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Re-examining the effects of governance on economic complexity in Sub-Saharan Africa: identifying transmission channels

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Abstract

The role of governance in promoting economic growth has been strongly demonstrated in contemporary literature. To this end, several studies argue that economic complexity helps to explain the global distribution of long-term economic growth. This study examines the effect of governance on economic complexity in 29 sub-Saharan African countries over the period 2002-2019. We construct four composite governance indices based on principal component analysis. The results provide strong evidence of a positive relationship between governance and economic complexity. To this end, we identify human capital, foreign direct investment, and innovations as transmission channels through which governance promotes economic complexity. Thus, in order to highlight the effects of governance for better economic complexity, Sub-Saharan African countries should develop better institutions that can improve the quality of governance by giving pride of place to human capital, FDI and innovations; the main consequence of which would be to improve economic growth.

Keywords: Economic complexity; governance; Sub-Saharan Africa; human capital; FDI; Innovations.

1. Introduction

Economic development is characterized in literature as a learning process aimed at achieving more complex production. This process emphasizes enhancing productive and innovative capacities, which leads to creative destruction and economic transformation (Lewis, 1954; Hidalgo et al., 2007). The concept of transformation has gained renewed attention in recent studies and is now central to discussions on sustainable development (Vu, 2022; Kamguia et al., 2022). It is defined as a change in the productive structure of economies, particularly regarding export sophistication and/or economic complexity. This definition of structural transformation highlights a country's capacity to provide diversified production, thereby improving its competitiveness in the market (Lectard & Rougier, 2018).

For decades, theories of economic growth have sought to explain why some countries develop more rapidly than others. In response, a newer school of thought suggests that the differences in economic growth between countries can be best understood through the lens of economic complexity (Hartmann et al., 2017; Hausmann et al., 2014; Hausmann & Hidalgo, 2011; Hidalgo & Hausmann, 2009). Economic

complexity measures the sophistication and diversification of each country's productive structure. Beyond serving as an analytical tool for understanding global patterns of sustained economic growth, economic complexity is particularly significant for developing countries, as it is currently the most advanced indicator for assessing a nation's development progress (Hidalgo et al., 2007; Lapatina, 2016; Hidalgo & Hausmann, 2009; Hidalgo, 2021). Numerous studies highlight the advantages of economic complexity for growth and development (Hausmann et al., 2007; Jarreau & Poncet, 2012). Following the work of Hidalgo and Hausmann (2009), economic complexity encompasses the breadth of knowledge and technological advancement. It incorporates two key criteria: export diversity, which reflects the ability to generate and export a wide range of products, and the ubiquity of exported goods, which indicates the sophistication of production capabilities and the number of countries involved in exporting such products.

Although the process of structural transformation has been underway for more than two decades, many developing countries, particularly those in sub-Saharan Africa, have lagged behind. Their average Economic Complexity Index (ECI) remains low, averaging less than 25% of GDP



(Hausmann et al., 2014). While most countries producing the most sophisticated products are located in Asia, America, and Europe, those in Africa¹ represent the least sophisticated region. Several factors contribute to this low level of economic complexity, including poor enforcement of property rights, inappropriate macroeconomic policies, and persistent corruption (Diamond, 1997; Acemoglu, 2001). Additionally, Africa has experienced a significant decline in its share of global exports. According to the United Nations Economic Report for Africa (UNECA), Africa's share of world exports was projected to remain below 3%, compared to 36.3% for Asia in 2021. Commodities accounted for 60% of total exports, making African countries vulnerable to shocks linked to fluctuations in world prices, which weakens their prospects for growth and economic development (UNCTAD, 2022). Therefore, exploring innovative instruments is essential, necessitating a robust system of governance.

Since the pioneering work of Hausmann et al. (2007) on export sophistication, numerous studies have examined the determinants of economic complexity. These studies have identified various economic factors, including sophisticated employment, foreign direct investment, migrant remittances, income inequality, natural resources, and increased economic growth (Zhu & Li, 2017; Kannen, 2020; Saadi, 2020; Yu, 2023). Environmental and social factors have also been considered, such as the level of collective intelligence, migration from developing to developed countries, Internet access, education, research, and technology (Lapatinas, 2019; Valette, 2018; Wang et al., 2023). Furthermore, some studies on economic complexity have focused on the quality of institutions, emphasizing the importance of promoting democracy (Kamguia et al., 2022). Fung (2006) argues that more effective public participation leads to better-informed and better-represented policies, which could ultimately foster a more complex and dynamic economy. Jessop (1998) contends that the rise of governance arises from the inability of markets and hierarchies to manage the increasing complexity of modern economies. However, despite the growing literature on the determinants of economic complexity, the role of governance as a determinant has not yet been sufficiently explored. Nevertheless, both institutions and governance are considered fundamental elements of economic performance. Indeed, governance influences the economic growth of states through factors such as respect for property rights, the implementation of sound regulatory policies, and political stability (North, 1989).

Previous studies have analyzed the effects of governance on various development indicators. While some argue for an inverse relationship between economic complexity and governance (Djeunankan et al., 2023; Kamguia & Mekongo, 2024), the first empirical evidence of the indirect effect of

institutions on economic complexity is presented by Vu (2022). He demonstrates this relationship through intermediary channels, particularly human capital and innovations. This study differs from Vu (2022) in several ways. Vu measures the quality of institutions using the Index of Global Economic Freedom (IGEF) developed by the Canadian Fraser Institute and the Heritage Foundation. One of its main limitations is that it focuses primarily on economic aspects, such as international trade freedom, access to money, and the regulation of credit, labour, and employment. Vu (2022) concludes that minimal government intervention in market policies can foster an inclusive institutional environment and thereby stimulate economic prosperity. We argue that an approach to economic complexity that considers governance as an institutional determinant would be more relevant. Governance is based on six indicators grouped into sub-indices (Kaufmann et al., 2009): political governance, which encompasses citizen voice and accountability as well as political stability; economic governance, which refers to the quality of regulation and the efficiency of public authorities; and institutional governance, which considers the rule of law and control of corruption. This governance index goes beyond economic factors, also providing insights into the conduct of elections and the replacement of political leaders. It adopts a broader view of well-being, making it more applicable to developing countries. Through institutional governance, we can evaluate respect for the institutions governing interactions between citizens and the state (Asongu & Nwachukwu, 2017). A recent study has further confirmed governance as a significant determinant of economic complexity through several of its indicators (Mini et al., 2024).

