promax rotation procedure is employed to distribute component loading among the three components. The component loading after rotation is presented in Table 2.

It is apparent from the table above that the first component (Comp1) is mainly explained by socioeconomic condition, investment profile and bureaucracy quality. These indicators are essential to create a conducive business environment and attract investment in the country and are mainly related to the economic situation; therefore, we call component 1 as "*investment-promoting economic institutions*." On the other hand, the second component (Comp2) is heavily loaded with democratic accountability, corruption and polity2, which reflects the quality of the country's political system. Thus, this component can be expressed as "*democratic and regulatory institutions*." The last component (Comp3) is profoundly loaded with government stability, external conflict, and law and order. These indicators measure the capability of the country to preclude cross-border and internal conflicts. Because of this, we call the third component as "*conflict-preventing institutions*."

Variable	Comp1	Comp2	Comp3
Government Stability	0.0214	−0.0092	*0.7065*
Socioeconomic condition	*0.5246*	−0.2111	0.0851
Investment Profile	*0.4258*	−0.0484	0.0873
Internal Conflict	0.228	0.251	−0.0832
External Conflict	0.1744	0.275	*−0.3505*
Corruption	−0.2077	*0.4388*	0.2849
Military in politics	0.2682	0.2004	−0.1028
Religious tension	0.0501	0.2789	0.044
Law and order	0.1966	0.0342	*0.496*
Ethnic tension	0.1405	0.2493	0.0707
Democratic accountability	0.0168	*0.3307*	0.0949
Bureaucracy quality	*0.5387*	−0.2481	−0.013
polity2	−0.2952	*0.5996*	−0.0732

Table 2.
Component loading after rotation

Note(s): Promax rotation procedure is employed in order to distribute component loading among the three components. The highlighted numbers indicate the corresponding loading of each variable on the components
Source(s): Author's own work

3.4 Econometric technique and estimation

The growth equation with institutional indicators and other control variables can be written as follows:

$$lnY_{it} = C + \gamma lnY_{it-1} + \delta INST_{it} + \lambda lnX_{it} + \mu_i + \eta_t + u_{it} \quad (5)$$

For i = 1 … N and t = 1 … T using datasets with large N and fixed T μ_i = *country fixed effect* η_t = *period effect*

Since lnY_{it-1}, in equation (5) is correlated μ_i, estimating the above growth equation using OLS produces a biased estimate. One alternative to circumvent this problem is to use the difference of the variables in the original data as follows:

$$\Delta lnY_{it} = \gamma \Delta lnY_{it-1} + \delta \Delta INST_{it} + \lambda \Delta lnX_{it} + \Delta \eta_t + \Delta u_{it} \quad (6)$$

By differencing the original model, we get rid of the country-fixed effect μ_i, and the constant term C, but it creates another problem: the correlation between ΔlnY_{it-1} and Δu_{it}. This is because lnY_{it-1} in ΔlnY_{it-1} is a function of the u_{it-1} which is also in Δu_{it}. Thus, even the above equation (equation 6) cannot be estimated using OLS.

The classical way to counter endogeneity is using the Instrumental Variable (IV) estimator. However, finding exogenous instruments related to the variable but not the error term is challenging. The recommended estimator is Arellano and Bond (1991) first difference GMM and/or (Arellano and Bover, 1995; Blundell and Bond, 1998) system GMM estimator. GMM estimator uses the lagged value of the variable in the sample as an instrument; thus, the coefficients of the model are estimated more efficiently than IV estimates of the dynamic panel data model. Another advantage of GMM is that the possibility that all explanatory variables can be endogenous in the model, yet the estimator is unbiased (Bond *et al.*, 2001; Caselli *et al.*, 1996). The difference GMM uses the lagged values of endogenous variables as instruments, but these are considered poor instruments, especially if the variables are close to a random walk (Blundell and Bond, 1998). The system GMM estimator, on the other hand, uses the lag of the first difference, in addition to lagged values of endogenous variables, as instruments, enhancing the estimator's efficiency. As a result of this, Bond *et al.* (2001) recommended the system GMM estimator for the empirical analysis of economic growth. Although it is efficient, the system GMM estimator is vulnerable to instrument proliferation. Roodman (2009) warned about instrumental proliferation and argued that some asymptotic results and specification tests are not valid in the case of too many instruments. The author suggested comparing the number of instruments with the number of cross-sections (countries). If the number of instruments is greater than the number of cross-sections, there is a high probability of instrumental proliferation. To circumvent the above-stated problems of each estimator, the present study employed a two-step system GMM estimator with the strategy suggested by Roodman (2009).

