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Political leadership and economic complexity in Africa

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Abstract

Following the literature on leadership impact, this article examines the effect of presidential attributes on the level of economic complexity in African countries. For this purpose, a sample of 28 countries observed over the period 1998 to 2020 was selected. Based on estimates using the ordinary least squares (OLS) and the feasible generalized least squares (FGLS) estimators, it is established that the President's education and occupation are important factors in economic complexity. These results are robust to the employment of various methodologies. The study identifies two potential transmission channels through which the president's attributes influence economic complexity. These mechanisms are institutional quality and human capital.

Keywords: political leadership; economic complexity; political economy; quality of institutions; human capital

1. Introduction

In recent years, questions surrounding economic complexity have attracted the attention of economists and political decision-makers. This interest can be explained by the virtuous effects of economic complexity. Indeed, numerous studies underline the essential role of economic complexity for economic development. A summary of these studies shows that economic complexity increases productivity, mitigates inequality and reduces dependence on natural resources. The literature also shows as well as supports the perspective that economic complexity is associated with improved health, environmental quality and economic growth (Zhu & Li, 2017; Mealy & Teytelboym, 2020; Vu, 2020; Emeka et al., 2024). Given the beneficial effects of economic complexity, it is essential to know which factors are likely to influence its development.

According to statistics, Sub-Saharan African countries have comparatively low economic complexity levels relative to other regions such as Asia, Europe, Latin America and the MENA (Middle East and North Africa). Indeed, a closer look at the average economic complexity index from 1995 to 2020 reveals that East Asia & Pacific, Europe & Central Asia and North America have positive average economic complexity scores (0.2; 0.74 and 1.22), while the MENA, South Asia, Latin America & the Caribbean and Sub-Saharan Africa have negative scores. Latin America and the Caribbean, MENA, South Asia and Sub-Saharan Africa have negative scores (-0.22; -0.33; -0.41; -0.89 respectively). The resulting concern is a quest to understand why some countries have comparatively better levels of economic complexity.

Many arguments have been put forward in the literature to explain variations in the level of economic complexity between countries. The very first empirical contributions highlighted the influence of demographic, technological, financial, historical, institutional and macroeconomic factors on the level of economic complexity, growth and development (Keneck-Massil et al., 2021; Bahar et al., 2022; Atemnkeng et al., 2024; Kitutilla, 2024; Olaoye et al., 2024; Oyelaran-Oyeyinka & Barclay, 2024). To put this in perspective, Hidalgo and Hausmann (2009) highlight the existence of a strong correlation between economic growth and economic complexity. With regard to foreign direct investment (FDI), Kannen (2020) finds that FDI directed towards the services sector has a positive effect on the level of economic complexity. With regard to demographic factors, studies conclude that there is a positive effect of migration (both quantitative and diverse) on the level of economic complexity (Valette, 2018; Bahar et al., 2022). In the same vein, Lapatinas and Litina (2019) found that a country's level of collective intelligence is positively correlated with the level of economic complexity. Chu (2020) found that higher education and population density positively affect the level of economic sophistication because they improve the level of human capital. Regarding studies on the impact of infrastructural and technological factors, Lapatinas (2019) and Nguyen et al. (2020) show that internet access has a positive impact on the degree of economic sophistication. Similarly, Gao and Zhou (2018) find that technological innovation is a channel of economic complexity in China. With regard to historical factors, some studies have highlighted the role of the colonial past on economic performance and by extension, the level of economic complexity (Nunn, 2009; Keneck-Massil et al., 2021; Asongu, 2014). For example, Keneck-Massil and Njoya (2021) have analyzed the effect of colonization on the economic complexity of former colonies over the period 1968-2017. They show that the differences in the level of economic complexity observed between developing and developed countries can be explained by the colonial past of these countries.

