

## Volume 42, Issue 2

### Duration of heads of state in power and economic growth: a Sub-Saharan African tale

Hibrahim Limi Kouotou  
*University of Yaoundé II*

Boniface Ngah Epo  
*University of Yaoundé II*

#### Abstract

This paper scrutinizes the effect of the duration of Heads of State in power on economic growth using a panel of 41 Sub-Saharan African countries spanning the period 1990 to 2016. We test for both the linear and non-linear effects of duration of Head of State in power by adopting a linear and quadratic function of this relationship and thereon compute the optimal threshold of the stay in power. Results obtained from the empirical estimations indicate that there is an inverted U-shaped relationship between duration of Heads of State in power and economic growth which is positive before the optimal threshold of twelve years and negative beyond. Nonetheless, this threshold varies when we account for linguistic specificities suggesting that on average English-speaking African countries have a threshold of eleven years whereas the French-speaking African countries have a threshold of fifteen years. For Lusophone/other linguistic-speaking African countries, we also find an inverted U-shaped relationship which is however not significant.

---

**Citation:** Hibrahim Limi Kouotou and Boniface Ngah Epo, (2022) "Duration of heads of state in power and economic growth: a Sub-Saharan African tale", *Economics Bulletin*, Volume 42, Issue 2, pages 1153-1170

**Contact:** Hibrahim Limi Kouotou - hibrahimlimi@yahoo.fr, Boniface Ngah Epo - epongahb@yahoo.fr.

**Submitted:** July 11, 2021. **Published:** June 30, 2022.

# 1. Introduction

Contemporary literature on determinants of economic growth suggest that several other dimensions are yet to be discovered. As early as the beginning of the 19th century, economists already emphasized on the role of the traditional factors of production such as capital and labor (Ricardo 1817; Smith 1776). In the 1950s, these two factors were taken up again in more elaborated models and supplemented by a third element coined technical progress (Solow 1956). Thereon and with a view towards better understanding determinants of growth, recent authors decomposed technical progress into endogenous factors (Romer 1986; Lucas 1988; Barro 1991; Mankiw et al. 1992), unlike the pioneering authors who assumed it as exogenous.

Technical progress contains several factors that optimizes the effectiveness of capital and labor in sustaining long-term growth. This view was reinforced towards the end of the 20th century with the rise of a multitude of endogenous growth theories amongst which the theory of institutions. North (1990) defines institutions as “*the formal or informal rules of the game in force in societies, linking all social actors, including the state, which shape behavior and expectations and contribute (or not) to growth*” Thus, one of the key inputs of appropriate institutional framework or practice is democracy. The latter refers to the set of institutions that enables the population to choose their decision-makers through free, competitive and regular elections (Karl 1990).

The relationship between democracy and economic growth has long been debated upon. However, it is still far from being fully grasped. There are two opposing strands of literature on the effect of democracy on growth. While some authors purport a positive relationship (Rodrik and Wacziarg 2005; Papaioannou and Siourounis 2008; Persson and Tabellini 2009; Doces 2019), others suggest a negative or no relationship between economic growth and democracy (Helliwell 1994; Borner and Weder 1995; Barro 1996 and 1997; Minier 1998; Rodrik 1999; Przeworski et al. 2000; Tavares and Wacziarg 2001; De Haan 2007; Besley and Kudamatsu 2008).

Mixed results on the effects of democracy on growth call for new avenues of analysis. One of these avenues is to test the different components of democratic practices to better appraise its effects. These practices refer to the fundamental principles which, in the case of African countries, were enshrined in the constitutional renewal of the 1990s (Senou 2016). They include multipartyism, freedom of opposition, alternation of power, election by direct universal suffrage, the constitutionality of laws as well as limitation of the duration and number of terms of office of Heads of State. Each of these principles plays a key role on how democracy affects a country's economic growth (Heo and Tan 2001; Doucouliagos and Ulubasoglu 2008; Acemoglu et al. 2014). However, term limits have a peculiar role because setting limits to the duration of Heads of States in power explicitly opposes the capture and personalization of power (Loada 2003).