Thus, our contribution to literature unfolds at three levels. First, our study is the first to test both the direct and indirect effects of governance on economic complexity in Sub-Saharan Africa. This study examines the interaction between governance and three additional variables: human capital, foreign direct investment (FDI), and innovation. This approach allows us to assess whether governance is potentially less detrimental to economic complexity in the presence of these variables, which are considered transmission channels. Second, to the best of our knowledge, this is the first study to analyse the effect of governance on economic complexity by distinguishing among the following types of governance: political governance, economic governance, institutional governance, and general governance. Third, this study accounts for endogeneity by employing appropriate econometric methods. Specifically, we use two alternative empirical estimation techniques: the Generalized Method of Moments (GMM) in a two-stage system. This estimator addresses the endogeneity bias that may arise from the presence of endogenous explanatory variables while providing unbiased, consistent, and efficient estimates in the presence of lagged variables. Additionally, to further limit endogeneity problems, we employ the two-stage least squares instrumental variable approach (IV-2SLS) for comparison purposes. The remainder of the paper is organized as follows: Section 2 discusses the theoretical link underlying the relationship between governance and economic complexity. Section 3

¹ According to the *Observatoire de la Complexité Économique* (2022), four of the last five countries in the world with the worst Economic Complexity Index are in Africa. These are Nigeria (-1.6289), Guinea (-1.7804), Angola (-2.2458) and Libya (-3.1767).

describes the data and empirical strategy. Section 4 presents the empirical results; section 5 looks at the transmission channels and section 6 conclude the study.

2. Literature review

2.1 Theoretical framework

The literature on economic complexity is extensive. International trade theories, such as Ricardo's theory of comparative advantage (1817), suggest that countries can benefit from trade by specializing in the production of goods for which they have relative advantages and lower costs, treating labour as the sole factor of production. Additionally, the Heckscher-Ohlin-Samuelson (HOS) model, developed by Heckscher (1919), Ohlin (1935), and Samuelson (1948), is often used to explain the development of countries, the acceleration of economic growth, and their contributions to increased economic complexity. While these theories highlight the importance of specialization in production, they overlook the challenges posed by the institutional framework. In contrast, Williamson (1975) views this framework as an exogenous factor. He argues that governance acts as a mechanism to facilitate effective coordination among local actors or organizations. It helps establish regulations among economic players whether public or semi-public—thereby reducing transaction costs and fostering greater economic complexity. Similarly, North's (1989) theory of institutions emphasizes the historical evolution of institutions and their influence on economic performance. He contends that efficient institutions promote innovation and growth, while inefficient or extractive institutions hinder progress. Chenery (1975) and Syrquin (1986) also contribute to the discussion by highlighting theories of structural change, which focus on pricing and resource allocation. These concepts align with new growth theories that leverage structural change to enhance economic complexity.

The notion that a country's production structure and institutions evolve simultaneously can be traced back to Smith (1776), who asserted that for a business to thrive in a specific sector, it must adopt the most efficient institutions. Smith further argued that the wealth of nations is fundamentally connected to the division of labor. Supply-side theory finds support in the idea that markets characterized by sound governance promote effective risk management, reduce costs, and mitigate corruption, all while stimulating economic growth and complexity. Increased economic complexity can, in turn, heighten the demand for governance, including property rights, due to the various risks associated with innovation and productive growth in a sophisticated economic context (Romer, 1990). Therefore, institutions serve as optimal solutions for enhancing economic performance, significantly influencing that performance through good governance.

2.2 Summary of empirical work

Finding an answer to the question of how governance affects economic complexity is relevant to both academic and policy concerns. We hypothesise that governance can affect economic complexity through direct or indirect channels. The

direct link is supported by a body of existing research. Stoker (1998) argues that governance involves the ability to perform actions that do not rely solely on government power. From this perspective, government is seen as an entity capable of mobilising new tools and techniques to direct and guide. Djeunankan et al (2023) establish an inverse relationship between economic complexity and governance. According to Kamguia & Mekongo (2024), the link between governance and economic complexity is strengthened by political and institutional governance. This relationship is linear in African countries and was accentuated following the global financial crisis (Mani et al., 2024). Fung (2006) argues in favour of political governance, stressing that more effective public participation could lead to more informed and representative policies, thereby promoting a more complex and dynamic economy. Jessop (1998) argues that the rise of governance can be explained by the inability of markets and hierarchies to manage the increasing complexity of modern economies. This complexity stems from the increased interdependence between different economic and social actors, making it difficult to coordinate economic activities solely through prices or hierarchies. Governance, in its various manifestations, offers a means of coordinating the economy and contributing to the increase in economic complexity.

However, although we intuitively support the idea of a direct link between governance and economic complexity, an indirect link could also exist through various transmission channels. To our knowledge, the literature on the effect of governance on economic complexity is still relatively limited. By focusing on the relevance of institutions, Vu (2022) represents one of the most significant empirical tests of the indirect effect of institutions on economic complexity. The study shows that robust institutions promote a higher level of economic complexity by creating an environment conducive to innovative entrepreneurship, encouraging the accumulation of human capital and directing human resources towards productive activities. Moreover, institutions guarantee the security of property rights and encourage innovative entrepreneurs to invest in the process of "cost discovery" (Hartmann et al., 2017; Vu, 2022). Kamguia et al. (2022) show that democracy, as a transmission channel, can improve economic complexity through foreign aid. In this study, we argue that governance can influence economic complexity through human capital accumulation, innovations and foreign direct investment inflows.

Human capital is one of the main factors explaining the positive effect of governance on economic complexity. In this respect, Acemoglu et al (2012) make the case for long-term development by highlighting the importance of institutions and human capital. They prove that the theory of institutions is particularly predictive, especially with regard to GDP per capita between countries. On the other hand, there is a broad consensus on the link between governance and human capital, thanks in particular to the pioneering work of Baumol (1990) and North (1990). Effective institutions foster the structural transformation of a country through the accumulation of human capital. Moreover, good governance stimulates this

accumulation of human capital by improving the allocation of human resources, which leads to an increase in the level of economic complexity via structural transformation.

The relevance of foreign direct investment (FDI) in analysing the link between governance and economic complexity goes beyond existing contributions in the literature. In the light of these studies, Osinubi and Ajide (2022) emphasise that the importance of FDI lies in its potential to promote highly technical and selective investments, guaranteeing the development of several priority sectors. It is therefore necessary to promote incentive policies to encourage FDI in various countries, ensuring an increase in economic complexity. With this in mind, Kannen (2020) argues for the proactive involvement of policymakers and investment promotion agencies to attract FDI, particularly in the tertiary sector. Policymakers should not focus solely on diversifying the productive structure of the economy, but rather on the complexity of new industries. According to Buchanan et al (2012), institutional quality influences both the level of FDI and its volatility. Sadeghi et al (2020) also provide evidence of a link between FDI and economic complexity. However, the literature demonstrating that FDI promotes economic complexity is particularly rich (Sweet & Maggio, 2015). Antonietti & Franco (2021) argue that a positive relationship exists between FDI and economic growth. Indeed, attracting and accumulating an increased volume of FDI allows countries to improve their average level of economic complexity, although this dynamic is more effective in the presence of strong governance institutions. Higher economic complexity is correlated with a more advanced stage of economic development; attracting FDI and multinationals is a policy lever for generating positive knowledge spillovers. With regard to innovations, Vu (2022) shows that institutions favouring innovative entrepreneurship contribute to higher levels of economic complexity. Similarly, Neffke et al. (2018) argue that multinational enterprises function as agents of structural change and innovation, thus contributing to improving the average level of sophistication of firms' products.

