Empirical Investigation into Economic Growth Episodes and Institutional Clusters in Africa*

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Abstract

The literature on the institution-growth nexus treats the influence of institutions on economic growth regardless of the episodes of economic growth although it has long been recognized that the proximate cause of low per capita income growth in Africa is the sequence of boom and bust. This study reorients the central research question towards explaining the given-institution elasticity of growth episodes (e.g., acceleration and deceleration). Notably, we attempt to re-evaluate the relationship between economic growth episodes and clusters of institutions using a modified endogenous growth framework and a panel data of 42 African countries covering the period 2005 to 2019 within the System-GMM approach. Growth acceleration and deceleration episodes are identified using an improved variant of the filter developed by Hausmann, Pritchett, and Rodrik (2005). One of the striking results indicates that the effects of institutions on economic performance are asymmetric. Importantly, we also find that growth deceleration seems to be driven by a different set of institutions than growth acceleration; meaning that the relative importance of specific institutions to economic performance varies depending on episodes of economic growth. Another interesting finding is the confirmation that institutions trump on other fundamental growth causes such as geography. Overall, we interpret these results to suggest that weaker institutions and structural policies have a constraining effect on economic growth as they indirectly affect countries' potential to respond to low-growth challenges.

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1 Introduction

Sub-Saharan Africa (SSA) countries have experienced a significant increase in growth over the period 2005-2019, with average annual per capita GDP growth increasing from 0.2 percent in 1990-2004 to 1.4 percent between 2005 and 2019 (i.e. the annual average growth rate in 1990-2004 has been multiplied by about 7). Some papers in the literature on the institution-growth nexus attempted to identify the key determinants of this economic (counter-) performance.[1] The standard approach in the empirical literature on the institution-growth nexus (see e.g., Acemoglu, Johnson, and Robinson 2001 and the subsequent literature) is to examine the determinants of the economic prosperity using a cross-country regression equation where log GDP per capita is the main dependent variable. This approach may be a source of concerns for many reasons. For instance, to date, most work on long-run economic performance has focused on 'growing', but recent work for the post-1950 period has suggested that economies vary as least as much in how they 'shrink' as in how they grow (Easterly et al. 1993). Meaning that most studies in the literature treat the influence of institutions on economic growth regardless of the episodes of economic growth.

Ignoring episodes of economic growth in the African context could be problematic insofar as it has long been recognized that the proximate cause of low per capita income growth in Africa is the sequence of acceleration and reversal growth episodes. Toh (2016, p. 238) show that more than one third of the countries in Africa experienced low growth, and their economies remained fragile. Jerven (2010) argues that the proximate cause of low per capita income growth in Africa is the sequence of boom and bust. Easterly et al. (1993), Pritchett (2000), Dovern and Nunnenkamp (2007), Avom, Kamguia, and Njangang (2021), among others, point out that growth performance tends to be highly unstable. Figure B.1 in Appendix B shows that the SSA countries have experienced more reversal growth episodes than acceleration growth episode over 2005-2019. Taking into account the above observation, our paper attempts to re-evaluate the relationship between institutions and the economic performance in SSA countries countries using the Generalized Method of Moments (GMM) estimation to deal with the critical issues of endogeneity and unobserved heterogeneity. One of the distinguishing characteristics of the study is that instead of taking the usual approach of focusing on long-run growth and assuming that African countries have homogenous parameters in growth regressions, the study focuses on episodes of growth and their asymmetric sensitivity with types of institutions.

We execute a simple three-step regression approach. First, we apply the Rodrik, Subramanian, and Trebbi's (2004) procedure (RST procedure) to identify among the determinants of long-term growth, which is the most statistically significant (or simply the *most relevant growth determinant*) for the economic performance

[1] See Goldsmith 1998, Ndulu and O'Connell 1999, Pinkovskiy and Sala-i Martin 2014, Archibong, Coulibaly, and Okonjo-Iweala 2021 among others.

in our 42-country sample for the 2005-2019 period. We consider the following variables of interest: geography, institutions, and trade or integration.[2] In reference to Acemoglu, Gallego, and Robinson (2014), we also include the human capital. We will be interested in the size, sign, and significance of the estimated coefficients of these variables. Our baseline results suggest that the institutions variable is the most statistically significant. The impact of institutions on economic performance appears robust when we use alternative specification as in Acemoglu et al. (2019). Second and importantly, we investigate the impact of institutions on growth episode. To do so, we apply an improved variant of the filter developed by Hausmann, Pritchett, and Rodrik (2005), henceforth HPR (2005), to identify growth acceleration episodes in our 42-country sample. We examine how different institutional clusters affect growth acceleration episodes SSA countries during the period 2005-2019. Third, based on the evidence from Figure B.1 (see Appendix B), we also identify reversal growth episodes. We reapply the same procedure as in the second step on reversal episodes.

Overall, our results suggest that the effects of institutional clusters are not symmetric, i.e., institutional clusters don't play the same role in growth acceleration episodes and in reversal growth episodes. These results provide an empirical support to ideas that institutions are a key fundamental determinant of economic performance, however the relative importance of institutional clusters critically depends on episodes of economic growth (acceleration *versus* reversal).

Our paper makes three contributions to the empirical growth and institutions literature. First, we use both the traditional measure of institutions (i.e., the rule of law) and a rich database on the Country Policy and Institutional Assessment (CPIA) index to deal with the open issue about the relative effects of a cluster of institutions on episodes of economic growth. The World Bank's CPIA assess the conduciveness of a country's policy and institutional framework to poverty reduction, sustainable growth, and the effective use of development assistance.[3] Thus, empirically, the CPIA dataset would allow for addressing the AJR open issue quite well. Also, in reference to Bardhan (2005, 2016) and Rodrik (2005), among others, our empirical strategy basically focuses on interactions between some aspects of institutional quality and economic performance.

Second, in contrast to AJR (2001) who basically implement a cross-section approach, we use a panel data procedure. As argued by Islam (1995), the main usefulness of the panel approach lies in its ability to allow

[2]We refer to the RST procedure the econometric strategy which consists of sequentially estimating the relative importance of potential determinants for long-term economic growth.

[3]The CPIA rates countries against a set of institutional criteria grouped in four clusters: (i) economic management; (ii) structural policies; (iii) policies for social inclusion and equity; and (iv) public sector management and institutions. The criteria are focused on balancing the capture of the key factors that foster growth and poverty reduction, with the need to avoid undue burden on the assessment process. See IEG World Bank (2010) for more details.

for differences across countries that are not readily measurable or observable. Moreover, in reference to the empirical evidence that emerge from Figure B.1 (see Appendix B), panel data approach would also allow for investigating episodes of economic growth and their asymmetric sensitivity with institutional clusters over time.

Third, in contrast to AJR (2001) which consider a global sample, our study focuses on a set of selected African countries. Our purpose is not to examine if differences in institutions explain difference across advanced and developing nations. This issue has been discussed extensively in the literature (see e.g. Durlauf (2020) for an overview). We instead seek to identify what set of institutions would result in significant gains in income per capita for African countries, i.e. a subset of countries with almost the same economic structures. Focus on this issue allows for paying more attention to the policy side of the growth-institutions literature and properly tackling the issue of the relative importance of institutional clusters for episodes of economic growth.

Since we attempt to quantify the impact of institutions on economic performance, one of traditional challenges refers to the reverse causality, measurement error, omitted variables and endogenous bias. For exemple, in presence of "bad controls" (see e.g., Angrist and Pischke (2009, pp. 64-68) for more details) or in the absence of valid instruments, the impact of institutions on income per capita would be inconsistent. Thus, we follow Acemoglu et al. (2019) and address these challenges by using a dynamic panel model for GDP which includes both country fixed effects and autoregressive dynamics (see e.g. Anderson and Hsiao (1982) for an introduction in dynamic models using panel data). We control for various measures of geography that could be correlated with economic development; whether a country was colonized by the British, French, or other European powers; and various measures of health.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature while Section 3 outlines methodological considerations. Section 4 presents our benchmark results. Section 5 complements the previous section and focus on the the institutional clusters effects on growth. Section 6 proposes an inclusive discussion of our results. Section 7 concludes.

2 Literature Review

In recent years, the importance of institutions for economic growth has increasingly been recognized. However, establishing the institutions-growth nexus has been challenging in empirical literature. For instance, benchmark growth models, including Lucas (1988) and Romer (1990) among others, do not explicitly model institutions, but offer only a general framework that allows for making conjectures regarding how institutions operate. Critically, authors such as North and Thomas (1973), North (1989), Olson (2000) and others have established that that neoclassical variables do not account for economic differences between countries and that the structure of incentives, which are clearly distinguished by national boundaries, is the root cause of the differences. These incentives rely on institutions and economic policies, through which enforce contracts impartially and protect property rights for a long time, making the differences in economic performance.

Recent developments in institutional economics have recognized the fact that the way that humans themselves decide to organize their societies determines whether or not incentives to improve productivity and increase output will be forthcoming (Acemoglu 2008). Some ways of organizing societies encourage people to innovate, to take risks, to save for the future, to find better ways of doing things, to learn and educate themselves, to solve problems of collective action and to provide public goods. Others do not.