Nearly thirty years after the advent of democracy in Africa, evidence shows that many countries are still struggling to come to terms with some democratic principles. The undemocratic behavior of some leaders in power such as refusal to leave power once it has been acquired and/or preventing the application of laws on mandate limitation constitutes one of the main ills from which these countries suffer (Senou 2016). Keneck-Massil (2019) indicate that in the recent political history of SSA, we are witnessing several abusive manipulations of constitutions. Vencovsky (2007) and the Economic Commission for Africa (2009) reports that eight African countries changed their constitutions between 1990 and 2008 to extend the president's term of office. Additionally, three attempts to amend the constitution were recorded after Heads of State exceeded the term limit provided by law. Overall, the Africa Center for Strategic Studies argues that countries with no term limits tend to be more unstable (Center d'Etudes Stratégiques de l'Afrique 2018).

According to their report, one-third of the 18 countries in question faced an armed conflict between 2015 and 2018. On the contrary, only two out of twenty-one countries with presidential term limits reported conflicts over the same period. The ensuing effect of these conflicts is its high cost on economic growth.

In sum, actions taken to remain in power in a context of internal and external criticisms proves that term of office limitation is one of the main democratic principles that needs strengthening within Africa's democracies. Given the pivotal role of democracy is stirring the continent's growth (Papaioannou and Siourounis 2008; Persson and Tabellini 2009), via a transitive logic the limitation of term of office is also important. Thus, there is need to substantiate on this important principle through robust studies as suggested in this paper. Consequently, the main question we attempt to answer is: what is the impact of the duration of the Heads of State in power on economic growth in SSA? Precisely, what is the optimal duration of a Head of State cumulative terms of office to foster economic growth in SSA?

The objective of this study is to analyze the relationship between the duration of Heads of State in power and economic growth in Sub-Saharan Africa. We hypothesize that there is a threshold below which the duration of Heads of State in power has a positive effect on growth and above which this effect becomes negative. Accounting for heterogenous nature of countries in SSA and robustness verification, we investigate this threshold overall and according to the three linguistic zone. These zones are English-speaking, French-speaking and Lusophone/other linguistic-speaking African countries.

The rest of this manuscript is organized into four sections. Section 2 reviews the literature on the effect of democracy on economic growth. Section 3 presents the empirical models of the study, the data used and descriptive statistics of the variables of interest. Section 4 scrutinizes the results from the different estimates and Section 5 concludes the paper.

## **2. Literature review**

An overview of the literature on democracy and economic growth reveals two gaps. On the one hand, none of the studies encountered assess the effect of democracy on growth through the prism of duration of Heads of State in power. On the other hand, there are very few studies with a focus on African countries (Fosu 2008; Narayan *et al.* 2011; Abdoulaye 2014) that appraise the relationship between democracy and economic growth.

### **2.1. Democracy and economic growth: the absent of studies investigating the potential role of duration in power**

Although we find no studies that assess the effect of democracy on growth through the duration of Heads of State in power, several publications nevertheless identify different aspect around the question of democracy and economic growth. These questions can be casted into three main schools of thought (Sirowy and Inkeles 1990) captioned as the compatibility approach, the conflict approach, and the skeptical approach.

The literature on the compatibility approach advocates the idea that democracy has a positive effect on growth. Feng (2004) argues that democratic governments perform better economically than those resulting from other political arrangements. Democracy stirs governments to promote economic freedom and encourage the private initiative of entrepreneurs (Heo and Tan 2001), which in turn constitutes an important determinant or input for growth (Przeworski and

Limongi 1993; Barro, 1999). North (1990) asserts that in democratic countries, citizens through elections correct situations where governments inappropriately regulate their economies. Moreover, the democratic mechanism tends to deter cronyism and corruption (Mesquita et al. 2001). Rodrik (1999) as well as Baum and Lake (2003) show that democracy ensures stable and sustainable growth because it limits state intervention in the economy while promoting its role on social aspects like education, health and justice.