3. Data and methodologies

3.1 Data presentation

This study examines the impact of governance on economic complexity based on an unbalanced panel of 29 sub-Saharan African countries, covering the period from 2002 to 2019. The data used come from the World Economic Complexity Observatory (WTO), the World Bank (WDI) and the World Governance Indicators (WGI). Data availability determines the sample and frequency of observations. Definitions of the variables, data sources and a list of the countries concerned are provided in the appendix. The following section gives details of the data.

3.1.1 Dependent variable

The economic literature proposes various indicators for measuring economic growth, each of which has its limitations, notably their inability to anticipate the future. Gross domestic product (GDP), which is often used, is criticised for its

emphasis on the quantitative aspect of growth. In response to these limitations, Hidalgo and Hausmann (2009) developed the Economic Complexity Index (ECI) as an alternative. The dependent variable in this study is economic complexity, quantified by the ECI, developed by Hidalgo & Hausmann (2009) and accessible via the Observatory of Economic Complexity². The ECI assesses the amount of knowledge integrated into a country's production structure, as well as the availability of the production capacity required to manufacture complex goods. This assessment is based on the diversity of products exported and the ubiquity of these products, i.e. the number of countries exporting the same product (Hidalgo & Hausmann, 2009). The choice of this indicator is based on the growing literature on the determinants of economic complexity (Lapatinas, 2019; Saadi, 2020; Kamguia et al., 2022). This indicator also helps to mitigate the criticisms levelled at export sophistication indices.

To assess the robustness of our results, we adopt the methodology of Kamguia et al. (2022), using two alternative measures of economic complexity. The first is the Enhanced Economic Complexity Index (ECI+), proposed by Albeaik et al. (2017), while the second is the Productive Capacity Index. The ECI+ assesses the diversity and sophistication of a country's export structure, adjusted for the difficulty of exporting each product, incorporating information on diversity (number of products exported) and ubiquity (number of countries exporting the same products) (Hidalgo & Hausmann, 2009). The ICE+ is calculated from data establishing the links between countries and the products they export, and is freely accessible via MIT's Economic Complexity Observatory. The second measure of economic complexity comes from the United Nations UNCTADSTAT³ with the Productive Capacity Index (PCI) as an alternative to economic complexity. The PCI assesses the productive economic structure of a country and indicates the orientation of factors of production towards productive areas, facilitated by a process of structural transformation. Unlike other indicators, the PCI captures the entire economic structure.

3.1.2 Variable of interest

The variables of interest consist of four composite governance⁴ indices: political governance, economic

² These data can be accessed here <http://atlas.media.mit.edu>

³ These data can be accessed here

<https://unctadstat.unctad.org/datacentre/>

⁴ **Governance** refers to the exercise of political, economic, and administrative authority in the management of a country's affairs. Good governance encompasses several key elements, including legitimacy, which enables the government to secure the consent of the governed; accountability, which guarantees transparency and responsibility for actions; adherence to the rule of law and the protection of human rights; competence; and decision-making capacity. According to Kaufmann et al. (2010), governance is assessed based on three primary indicators: political, economic, and institutional.

governance, institutional governance and general governance. These variables are made up of composite indices developed using the principal component analysis (PCA) technique. More specifically, political governance is derived from the PCA of political stability, citizen voice and accountability, while economic governance is derived from the PCA of government effectiveness and regulatory quality. This study is in line with recent governance literature (Kaufmann et al., 2009; Asongu & Nwachukwu, 2017). Furthermore, institutional quality is achieved through the CPA of corruption control and the rule of law. Finally, overall governance is derived from the PCA of political stability, voice, accountability, government effectiveness, regulatory quality,

control of corruption and rule of law. PCA is a statistical method commonly used to reduce a set of highly correlated variables into a smaller set of uncorrelated variables, referred to as principal components (PCs). In line with the objective of this study, it should be emphasised that the grouping of governance indicators also aims to clarify certain governance concepts that are frequently used without any statistical basis. The criterion for retaining common factors is based on the recommendations of Kaiser (1974), who recommends retaining PC with an eigenvalue above the mean. The description of these composite governance indices is given in Table 1.

Tableau 1. Principal component analysis

Principal component	Component matrix	SP	VC	EP	QR	CC	ED	Proportion	cumulatives	Eigenvalue
Polgov	First PC	0.7071	0.7071					0.8648	0.8648	1.7295
	Second PC	-0.7071	0.7071					0.1353	1.000	0.27047
Ecogov	First PC			0.7071	0.7071		-	0.962	0.962	1.72956
	Second PC			-0.7071	0.7071			0.381	1.000	0.270471
Instgov	First PC					0.7071	0.7071	0.9417	0.9417	1.8835
	Second PC					-0.7071	0.7071	0.0583	1.000	0.11652
Gengov	First PC	0.387	0.844	0.4212	0.4157	0.4071	0.4319	0.8438	0.8439	5.06307
	Second PC	0.5486	0.5976	-0.3997	-0.344	-0.2411	-0.0431	0.0554	0.8992	0.33239
	Third PC	-0.1545	0.6946	0.0798	0.0765	-0.1035	0.0754	0.0457	0.9449	0.273995

PC: Principal Component. SP: Political Stability; VA: Voice and Accountability; EP: Government Effectiveness; QR: Regulatory Quality; CC: Corruption Control; ED: Rule of Law. Polgov (Political Governance): First principal component (PC) of SP and VA. Ecogov (Economic Governance): First PC of EP and QR. Instgov (Institutional Governance): First PC of CC and ED. Gengov (General Governance): First PC combining SP, VA, EP, QR, CC, and ED.