In a landmark study of new institutional economics, Rodrik, Subramanian, and Trebbi (2004) assess the relative importance of institutions, geography and integration (trade) in determining the differences in incomes between the world's most developed countries and the poorest ones. They find that institutional determinants trump all others. Need not to say, institutions conducive to economic growth reduce the costs of economic activity. The costs include transaction costs such as search and information costs, bargaining and decision costs, policing and enforcement costs (Coase 1992, p 197; Dahlman 1979, p. 149). They lower transaction costs by providing common legal frameworks (e.g. contracts and contract enforcement, commercial norms and rules), and they encourage trust by providing policing and justice systems for the adherence to common laws and regulations.

It should be observed that in much of the literature, both theoretical and empirical, the predicted effects of institutional clusters affect economic growth regardless of whether a given economy is going through growth acceleration or deceleration. With the exception of Rodrik, Subramanian, and Trebbi (2004) where episodes of growth acceleration is considered, the specific institutional effects on growth deceleration have not been empirically studied, even though literature such as the so-called 'resource curse' indicates the dragging influence of institutions on economic growth In line with the recent literature on growth episodes, we argue that much can be learned from analyzing the mechanisms of the growth episodes and institutions nexus. Acemoglu et al. (2003) suggest that in institutionally weak societies, elites and politicians will find various ways of expropriating different segments of the society, ranging from macroeconomic to various macroeconomic policies. Importantly, Homer-Dixon (1995) describe two mechanisms by which episodes of low growth or the related resource scarcity can limit both the total supply and the rate of supply of ingenuity. Increased scarcity often provokes competitive action by powerful elite groups and narrow social coalitions to defend their interests or to profit from the scarcity through "rent-seeking" behavior. These actions can hinder efforts to create and reform institutions and can generally make it harder to focus and coordinate human activities, talents, and resources in response to economic slowdown. Even worse, prolonged low-growth episodes may lead to socio-political unrest and violence, which can in turn directly inhibit ingenuity-generating institutions.

Following Chong and Gradstein (2007), it can be argued that during an economic slowdown a weak institution allows the rich and powerful to obstruct changes in order to protect their ability to capture rents. Also, weak judicial systems which do not give adequate protection to firms/entrepreneurs constrain the ability of entrepreneurs to innovate or improve productivity needed to take back the economy to high growth rates. The importance of paying a closer attention to episodes of economic growth can also be found in resource curse literature where there has long been a recognition that certain types of institutions represent a drag and enhancer of prolonged economic slowdown as they negatively affect productivity and incentives. For instance, trade has a joint effect on economic growth in the long run (e.g., Dollar and Kraay 2003). Emphasis has been on a causal logic that emphasizes institutional obstacles to policy change, such as those presented by multiple veto points. This has especially been the case when it comes to the important question of how political institutions influence governments' responses to exogenous economic shocks.

There is a large body of cross-section studies that investigate interactions between institutional factors and growth.[4] Seminal contributions in this line of research include Barro (1991), Scully (1992), Mauro (1995), Knack and Keefer (1995, 1997), Hall and Jones (1999), Rodrik (1999), among others. These studies do not establish a causal effect of institutions on growth because of major simultaneity and endogeneity concerns. Mauro (1995) and Hall and Jones (1999) are notable exceptions. To deal with endogeneity of institution, Mauro (1995) instruments for corruption using ethnolinguistic fragmentation, while Hall and Jones (1999) instrument for social infrastructure using latitude, i.e. distance from the equator. More recently, following a large research program originated by Acemoglu, Johnson, and Robinson (2001), henceforth AJR (2001), numerous papers have also explored interactions between institutional differences and economic development across countries. AJR (2001) argue that differences in colonial experience could be a source of exogenous differences in institutions. Then, using this source of variation, the authors estimate large effects of institutions on income per capita.[5] However, AJR (2001) treat institutions as a black box. For example, AJR

[4] In contrast, there are not many papers using the time series or panel data approaches. Rare exceptions using time series analyzes include North and Thomas (1973), Nathan and Birdzell Jr. (1986), and Jones (2001) among others, which note that changes in institutions are a key factor for understanding growth over the very long run. Eicher and Leukert (2009, p. 198) note that countries' sample and econometric approach are often dictated by data availability.

[5] Using the protection against *risk of expropriation* index from Political Risk Services as a proxy for institutions and exploiting differences in colonial experience to create an instrumental variables strategy, Acemoglu, Johnson, and Robinson (2001) and subsequent papers (including Acemoglu, Johnson, and Robinson (2002, 2005, 2012), Acemoglu, Gallego, and Robinson (2014) among others) show that institutional differences are more promising in explaining the

(2001, p. 1395) explicitly note that: “The results indicate that reducing expropriation risk (or improving other aspects of the ‘cluster of institutions’) would result in significant gains in income per capita, but do not point out what concrete steps would lead to an improvement in these institutions.”

Noteworthily, African countries often depend on primary products or natural resources and related rents for fiscal revenues, export sales, or both. Some of these resources are more volatile (e.g mining resources or oil) and others are relatively more stable (e.g. agricultural commodities). This dependence on primary commodities has been recognized as a structural weakness. For instance, Blair, Christensen, and Rudkin (2021, p. 709) find that increases in the price of oil, a capital-intensive commodity, provoke conflict. Such structural fragility requires adequate structural policies. It is interesting to examine to what extent the quality of institutions can help to manage these structural weaknesses.

In empirical studies, establishing evidence on the nexus between institutions and growth has remained a huge challenge. Particularly, institutions are created and influenced by various historical, cultural and geographical factors and affect the economic and social outcomes of society through various paths. It follows thus that detecting the causal mechanism between institutions and economic performance requires controlling this endogenous feature of institutions. Beginning with the seminal research of Mauro (1995), Hall and Jones (1999), and AJR (2001), one strand of studies utilized geographical, cultural, and historical characteristics as instruments in order to control for the endogeneity issue of institutional variables in cross-sectional settings (Acemoglu, Johnson, and Robinson 2002, Rodrik, Subramanian, and Trebbi 2004 Acemoglu, Johnson, and Robinson 2005). The time-invariant and exogenous features of the instruments are effective to address the endogenous regressors, but cannot be used for time-series or panel analysis. This means that other possible economic determinants that change over time cannot be controlled. Thus, another strand of research used a method such as System GMM that uses internal instruments, which utilize lags of regressors as instruments, to resolve an endogeneity issue in panel settings (Nawaz and Khawaja 2019).

Moreover, in contrast to AJR (2001), which considers a global sample, our study focuses on a set of selected African countries. Our purpose is to examine if alternative institutions differently affect economies depending on the episode of growth. More importantly, our study also seeks to identify what set of institutions would boost or drag the growth gains in income per capita for African countries during alterning growth episodes. Focus on this issue allows for paying more attention to the policy side of the institution’s literature. Our theoretical models will then pinpoint exactly what specific policy and institutional variables are important in retarding or encouraging economic growth.

process of economic growth and cross-country income differences compared to culture, geography or human capital.

3 Methodology and data

We study the empirical determinants of economic prosperity in Sub-Saharan Africa (SSA) countries. We apply a three-step strategy. In the first step of our regression analysis, we follow the common practice in the literature (see e.g., Rodrik, Subramanian, and Trebbi 2004; Acemoglu, Gallego, and Robinson 2014) and basically seek to identify the determinants of the economic performance which are statistically and economically significant (i.e., *relevant variables*) in the context of the SSA countries. Then, based on empirical evidence from Jerven (2010) in the second step we examine the interactions between relevant variables and growth acceleration episodes. However, as emerges from Figure B.1 in the Appendix B, in the context of the SSA countries, the number of growth reversal episodes is higher than the number of acceleration episodes. Thus, unlike the common practice in the literature (see e.g., HPR 2005 and Avom, Kamguia, and Njangang 2021 among others), in the third step we assess the relative importance of the long-term growth determinants for reversal episodes. In the rest of this section, we discuss in detail our econometric strategy, outline the methodological approach that we apply to identify the economic growth acceleration and reversal episodes, and present data that we use for our regression analysis.

3.1 Theoretical model

To put the discussion in a framework, we modify the growth model of Mankiw, Romer, and Weil (1992), which is a semi-endogenous growth model and argues that the variation in the long-run output is determined by the growth of knowledge. Our starting point is the standard growth model with labor, human capital and physical capital as the factors of production:

$$Y_{i,t} = f(K_{i,t}, L_{i,t}, H_{i,t}) \tag{1}$$

where Y is real output, K is the stock of physical capital, H is the stock of human capital and L is raw labor. We assume that labor factor grows according to:

$$L_{i,t} = L_{i,0} \exp n_i t \tag{2}$$

where n_i is the exogenous rate of growth of the labor force. We assume a simple Cobb-Douglas production function with constant return to scale for the entire economy. This function for the country i at time t is given by:

$$Y_{i,t} = A_{i,t} K_{i,t}^{\alpha} H_{i,t}^{\beta} L_{i,t}^{1-\alpha-\beta} \tag{3}$$

where α is the share of physical capital, β is the share of human capital and $1-\alpha-\beta$ is the share of raw labor. We also assume that $0<\alpha,\beta<1$, i.e. there is decreasing return to all factors of production and constant return to scale at the aggregate level. $A_{i,t}$ denotes the advancement of technology and the efficiency of the factor of production in the country that represents the level of total factor productivity for the country i at time t. Equation (3) states that the total output of the economy depends upon the physical capital, labor employed, skill of the employed labor force and the level of total factor productivity.