Publications associated with the conflict approach purports that in developing countries, maintaining at least some capacity to resist populist pressures is necessary for growth. Indeed, in these countries, many low-income individuals have a strong demand for immediate consumption and therefore use their vote or political power to push for policies that advocate for increases in wages and taxes on capital (Nelson 1987). By voting for income redistribution policies, they may undermine profit accumulation as well as investment (Alesina and Rodrik 1994; Persson and Tabellini 1994; Acemoglu and Robinson 2006). Consequently, democracy may thus decelerate investment and therefore economic growth (Wade 1990; Asiedu and Lien 2011).

The argumentation associated with advocates of the skeptical approach rejects the idea of a systematic link between democracy and growth. These advocates suggest that different political systems can implement similar economic policies and therefore concur that these systems have no effect on economic growth (Pye 1966).

A review of empirical studies investigating the effects of democracy on growth point to the observance that there is no consensus on one of the three approaches suggested in the preceding paragraphs. Reviewing thirteen empirical publications, Sirowy and Inkeles (1990) reveal that three of these studies find a negative effect of democracy on growth, four a positive effect and six a non-significant effect. Przeworski and Limongi (1993) compared twenty-one empirical studies and highlight that eight of these studies indicate a positive effect, eight a negative effect and five reject and linkage between democracy and growth. Brunetti (1997) reviews seventeen studies and disclose that nine found a non-significant relationship between democracy and economic growth, four concluded on the positive effect and four others on a negative effect. Perusing forty-seven studies, Kurzman et al (2002) find that nineteen report a positive relationship between democracy and growth, six describe a negative relationship and ten reveal an insignificant relationship. Nonetheless, findings from several recent empirical publications cluster around two trends. The first trend rejects any direct effect of democracy on growth (Giavazzi and Tabellini 2005; Doucouliagos and Ulubasoglu 2008; Sandalcilar 2013; Freund and Jaud 2014) whereas the second validates a direct positive effect (Knutsen 2011; Madsen et al. 2015; Acemoglu et al. 2014).

## **2.2. Democracy and Economic Growth: Few Studies in Africa**

Table I below summarizes studies that have been undertaken overall to question the effect of democracy on economic growth. A key observation suggests that in the context of Africa, very few studies have been effectively undertaken. In furtherance, we record no study that investigates the effect of duration of Heads of State in power on economic growth. This study fills this gap in a current context where across Africa and the world there is growing challenges on benefits associated with lengthy staying in power of their Heads of State. Furthermore, we undertake a comparative analysis along linguistic orientations to be perceive this effect as well as compare possible thresholds and their implications.

Table I: Summary of empirical studies investigating the linkage between democracy and economic growth