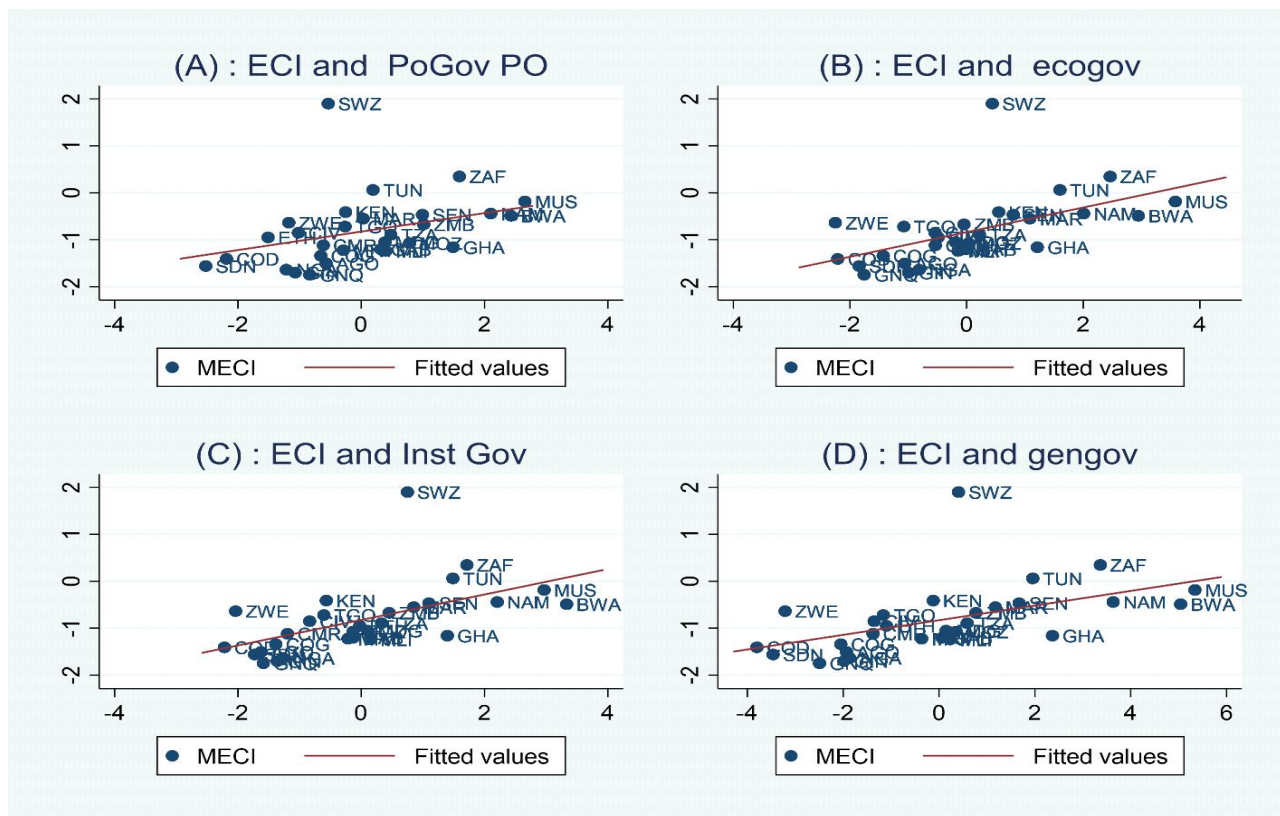


Figure 1: correlation between governance and economic complexity

Figure 1 above illustrates the correlation between the composite governance indices and economic complexity. It can be seen that these indices have a positive relationship with economic complexity, as measured by the ECI. As Vu (2022) indicates, institutional quality also has a positive impact on economic complexity. We therefore expect a similar effect of governance on economic complexity. Table 1 presents the summary statistics of the variables used in the subsequent estimations and shows little variation in the ECI score across countries, as indicated by the small standard deviation. Some countries in our sample have not yet succeeded in transforming their economic structure from the production of basic goods to more complex products. A closer analysis of the data reveals that most of the countries occupying the lowest positions in the Economic Complexity Index are African countries.

3.1.3 Control variables

In order to substantiate the relationship between governance and economic complexity, while avoiding variable omission bias, our fundamental analysis takes into account a subset of contemporary controls considered essential for economic complexity (Saadi, 2020; Kamguia et al., 2022). These controls include: financial development, measured in terms of domestic credit to the private sector as a percentage of GDP, internet access, measured in terms of the number of people with internet access (per 100 people), and remittances, quantified as a percentage of GDP of personal remittance inflows in total remittances. For robustness tests, we include four other controls: gross fixed capital formation (GFCF), population, inflation and foreign aid. In the interactive model, we also incorporate foreign direct investment (FDI), innovation and human capital (Vu, 2022; Djeunankan et al., 2023).

The choice of these variables is strongly supported by the literature. Indeed, financial development is crucial for fostering economic complexity, as it allows resources to be allocated to innovative activities and sophisticated production processes (Baskak, 2024; Olaniyi & Odhiambo, 2023). Similarly, Li & Guan (2024) argue for the inclusion of the Internet variable. Regions with advanced digital economies show a stronger positive effect on export complexity, indicating that digital infrastructure is essential for achieving technological complexity. Remittances, on the other hand, contribute significantly to the creation of new businesses, particularly in less developed economies where economic complexity is lower (Piras, 2023). Gross fixed capital formation is positively correlated with economic growth, as demonstrated by studies conducted in Africa and South Africa, where bidirectional causality has been observed

(Ncanywa & Makhenyane, 2016). Bruno & Musso (2000) show that inflation volatility has a negative impact on the rate of economic growth. In addition, recent research indicates a slight positive correlation between population growth and economic growth in OECD countries, suggesting that population growth could improve economic output (Bucci et al., 2021).

3.2 Methodology

This study aims to explore the influence of governance on economic complexity in sub-Saharan African nations. We postulate that governance exerts a positive relationship with economic complexity across the various countries in this region. Thus, we will be able to analyse the following model, formulated in equation (2).

$$\text{Economic complexity} = f(\text{Gouvernance}, X) \quad (1)$$

In this equation, X_{it} represents the set of control variables mentioned above; $G_{i,t}$ represents the various composite governance indices. To estimate the relationship illustrated in equation (2), we apply the generalised method of moments (GMM), adapted to dynamic systems. Revisiting various trade theories, the factors influencing the export complexity of developing nations can generally be expressed as follows

$$ECI_{i,t} = \alpha + ECI_{i,t-1} + \beta Gov_{it} + \beta_2 X_{i,t} + \mu_i + \gamma_t + \varepsilon_{i,t} \quad (2)$$

Where $ECI_{i,t}$ denotes the economic complexity index of country i in year t , while $ECI_{i,t-1}$ denotes the lagged value of the index $ECI_{i,t}$. This lagged value was also considered in a lag structure by Lectard & Rougier (2018). It is likely that a country's past export sophistication impacts its current sophistication. Moreover, as highlighted by Hausmann et al. (2007), export sophistication is a process subject to a specific pathway, where externalities reinforce barriers to entrepreneurship in new production activities, particularly in developing countries such as those in Sub-Saharan Africa.

The vector of control variables $X_{i,t}$ includes elements such as financial development, internal credit, Internet access and remittances. The composite governance index Gov_{it} assesses various aspects of governance, including political, economic, institutional and general governance. In addition, μ_i represents a country-specific unobserved effect, while γ_t refers to a time-specific effect. Finally, $\varepsilon_{i,t}$ refers to the term error.