One of the ways in which institutions may influence $A_{i,t}$ (productivity) is through enhancing the productivity of complementary inputs of the private sector. In the standard neoclassical growth model (growth acceleration), technological progress is the sole determinant behind economic growth. In a typical growth deceleration episode, $A_{i,t}$ is expected to help the transformation of downturns from an absolute decline in output to a slower rate of positive growth. For example, growth effects provide a long-term view and promote investment that may encourage specialization in sectors with higher productivity. The literature also shows that institutions influence output through total factor productivity (Nawaz and Khawaja 2019). Institutional weakness could have a direct and quick impact on economic growth during deceleration growth episodes if they (institutions) hinder the effectiveness of recovery policies This is often the case in African countries. However, to assess the long-term impact it is more important to examine the influence of institutional quality to economic growth episodes on productivity through improvement in the quality and quantity of factors like human capital and channels such as trade openness (see e.g., Lucas 1988).

As institutions facilitate cooperative activity by establishing 'rules of the game' therefore the institutions may influence economic growth through their impact on factor productivity. Krueger (1974) argues that weak institutional framework promotes rent seeking, a socially unproductive activity. For example the prevalence of corruption would require that more time be devoted to rent seeking activities, thus leaving little time for productive activities. Similarly Olson (1982) argues that given rent seeking the production of public goods could be inefficient due to the existence of weak institutional framework —Corruption may distort the allocation of resources and their productivity by altering the incentive structure. This distortion may cause loss in efficiency and productivity of the resources (North 1990, Nelson and Sampat 2001). Moreover, corruption may increase the cost of importing and using superior technology to such levels that it becomes difficult to import better technology (Bernard and Jones 1996).

Based on this discussion, we extend the neoclassical model by assuming that technological advancement depends not only upon the rate of technological progress but also upon the quality of institutions. We suppose that A is determined by the rate of technological progress p and by the quality of institutions INS.

Therefore, the variable A is assumed to evolve according to the following function:[6]

$$A_{i,t} = A_{i,0} \exp\left(\theta p_{i,t} + \psi \mathrm{INS}_{i,t}\right) \tag{4}$$

where ψ is the parameters determining the outcome of institutions. Productivity improvement depends on technological upgrading, p, assumed to flow through trade openness, but also on the quality of institutions which tend to enhance productivity (see North 1990, Nelson and Sampat 2001). This departure from the model of reference (Mankiw, Romer, and Weil 1992) is more relevant in the context of most developing countries where technology from the innovating North to imitating South flow via trade (Grossmann and Steger 2009).

We follow Mankiw, Romer, and Weil (1992) and assume that both the physical and human capital face a similar production function and the depreciation rates for each type of capital are represented by δ_j, $j = k, h$. The population growth rate is n_i and the time-invariant country-specific saving rates for each type of capital are given by $s_{it,j}$, $j = k, h$. Given the steady state assumption, then by using the expressions for physical and human capital to effective labor ratio in steady state, it follows that:

$$y^{\star} = A\left(\frac{s_k}{n+p+\delta_k}\right)^{\frac{\alpha}{1-\alpha-\beta}}\left(\frac{s_h}{n+p+\delta_h}\right)^{\frac{\beta}{1-\alpha-\beta}} \tag{5}$$

where $y^{\star} = Y/L$ is the steady state income per capita. Now putting the value of A from equation (4) into equation (5), assuming uniform depreciation rate for both types of capitals, i.e. physical capital and human capital, and taking log of equation (5), we obtain:

$$\log y^{\star} = \log A_0 + \theta p_t + \psi \mathrm{INS} + \frac{\alpha}{1-\alpha-\beta}\log s_k + \frac{\beta}{1-\alpha-\beta}\log s_h - \frac{\alpha+\beta}{1-\alpha-\beta}\log\left(n+p+\delta\right) \tag{6}$$

Equation (6) implies that the steady state output per capita depends on the accumulation of reproductive capital, the stock of technology, direct impact of institutions and the effect of technology via trade openness. In part because of data constraints, it is assumed that s_h does not vary over time but s_k and n can be assumed to vary over time. This implies that the effect of s_h can be captured by the constant term A_0 in Equation (6). It follows thus that the steady-state growth per capital grows according to:

$$\log y^{\star} = A_{i,0} + \theta p_t + \psi \mathrm{INS} + \frac{\alpha}{1-\alpha-\beta}\log s_k - \frac{\alpha+\beta}{1-\alpha-\beta}\log\left(n+p+\delta\right). \tag{7}$$

[6] Demetriades and Law (2006) modeled A in a similar fashion to incorporate the level of financial development and quality of institutions. For simplicity we have omitted the subscripts for time and cross section.

Rearranging Equation (7) we develop the long-run model to empirically quantify the impact of institutions on economic growth, in compact form, as follow:

$$\log y_{it} = \vartheta_i + \psi \text{INS}_{i,t} + \mathbf{x}_{it}' \boldsymbol{\gamma} + u_{i,t} \tag{8}$$

where ϑ_i denotes a set of country fixed effects, which will absorb the impact of any time-invariant country characteristics, and ψ measures the causal effect of institutions. The error term u_{it} captures all other omitted factors and time-varying unobservable shocks to GDP per capita, with $E(u_{it}) = 0$ for all i and t. The vector of other covariates $\mathbf{x}_{it}$ includes our measures of others potential deep determinants of log GDP per capita (geography, integration, and human capital) and control variables. This empirical specification is similar to the panel version of the equation (1) in Rodrik, Subramanian, and Trebbi (2004), but applies different regression combinations as in Acemoglu, Gallego, and Robinson (2014) to discriminate the relative impact of institutional clusters on GDP.

3.2 Empirical model

We apply a three-step empirical strategy to investigate the relative importance of institutional clusters for growth episodes.

Step 1. In the first stage of our regression analysis, we examine the interactions between economic performance and its "deep determinants." The deep determinants of economic performance include four sets of variables: institutions; integration; geography. Following Acemoglu, Gallego, and Robinson (2014), we also include the human capital variable. We follow Islam (1995) and the subsequent literature that use the panel data approach. We basically consider a panel version of the equation (1) in Rodrik, Subramanian, and Trebbi (2004, p. 138), to quantify the independent contribution of these four sets of deep determinants to the economic performance across countries and over time. In particular, as discussed in the introduction, we analysis the relative impact of institutions on per capita GDP. The estimation of the causal effect of institutions on GDP faces two main challenges. First, existing institutional clusters measures, as the World Bank's CPIA indices, are subject to considerable measurement error, potentially leading to spurious changes in institution scores that do not correspond to real dynamics in the countries of interest. Second, differences in institutional clusters across countries and over time result from policy reforms, but it can also result from unobserved characteristics, such as historical, and cultural aspects, that also have an impact on GDP. Thus, as in Acemoglu et al. (2019), we attempt to tackle these challenges by using a dynamic panel model for

GDP which includes both country fixed effects and autoregressive dynamics. The underlying economic assumption here is that, conditional on the lags of GDP and country fixed effects, the differences in institutional clusters are not put a country on a differential GDP trend (see e.g. Blundell and Bond (1998) for more details). This strategy leads to robust and precise estimates.

Step 2. In the second stage of our regression analysis, we examine how institutional clusters interact with episodes of growth acceleration. We organize the data around the turning points in growth experience by applying an improved variant of the Hausmann, Pritchett, and Rodrik's (2005) filter (HPR filter). To identify an episode of growth acceleration, HPR (2005) propose to retain for each country in the sample the logarithm of real GDP per capita and then regress it over time for each eight-year period using the ordinary least squares method:

$$y_{t+i} = a + g_{t,t+n} \times t, \quad i = 0, ..., n, \tag{9}$$

where y denote the log of real GDP per capita and t denote an index of time, and $g_{t,t+n}$ denotes the least squares growth rate of real GDP per capita from t to $t+n$. Then the least squares estimate of the average growth rate, $\hat{g}_{t,t+n}$, is used to compute the change in the average growth rate during n periods before t to n periods following t:

$$\Delta\hat{g}_t = \hat{g}_{t,t+n} - \hat{g}_{t,t-n}. \tag{10}$$

To identify the trigger of growth acceleration, we follow Harding and Pagan (2002), Avom, Kamguia, and Njangang (2021), among others and apply an annual version of the Bry and Boschan (1971) algorithm. To qualify as the start of economic growth acceleration in year t, growth should be higher than in the year before, i.e. $g_{t+1} > g_t$.