| Authors                              | Sample                                       | Established linkages   |
|--------------------------------------|--|--|
| Rodrik and Wacziarg (2005)           | 1950-2000 for 154 countries                  | Democracy positively affects short-term growth.  |
| Fosu (2008)                          | 1975-2004 for 30 SSA countries               | U-shaped relationship between democracy and growth.  |
| Doucouliafos and Ulubasoglu (2008)   | Up to 2005 for 483 estimates from 84 studies | Democracy has no direct effect on growth. It indirectly stimulates the rate of growth through human capital, economic freedom and economic stability.  |
| Papaioannou and Siourounis (2008)    | 1960-2003 166 countries                      | The positive effect of democracy on growth is observed after a certain period. During the period of democratic transition, the growth rate declines and then stabilizes at a high level.   |
| Rock (2009)                          | 1960-2003 for 166 countries                  | Democracy positively affects growth and investment.  |
| Persson and Tabellini (2009)         | 1960-2000 for 150 countries                  | The positive effect of democracy on growth depends on the order of reforms as well as the nature of the democratic regime (parliamentary or presidential).   |
| Narayan <i>et al.</i> (2011)         | 1972-2001 for 30 SSA countries               | Democracy affects growth in the long term.   |
| Knutsen (2011)                       | 1820-2003 for over 150 countries             | Democracy positively and significantly affects the growth  |
| Sandalcilar (2013)                   | 1992-2010 for 12 countries                   | There is no robust relationship between democracy and economic growth  |
| Abdoulaye (2014)                     | 1975-2008 for UEMOA countries                | Democracy positively affects growth and the relationship is reciprocal.  |
| Acemoglu <i>et al.</i> (2014)        | 1960-2010 for 175 countries                  | Democracy positively and significantly affects GDP.  |
| Freund and Jaud (2014)               | 1960–2011 for 158 countries                  | The change in political regime leads to an increase in the economic growth rate of 1 percentage point in the long term, regardless of the direction of change. The gradual transition to democracy has no significant effect on growth.                      |
| Salahodjaev (2015)                   | 1970-2013 for 93 countries                   | Relationship between democracy and growth varies with the level of a nation's cognitive capacities.  |
| Madsen <i>et al.</i> (2015)          | 1820-2000; 1500-2000 for 141 countries       | Democracy is a significant determinant of growth.  |
| De Kadt and Wittels (2019)           | 1975–2008 for SSA countries                  | In some countries, democratization has had a negative impact on economic output, while in others it has had a similar positive effect.   |
| Luo and Przeworski (2019)            |  | The convergence of incomes and the positive association between income levels and democracy create the historical trends observed, without any assumptions on the effect of regimes on growth.   |
| Guadalupe-Lanas <i>et al.</i> (2018) | 1 country (Ecuador)                          | What determines the evolution of growth is not the policy regime that oversees it, but the magnitude of a positive exogenous shock to commodity prices, which, by providing higher incomes, considerably increases the level of investment and productivity. |
| Anupama (2019)                       | 1996-2012 56 countries                       | Democracy has a direct negative impact on growth but an indirect positive impact on growth through the channel of trade opening.   |
| Zuazu, (2019)                        | 1990 to 2010 for 72 countries                | The effect of democracy is conditioned by technology. Political regime changes towards democracy stimulate the growth of industries close to the global technological frontier but have a negative effect on backward industries.                            |
| Doces (2019)                         |  | Democracy promotes growth because it conditions public consumption so that it is used for public purposes rather than private needs, leading to faster growth.   |

Source: Compiled by authors from the literature.

### 3. Empirical strategy

In this manuscript, we test both the linear and non-linear effects of duration of Heads of State in power on economic growth by adopting both a linear and quadratic model using a panel data contracted from both primary and secondary sources. Primary data is gotten from a review of the political literature to calculate the number of years of duration in power for each of the 41 countries that make up this panel. Secondary data is obtained from the World Bank Development Index.

Contemporaneously, the much-debated question on the non-linear nature of macroeconomic variables requires we factor-in this possibility in modeling relationships between macroeconomic variables. This justifies the adoption of a quadratic formulation of the relationship between duration of Heads of State in power and economic growth as suggested in this paper. Several formulations abound in the literature on how to model non-linear macroeconomic relationships with preferences for quadratic and regime-switching models. Regime-switching models have the advantage computing both the non-linearity as well as regimes associated with the macroeconomic variables of interest (Hansen 1999; Gonzales et al. 2005). Nonetheless, in this paper we opt to use a quadratic model because there are several missing data points in our sample which renders regime-switching models inoperative, especially in carrying out the analysis by linguistic zones which have smaller country samples.

#### 3.1. Empirical model

In this paper, the theoretical specification to the empirical model contextualizes and extends Solow's growth model (Solow 1956) to obtain a growth model similar to Mankiw et al. (1992) including the variable of interest-duration of Heads of State in power.