Recent studies have put forward the idea of an institutional explanation for heterogeneities in economic complexity between countries. Most of these studies conclude that well-functioning political institutions (quality of governance, nature of political and legal systems, government

capacity, and national confidence) remain a very important factor in economic complexity (Costinot, 2009). Countries with a better institutional environment not only attract domestic and foreign investment, but also offer a framework that is conducive to the development of local businesses. For example, based on a sample of 115 countries, Vu (2020) demonstrates that institutions influence economic complexity by encouraging the accumulation of human capital and enhancing incentives for innovative activity. Other studies have examined the role of the political regime, democracy, in explaining differences in economic complexity between countries. For example, on a sample of 116 countries, Njangang and Njoya (2023) found a positive effect of democracy on economic complexity. Another aspect among the institutional characteristics likely to influence economic development, particularly economic complexity, is the personality of the head of the Executive power. This relates to the number of years in power, his/her level of education and his/her profession. For example, over the period 1960-2009, Papaioannou and Van Zanden (2015) have shown that longevity in power reduces economic growth, increases inflation and deteriorates the quality of institutions. Furthermore, Ndayikeza (2021) shows that longevity in power affects the distribution of public spending, with an increase in military spending to the detriment of social spending. Avom et al. (2024) have recently shown that longevity in power reduces the happiness of individuals.

In addition, some studies have shown that politicians' attributes affect economic outcomes (Jochimsen & Thomasius, 2014; Nones, 2023). For example, Dreher et al. (2009) argue that the educational and professional background of the President influences the implementation of liberal market reforms. Furthermore, Besley et al. (2011) have established that economic growth is higher when leaders are better educated.

Surprisingly, the question of how politicians' attributes influence economic development outcomes has not so far been studied in terms of explaining economic complexity. Our analysis focuses on economic complexity in order to contribute to the extant literature on the subject. More specifically, this paper aims to analyze the effect of individual characteristics of Presidents on economic complexity in Africa. Without being exhaustive, this paper contributes to the literature for at least three reasons. First, to the best of our knowledge, this is the first study to empirically examine the relationship between longevity in power and economic complexity. Most studies have examined the role of institutional factors (institutional quality and democracy) without paying attention to the attributes of politicians (Costinot, 2009; Vu, 2019; Njangang & Njoya, 2023). Secondly, this study goes beyond the simple analysis of the causal effect of time in power on economic complexity to highlight the potential transmission channels through which this effect passes. These are the institutional and the human capital channels. Third, we add to the literature on the economic implication of politicians' attributes, notably socio-demographic characteristics and political ideology (Jochimsen & Thomasius, 2014; Nones, 2023). Indeed, the literature has shown that politicians' attributes affect economic growth (Jochimsen & Thomasius, 2014; Nones, 2023), fiscal performance (Milkosch & Somogyi, 2009), reform implementation (Dreher et al., 2009), institutional quality (Efobi, 2015), and public spending (Hayo & Neumeier, 2012). We contribute to this literature by highlighting its effect on economic complexity.

The rest of the article is structured around four additional sections. The second discusses the channels through which the educational and professional background of the President affects economic complexity. The third presents the empirical strategy used in this study. The fourth discusses the results and provides sensitivity analysis. The fifth concludes with policy recommendations.

2. President's attributes and economic complexity: identifying transmission channels

2.1. Institutional quality

A growing body of literature links the personal characteristics of politicians to institutional quality. This literature postulates that politicians' personal attributes shape their opinions and judgments in the implementation of constructive policies. By way of illustration, over the period 1960-2009, Papaioannou and Van Zanden (2015) analyzed the impact of politicians' personal characteristics, particularly their longevity in power, on economic and institutional variables in developing countries. They show that longevity in power reduces economic growth, accelerates inflation and deteriorates the quality of institutions. This effect is more pronounced in African and Middle Eastern countries. In the same vein, Efobi (2015) studied the link between politicians' attributes (socio-demographic characteristics, level of education, experience and political ideology) and the quality of institutions, particularly the control of corruption. Using a sample of data on political leaders from 39 African countries observed over the period from 1996 to 2010, the author showed that the qualities of politicians play an important role in explaining the extent of control over corruption. Furthermore, the literature has identified institutional factors as an indispensable catalyst for the development and export of sophisticated goods (Ongba 2014; Vu, 2022; Avom & Ndoya, 2024). For example, Avom and Ndoya (2024) examined the effect of political stability on economic complexity. On a sample of 118 countries observed over the period from 1995 to 2018, they establish that a country's political stability has a positive effect on its level of economic complexity. In the same vein, Vu (2022), using data collected on a sample of 115 countries, highlights the existence of a positive effect of the quality of institutions (i.e., measured by the Index of Economic Freedom) on economic complexity.