4. Discussion and empirical results

4.1 Baseline regression result

The estimation results of the above growth equation, as seen in Table 3, start with the pooled OLS estimation and then move on to a series of other estimators. It is important to note that there are several reasons why the pooled OLS should not be relied upon to investigate the nexus between growth and institutions. This is partly because the lagged value of the dependent variable is correlated to the error term, which violates one of the assumptions of classical OLS estimation. A panel-fixed effect estimator is suggested to address this issue, as seen in column 2 of Table 3. However, the lagged dependent variable remains endogenous

Independent variables	(1) Pooled OLS	(2) Fixed effect	(3) Difference GMM	(4) System GMM
GDP per capita ($t-1$)	0.969***	0.708***	0.564***	0.884***
	(0.0219)	(0.0938)	(0.0373)	(0.0391)
Investment-promoting	0.00122	0.0232*	0.0185***	0.0317***
	(0.00981)	(0.0124)	(0.00298)	(0.00876)
Democ and regulatory	0.00864	0.0260**	0.0135	0.0151*
	(0.00844)	(0.0127)	(0.0105)	(0.00843)
Conflict-preventing	0.00675	−0.00214	0.00161	0.0123
	(0.0107)	(0.0107)	(0.00551)	(0.0131)
Human capital	−0.0418	−0.0181	−0.000543	−0.00578
	(0.0299)	(0.0493)	(0.0218)	(0.0380)
Population growth	−0.0347	−0.00602	0.00587	−0.0385*
	(0.0265)	(0.0450)	(0.0238)	(0.0207)
Domestic saving	0.0279**	0.0728***	0.0778***	0.0710***
	(0.0128)	(0.0218)	(0.0122)	(0.0173)
Constant term	0.532***	2.057***		0.773***
	(0.177)	(0.636)		(0.179)
R-squared	0.989	0.870		
Period dummies	yes	yes	yes	yes
AR (2) test (p-value)			−1.23 (0.219)	−0.79 (0.429)
Hansen J-test (p-value)			14.40 (0.496)	10.68 (0.298)
Number of Instruments			27	22
Number of countries		29	27	29

Table 3.
Estimation results of the growth equation

Note(s): Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are expressed as natural logarithms except for population growth and institutional indicators

and is correlated to the error term. Roodman (2009) and Bond *et al.* (2001) suggest that the true parameter likely lies between the coefficient of OLS and the fixed effect.

The potential estimator that addresses both endogeneity and country heterogeneity is the difference GMM. This estimator transforms the data into a first difference, eliminating the fixed effect and using the endogenous variable's lagged value to circumvent the endogeneity problem. The estimation results using this estimator are presented in Table 3, column 3. One of the problems of this estimator is that the lagged values of the variables are poor instruments, and most of all, the coefficient of the lagged dependent variable is outside the credible range (between OLS and fixed effect). A more efficient and consistent is system GMM. One of the advantages of this estimator is the use of the lag of the first difference of endogenous variables as an additional instrument. The estimation result of our growth equation is presented in the fourth column of Table 3. As shown in the table, the coefficient of the lagged dependent variable is within the acceptable range. Thus, the interpretation of the growth equation is based on the results from system GMM (column 4) [5].

Two specification tests are important to check the validity of the GMM estimation method: the Hansen test and Arellano–Bond test. The Hansen test is used to determine the validity of the instruments so that they are not correlated with the error term, while the Arellano–Bond test is used to detect the existence of second-order serial correlation in the error term. Results from both tests are presented in the lower section of Table 4. The p-value of the Arellano–Bond test is 0.429, indicating that the null hypothesis of no second-order serial correlation is not rejected. The Hansen test has a p-value of 0.298, indicating the instruments' validity. Since the strategy Roodman (2009) suggested was followed, instrumental proliferation did not weaken the estimation result. Overall, the result of the system GMM is satisfactory and robust.