To empirically model our growth function, we first linearize a Cobb-Douglas production function expressed as

$$Y_{i,t} = V_{i,t} + \alpha K_{i,t} + \beta L_{i,t} \quad (1)$$

where  $Y_{i,t}$ ,  $V_{i,t}$ ,  $K_{i,t}$ , and  $L_{i,t}$  are respectively the growth rates of the economy's real output, technological progress, the stock of physical capital and stock of labor of country  $i$  at date  $t$ .

Decomposing the vector of technological progress, into a linear combination of several factors including questions of democracy and precisely duration of stay in power, we obtain:

$$V_{i,t} = a_{i,t} + a_1 dur_{i,t} + a_2 dur_{i,t}^2 + \sum_{j=1}^N b_j Z_{j,i,t} \quad (2)$$

where  $a_{i,t}$  portrays the evolution of the exogenous level of technology progress;  $dur_{i,t}$  the duration of the Head of State in power and  $\sum_{j=1}^N b_j Z_{j,i,t}$  the weighted sum of  $N$  other variables that can

influence the real output of the economy. The expression  $a_1 dur_{i,t} + a_2 dur_{i,t}^2$  translates the non-linear consideration captioned in this modeling with  $dur_{i,t}^2$  representing the variable duration in power squared.  $a_1$ ,  $a_2$  and  $b_j$  are parameters to be estimated.

Combining equations (2) and (1), we can express the following quadratic function specified as follows:

$$Y_{i,t} = a_{i,t} + a_1 dur_{i,t} + a_2 dur_{i,t}^2 + \sum_{m=1}^M \alpha_m X_{m,i,t} + \varepsilon_{i,t} \quad (3)$$

where  $a_{i,t}$  is the exogenous level of technology progress,  $dur_{i,t}$  the duration of the Head of State in power,  $dur_{i,t}^2$  representing the variable duration in power squared,  $X$  a vector of exogenous covariate includes in the model such as investment growth, population growth, trade openness and rate of inflation.  $a_i$ ,  $a_1$  and  $a_2$  are parameters to be estimated with  $\varepsilon_{i,t}$  designating the error term of the stochastic model.

As earlier purported, we test both the linear and non-linear effects of duration of Head of State in power by estimating equation (3) using both the ordinary least squares (OLS) and Two stage least square (2SLS) approaches, without (linear expression) and with (non-linear expression) the inclusion of the variable  $dur_{i,t}^2$ . The main motivation of adopting the 2SLS approach is to correct the presence of possible sources of endogeneity between economic growth and some explanatory variables included in the model. Adopting the 2SLS approach requires we instrument the endogenous variables with their one period lagged values. We verify for discrepancies between the OLS estimator and the 2SLS estimator by running the Hausman test. In addition, the stationarity test suggest that the variables are stationary (Table V in the annexes) and our estimates are corrected for heteroskedasticity by adopting the White method.

To test the robustness of our model, which was initially estimated using static panels, we re-estimate it using dynamic panels. Indeed, the data used in this paper consists of 41 countries and 27 years (from 1990 to 2006), and thus a relatively large time period. We run a regression in dynamic panel data to check whether this would produce similar results. For this purpose, we include the lagged term of economic growth among the explanatory variables. The estimation technique used here is the Generalized Method of Moments (GMM) in system. Also, we perform post-estimation tests (first-order and second-order autocorrelation tests of the residuals, and Hansen's test) to ensure the appropriateness of this method.

The quadratic relation hypothesized in equation (3) allows us to compute the threshold level for the duration of Heads of State in power. This is possible only if the coefficients  $dur_{i,t}$  and  $dur_{i,t}^2$  are significant and post opposite signs. This value is obtained by partially differentiating economic growth with respect to the duration variable, as in the following equation (4):

$$\frac{\partial Y_{i,t}}{\partial dur_{i,t}} = 0 \Leftrightarrow a_1 + 2a_2 dur_{i,t} = 0 \Rightarrow dur^* = \frac{-a_1}{2a_2} \quad (4)$$

where  $dur^*$  is the threshold value of the variable  $dur$ .