2.2. Human capital

The level of investment in human capital, including education and health, is the second channel through which a leader's attributes can affect economic complexity. According to Hayo and Neumeier (2012), governments headed by a prime minister from a low socio-economic background spend significantly more on social spending. Diaz-Serrano and Pérez (2013) analyzed the impact of the level of education of the political leader on the level of education of the population. They found that the population's level of education increases when a better-educated leader is in power. Furthermore, they showed that episodes of political transition characterized by the accession to power of a less-educated leader following a more-educated leader are accompanied by a fall in the population's level of education. At the same time, the literature has shown that the level of human capital explains a country's level of economic complexity in such a way that low levels of human capital formation slow down the structural transformation of economic structures (Hausmann et al., 2007; Hidalgo & Hausmann, 2009; Vu, 2020). For example, Chu (2020) has shown that higher education and population density positively affect economic complexity through knowledge accumulation. By considering the level of intelligence as a proxy for human capital, Lapatinas (2019) shows that countries with a high level of human capital produce and export more sophisticated products. However, this relationship appears to be bidirectional. This is the idea supported by the results of the work of Vu (2020). Using a global analysis, he showed that economic complexity reduces infant mortality and improves life expectancy. Furthermore, a high degree of human capital serves to develop the productive structure of the economy, leading to the development of more complex products.

3. Empirical strategy

3.1. Econometric specification

With the aim of examining the effect of the attributes of the political leader on economic complexity in Africa, we use a model similar to that adopted by Vu (2022) and the corresponding model is specified as follows in Equation (1):

$$ECI_{it} = \delta + \beta_1' Prof_{it} + \beta_2' Educ_{it} + \vartheta' X_{it} + \varepsilon_{it} \quad (1)$$

Where ECI_{it} is the endogenous variable and measures the sophistication of an economy's structure. It assesses the capacity of states to manufacture complex goods. A country's productive capacity is estimated from data on the variety of products it exports and the number of other countries that export these products (Hidalgo & Hausmann, 2009). $Prof_{it}$ and $Educ_{it}$ measure the attributes of the political leader, respectively, in terms of profession before coming to power and level of education. These are binary variables which take 1 if the political leader has one of the characteristics listed below with regard to profession or level of education and 0 otherwise. With regard to profession, like Dreher et al. (2009), we used the following professional categories: entrepreneurs, trade union leaders, economists, military, politicians, other scientists (including lawyers) and or other professions (including white collar and blue collar). For the education variable, we distinguish between economics, natural sciences, other university fields (including education in law and politics) and education that is unknown. It has been established in the literature that chief executives occupy a leading position and dominate the government's political agenda. They provide direction and drive the reforms needed to steer the economy in a favorable direction (Dreher et al., 2009). To do this, their education and profession are important variables. For example, once in power, entrepreneurs and economists are likely to push through liberal reforms, given their economic background. This would not be the case if a trade unionist came to power. X_i is the matrix of control variables that includes the determinants of economic complexity. These are investment, government expenditures, internet, and natural resources. ε_{it} is the error term.

The above equation is estimated by employing the ordinary least squares (OLS) estimator. We introduce some control variables into the regression in order to limit the bias associated with omitted variables. We then re-estimate our equation using the feasible generalized least squares (FGLS) estimator. This choice is justified by the fact that the FGLS estimator has been shown to perform better in the case of heteroscedasticity and autocorrelation than standard panel estimators (Liao & Cao, 2013).