As a result, when a period t fulfills this criterion, an acceleration episode is defined as a time interval extending from $[t, t+n]$ and fulfills the following criteria:

1. The trend growth rate of real GDP per capita is at least 3.5% per year, i.e. $g_{t,t+n} \geq 3.5$;

2. The trend growth rate during the episode exceeds the trend growth rate during the previous interval by at least 2 points percentage, i.e. $\Delta\hat{g}_t \geq 2.0$;

3. The level of real GDP per capita at the end of the episode is at least as high as the maximum level recorded before the start of the episode, i.e. $y_{t+h} \geq \max\{y_i\}, \forall i \leq t$.

In sum, the fist filtering condition requires the level of the growth rate to exceed some threshold to qualify for a growth acceleration. As in HPR (2005), we assume to be 3 percent in our baseline setting. The second condition guarantees that the change in average economic growth exceeds a certain threshold. As in HPR (2005), we assume to be 2 percent in our baseline setting. The third condition ensures that the output level after a growth acceleration exceeds all historical peak output levels. This condition serves to exclude phases of rapid growth that are preceded by catastrophes such as wars or natural disasters, i.e., phases of growth simply resulting from economic recovery after a substantial destruction of the economy.

Step 3. Finally, in the third stage of our regression analysis, we refer to evidence from Figure B.1 which shows the number of growth reversal episodes is higher than the number of acceleration episodes in the context of the SSA countries. It is therefore important to complement our analysis from step 2 by examining how institutional clusters interact with reversal episodes. To do so, we apply again the HPR filter. We define a reversal episode as an interval $[t, t+n]$ during which:

1. The trend growth rate of real GDP per capita is slow, i.e. $g_{t,t+n} \leq 0$;

2. The trend growth rate during the turnaround is at least 2 points percentage to that of the previous interval, i.e. $\Delta \hat{g}_t \leq 2.0$;

3. The level of real GDP per capita declines such that the average level of real GDP per capita during episode $[t, t+n]$ is below the average level of real GDP per capita during $[t-n, t]$, i.e. $\bar{y}_{t,t+h} \leq \bar{y}_{t-h,t}$.

We set the time horizon at 5 years, i.e. $(n = 4)$. The period of 5 years is the period used in the growth literature, based on the fact that the year-to-year variations are affected by too many variables to provide meaningful policy solutions.

3.3 Data

We construct an annual panel that comprises 42 SSA countries from 2005 to 2019, although not all variables are available for our entire sample. The included countries are listed in the appendix. As in Rodrik, Subramanian, and Trebbi (2004) and Acemoglu, Gallego, and Robinson (2014), the benchmark empirical framework relates the economic performance to five kinds of variables: human capital, institutional quality, integration, and geography.

The economic performance is measured by the log of GDP per capita on a purchasing power parity (PPP) basis for 2017, from the World Development Indicators (WDI) the World Bank's database. The log of GDP per capita will be our main dependent variable. There is substantial variation in GDP per capita. Over 2005-2019 period, the overall mean for 42-country sample is \$5,185.7, the standard deviation of log GDP is 91.1 percent, with the poorest country's (Burundi) GDP being $821.4 and that of richest (Equatorial Guinea) $31,403.1. In the first period (2005) of our countries sample, the mean income is $4,718.4, the standard deviation is 94.7 percent, with the poorest country's (DRC) GDP being $779.0 and that of richest (Equatorial Guinea) $32,390.2. Moreover, for the period 2018 in our countries sample, the mean income is $5,253.0, the standard deviation is 87.6 percent, with the poorest country's (Burundi) GDP being $761.5 and that of richest (Equatorial Guinea) $22,208.3. In 2019, the poorest country is again Burundi ($751.7) However, the richest country is now Mauritius ($22,870.3).

Our main indicator of the institutional quality is the rule of law index from the Worldwide Governance Indicators constructed by the World Bank (Kaufmann, Kraay, and Mastruzzi 2011).[7] By construction the rule of law can go from -2.5 (weakest institutions) to 2.5 (strongest institutions). In our 42-country sample, the mean score over the period 2005-2019 is-0.7, with the DRC (score of -1.62) having the weakest institutions, and Mauritius (score of 0.88) the strongest. In addition, we also use the World Bank's CPIA database to investigate interactions between growth (episodes) and institutional clusters. Time series for the rule of law span the period 1996-2020. Data for the World Bank's CPIA indices are only available from 2005. Thus, we specifically choose the period 2005-2019 to allow direct comparisons

Our main indicator of investment in human capital is the total government expenditure on education from the WDI World Bank's database. As a proxy of human capital, we also use the expenditures on health from the World Health Organization (WHO) Global Health Expenditure database, Series for education and health spending are expressed in per capita on a purchasing power parity (PPP) basis for 2017. Our main indicators of investment in human capital do not measure the aggregate stock of human capital but rather it only gives a clear indication of the institutional capacity of countries to invest in human capital. To measure the stock of human capital, the standard cross-section empirical studies use the school enrollment ratios or literacy rates (Barro 1991, Mankiw, Romer, and Weil 1992) and average years of schooling of the population (Barro and Lee 2013, 1996; Cohen and Soto 2007). In the context of both panel data and SSA countries, availability for the average years of schooling is limited.[8] As alternative, we will use rates in school enrollment in primary and secondary respectively.

Our main indicator of integration is the ratio of trade to GDP from the World Development Indicators (WDI) the World Bank's database. Trade to GDP is the sum of exports and imports of goods and services measured as a share of gross domestic product. Our measure of integration also varies substantially between countries. The average ratio is for the period 2005-2019 is 73.2 percent, with the least open country posting a ratio of

[7] Rodrik, Subramanian, and Trebbi (2004), Acemoglu, Gallego, and Robinson (2014), among others argue that this indicator captures more elements that go toward determining institutional quality.

[8] See Angrist, Goldberg, and Jolliffe (2021) for more details lower statistical capacity in developing countries.

Table 1: Descriptive statistics (Sub-Saharan African Countries). Period: 2005-2019.

Panel (a)	Observations (cross-section)			Panel	Mean (cross-section)			Panel
	2005	2018	2005-2019	data	2005	2018	2005-2019	data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Economic performance	42	42	42	630	4,718.4 (0.95)	5,253.0 (0.88)	5,185.7 (0.91)	5,185.7 (0.91)
Institutions	41	42	42	624	-0.41 (0.85)	-0.37 (0.87)	-0.70 (0.61)	-0.37 (0.84)
Human capital (1)	25	25	39	352	185.7 (1.18)	174.2 (0.85)	193.5 (1.07)	171.7 (1.01)
Human capital (2)	41	41	42	576	202.9 (0.84)	258.8 (0.84)	249.5 (0.84)	243.0 (0.84)
Integration	39	41	41	606	74.30 (0.49)	69.4 (0.44)	73.18 (0.41)	73.26 (0.44)
Geography	42	42	42	630	12.46 (1.37)	12.46 (1.37)	12.46 (1.37)	12.46 (1.37)

Panel (b)	Min (cross-section)			Panel	Max (cross-section)			Panel
	2005	2018	2005-2019	data	2005	2018	2005-2019	data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Economic performance	779.0	761.5	821.4	751.7	32,390	22,208	31,403	41,249
Institutions	-1.66	-2.05	-1.62	-2.09	1.81	1.83	0.88	2.03
Human capital (1)	15.33	38.68	14.27	13.20	1,333.1	1,073.7	1,284.0	1,333.1
Human capital (2)	32.37	35.84	37.17	28.81	829.1	1,293.9	941.1	1,293.9
Integration	33.06	21.84	30.55	16.14	270.4	145.4	159.0	311.3
Geography	0.02	0.02	0.02	0.02	30.56	30.56	30.56	30.56

Note: Table 1 reports the descriptive statistics of key variables that we use in the first stage of our regression analysis. In Panel (a), values in parentheses in columns (5), (6), (7), and (8) denote standard deviations computed from data expressed in log. As in Rodrik, Subramanian, and Trebbi (2004), Acemoglu, Gallego, and Robinson (2014)), our main measure of economic performance is the log GDP per capita from the WDI World Bank's database. Our main measure of institutions is the rule of law from the Worldwide Governance Indicators (see Kaufmann, Kraay, and Mastruzzi 2011). Our main measure of human capital (1) is the government expenditure on education per capita from the WDI World Bank's database. We also use the expenditure on health per capita as an alternative measure of human capital (human capital (2)). Our main measure of integration is the ratio of trade to GDP from the WDI World Bank's database. Our main indicator of geography is a country's distance from the equator measured in degrees. We consider 2018 because it contains more observations than 2019.

33.1 percent in 2005 (Nigeria), 26.2 percent in 2019 (Sudan), and 30.6 percent over the period 2005-2019 (Sudan). The most open country posts a ratio of 270.4 percent in 2005 (Liberia), 138.7 percent in 2019 (Lesotho), and 159.0 percent over the period 2005-2019 (Liberia).