Table 2. Descriptive statistics

Variables	Observations	Mean	Standar-division	Min	Max
ECI	510	-0.813445	0.7686281	-2.628273	2.116034
ECI +	272	-1.216049	0.7760257	-3.5323	0.589703
FDI	522	4.029379	5.6078	-11.19719	39.81094

Political governance	522	0.0051925	1.326027	-2.942493	2.788352
Economic governance	522	0.0484555	1.497366	-2.878697	4.456658
Institutional governance	522	-0.003212	1.483913	-2.589133	3.927767
General governance	522	0.0284405	2.394294	-4.292943	5.89889
Internet	510	13.79291	16.39381	0.0724023	84.12036
Remittances	506	2.3021	2.87355	0	13.61145
Financial development	459	26.04469	28.75364	0.4913875	142.422
Gross fixed capital formation	502	23.60338	9.065855	2.000441	81.02102
Foreign Aid	522	5.004113	5.838057	-0.25092	62.1866
Inflation	504	8.137327	14.69436	-3.099781	255.305
Population	522	2.409027	0.9345565	0.03224	4.780037
Human Capital	468	1.903059	0.453907	1.14143	2.938816
Productive Capacity Index	512	31.16409	9.106939	13.5159	54.026
Innovations	367	27.3432	19.41393	1.875816	88.55944

The introduction of the lagged economic complexity explanatory variable calls into question the validity of the standard static panel regression, due to the bias associated with the dynamic panel (Nickell, 1981). Once the country-specific fixed effects have been eliminated by first difference, the lagged dependent variable, expressed in first difference, remains correlated with the idiosyncratic error term, which raises the question of endogeneity. As a result, static estimation is likely to produce biased and inconsistent results. Endogeneity may result from at least three factors: firstly, reverse causality, where governance could be endogenous, thus increasing the chances of a feedback effect of economic complexity on governance. Secondly, measurement errors, as indicators of governance or economic complexity are often imprecise, particularly in developing countries. Finally, the omission of critical variables, such as geographical, cultural or historical factors, can also affect regression models, as they are important determinants of economic complexity and correlated with certain explanatory variables. To address this endogeneity problem, the literature generally advocates the use of the instrumental variables approach or dynamic GMM. In this context, the GMM system is favoured over the 2SLS instrumental variables approach.

Previous studies have demonstrated the effectiveness of the instrumental variables method using external instruments to address the issue of reverse causality (Farhadi et al., 2015). Nevertheless, an important constraint of this method is the difficulty of unearthing a truly exogenous external instrument, exhibiting variation across countries and over time. Consequently, this approach may neglect the endogeneity of other explanatory variables. On the other hand, the GMM has the advantage of managing the endogeneity of all the explanatory variables by using internal instruments. In addition, it also handles the endogeneity associated with reverse causality, while providing valid instruments. To adequately estimate the dynamic model under discussion, we

opt for the GMM initially developed by Arellano & Bond (1991), then refined by Arellano & Bover (1995) and Blundell & Bond (1998). The GMM method takes two forms: the difference GMM, which uses the lagged levels of the explanatory variables as instruments, and the system GMM, which amalgamates the difference and level regressions. Bond et al (2001) have pointed out, however, that the system GMM estimator proposed by Arellano & Bover (1995); and Blundell & Bond (1998) could considerably increase efficiency while avoiding the problem of weak instruments identified in the first-order difference GMM estimator by Arellano & Bond (1991).

Thus, for the estimation of equation (2), we adopt the system GMM of Blundell & Bond (1998), while incorporating the standard error correction of Windmeijer (2005) to obtain more efficient estimators. Adequate estimation of the system GMM depends on several conditions. Firstly, to ensure consistent estimation of the lagged dependent variable used as a regressand, the idiosyncratic error term must show first-order serial correlation but no second-order link. In other words, the Arellano-Bond test for first-order serial correlation, denoted AR(1), should lead to the rejection of the null hypothesis, while the test for second-order correlation, denoted AR(2), should not. The second condition concerns the exogeneity and validity of the instruments. Hansen's over-identification test tests the null hypothesis of the joint validity of the instruments, while Hansen's difference test checks the validity of each subset of instruments. Too many instruments can considerably weaken and bias the results of Hansen's identification test. Thus, the rule of thumb suggests that the number of instruments should be smaller than the number of countries (Roodman, 2009). Although the GMM estimator proves to be relevant for tackling simultaneity problems, this approach is not without its shortcomings. For the sake of comparison and to limit endogeneity problems, we use the IV-2SLS approach in this study.

4. Presentation of results

4.1. Basic results

This subsection presents the basic results on the effects of governance on economic complexity. Columns (1), (2), (3) and (4) represent respectively the effects of political, economic, institutional and general governance on economic complexity. Consequently, the econometric model is estimated using the Generalized Methodological Moments (GMM) method in a two-stage system. The various results are summarised in Table 3. For each table below, four main information criteria are used to examine the validity of the GMM models. The AR(1) test on the null hypothesis of uncorrelated error terms is rejected, while the AR(2) statistic on the hypothesis of uncorrelated residuals is accepted. In addition, the regressions based on the Hansen statistic confirm

the validity of all the instruments. Indeed, the Hansen test of over-identification is insignificant, which suggests that all the instruments used satisfy the exogeneity condition required to obtain consistent estimates.

In this respect, the number of instruments is less than the number of countries in each specification. The Economic Complexity Index (ECI) is lagged by 1% in all specifications, indicating the path dependence of economic complexity in Sub-Saharan African countries. This result is in line with the findings of Hidalgo and Hausmann (2009) and Kamguia et al. (2022). The various estimated coefficients in Table 3 provide significant information. Column (1) presents the effects of political governance on economic complexity. The results show a positive effect of political governance on economic complexity.

Table 3. Governance and economic complexity (System GMM : 29 countries from 2002-2019)

	Dependent variable ECI			
LECI	0.7877*** (0.0580)	0.8504*** (0.0381)	0.8250*** (0.0522)	0.7865*** (0.0488)
Political governance	0.0285*** (0.0065)			
Economic governance		0.0375*** (0.0052)		
Institutional governance			0.0542*** (0.0132)	
General governance				0.0410*** (0.0058)
Financial development	0.0018** (0.0009)	0.0007 (0.0006)	0.0008 (0.0006)	0.0007 (0.0007)
Internet	0.0008* (0.0004)	-0.0002 (0.0002)	-0.0006* (0.0003)	0.0002 (0.0003)
Remittances	0.0194** (0.0087)	0.0121** (0.0054)	0.0409*** (0.0128)	0.0474*** (0.0104)
Constant	-0.2519*** (0.0698)	-0.1646*** (0.0484)	-0.2397*** (0.0643)	-0.2919*** (0.0589)
Observations	409	409	409	409
Number of countries		29	29	29
Number of instruments		25	24	23
AR(1)		0.000450	0.000544	0.000267
AR(2)		0.589	0.632	0.632
			0.632	0.688

Hansen OIR	0.636	0.204	0.445	0.538
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Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Specifically, the coefficient for political governance is 0.0285, indicating that an increase of one unit in political governance leads to an increase in economic complexity of about 0.0285 units. Similarly, for dimensions (2), (3) and (4), we observe that the coefficients associated with economic governance, institutional governance and overall governance are positive and statistically significant. These four results suggest that political, economic, institutional and overall governance contribute to improving economic complexity. More specifically, an increase in the indicators of political, economic, institutional and overall governance leads respectively to an increase in economic complexity of 0.0285 units (for the effect of political governance), of 0.0375 units (for the effect of economic governance), of 0.0542 units (for the effect of institutional governance) and finally of 0.0410 units (for the effect of overall governance). These results are consistent with the literature, which shows that the quality of institutions improves the level of economic complexity.