3.2. Data

In order to constitute our sample, we mobilized several databases. Firstly, we used data from Dreher et al. (2009) to capture the attributes of the leader. However, their database is limited to 2005. To complete the information for subsequent periods, we used information on the bibliography of political leaders available on the internet. Secondly, we used data from the Massachusetts Institute of Technology's Observatory of Economic Complexity. The Economic Complexity Index (ECI) represents a ranking of nations in the light of their diversity and complexity of their export basket. Moreover, high complexity nations can generate a wide variety of complexed items because they have access to a variety of advanced, specialized capabilities (Emeka et al., 2024). Third, data from the WDI and the WGI are also used. Our sample consists of 28 African countries observed over the period 1998-2020. These countries were selected based on

data availability. The list of countries and the definitions of all the variables used in this research are disclosed in Tables 1 and 2. The correlation matrix between the different variables used is presented in the Table 3. This table shows that no potential multicollinearity could be identified between the variables except for the institutional variables. Thus, these variables cannot be included in a same regression.

Table 1: List of sample countries

Algeria	Madagascar
Angola	Mali
Burkina Faso	Mauritania
Cameroon	Morocco
Chad	Mozambique
Congo	Namibia
Congo (DRC)	Niger
Cote d'Ivoire	Nigeria
Egypt	Senegal
Gabon	Sudan
Ghana	Tanzania
Guinea	Uganda
Kenya	Zambia
Libya	Zimbabwe

Table 2: Data sources and description of variables

Variables	Descriptions	Sources
ECI	Economic complexity index	OECD
Profession		Various sources and Dreher and al. (2009)
Entrepreneur	Dummy variable equal to one if the individual was an entrepreneur before becoming president and zero otherwise	
Economist	Dummy variable equal to one if the individual was an economist before becoming president and zero otherwise	
Military	Dummy variable equal to one if the individual was a military officer before becoming president and zero otherwise	
Politician	Dummy variable equal to one if the individual was a politician before becoming president and zero otherwise	
Science (other)	Dummy variable equal to one if before becoming President, the individual worked as a scientist and zero otherwise	

Education		
Economics	Dummy variable equal to one if the President is a graduate in economics and zero otherwise	
Natural sciences	Dummy variable equal to one if the president is a graduate in natural sciences and zero otherwise	
Other university	Dummy variable equal to one if the president is a graduate of another university and zero otherwise	
Unknow/not	Dummy variable equal to one if the president is a graduate unknown/other and zero otherwise	
Investment	Gross fixed capital formation as a percentage of GDP	
GovExp	General government final consumption expenditure (% of GDP)	WDI
Internet	Individuals using the Internet (% of population)	
Total Natural Ressources	Sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	
Human capital	Human capital index, based on years of schooling and returns to education; see Human capital in PWT9.	PWT
Rule of Law	Quality of law (- 2,5: bad; 2,5: good)	WDI
Control of Corruption	Corruption (- 2.5: bad; 2.5: good)	
Regulatory Quality	Regulatory quality (- 2.5: bad; 2.5: good)	

Source: Authors' constructions

[illegible]

Table 4 shows the distribution of the number of politicians by profession and education. As can be seen, the military and professional politicians (i.e., people who have never worked in a field other than politics before becoming head of government) are the two dominant professional categories in our sample. The sample includes 25 economists and 18 entrepreneurs. In addition, there are 20 heads of executive who have practiced a variety of professions other than those previously named, and none of them was a trade union leader before taking office. In terms of education, the vast majority of the politicians in our sample have a university degree.

Table 4: Heads of States profession and education

Profession	Obs	Number of politicians
Entrepreneur	644	18
Economist	644	25
Military	644	280
Politician	644	278
Science other	644	20
Education		
Economics	644	107
Natural Science	644	46
Other University	640	248
Unknown/Other	621	215

Notes: Authors' construction

Table 5 summarizes the results of the descriptive analysis of the different variables. We observe that, on average, the countries in our sample score more poorly in terms of economic complexity. More specifically, the level of economic complicity is -1.04 on average. This confirms the finding that African countries have the lowest level of economic complexity. As for the quality of institutions, whether in terms of the rule of law, the quality of regulation or corruption-control, all these indicators are poor on average, with mean values of -0.77, -0.790 and -0.72, respectively. On average, African countries devote 24% of their GDP to investment. The characteristics of the other control variables are presented in the following table.