Independent variables	(1) System GMM basic	(2) _gov	(3) Openness	(4) Inf	(5) Finance	(6) All
GDP per capita ($t-1$)	0.884***	0.887***	0.869***	0.880***	0.927***	0.903***
	(0.0391)	(0.0416)	(0.0311)	(0.0393)	(0.0456)	(0.0374)
Investment-promoting	0.0317***	0.0331***	0.0291***	0.0319***	0.0268***	0.0307**
	(0.00876)	(0.0118)	(0.00796)	(0.00970)	(0.00932)	(0.0133)
Democ and regulatory	0.0151*	0.0178*	0.0173**	0.0155*	0.0212**	0.0205*
	(0.00843)	(0.00916)	(0.00743)	(0.00852)	(0.00883)	(0.0109)
Conflict-preventing	0.0123	0.0124	0.00730	0.0103	0.0255*	0.0171
	(0.0131)	(0.0117)	(0.0126)	(0.0117)	(0.0146)	(0.0107)
Human capital	−0.00578	0.00334	0.0118	−0.00459	−0.0304	0.00372
	(0.0380)	(0.0399)	(0.0240)	(0.0377)	(0.0380)	(0.0308)
Population growth	−0.0385*	−0.0319	−0.0440**	−0.0396*	−0.0283	−0.0338
	(0.0207)	(0.0236)	(0.0193)	(0.0232)	(0.0229)	(0.0287)
Domestic saving	0.0710***	0.0674***	0.0746***	0.0732***	0.0564***	0.0637***
	(0.0173)	(0.0180)	(0.0150)	(0.0168)	(0.0185)	(0.0201)
Government expend		−0.0529				−0.0458
		(0.0596)				(0.0547)
Openness			0.0144			−0.0194
			(0.0471)			(0.0345)
Inflation				−5.57e-06		5.95e-05
				(4.55e-05)		(8.69e-05)
Credit to private					−0.0212	−0.00903
					(0.0136)	(0.0134)
Constant	0.773***		0.767***	0.797***	0.734***	
	(0.179)		(0.166)	(0.185)	(0.211)	
AR(2) test (p-value)	−0.79 (0.429)	−0.61(0.539)	−0.72(0.473)	−0.79 (0.431)	−0.97(0.334)	−1.13 (0.259)
Hansen test (p-value)	10.68 (0.298)	9.01 (0.436)	10.11 (0.341)	10.36 (0.322)	9.07 (0.431)	7.90 (0.545)
Number of Instruments	22	23	23	23	23	26
Number of country1	29	29	29	29	28	28

Note(s): Standard errors in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All variables are expressed as natural logarithms population growth and institutional indicators. For all estimations, two-step estimator, orthogonal deviation and period dummy were used
Source(s): Author's own work

Table 4. System GMM estimation with additional control variables

The above estimation result shows that the explanatory variables' estimated coefficient has the correct sign, although some of the variables are insignificant. It shows that out of the three institutional indicators, only conflict-preventing institutions are insignificant. But investment-promoting and democratic and regulatory institution indicators are positive and significant at a conventional significance level, indicating that improvement in these institutional dimensions significantly affects the region's growth performance. More specifically, conditional on all other regressors and the initial level of GDP per capita, a 10-percentage point increase in the quality of investment-promoting institutions leads to a 0.3% point increase in the GDP per capita growth rate. Similarly, a 10-percentage point increase in the quality of democratic and regulatory institutions improves economic growth by 0.2%. The third institutional dimension, conflict-prevention, is found to be insignificant. This finding is in line with the results of previous studies in the case of SSA countries

(e.g. Hashim Osman *et al.*, 2011) and in the case of the global sample (Acemoglu *et al.*, 2001; Knack and Keefer, 1995; Lee and Kim, 2009; Rodrik *et al.*, 2004).

Human capital is found to be insignificant. This result corroborates the study of Barro and Lee (2001), Delgado *et al.* (2014), Durlauf *et al.* (2008), Minier (2007). Although the above studies support our result, it is counter-intuitive and appears to contradict a bulk of theoretical and empirical studies. Thus, this result should be interpreted with caution for several reasons. First, the relationship between human capital and economic growth may not be linear and may vary depending on the functional form of the growth model. Second, school enrollment may not adequately represent human capital in growth regression; therefore, there is a need to check if the indicator of human capital is significant or not when an alternative measure of human capital is used (for instance, secondary vs tertiary, vocational training vs formal training).

As expected, the coefficient of population growth is negative and significant, indicating that population growth has a significant negative effect on the region's economic growth. Likewise, the coefficient of domestic savings is positive and significant at the 1% level, implying that domestic savings strongly affects the region's economic growth. To be more specific, a 10-percentage point increase in domestic saving leads to a 0.7% point increase in the growth rate of GDP per capita, *ceteris paribus*. Numerous theoretical and empirical studies, such as Aghion *et al.* (2016), further support this significant and positive impact of domestic saving.

4.2 Robustness check via additional control variables

Our empirical estimate is valid and reliable as it passes all the diagnostic tests. However, we conducted a robustness check by including other determinants of growth to account for potential omitted variable bias. If the relationship between institutional indicators and growth still exists and is similar after the inclusion of other determinants of growth, we can conclude that our empirical result is robust. The widely discussed determinants of growth that we included in our analysis were government expenditure, openness to trade, inflation and financial development.