Our main indicator of geography is a country's distance from the equator measured in degrees. The equator is latitude zero degree. In our sample, the typical country is about 12.5 degrees away the equator. Kenya is the closest country away from the equator with 0.02 degree (Kenya is bisected by the equator). South Africa is the furthest country away from the equator (30.56 degrees).

Additional variables used include the World Bank's CPIA indices, total natural resources rents (% of GDP), and official languages inherited from the colonial rule.

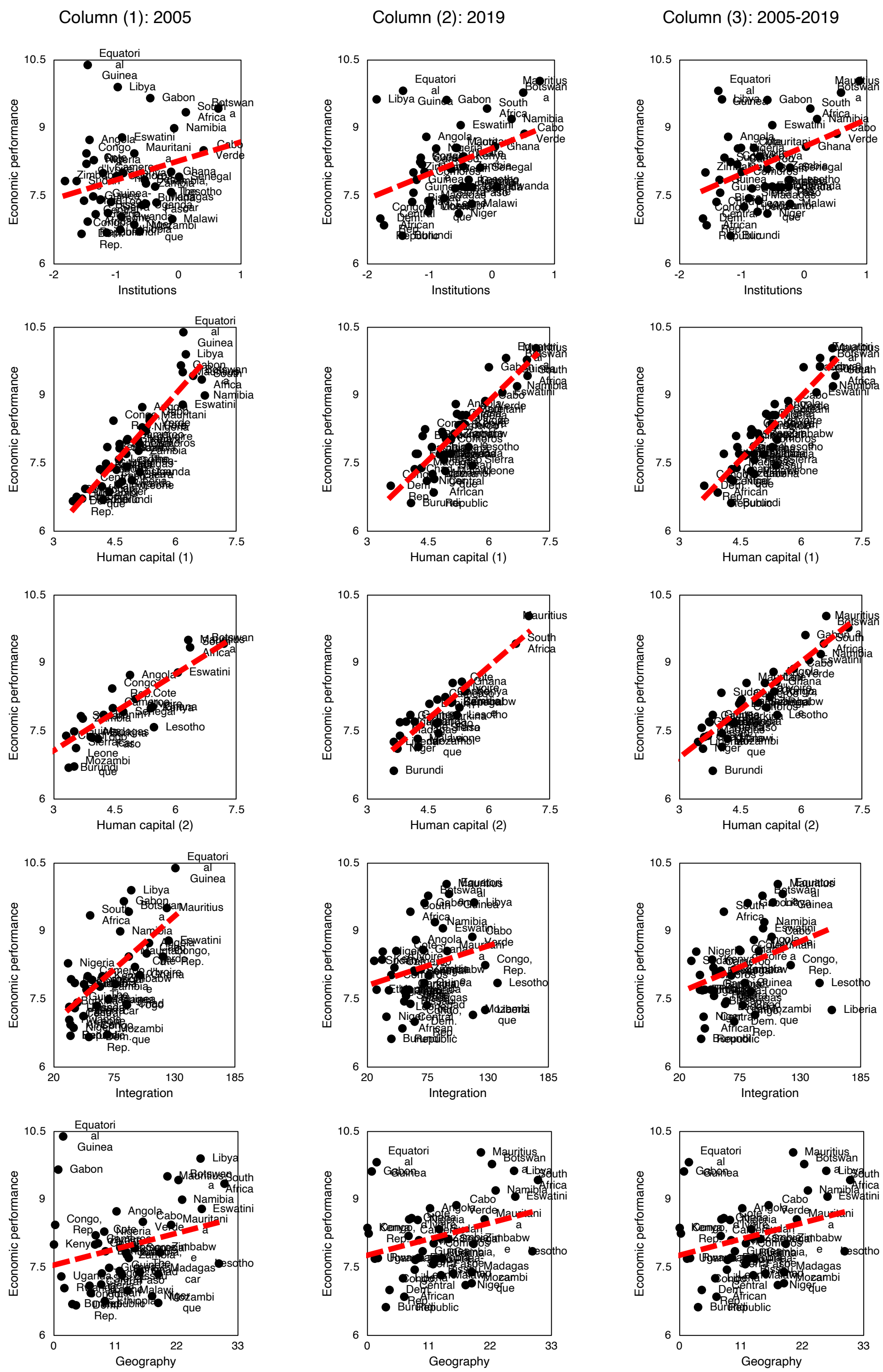
Table 1 presents descriptive statistics of key variables that we use in the first stage of our regression analysis. For each panel, Columns (1) and (5) report descriptive statistics for the first period in our sample (2005). Columns (2) and (6) report descriptive statistics for the last period in our sample (2019). Columns (3) and (7) report descriptive statistics for the period 2005-2019 in annual average for each country. Columns (4) and (8) report descriptive statistics over the period 2005-2019 in our sample. Importantly, compared to descriptive statistics calculated from the full sample of panel data, the results Table 1 clearly show that the cross-section data overestimates the minimum and underestimates the maximum. Thus, columns (4) and (8) in both Panels (a) and (b) provide an intuitive illustration of the rich dynamics brought by panel data compared to cross-section data (columns 3 and 7).

4 Econometric model and baseline results

In the first stage of our regression analysis, we quantify the relative importance of potential determinants for long-term economic growth in SSA countries by first applying the RST procedure. As discussed in Section 3.1, these potential determinants include geographical, institutional, human capital and integration variables. Figure 1 shows the bivariate correlations between the economic performance and each of the deep determinants for three different periods: 2005 (column 1), 2019 (column 2), and 2005-2019 (column 3). All the columns plot a positive correlation between the economic performance and its potential determinants. This visual inspection suggests that these all of these variables have the potential to explain the economic performance in SSA countries.

Thus to assess the independent contribution of these variables to the difference in income levels across countries and over time, we consider a panel version of the equation (1) in Rodrik, Subramanian, and Trebbi

Figure 1: Correlations between economic performance and its determinants



Note: Figure 1 plots correlations between income and its determinants. Determinants include institutions (rule of law), human capital (education; health), integration (ratio trade to GDP), and geography (distance from equator).

(2004, p. 138):

$$\log y_{it} = \alpha \text{GEO}_{it} + \beta \text{INS}_{it} + \gamma \text{HUM}_{it} + \delta \text{INT}_{it} + \mu_i + u_{it} \tag{11}$$

where $\log y_{it}$ is the log of per capita GDP of country i at time t, GEO_{it}, INS_{it}, HUM_{it}, and INT_{it} are respectively measures for geography, institutions, human capital, and integration in country i at time t. The μ_i's denote a full set of country fixed effects, which will absorb the impact of any time-invariant country characteristics. The error term u_{it} captures all other omitted factors and time-varying unobservable shocks to GDP per capita, with $E(u_{it}) = 0$ for all i and t.

Table 2 reports results from random effects and within regressions in Panels (a) and (b), respectively. The random effects estimator assumes that the individual-specific effects μ_i are distributed independently of the regressors, and therefore include μ_i in the error term. In contrast, the within estimator allows the individual-specific effects μ_i to be correlated with the regressors, and include μ_i as intercepts.[9] The Hausman test shows insignificant differences between estimates from the random effects and within models, i.e. supports the random effects estimator. Therefore, the random effects estimator and the random effects estimator are consistent. However, the random effects estimator is more efficient than the within estimator. Moreover since Theta (λ) is 95%, the random effects estimates are much closer to the within estimates than to the OLS estimates.

In sum, results from random effects and within regressions of equation (11) show that the signs of geography, institution, human capital (education and health), and integration are as expected. However, only institution and human capital (education) are statistically significant. Of course, for a number of reasons discussed extensively in the literature (reverse causality, omitted variables, and measurement error), the bilateral correlation between Economic performance and Institutions or between Economic performance and Human capital cannot be interpreted as causal. To address this challenge, we follow Acemoglu et al. (2019) and posit a full dynamic econometric model for per capita GDP:

$$\log y_{it} = \beta \text{INS}_{it} + \sum_{j=1}^{J} \phi_j y_{it-j} + \mathbf{x}'_{it} \boldsymbol{\gamma} + \delta_t + \mu_i + u_{it} \tag{12}$$

where $\log y_{it}$ is the log of per capita GDP of country i at time t and INS_{it} is our measure of the institutions (rule of law) in country i at time t. The parameter β therefore measures the causal effect of institutions on economic performance. The specification includes J lags of log GDP per capita on the right-hand to control for the dynamics of GDP and to potentially capture the tendency of the economic performance to return

[9] The pooled OLS estimator specifies constant coefficients (i.e. $\mu_i = \mu$ for all i) as in the usual assumptions for cross-sectional analysis. We report results from pooled OLS in Appendix.

to some equilibrium value for the country (mean-reverting dynamics). The vector of other covariates $\mathbf{x}_{it}$ includes our measures of others potential deep determinants of long-term growth (geography, integration, and human capital) and control variables. The δ_t's denote a full set of time effects which capture common shocks to common trend in the economic performance. The μ_i's denote a full set of country fixed effects, which will absorb the impact of any time-invariant country characteristics. The error term u_{it} captures all other omitted factors and time-varying unobservable shocks to GDP per capita, with $E(u_{it}) = 0$ for all i and t. We control for natural resource and dummies for British and French colonies (the omitted group is the other European colonies).[10] These variables are potentially important controls. Most importantly for our context, natural resource and dummies for British and French colonies may have had both different institutional legacies and human capital policies. Panel (c) of Table 2 reports the Blundell and Bond (1998) estimates for equation (12).