For further robustness check, we estimate the linear and non-linear models spatially along linguistic zones. We group, the forty-one African countries into French-speaking, English-speaking and Lusophone/other linguistic-speaking countries.

### 3.2.Data source and processing

The data in the study covers a panel of 41 countries in Sub-Saharan Africa over the period 1990 to 2016. The duration of Heads of State in power is constructed from a literary review of the political history of African countries (Archigo's leader's data 2014; Keneck-Massil 2019; Limi

Kouotou and Epo 2019). The other variables include the dependent variable defined as growth in GDP and the other covariates such as the growth rate of investment proxying physical stock of capital; population growth rate proxying labour; the degree of trade openness measured by the sum of imports and exports as a percentage of GDP and the rate of inflation. These variables are obtained from the World Development Indicators database (World Bank 2018). Table II below provides descriptive statistics for these covariates.

Table II: Descriptive statistics

| Variables              | Average | Standard deviations | Min.   | Max.  |
|------------------------|---------|---------------------|--------|-------|
| GDP growth             | 4.195   | 7.745               | -50.25 | 149.9 |
| Investment growth rate | 10.83   | 86.40               | -294.2 | 2357  |
| Population growth rate | 2.507   | 1.045               | -6.184 | 7.917 |
| Trade openness         | 4.205   | 0.461               | 2.979  | 6.276 |
| Inflation rate         | 54.24   | 817.9               | -31.57 | 26762 |
| Time of stay in office | 9.139   | 8.965               | 0      | 41    |

Source: Compiled by authors using data from the World Bank data.

An appraisal of the descriptive statistics shows that between 1990 and 2016, the average growth rate for GDP was 4%, 10% for investment capital, 2.5% for the population growth rate, close to 4% for trade openness and about 54% for inflation. The relatively high values reported for the standard deviations and extremely large gaps between the maximum and minimum values for some variables in Table II corroborates the economic history of African countries.

For example, Equatorial Guinea's GDP grew by 149% in 1997 after the discovery in 1996 of large oil reserves and subsequent exploitation which suggest the extremely high growth rates. On the contrary, in the 1994 Rwandan genocide adversely affected the country's GDP causing her GDP to collapse by over 50%. In terms of inflation, the continent's record inflation rates of 26762% occurred towards the end of the last century in Congo (formerly Zaire) in 1994. This context of hyperinflation was the result of the poor choice of the country's authorities who were obstinate in compensating for large budget deficits by a massive and systematic issuing of money. Concerning the extremely high variations in investment rates, this was a result of the civil war in Sierra Leone in the 1990s. The war led to a loss of life and property with capital investment plummeting by almost 300% in 1998. The year 2000 marked the beginning of the end of the war and reconstruction of the country based on the legal exploitation of diamonds. This led to a rebound in investment to the record level of 2357%.

Constructing the number of years spent in power required that we gather and code the data from the political history of Africa. This variable was given the value zero for the year of accessing power of a given Head of State and subsequently 1 for the first year in office, 2 for the second year and so on until the last year. The statistics in Table II reveal that between 1990 and 2016, the average time African leaders have been in power between 1990 and 2016 was about 9 years (9 years and 50 days to be exact). Nonetheless, the dispersion around the average is relatively large with a standard deviation of about 8 years (8 years and 350 days to be exact). Moreover, the minimum year spent by a Head of State in power is less than one year whereas the longest-serving ruler was 41 years and corresponded to Gabon. Table VII in the appendix shows the number of years spent in power by the Heads of State of the 41 countries in the sample.