Indeed, Acemoglu et al. (2014) argue that institutions are fundamental determinants of economic complexity. More specifically, Djeunankan et al. (2023) rightly argue that good governance is strongly correlated with economic complexity. Similarly, Vu (2022) who collectively identify a positive (albeit insignificant) effect of government effectiveness, regulatory quality, property rights and regulatory quality. He argues that institutions exert a positive influence on economic complexity by stimulating incentives for innovative entrepreneurship, improving the quality of human capital and increasing the deployment of human resources in productive activities. With regard to the control variables, we note that the coefficient associated with the financial development variable is positive and statistically significant for all four regressions. On the other hand, the coefficient associated with the Internet variable is controversial: in the presence of political governance in the first column, it is positive and statistically significant. This reflects the fact that increasing internet use

speeds up production capacity and improves economic complexity (Lapatinas, 2019). This result differs from those observed with the other composite governance indices. With regard to the transfer of funds, the coefficient associated with this variable is also positive and statistically significant, which is consistent with the work of Saadi (2020).

4.2 Robustness check

In order to assess the robustness of our main results, this subsection presents sensitivity analyses at several levels. First, we include additional control variables; second, we employ alternative measures of economic complexity. In general, all the robustness checks reveal results consistent with those obtained from the basic model specifications.

4.2.1. Additional control variables

We initially examine the robustness of our results by including three additional control variables in our model. In order to take account of possible omissions, we add three additional variables, as illustrated in Table 4, namely population density, inflation and gross fixed capital formation (GFCF). This is because our control variables may be biased if these factors are not adequately controlled for. According to Table 4, the four columns represent the impact of political, economic, institutional and general governance on economic complexity. Looking at the coefficients of the additional control variables, we note that they also show expected signs. From column (1) to column (4), the inclusion of each additional control variable keeps the coefficients associated with each composite governance index in positive and statistically significant territory. Our results therefore demonstrate robustness to the inclusion of additional control variables. Concerning these variables, in line with the findings of Djeunankan et al (2023), who establish a link between population and economic complexity, we observe that the coefficient associated with population density is significant and positive in columns (1), (3) and (4). Our results also corroborate those of Kamguia et al (2022).

Table 4. Governance and economic complexity (System GMM with additional controls: 29 countries from 2002-2019)

VARIABLES	Dependent variable ECI			
	(1)	(2)	(3)	(4)
L.ECI	0.7338*** (0.0444)	0.7787*** (0.0602)	0.8977*** (0.0572)	0.8428*** (0.0566)
Political governance	0.0258** (0.0119)			
Economic governance		0.0676*** (0.0193)		
Institutional governance			0.0980*** (0.0227)	
General governance				0.0535***



				(0.0107)
Financial development	0.0013*	0.0020*	0.0010	0.0009
	(0.0007)	(0.0011)	(0.0009)	(0.0009)
Internet	0.0002	0.0003	-0.0003	0.0008
	(0.0004)	(0.0005)	(0.0006)	(0.0009)
Remittances	0.0343**	0.0161*	0.0516***	0.0451***
	(0.0164)	(0.0092)	(0.0107)	(0.0099)
Foreign Aid	0.0045	0.0009	-0.0128*	-0.0027
	(0.0050)	(0.0078)	(0.0064)	(0.0072)
Population	0.0968**	0.0463	0.1770***	0.1001*
	(0.0442)	(0.0671)	(0.0518)	(0.0659)
Inflation	-0.0001	0.0004	0.0006*	-0.0007**
	(0.0005)	(0.0005)	(0.0003)	(0.0003)
Cros fixed capital formation	0.0083***	0.0126*	0.0142**	0.0010*
	(0.0019)	(0.0064)	(0.0052)	(0.0058)
Constant	-0.3070**	-0.6932***	-0.2433	-0.4634**
	(0.1362)	(0.2029)	(0.2127)	(0.1957)
Observations	394	394	394	394
Number of countries	28	28	28	28
Number of instruments	23	26	26	26
AR(1)	0.000384	0.00128	0.000201	0.000114
AR(2)	0.994	0.756	0.596	0.811
Hansen OIR	0.756	0.276	0.453	0.440

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.2.2 Robustness in relation to alternative dependent variables

To further ensure the robustness of our results, in this section we use two alternative measures of ECI, as mentioned earlier: the Enhanced Economic Complexity Index (ECI+) proposed by Albeaik et al. (2017), and the Productive Capacity Index (PCI). Like the ICE, the ICE+ is derived from the Economic Complexity Observatory. Its particularity lies in the fact that it

assesses the diversity and sophistication of a country's export structure, while being adjusted according to the difficulty of exporting each product. According to Gnanon (2021), productive capacities and total Aid for Trade flows act in a complementary manner to positively influence economic complexity. Moreover, this degree of complementarity is higher in poor countries than in other countries receiving aid for trade.

Table 5. Governance and ECI+ (System GMM: 29 countries from 2002-2019)

	Dependent variable ECI+			
L.ECI+	0.7877***	0.8504***	0.8250***	0.7865***
	(0.0580)	(0.0381)	(0.0522)	(0.0488)
Political governance	0.0285***			
	(0.0065)			

Economic governance		0.0375***		
		(0.0052)		
Institutional governance			0.0542***	
			(0.0132)	
General governance				0.0410***
				(0.0058)
Financial development	0.0018**	0.0007	0.0008	0.0007
	(0.0009)	(0.0006)	(0.0006)	(0.0007)
Internet	0.0008*	-0.0002	-0.0006*	0.0002
	(0.0004)	(0.0002)	(0.0003)	(0.0003)
Remittances	0.0194**	0.0121**	0.0409***	0.0474***
	(0.0087)	(0.0054)	(0.0128)	(0.0104)
Constant	-0.2519***	-0.1646***	-0.2397***	-0.2919***
	(0.0698)	(0.0484)	(0.0643)	(0.0589)
Observations	409	409	409	409
Number of countries	29	29	29	29
Number of instruments	25	24	23	25
AR(1)	0.000450	0.000544	0.000267	0.000383
AR(2)	0.589	0.632	0.632	0.688
Hansen OIR	0.636	0.204	0.445	0.538

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results of the robustness check, in response to the use of the alternative measure of enhanced economic complexity (ECI+), are reported in Table 5. The results in columns (1) to (4) highlight the effect of political, economic, institutional and general governance on economic complexity, as measured by

the ECI+. It should be noted that the coefficients associated with the different composite governance indices (political, economic, institutional and general) are positive and statistically significant.