Column 8 shows the bivariate relationship between Economic performance and Institutions. There is a significant relationship with a coefficient of 0.03 (standard error, s.e.=0.014). Column 9 shows the bilateral correlation between Economic performance and Human capital. There is an insignificant correlation between these two variables with a coefficient of 0.01 (s.e.=0.017).

Column 10 includes both Institutions and Human capital in the regression. Institutions continue to be statistically significant and the human capital variable is again not statistically significant. Column 11 includes Institutions, Human capital and others potential deep determinants of long-term growth (geography and integration) in the regression. Results confirm the importance of institutions in explaining the economic performance in our 42-country sample for the 2005-2019 period.

In sum, our panel evidence for a set of SSA countries confirms cross-section evidence from Rodrik, Subramanian, and Trebbi (2004). We find that Institutions trump geography, human capital, and integration. In our preferred specification (column (11)), not only are institutions significant, their impact is large. The estimated coefficients on geography, human capital, and integration are not statistically significant, and the geographical and human capital (health) variables exhibit the "wrong" sign.[11]

[10] As in AJR (2001), we consider the paradigmatic structure outlined by North and Thomas (1973) who treat physical capital, human capital, and TFP as proximate causes, determined by, and acting as channels of influence for institutions and thus do not control for these separately. According to this approach, it would be both incorrect and interpretationally confusing to control for the proximate determinants (physical capital or TFP differences across countries) in trying to explain differences in income per capita with institutions. It would be what Angrist and Pischke (2009) refer to as bad control.

[11] Rodrik, Subramanian, and Trebbi (2004) also found that geography and integration exhibit the wrong sign in their preferred specification (see column (6) of their Table 3).

Table 2: Baseline results

Dependent variable: Log GDP per capita												
	Panel (a): Random effects estimates (RST procedure)				Panel (b): Within estimates (RST procedure)			Hausman test	Panel (c): Blundell-Bond estimates			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(4) *vs* (7)	(8)	(9)	(10)	(11)
Geography	0.03***	0.03	0.02	0.02								0.00
	(0.02)	(0.02)	(0.02)	(0.02)								(0.00)
Institutions		0.12*	0.19***	0.19***	0.13***	0.21***	0.20***		0.06*		0.03**	0.03***
		(0.06)	(0.07)	(0.07)	(0.03)	(0.03)	(0.03)		(0.03)		(0.01)	(0.02)
Human cap.(1)			0.08*	0.09**		0.08***	0.09***			0.01	0.00	0.01
			(0.05)	(0.05)		(0.03)	(0.02)			(0.02)	(0.2)	(0.02)
Human cap.(2)			0.08	0.07		0.10**	0.09**					-0.08
			(0.09)	(0.09)		(0.04)	(0.09)					(0.03)
Integration				0.00			0.00					0.06
				(0.09)			(0.03)					(0.02)
R-sq: overall	0.08	0.04	0.07	0.12	0.01	0.01	0.03					
Rho	0.98	0.98	0.98	0.98	0.98	0.99	0.99					
Theta (λ)	0.96	0.96	0.95	0.95								
chi2 stat								5.46				
p-value (chi2)								(0.24)				
AR2 test *p*-v									0.50	0.71	0.68	0.94
p-v (unit root)†									0.00	0.00	0.00	0.00
Observations	630	624	345	330	624	345	330		583	327	325	307

Note: Table 2 presents our baseline estimates of the relative impact of deep determinants on log GDP per capita for a set of selected Sub-Saharan Africa. Columns (1–4) present results from the random effects estimator. Columns (5–7) present results from the within estimator. Hausman test tests whether there is a significant difference between the fixed and random effects estimators. Columns (9–11) present results from Blundell and Bond's (1998) GMM estimator. The AR2 row reports the *p*-value for a test of serial correlation in the residuals of the GDP series. Standard errors robust against heteroskedasticity and serial correlation at the country level are reported in parentheses. Significance at the 1, 5, and 10 percent levels are denoted by ***, **, and *, respectively.

†As in Acemoglu et al. (2019), we also apply Levin, Lin, and Chu's (2002) test for the presence of a unit root in GDP.

Alternatively, we follow Acemoglu et al. (2019) and also estimate a transformed version of Equation (12) which allows GDP to have a unit root.

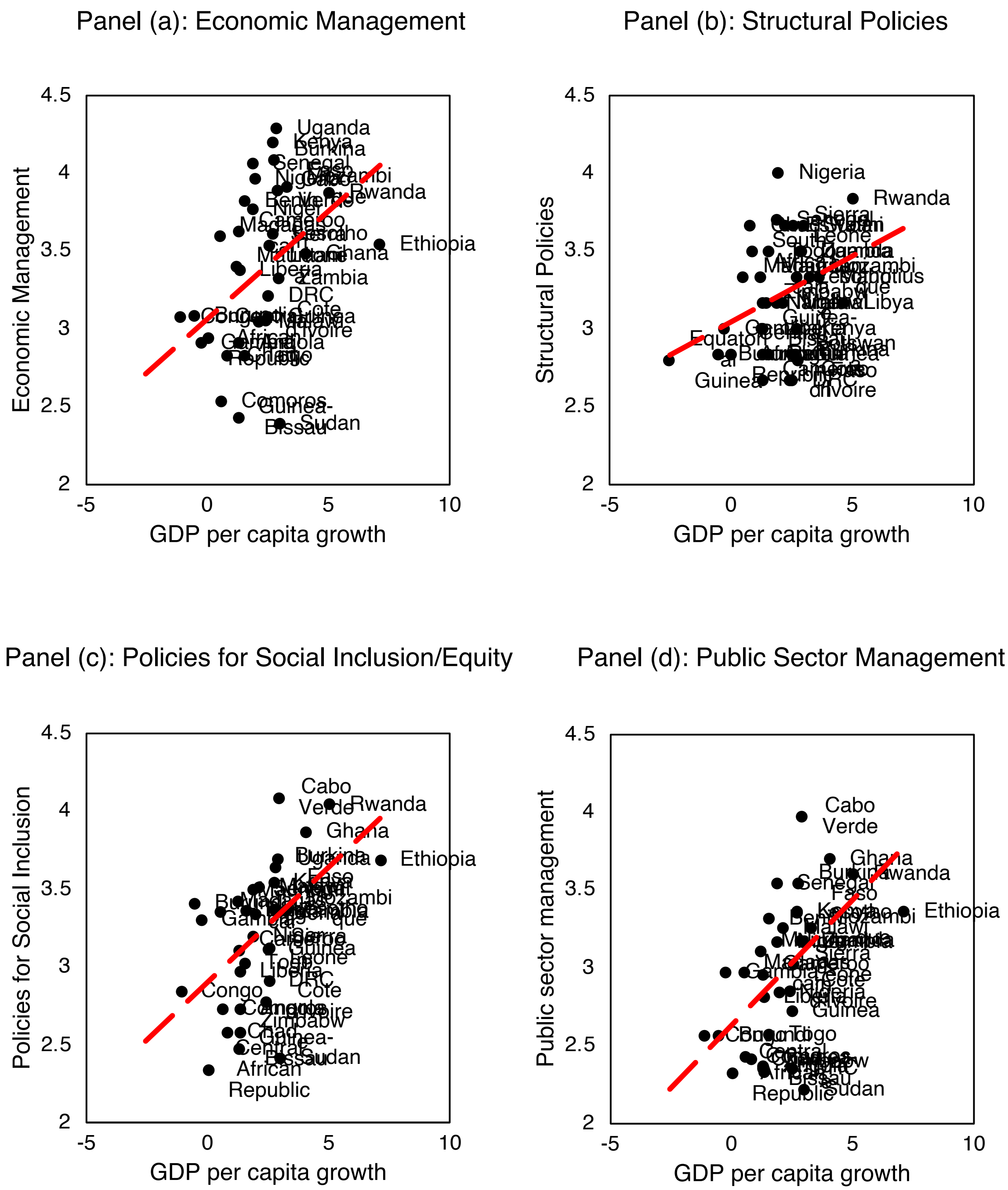
$$\Delta y_{it} = \alpha \text{INS}_{it} + \sum_{j=1}^{J} \phi'_j \Delta y_{it-j} + \mathbf{x}'_{it}\boldsymbol{\gamma} + \delta_t + \mu_i + u_{it} \tag{13}$$

where, in terms of ϕ_j in Equation (12), $\phi'_j = \sum_{i=1}^{j} \phi_i - 1$. The vector of other covariates $\mathbf{x}_{it}$ includes control variables. We use the World Bank's CPIA indices (institutional) clusters to capture different aspects of the quality of institutions. The World Bank's CPIA indices include Economic management, Structural policies, Policies for social inclusion, and Public Sector Management. We estimate Equation (13) to examine how institutional clusters affect the economic growth. Before we discuss our results, it is useful to look at the simple, bivariate relationships between the growth rates of GDP per capita and institutional clusters. Figure 2 shows the bivariate correlations between the growth rate of GDP per capita and institutional clusters. All the panels plot a clear and unambiguously positive correlation between the growth rate of GDP per capita and institutional clusters. This visual inspection suggests that these all of these variables have the potential to explain the growth rate of GDP per capita in SSA countries.