Table 5 : Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
ECI	497	-1.047706	.5023973	-2.761691	.1012611
Investment	628	24.30626	9.937659	1.525177	79.40108
Gov Exp	588	14.10309	6.349273	.9517466	56.85445
Internet	599	10.21561	14.57362	.0004131	84.12036
Natural Ressources	644	13.45035	12.41675	.1946334	66.05989
Human capital	528	1.775669	.4235217	1.061361	2.876267
Rule of Law	588	-.7789058	.5230931	-1.918399	.4786182
Control of Corruption	588	-.7920461	.4642288	-1.574677	.7731333
Regulatory Quality	588	-.7213068	.5206849	-2.282205	.5829958

Note: Authors' construction

4. Empirical Results

4.1. Preliminary evidence

Table 6 presents the results of the different estimations using the ordinary least squares (OLS) method. Columns 1, 2, 3, 4 and 5 highlight the effect of leader attributes on economic complexity. Column 1 presents the results of estimates of the effect of leader attributes on economic complexity without control variables. In Columns 2 to 4, we introduce the control variables in turn. In Column 5, we estimate our model taking into account all control variables. The categories "Science (other)" and "Unknown/Other" are designated as reference variables and all results are interpreted in relation to these reference groups.

With regard to profession, the results show that the presence of a former military leader, a professional economist, an entrepreneur and a politician as President reduces the probability of achieving a high level of economic complexity, compared with countries headed by a leader who has been "Science (other)". These results have varying levels of significance.

Regarding the level of education, as we can see, the fact of having a political leader with a degree in economics and other university education (including education in law and politics) increases the probability of achieving a high level of economic complexity compared to countries led by a leader with "Unknown/Other". These coefficients are significant at the 1% level.

In terms of control variables, investment and natural resource abundance negatively affect a country's level of economic complexity. The negative effect of investment departs from the work of Saadi (2020); Lapatinas (2019), who showed that investment has a positive effect on economic complexity. These coefficients are significant at the 1% level. The result relative to natural resources, which is in the same vein as those obtained by Yalta and Yalta (2021) is explained by the natural resource curse hypothesis. The estimates also highlight a positive effect of government consumption expenditure on economic complexity. This result is in line with the findings of Jouini et al. (2016), who showed that government consumption expenditure positively affects economic complexity due to externalities linked to the provision of public goods such as education and health.

Several potential explanations can be advanced. Concerning economists' education and profession, they have good theoretical knowledge and experience of the merits of implementing measures to improve economic complexity (hence the positive effect of economist education). Moreover, trained economists are more rational and less emotional when making economic decisions (Dreher et al., 2009). However, the political leader who is a former economist may apply theoretical economic models that do not always take into account the complex realities on the ground. Economic theories can be idealized and fail to anticipate the practical challenges of implementation. We can pick up an argument from related literature on the difficulties of implementing industrial policies in Africa. Rodrik (2008, p2) argues that "bureaucrats have wide latitude to implement policies, while remaining ignorant of the nature of the fundamental problems. Spending ministries make budget allocations with little ability to assess the impact of their decisions. Bureaucratic routine rather than economic logic determines much of the behavior on the ground". As a result, effective initial measures can turn out to be counter-productive. In addition, they are less able to resist pressure from interest groups in policy implementation. Indeed, previous studies argue that interest groups have several means of influencing public policy (McKay, 2011; De Figueiredo & Richter, 2014).