Table 6. Governance and the PCI (System MMG: 29 countries from 2002 to 2019)

VARIABLES	Dependent variable PCI			
	L.PCI	0.9053***	0.8747***	0.8894***
	(0.0443)	(0.0486)	(0.0224)	(0.0299)
Political governance	0.1212**			
	(0.0471)			
Economic governance		0.5692***		
		(0.1217)		
Institutional governance			0.1178***	
			(0.0394)	
General governance				0.2617***
				(0.0538)

Financial development	0.0202*	0.0032	0.0238***	0.0126
	(0.0101)	(0.0167)	(0.0071)	(0.0108)
Internet	-0.0006	0.0043	0.0002	-0.0007
	(0.0063)	(0.0058)	(0.0032)	(0.0039)
Remittances	0.2371***	0.5467***	0.3032***	0.6043***
	(0.0850)	(0.1207)	(0.0702)	(0.0891)
Constant	2.2527**	2.6929**	2.4369***	1.9955***
	(0.9322)	(1.1931)	(0.4986)	(0.6827)
Observations	413	413	413	413
Number of countries	29	29	29	29
Number of instruments	22	25	25	25
AR(1)	0.00102	0.00155	0.00113	0.00141
AR(2)	0.652	0.609	0.637	0.593
Hansen OIR	0.268	0.782	0.495	0.660

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Similarly, the use of the alternative measure of economic complexity, the PCI, as the dependent variable, as presented in Table 6, provides us with very conclusive results. The coefficients associated with the various composite governance indices (political, economic, institutional and general) are positive and statistically significant at the 1% and 5% thresholds. These results indicate that an improvement in the quality of governance is associated with an increase in

economic complexity. This supports the intuition that countries with a high level of sophistication effectively exploit the quality of their institutions to increase the level of sophistication of their economy. From the above discussion, we can therefore conclude that our results are robust to the use of ICI+ and CPI as alternative variables of economic complexity.

Table 7. Governance and economic complexity (IV-2SLS: 29 countries from 2002-2019)

VARIABLES	Dependent variable ECI			
Political governance	0.376***			
	(0.127)			
Economic governance		0.326***		
		(0.0895)		
Institutional governance			0.420***	
			(0.120)	
General governance				0.216***
				(0.0613)
Financial development	0.00469	0.00163	0.00118	0.00228
	(0.00287)	(0.00319)	(0.00340)	(0.00308)
Internet	0.000882	0.000320	-0.00131	-5.53e-06
	(0.00269)	(0.00241)	(0.00269)	(0.00254)
Remittances	0.0466***	0.0513***	0.0443***	0.0478***
	(0.0102)	(0.0107)	(0.00982)	(0.00983)
Constant	-1.062***	-0.996***	-0.924***	-0.991***
	(0.0780)	(0.0846)	(0.109)	(0.0891)

Observations	432	432	432	432
R^2	0.079	0.276	0.213	0.227
Kleibergen – Paap LM P-val	0.0023	0.0000	0.0007	0.0002
Kleibergen – Paap Wald	19.514	29.767	12.441	21.993
Stock – Yogo weak critical values 10% max	16.38	16.38	16.38	16.38

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We then adopt a least squares approach to instrumental variables. To instrument governance correctly, it is necessary to identify a variable correlated with governance, but not with economic complexity, apart from the regression variables included (Baum et al., 2007). To this end, we draw on the work of Vu (2020), using the simple Jackknife average of governance levels in neighbouring countries to instrument a country's governance at a given point in time. The logic behind this identification strategy is based on the fact that geographical proximity between countries can favour the cross-border diffusion of knowledge and technology. The results of the IV-2SLS regression are presented in Table 7. With regard to the quality of the instruments, the results are satisfactory overall. The relevance of the instruments is assessed by the Kleibergen-Paap rk Wald F statistic, which is used to test the weakness of the instruments (Kleibergen & Paap, 2006). To avoid considering a weak identification as problematic, this statistic must be greater than or equal to 10. In our analysis, the values shown in Table 2.8 exceed this threshold, suggesting that weak identification is unlikely. In addition, the Kleibergen-Paap rk LM statistic is used to measure under-identification. All of these statistics are satisfactory. In particular, the coefficients associated with the various composite governance indices (political, economic,

institutional and general) are positive and significant at the 1% level. These results therefore illustrate robustness to instrument variation.

5. Mediation analysis

In this section, we examine the transmission channels through which governance can affect economic complexity, notably through human capital, FDI and innovation. The predominant method in the literature is most often to integrate potential mechanisms into regression models to eliminate the effects of mediating factors. However, this approach has limitations, as highlighted by Djeunankan et al (2023) and Kamguia & Balla (2024), who argue that it can lead to biased and inconsistent estimates when combining both treatment and mediating factors in a single model specification. In response to this problem, our study adopts the mediation approach proposed by Baron & Kenny (1986), as taken up by Kamguia & Balla (2024). This choice has the advantage of allowing a precise evaluation of the contribution of each channel to the explanation of the relationship. In other words, this method facilitates the quantification of the respective share of each channel in the analysis of the effects of governance on economic complexity.

Tableau 8. Mediation analysis with political governance

dependent variables	Human capital		FDI		Innovations		
	ECI	Human capital	ECI	FDI	ECI	Innovations	ECI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Political governance	0.0285*** (0.0065)	0.11667*** (0.01677)	0.02337*** (0.03390)	0.23572** (0.237369)	0.073077** (0.0925)	0.1913** (0.09147)	0.02217*** (0.03438)
Human capital			0.0970** (0.0975)				
FDI					0.01954*** (0.0061)		
Innovations							0.02234*** (0.00232)
Baseline control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.2519*** (0.0698)	1.2655*** (0.18561)	1.06643*** (0.06986)	5.449954*** (0.428125)	1.810903*** (0.03382)	1.022585*** (0.17842)	1.810903*** (0.03382)
Sobel test			0.211*** (0.011)		0.0231*** (0.0044)		0.041*** (0.0197)
Proportion of total effect total that is mediated			32%		17%		18.51%
Observations	409	382	382	488	488	294	294

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tableau 9. Mediation analysis with economic governance

dependent variables	Human capital		FDI		Innovations		
	ECI	Human capital	ECI	FDI	ECI	Innovations	ECI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
economic governance	0.8504*** (0.0381)	0.0959106*** (0.017675)	0.160572** (0.3318)	0.01580** (0.00583)	0.017869*** (0.02939)	0.431132 *** (0.82058)	0.087526*** (0.0355)
Human capital			0.000068** (0.092550)				
FDI					0.42964*** (0.24138)		
Innovations							0.020469*** (0.0024)
Baseline control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.0375*** (0.0052)	1.2655*** (0.033813)	1.022585*** (0.017842)	5.0999*** (0.44499)	1.00236*** (0.061568)	37.041 *** (0.782)	1.1713131 *** (0.11159)
Sobel test			0.311** (0.0091)		0.432** (0.005)		0.091 *** (0.020)
Proportion of total effect total that is mediated			31%		28%		34%
Observations	409	382	382	488	488	294	294

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tableau 10. Mediation analysis with institutionnal governance