Table 3 presents formal results about the impact of institutions on growth. Columns (1), (2), (3), and (4) estimate the effect of institutions using the rule of law. Columns (4), (5), (6), and (8) estimate the effect of institutional clusters using the World Bank's CPIA indices. In all for estimations, we control for total natural resources rents and for official languages inherited from the colonial rule.

The impact of institutions (rule of law) on growth is positive and the associated coefficient is greater than 1 (see columns 1, 2, 3, and 4 of the table 3). The results are statistically significant and robust to the various alternative specifications. Among the World Bank's CPIA indices, only the Economic management variable is economically and statistically significant (see column 5 in Table 3). The other variables including Structural policies, Policies for social inclusion, and Public Sector Management are statistically non-significant. Even though the effect of rule of law is significant, we find that the different institutional clusters do not play the same role in explaining economic growth in SSA. The policy approach which consists of improving structural policies, policies for social inclusion, and public sector management appear to have a non-significant impact on growth. Two immediate lessons result from these findings: (i) it is important for policy makers to promote policies that improve economic management because their effect on economic growth is significant; (ii) at the same time, even if effects of structural policies, policies for social inclusion, and public sector management on growth are statistically non-significant, it is important to implement appropriate reforms to transform the global effect of these variables on growth, in order to make it statistically significant.

Figure 2: Bivariate correlations between growth and institutional clusters



Note: Figure 2 plots bilateral correlations between the growth rate of GDP per capita and institutional clusters. Institutional clusters include Economic management, Structural policies, Policies for social inclusion, and Public Sector Management.

Table 3: Alternative specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: Growth Rate of GDP per Capita								
Institutions:									
Rule of law	3.86**	3.74*	4.74**	3.87*					
	(2.02)	(2.32)	(2.43)	(2.05)					
Institutional clusters:									
Economic Management					3.23**				2.76**
					(1.28)				(1.18)
Structural Policies						2.51			-0.09
						(2.45)			(2.80)
Policies for Social Inclusion							0.74		-2.06
							(2.37)		(2.80)
Public Sector Management								4.61	3.38
								(3.04)	(3.08)
Natural resources	×	×	×	×	×	×	×	×	×
English	×			×	×	×	×	×	×
French		×		×					
Others			×						
AR2 test *p*-value	0.84	0.81	0.70	0.85	0.96	0.90	0.87	0.69	0.65
Number of obs.	210	210	210	210	165	165	165	165	165

Note: Table 3 presents our estimates of the relative impact of institutions on the growth rate of log GDP per capita for a set of selected Sub-Saharan Africa. While Columns (1–4) use the rule of law to capture the quality of institution, Columns (5–9) use the World Bank's CPIA indices to measure the institutional clusters. All results are based on Blundell and Bond's (1998) GMM estimator. The AR2 row reports the *p*-value for a test of serial correlation in the residuals of the GDP series. Standard errors robust against heteroskedasticity and serial correlation at the country level are reported in parentheses. Significance at the 1, 5, and 10 percent levels are denoted by ***, **, and *, respectively.

5 Institutional clusters' effects on growth episodes

As hinted in Section 3.2, we seek to quantify the relative impact of institutional clusters on acceleration and reversal growth episodes, respectively. Table 4 reports results of effects of institutional clusters on growth episodes. We use the rule of law in Columns (2) and (8) to capture the quality of institution while Columns (3–6) and columns (9–12) use the World Bank's CPIA indices to measure the institutional clusters. The impact of the rule of law on acceleration and deceleration growth episodes is reported in Columns (2) and (8), respectively. Columns (1) and (3–6) present the impact of institutional clusters on acceleration growth episodes, while Columns (7) and (9–12) present the impact of institutional clusters on deceleration growth episodes. We expect that coefficients be positive when the dependent variable is acceleration growth episodes. In other words, better institutional quality of countries or, equivalently, improving institutional quality would amplify the magnitude of growth acceleration episodes. In contrast, we expect that coefficients be negative when the dependent variable is deceleration growth episodes. In other words, better institutional quality of countries or, equivalently, improving institutional quality would reduce the magnitude of growth deceleration episodes.

One of the most striking results to emerge is that the variable rule of law does not explain economic growth acceleration nor the deceleration episodes in the African context. Its coefficient is 0.19 and 0.01 in Columns (1) and (2) but remains not significant. A similar result is found in Columns (7) and (8). However, we found that only the Economic management plays a significant role for acceleration growth episodes. The coefficient for the Economic management is significant and positively signed in Column (3) while being significant and negatively signed in Column (9).

Further analysis indicates that although our set of variables for institutional cluster play a significant role for deceleration growth episodes, their effect is found to be negative. For instance, the coefficient of structural policies is -1.34 and is significant (Column (7) while those of policies for social inclusion and public sector management are -1.13 and -1.09, respectively, in columns (11) and (12). Thus, the results, which are reported in columns (7) and (9-12), suggest that the institutional clusters have a growth-dragging effect in SSA countries. This is an important finding because it shows empirically that institutions matter for economic growth, however their effects critically depend on growth episodes.

Table 4: Effects of institutional clusters on growth episodes

	Dependent variable											
	Acceleration Growth Episodes						Reversal Growth Episodes					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	10	11	12)
Institutions:												
Rule of law	0.19	0.01					-0.84	1.35				
	(0.31)	(0.69)					(1.20)	(0.94)				
Institutional clusters:												
Economic Management	-0.09		0.12^{**}				0.38		-0.94^{***}			
	(0.26)		(0.05)				(0.51)		(0.27)			
Structural Policies	0.79			0.17			-1.34^{**}			-1.15^{***}		
	(0.55)			(0.15)			(0.58)			(0.32)		
Policies for Social Inclusion	-0.69				0.09		-2.14^{**}				-1.13^{***}	
	(0.47)				(0.09)		(0.92)				(0.30)	
Public Sector Management	0.22					0.14	1.86^{*}					-1.09^{***}
	(0.51)					(0.11)	(1.86)					(0.29)
AR2 test *p*-value	0.31	0.26	0.28	0.30	0.30	0.30	0.27	0.81	0.18	0.21	0.22	0.22
Number of obs.	266	336	266	266	266	266	266	336	266	266	266	266

Note: Table 4 presents our estimates of the relative impact of institutions on acceleration and reversal growth episodes for a set of selected Sub-Saharan Africa. Columns (2) and (8) use the rule of law to capture the quality of institution, Columns (3–6) and columns (9–12) use the World Bank's CPIA indices to measure the institutional clusters. All results are based on Blundell and Bond's (1998) GMM estimator. The AR2 row reports the *p*-value for a test of serial correlation in the residuals of the GDP series. Standard errors robust against heteroskedasticity and serial correlation at the country level are reported in parentheses. Significance at the 1, 5, and 10 percent levels are denoted by ***, **, and *, respectively.

6 Discussions

Overall, our empirical findings indicate that the effects of institutions on economic performance is indeed asymmetric; meaning that the relative importance of specific institutions to economic performance vary depending on episodes of economic growth. Another interesting finding is the confirmation that institutions trump geography, integration and human capital, i.e., institutions outperform all other potential key determinants of economic growth. This finding is consistent with the result by Rodrik, Subramanian, and Trebbi (2004). Thus, we interpret these results to suggest that weaker institutions and structural policies have a constraining effect on economic growth as they indirectly affect countries' potential to respond to low-growth challenges. Obviously, growth deceleration seems to be driven by a different set of institutions than growth acceleration. This finding agrees with Jones and Olken (2008).

Interestingly, it emerges from our results that Rule of law plays a significant role only for growth rates of the GDP per capita in the long run. However, its effect on growth acceleration episodes and on growth deceleration episodes is statistically not significant. This means that, as important as it could be for the economic performance in the long run, the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights and the courts, do not remarkably change between growth episodes in African context.

Another important finding was that economic management is the only variable found to have a significant effect on economic performance both in the long run and during growth episodes. Signs associated with its coefficients are theoretically consistent. Its effects on economic growth, growth acceleration episodes, and growth deceleration episodes are positive (3.23; see column 5 of the table 3), positive (0.12; see column 3 of the table 4) and negative (-0.94; see column 9 of the table 4), respectively, with a much bigger magnitude during the growth deceleration episode than during growth acceleration episodes in absolute value. Moreover, the relative influence of structural policies, policies for social Inclusion, and public sector management on economic growth performance remains significant only in growth deceleration episodes.