Table 6: OLS estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Dependent variable : ECI				
Economics	0.347*** (0.0773)	0.459*** (0.0789)	0.422*** (0.0874)	0.378*** (0.0904)	0.233*** (0.0881)
Natural science	-0.236*** (0.0897)	-0.165* (0.0925)	-0.154 (0.0943)	-0.207** (0.0956)	-0.199** (0.0815)
Other university	0.105* (0.0634)	0.160** (0.0632)	0.0911 (0.0758)	0.0499 (0.0768)	-0.0435 (0.0748)
Entrepreneur	-0.306*** (0.0552)	-0.452*** (0.0606)	-0.493*** (0.0647)	-0.492*** (0.0677)	-0.655*** (0.0705)
Economist	-0.479*** (0.0794)	-0.678*** (0.0839)	-0.617*** (0.0977)	-0.614*** (0.104)	-0.580*** (0.0921)
Military	-0.311*** (0.0596)	-0.398*** (0.0554)	-0.404*** (0.0592)	-0.335*** (0.0625)	-0.294*** (0.0615)
Politician	-0.141** (0.0667)	-0.299*** (0.0694)	-0.250*** (0.0763)	-0.226*** (0.0797)	-0.252*** (0.0701)
Investment		-0.00966*** (0.00216)	-0.0131*** (0.00229)	-0.0145*** (0.00246)	-0.0136*** (0.00244)
GovExp			0.0118*** (0.00367)	0.0158*** (0.00467)	0.0173*** (0.00469)
Internet				0.00332** (0.00159)	0.00128 (0.00137)
Natural resources					-0.0137*** (0.00263)
Constant	-0.924*** (0.0487)	-0.606*** (0.0846)	-0.688*** (0.108)	-0.750*** (0.112)	-0.510*** (0.121)
Observations	497	487	446	425	425
Number of countries	28	28	28	28	28
R-squared	0.162	0.193	0.225	0.235	0.312

Note: Authors' estimates, Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; The dummy variables indicate profession and education of the politicians in our sample.

Given this background, leaders may focus on established or already-developed economic sectors to achieve the short-term results voters expect, rather than investing in innovative or emerging sectors to achieve the high levels of economic complexity that slow down economic diversification. The situation is the same for leaders who have been former entrepreneurs. Indeed, given the strong correlation between being an entrepreneur and having a business background, we agree with Dreher et al. (2009) that they have a basic understanding of economic principles. It is therefore reasonable to assume that during their term of office, compared with that of "science (other)" politicians, they will carry out reforms conducive (Dreher et al., 2009), in particular to economic complexity. However, as in the case of economists, they can be overtaken by complex realities on the ground, such as operational problems or political resistance from pressure groups (McKay, 2011; De Figueiredo & Richter, 2014). A president who has only been involved in politics as a profession may lack practical knowledge of how markets, the business environment and the financial market work. This lack of expertise places him de facto at the mercy of his economic advisors or influential groups, which could lead him to make decisions in favor of one group to the detriment of the majority.

On the other hand, some politicians, when they come to power, may take populist measures to please their electoral base, but which are ineffective or harmful in the long term. These tend to be pro-consumption measures (such as tax cuts or increases in public spending), which are essentially short-term measures and can be detrimental to economic complexity. For example, Ndoya and Bakouan (2023) discovered that tax income promotes economic complexity in Africa by providing governments with crucial financial resources to develop complex and sophisticated goods. However, the necessary ingredients for economic complexity require long-term measures. For example, investment in research and development will only pay off in the medium to long term. The also applies to investment in human capital. These two important factors for economic complexity (Njangang et al., 2021), require a strategic vision whose horizon goes far beyond the short term, and whose stakes go beyond political and electoral interests.

Similar to politicians, presidents with Military backgrounds often have no training or experience in economic policy, public finance management or the mechanics of the market. This can lead to the implementation of economic policies that are inappropriate to market conditions, resulting in a decline in investor and business confidence. Moreover, the latter may have a budgetary orientation more focused on security than on important factors such as education, health, infrastructure or investments in innovation that are essential to improving the country's productive capacity (Jesmy et al., 2015; Nchofoung et al., 2022). For example, Khan et al. (2016) observed that dictatorship, particularly military dictatorship, hinders economic development because these regimes spend less on the provision of public goods such as health, education, drinkable water and public sanitation. Similarly, Lake and Baum (2001) find that the level and quality of public services decline when dictatorship is imposed. Moreover, stylized facts show that primary school enrolment fell from 81% to 72% and vaccination rates against childhood diseases dropped by more than half when Nigeria came under military rule in 1983. Moreover, dictatorship, particularly military dictatorship, is generally associated with expropriation. Fear of expropriation makes investors, innovators and new entrants unwilling to invest in research and development and long-term investments as posited by Khan et al. (2016, p.657). Yet these ingredients fuel economic complexity. We deduce that a former military leader is detrimental to economic complexity.