Dependent variables	Human capital		FDI		Innovations		
	ECI	Human capital	ECI	FDI	CEI	Innovations	CEI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Institutionnal governance	0.0542*** (0.0132)	0.085340*** (0.01584)	0.167998*** (0.29345)	0 (0.21733)	0.187372** (0.025901)	0.41588*** (0.075743)	0.107868** (0.03158)
Human capital			0.1913* (0.09147)				
FDI					0.016864** (0.05729)		
Innovations							0.020208*** (0.0235)
Baseline control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1,80923*** (0.03376)	1.978189*** (0.017615)	1.06643*** (0.06986)	5.22527*** (0.442717)	0.985200*** (0.060625)	1.27707*** (0.4376)	0.187192*** (0.11077)
Sobel test			0.834 *** (0.211)		0.348 ** (0.041)		0.069 *** (0.017)
Proportion of total effect total that is mediated			11%		9%		39%
Observations	409	382	382	488	488	294	294

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Tableau 11. Mediation analysis with general governance

dependent variables	Human capital		FDI		Innovations		
	ECI	Human capital	ECI	FDI	ECI	Innovations	CEI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
General governance	0.0410*** (0.0058)	0.0628715*** (0.10175)	0.079876*** (0.01967)	0.101684** (0.14352)	0.096432** (0.01721)	0.97883*** (0.049419)	0.038518*** (0.020609)
Human capital			0.04451** (0.09434)				
FDI					0.017702*** (0.05853)		
Innovations							0.021245 *** (0.2367)
Baseline control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.2919*** (0.0589)	-1.812072*** (0.33271)	5.267918*** (0.44105)	0.010217*** (0.061892)	1.810903*** (0.03382)	3.2684*** (0.111209)	1.978831 *** (0.111201)
Sobel test			0.196 *** (0.021)		0.484 *** (0.0344)		0.042*** (0.011)
Proportion of total effect total that is mediated			21%		13%		37%
Observations	409	382	382	488	488	294	294

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results of this approach are presented in tables 8, 9, 10 and 11, which respectively constitute regressions based on the different variables of interest, political governance, economic

governance, institutional governance and overall governance. Concerning the human capital channel, the value of the Sobel test, respectively 0.211; 0.311; 0.834; 0.196 according to

tables 8; 9; 10; 11, is therefore significant at the 1% threshold, with the exception of economic governance, which is significant at the 5% threshold, which attests to human capital as a mediator. As regards the estimated coefficients, column (1) of the four tables indicates that governance improves economic complexity, while column (2) of tables 8;9;10;11 shows a positive effect of political governance, economic governance, institutional governance and overall governance on human capital, suggesting that knowledge accumulation, improved education and training depend on the level of governance in each country. This result is consistent with the work of Acemoglu et al. (2014). In columns (3) in Tables 8; 9; 10; 10 on the other hand, the coefficient of human capital in each case is positive and statistically significant, just as the coefficients associated with our different variables of interest indicate that human capital improves economic complexity. In other words, these results show that governance is indirectly related to economic complexity through human capital. Political, economic, institutional and general governance promote economic complexity through increased human capital accumulation while improving the level of human capital. The lower part of our tables 8; 9; 10; 11 shows that human capital explains about 32%; 31%; 11% and 21% respectively of the effects of political, economic, institutional and overall governance on economic complexity.

Taking into account the FDI channel, the value of the Sobel test, respectively 0.023, 0.432, 0.348 and 0.484 according to tables 8, 9, 10 and 11, is therefore significant at the 1% threshold for the case of political governance and general governance, and at 5% for the case of economic and institutional governance, underlining the undeniable relevance of the mediating role of the number of FDI. Column (4) of the four 8;9;10;11 shows a positive and statistically significant effect at the 5% threshold of political governance, economic governance, institutional governance and overall governance on FDI, suggesting that the increase in governance increases the flow of FDI. In fact, the process of setting up good governance institutions requires a certain level of increase in FDI flows, as these investments encourage the implementation of a better institutional framework and the promotion of good governance. Furthermore, the estimated coefficients of FDI are significant and positive, as are the estimated coefficients of political, economic, institutional and overall governance on economic complexity in column (5) in tables 8;9;10;11. These results reflect the fact that governance indirectly improves economic complexity by increasing the flow of FDI. The lower part of our tables 8;9;10;11 shows that FDI explains about 17%; 28%; 9% and 7% respectively of the effects of political, economic, institutional and global governance on economic complexity.

The final transmission channel is innovation. Vu (2022) argues that the miraculous growth of several East Asian economies, driven by technological innovation, reflects the importance of the production and export of sophisticated products. To this end, the value of the Sobel test, respectively 0.041; 0.091; 0.069; 0.042 according to tables 8; 9; 10; 11, is significant at the 1% threshold, underlining the relevance of

the mediating role of technological innovations. This suggests that an increase in the level of governance leads to an increase in the level of innovation. This result also corroborates those of Vu (2022). The results in column (7) according to tables 8; 9; 10; 11 show that the coefficients associated political, economic, institutional and global governance are positive and statistically significant, while the estimated coefficient of innovations is positive and statistically significant in all four cases. These results indicate that governance indirectly improves economic complexity by increasing the level of innovation. The lower part of our tables 8; 9; 10; 11 shows that technological innovations explain about 18.1%; 34%; 39% and 37% respectively of the effects of political, economic, institutional and global governance on economic complexity.

Conclusion

In line with the growing literature that gives pride of place to studies based on economic development through structural transformation, this research focuses on economic complexity. As well as being an indicator reflecting the availability of productive capacity enabling a country to engage in more sophisticated production, economic complexity also captures the level of underdevelopment. The aim of this article was therefore to examine the effect of governance on economic complexity in sub-Saharan Africa. Proceeding by constructing composite indicators of governance, inspired by the literature (Asongu & Nwachukwu 2017; Djeunankan et al.2023), we reviewed theoretical and empirical developments in order to build a model to test the hypothesis that governance improves economic complexity in Sub-Saharan Africa. We estimated our basic model based on multidimensional indicators of governance namely: political, economic, institutional and general governance and also the economic complexity index (ECI) mainly using the dynamic panel estimation technique Generalized Moment Method on a sample of 29 sub-Saharan African countries over the period 2002-2019. The results provide strong evidence suggesting that governance has a positive and significant effect on economic complexity in the selected sub-Saharan African countries. This finding implies that governance drives structural transformation towards the production and export of a wide range of complex products. Further analysis identified human capital, foreign direct investment and innovation as the channels through which governance improves economic complexity. Based on these results, we make some interesting recommendations for African policymakers and for future studies. Based on these results, we encourage African policymakers to better invest in human capital, characterised by the accumulation of knowledge, as well as in the establishment of good governance institutions that can help increase the production and export of a variety of products. Secondly, the creation of a favourable environment for foreign investment not only leads to an improvement in the quality of governance, but also improves economic complexity. Similarly, an environment conducive to the creation of innovative businesses ensures economic development through a more complex economy.

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