It is somewhat surprising that this study did not find a significant effect of most of the institutional variables on growth acceleration episodes. This finding was unexpected and suggests that rather than institutional drivers of growth commodity prices and other world events influence economic performance in Africa during the boom periods. Yet, the reversal that follows the economic boom episode requires policies related to monetary and exchange rate, fiscal, and debt. The low qualities of such policies have been found to represent a dragging force on economic growth during the growth deceleration episodes.

Our findings corroborate the conclusions of a great deal of the previous work in this field. Particularly, the idea that equity of public resource use, human development, and social protection, are all crucial for economic performance during the growth deceleration episodes. This relates to Homer-Dixon's (1995) description of mechanisms by which growth deceleration episodes and resource scarcity lead to increased competitive action by powerful elite groups to defend their interests through rent-seeking behavior. Numerous anecdotal evidence has shown that in African context, these actions have often hindered reform efforts while making it even more challenging to focus on talents, and resources in response to economic slowdown. Furthermore, the relevance of the effects of public sector management on economic performance during growth deceleration episodes reflects the fact that aspects such as property rights and rule-based governance, quality of budgetary and financial management, and transparency, accountability, and corruption in the public sector, are all problematic in most African countries. Hence, during episodes of low growth, rather than generating automatic fiscal discipline responses, resource scarcities and the lack of transparency can lead to reduced investment into human capital and ingenuity efforts. This perspective associated with the endogenous growth models suggests that during growth deceleration episodes, the reduced resources often limit the availability of fiscal spending in education and research by shifting investment from long-term productivity enhancing projects to immediate politically motivated projects.

The overall findings have important implications for economic recovery in SSA. One obvious implication is related to urgency of building or strengthening crisis management institutions before expecting a sustained economic performance in SSA. That is, building robust institutions capable of shortening the length of growth deceleration episodes and prolonging growth acceleration episodes is crucial for African countries.

These results suggest that while institutions matter for economic growth, their effects differ significantly depending on whether a country experiences acceleration or reversal growth episodes. In other words, the effect of institutions on growth episodes is not symmetric. Thus, an institutional cluster which is conducive during acceleration growth episodes, will not necessarily be so during reversal growth episodes.

These findings need to be interpreted with caution because of the quality of the datasets related to the measurement of institutional variables. As it is well known, institutional variables are measured based on perception rather than actual objective observations. This is even a serious issue of concern in the context of most SSA countries.

7 Conclusion

Starting from the observation that economic growth in most African countries have not been steady in the last five decades, this paper aimed at reassessing the relationship between institutions and the economic performance in Sub-Saharan Africa (SSA). In contrast to the usual approach that focuses on long-run growth and assumes that African countries have homogenous parameters in growth regressions, this paper focuses on episodes of growth and their asymmetric sensitivity with institutions clusters. Our findings indicate that institutional determinants outperform all others potential drivers of long-term growth, including geography, human capital, and integration.

Moreover, our results show that the effects of institutional clusters on growth episodes are not symmetric. That is, in SSA context, this study found that the role of institutions varies across episodes of economic growth. Obviously, weaker institutions and structural policies have a constraining effect on economic growth as they indirectly affect countries' potential to respond to low-growth challenges. The results of this study also suggests that the rule of law plays a significant role only for growth rates of the GDP per capita in the long run. However, its effect on growth acceleration episodes and on growth deceleration episodes is statistically not significant. In addition, economic management is the only variable found to have a significant effect on economic performance both in the long run and during growth episodes.

The findings of this study have several implications for economic development of African countries. Institutional clusters do not play the same role in growth acceleration episodes and in reversal growth episodes. These results provide an empirical support to ideas that institutions are a key fundamental determinant of economic performance, however the relative importance of institutional clusters critically depends on episodes of economic growth (acceleration *versus* reversal).

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A Growth acceleration and reversal in SSA countries

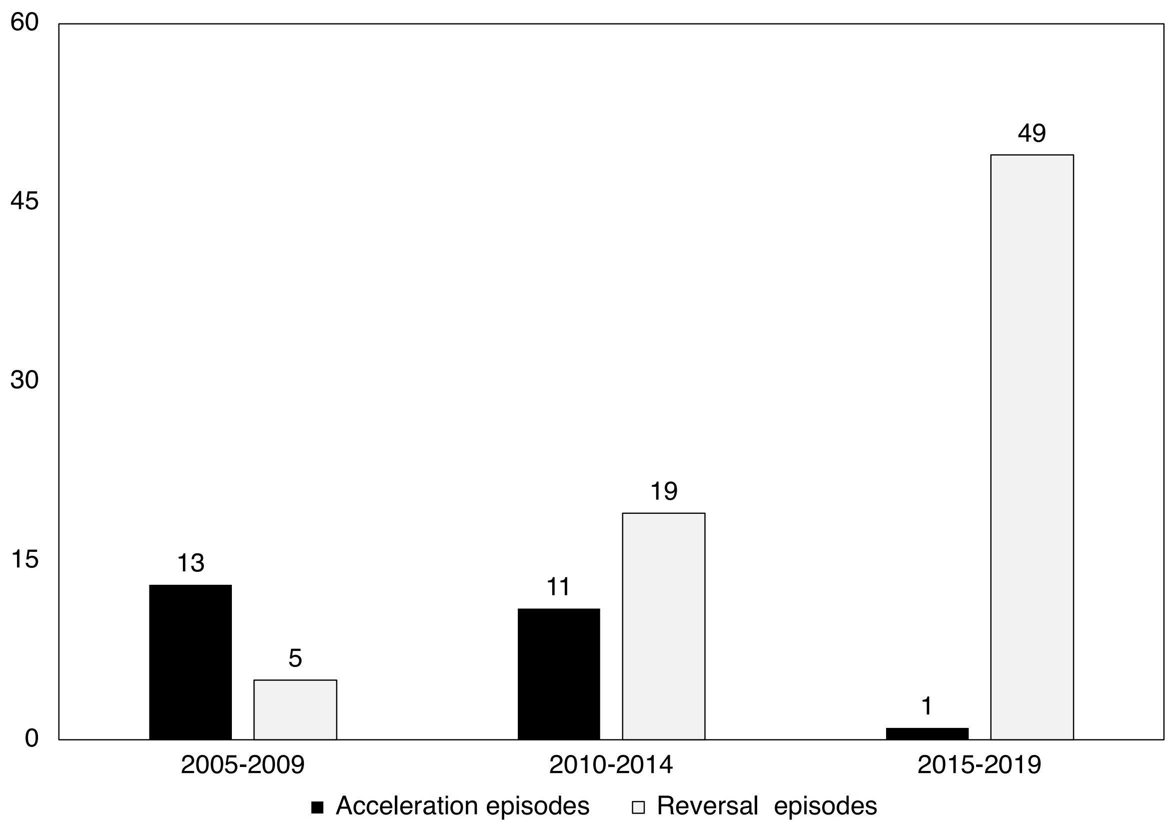
Table A.1: Growth acceleration and reversal in SSA countries. Period 2005-2019

Country	Acceleration years	Reversal years
Angola		2014, 2015, 2016, 2017, 2018
Burundi		2013, 2014, 2015
Benin		
Burkina Faso		
Botswana	2010	2018, 2019
Central African Republic	2008	2010, 2011, 2012
Cote d'Ivoire	2011, 2012, 2013, 2014	
Cameroon		
Congo, Dem. Rep.	2010	
Congo, Rep.	2008	2013, 2014, 2015, 2016
Comoros		
Cabo Verde		2019
Ethiopia	2005, 2006	
Gabon		2015, 2016
Ghana	2007, 2008, 2009	
Guinea	2013, 2015	
Gambia, The		2010, 2011
Guinea-Bissau		
Equatorial Guinea		2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016
Kenya		
Liberia		2014, 2015, 2016, 2017, 2019
Libya		2017, 2013, 2019
Lesotho		2016, 2017, 2018, 2019
Madagascar		2008, 2009, 2019
Mozambique		2019
Mauritania		2008
Mauritius		2019
Malawi	2005, 2006	
Namibia		2016, 2017, 2018, 2019
Niger		
Nigeria		2015, 2016, 2017

Country	Acceleration years	Reversal years
Rwanda		
Sudan		2018, 2019
Senegal	2014	
Sierra Leone	2008, 2009, 2010	2014, 2015
Eswatini		
Chad	2010	2014, 2015, 2016
Togo		
Uganda		
South Africa		2016, 2017, 2018, 2019
Zambia		2017, 2018, 2019
Zimbabwe	2008, 2009, 2010	2016, 2017, 2018, 201

B Growth episodes in Africa. Period 2005-2019

Figure B.1: Number of turnaround episodes by period



Note: Figure B.1 plots the frequency of growth episodes during time. We identify 25 acceleration episodes and 73 episodes of growth reversal in our 42-country sample for the period 2005-2019. Growth acceleration and reversal episodes are identified using an improved variant of the filter developed by Hausmann, Pritchett, and Rodrik (2005).