4.2. Robustness checks

We then re-estimate our equation using the feasible generalized least squares (FGLS) estimator. This choice is justified by the fact that the FGLS estimator has been shown to perform better in the case of heteroscedasticity and autocorrelation than standard panel estimators (Liao & Cao, 2013). The results are summarized in Table 7.

Concerning the education and occupation variables, the results are coherent with those obtained by OLS, but with a variation at the significance level. As regards our control variables, the results of the FGLS estimation are similar to those obtained in the baseline estimation. However, as in Dreher et al. (2009), even if some of our results are robust to the choice of method, others are not. For example, the effect of certain education and profession variables clearly depends on the choice of estimator.

Table 7: FGLS estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Dependent variable : ECI				
Economics	0.347*** (0.0830)	0.459*** (0.0849)	0.422*** (0.0892)	0.378*** (0.0894)	0.233*** (0.0874)
Natural science	-0.236*** (0.0811)	-0.165** (0.0827)	-0.154* (0.0854)	-0.207** (0.0859)	-0.199** (0.0814)
Other university	0.105* (0.0594)	0.160*** (0.0600)	0.0911 (0.0670)	0.0499 (0.0677)	-0.0435 (0.0656)
Entrepreneur	-0.306* (0.180)	-0.452** (0.180)	-0.493*** (0.186)	-0.492** (0.207)	-0.655*** (0.198)
Economist	-0.479*** (0.139)	-0.678*** (0.143)	-0.617*** (0.166)	-0.614*** (0.169)	-0.580*** (0.160)
Military	-0.311*** (0.0819)	-0.398*** (0.0830)	-0.404*** (0.0922)	-0.335*** (0.0940)	-0.294*** (0.0893)
Politician	-0.141* (0.0850)	-0.299*** (0.0909)	-0.250** (0.0992)	-0.226** (0.100)	-0.252*** (0.0949)
Investment		-0.00966*** (0.00223)	-0.0131*** (0.00258)	-0.0145*** (0.00263)	-0.0136*** (0.00249)
GovExp			0.0118*** (0.00351)	0.0158*** (0.00419)	0.0173*** (0.00398)
Internet				0.00332** (0.00145)	0.00128 (0.00141)
Natural resources					-0.0137*** (0.00199)
Constant	-0.924*** (0.0785)	-0.606*** (0.106)	-0.688*** (0.138)	-0.750*** (0.141)	-0.510*** (0.138)
Observations	497	487	446	425	425
Number of countries	28	28	27	27	27
Wald chi2	98.12	88.24	90.77	89.58	77.44
Prob > chi2	0.000	0.001	0.000	0.000	0.000

Note: Authors' estimates, Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; The dummy variables indicate profession and education of the politicians in our sample.

In the theoretical developments of Section 2, we proposed two transmission channels that could explain how the attributes of the leader affect the level of economic complexity. These are the institutional channel and the human capital channel. The procedure adopted to test these hypotheses involves estimating a model in which the ECI variable is regressed on the variable of interest, the human capital and/or institutions proxy and a set of control variables. The idea is that the variable measuring managerial attributes should lose its statistical significance, while the coefficients associated with the human capital and institutional proxies should remain positive and statistically significant. In other words, human capital and institutional quality may act as mediators that channel part of the effect of managerial attributes on economic complexity. The results of these estimations are shown in Table 8.

They show that several variables lose significance or have had their coefficients lowered with the introduction of variables chosen as transmission channels. This is the case, for example, in Column 2, where all the other variables relating to the manager's attributes experienced variations, with the exception of the Economics and Politician variables, when human capital was included as a variable. In view of these results, we can deduce that part of the effect of leader attributes on economic complexity is absorbed by human capital accumulation and institutional quality.