The regression result of our extended growth model with government expenditure is presented in the second column of Table 4, and the estimation result with trade openness as another explanatory variable is presented in column 3 of Table 4. The table shows that institutional variables' sign and significance levels remain unchanged. Our estimation with the inclusion of the inflation variable is also presented in column 4 of Table 4. Interestingly, this estimation result is that the sign and significance level of the three intuitional indicators remains the same with our baseline and other models (see columns 1, 2 &3).

This consistency of the significance and sign of institutional indicators, even though other growth determinants are included in the baseline model, indicates the robustness of the causal relationship between institutional quality and economic growth. Previous growth literature also has shown that growth is linked to the country's financial development level. Thus, to check whether including the country's financial development level might alter the institutional indicator's significance, the growth equation is extended using credit to the private sector as a percentage of GDP, and the estimation result is presented in column 5 of Table 4. The table shows that the two institutional indicators are positive and significant. Finally, we included the above variables simultaneously in the growth equation to investigate whether the significance of institutional variable indicators might change with the inclusion of additional variables, and the result is presented in column 6 of Table 4. Again, the regression estimate of the growth model indicates that the coefficients of the two institutional variables are both significant and positive. Besides, no significant change was found in the estimation

coefficient of other variables when compared with the baseline model estimate. To sum up, we found a robust relationship between the quality of institutions and economic growth, and our empirical results strongly support that investment-promoting and democratic and regulatory institutions affect economic growth. However, conflict-preventing institutions do not have a significant impact.

5. Conclusion and policy recommendations

Although there is now a growing consensus that institutions are important for economic growth and development, disagreement persists regarding the extent to which they influence economic growth and which institutional arrangements are the most effective. This disagreement is even more pronounced when sampled countries are reduced to a regional level. Thus, studies at a regional level can provide interesting insights concerning the nexus between institutions and economic growth. Against this backdrop, this study aims to investigate the effect of institutions on the economic growth of 31 SSA countries over the period 1991–2015. System GMM with a strategy Roodman (2009) suggested was used to estimate the growth equation. To ensure that our estimation was not driven by misspecification and omitted variable bias, a robustness check was conducted by including additional control variables.

Three important conclusions have been drawn from our empirical investigation of the nexus between institutional quality and economic growth in SSA. First, our study found that institutional quality had a significant positive effect on economic growth. However, the effects of different clusters of institutions varied. While investment-promoting and democratic and regulatory institutions significantly impacted economic growth, the effect of conflict-preventing institutions was negligible. Second, domestic savings and population growth were found to be significant determinants of economic growth for the countries considered. While population growth retards growth, domestic saving enhances the economic performance of the region. Third, once institutional quality is considered in the growth model, other growth determinants, such as openness, inflation and human capital, do not significantly impact growth. This suggests that institutional quality appeared to matter most in improving the region's economy.

The empirical findings of this study suggest that policymakers in the region should take steps to promote institutional reforms to accelerate regional economic growth. Specifically, reforming institutions that promote investment and democracy is essential in achieving this goal. This could involve drafting new laws and regulations related to the country's investment profile, reducing bureaucracy, and increasing democratic accountability. Additionally, there should be an emphasis on strengthening the capacity of local governments to implement reforms and ensuring that the local population is aware of the potential benefits of such reforms. Furthermore, public-private dialog should be encouraged to ensure that the private sector has a voice in policy decisions and that their interests are considered. Finally, there should be an effort to ensure that the reforms are implemented transparently and accountable to ensure that economic growth gains are equitably shared.

The results of this study are subject to data limitations, particularly in terms of institutional data. Ideally, it would have been better to use institutional data from various sources and analyze it using a PCA approach. However, institutional indicators for most countries in our sample are not available. Therefore, future research would include institutional indicators from various sources and apply a PCA approach to extract institutional variables and analyze the impact of each institutional index on economic growth.

Notes

1. https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups
2. https://www.indexmundi.com/factbook/compare
3. Over the last twenty years, SSA countries have registered an average GDP growth of above 5% and real GDP per capita growth of approximately 2% per annum. Similarly, within this period, institutional quality has improved. Nonetheless, both economic growth and improvement in institutional quality have been far from uniform across countries.
4. If equation 1 specification is followed, negative β_1 represent conditional convergence.
5. For all estimators, period dummies are used to remove time-related shocks from the error and two-step GMM estimator with orthogonal deviation and the Windmeijer (2005) correction was employed for both difference and system GMM.

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Corresponding author
Mohammed Seid Hussen can be contacted at: meetmame@gmail.com