Table 8: Transmission channels

VARIABLES	Dependent variable : ECI				
	(1)	(2)	(3)	(4)	(5)
Economics	0.233*** (0.0881)	0.244*** (0.0781)	0.202** (0.0900)	0.246*** (0.0902)	0.193** (0.0930)
Natural science	-0.199** (0.0815)	-0.0206 (0.0840)	-0.162** (0.0737)	-0.176** (0.0729)	-0.201** (0.0807)
Other university	-0.0435 (0.0748)	0.0344 (0.0620)	-0.0145 (0.0746)	-0.0238 (0.0735)	-0.0433 (0.0762)
Entrepreneur	-0.655*** (0.0705)	-0.557*** (0.0764)	-0.591*** (0.0759)	-0.515*** (0.0734)	-0.625*** (0.0740)
Economist	-0.580*** (0.0921)	-0.356*** (0.105)	-0.483*** (0.0974)	-0.516*** (0.0942)	-0.530*** (0.0970)
Military	-0.294*** (0.0615)	-0.223*** (0.0708)	-0.224*** (0.0625)	-0.175*** (0.0615)	-0.249*** (0.0634)
Politician	-0.252*** (0.0701)	-0.266*** (0.0695)	-0.228*** (0.0714)	-0.179** (0.0708)	-0.232*** (0.0726)
Investment	-0.0136*** (0.00244)	-0.00701*** (0.00254)	-0.0139*** (0.00245)	-0.0135*** (0.00241)	-0.0133*** (0.00247)
GovExp	0.0173*** (0.00469)	0.0173*** (0.00484)	0.0129*** (0.00464)	0.0121** (0.00470)	0.0158*** (0.00468)
Internet	0.00128 (0.00137)	-0.00375** (0.00148)	-0.000237 (0.00132)	0.000157 (0.00136)	0.00109 (0.00137)
Natural resources	-0.0137*** (0.00263)	-0.0253*** (0.00266)	-0.0111*** (0.00259)	-0.0106*** (0.00257)	-0.0122*** (0.00272)
Human capital		0.351*** (0.0598)			
Rule of Law			0.243*** (0.0464)		
Control of Corruption				0.259*** (0.0500)	
Regulatory Quality					0.118** (0.0463)
Constant	-0.510*** (0.121)	-1.196*** (0.202)	-0.315** (0.123)	-0.353*** (0.122)	-0.445*** (0.121)
Observations	425	347	405	405	405
Number of countries	28	28	27	27	27
R-squared	0.312	0.508	0.346	0.339	0.311

Note: Authors' estimates, Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; The dummy variables indicate profession and education of the politicians in our sample.

5. Conclusion, policy implications and future research directions

This paper has analyzed the effects of the president's attributes on the complexity of the African economy over the period 1998 to 2020. OLS and FGLS are employed to make estimations. We find that the President's education and profession are important factors for economic complexity. Specifically, we find that having a former military leader, a professional economist, an entrepreneur and a politician as president reduces the probability of achieving a high level of economic complexity, and that having a president with a degree in economics and other university education (including education in law and politics) increases the probability of achieving a high level of economic complexity. In addition, we conducted a more detailed analysis with a view to understanding the transmission channels linking presidential characteristics to economic complexity. Two main channels of transmission have been identified: institutional channel and human capital channel.

Our findings invite some reflection on the type of leader we should elect and also on the economic cost of a miscasting. For example, in addition to a requirement for a university background, constitutions should also include a background in international relations and economics. This does not imply that we posit to exclude some individuals from becoming President, but only that individuals with specific attributes have the required knowledge to improve the economic complexity of the country. The established nexuses while relevant to policy makers, especially as it pertains to improving economic complexity by means of politicians' attributes, are also relevant for theory-building (i.e., inductive research) in the light of the paucity of research on the subject.

Future research could examine whether the professional attributes of the cabinet members working with the president in the execution of the project are relevant. The choice of cabinet members is an important aspect of policy success. Another possible extension of our research would be to analyze, in addition to education and profession, the impact of the president's other attributes (number of children, ethnic background) on the country's level of debt, the direction of public spending and the size of the cabinet. The dynamism of economic complexity can also be further investigated, especially in terms of catch-up, convergence and time to full convergence among countries.

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