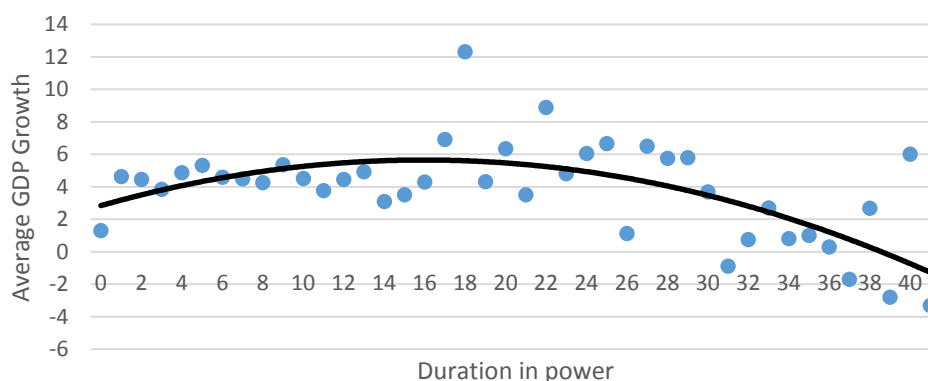
### 3.3. Stylized facts of the linkage between duration in power and growth

The graphical analysis of the intersection between the two main variables of interest reveals two stylized facts that presage the nature of the link between the duration of Heads of State in power and economic growth. The first stylized fact indicates that the relationship between the duration of rulers in the power and average economic growth tends to be non-linear and bell-shaped for SSA. The second stylized fact shows that Lusophone/other linguistic African countries are systematically out of line with Anglophone, Francophone African countries in terms of average growth and duration in power.

#### *Duration of Heads of State in power and average economic growth: a bell-shaped relationship*

The scatter plot in Figure 1 describes the evolution of average economic growth as a function of the number of years a Head of State has been in power for 41 Sub-Saharan African countries observed from 1990 to 2016. It appears that the most negative average economic growth rate (-3.3%) corresponds to the 41<sup>st</sup> years in power (the maximum duration in power). On the other hand, the highest average growth (12.3) is associated with 18 years in power. Moreover, the average growth rates are all positive up to the 30th year in power, although diminishing from the eighteenth year, and beyond this point recorded alternating positive or negative growth rates.

Figure 1: Evolution of economic growth as a function of the duration of Heads of State in power



Source: Computed by authors using data from the World Bank data and primary data collected from the political literature. The trend approximated by a polynomial function of order two.

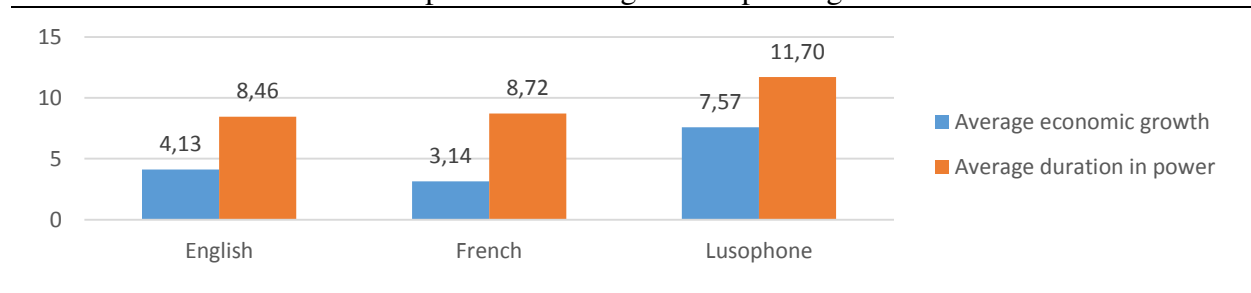
Fitting the scatterplot around a second-order polynomial function (black curve) reveals a bell-shaped relationship between average economic growth and the duration of Heads of State in power. An optimal threshold could be found below which the series studied are positively correlated and above which the correlation becomes negative. This justifies the ambition of this study to identify such a threshold, using more appropriate multivariate models that take into account the possible influence of other economic variables.

#### *Average duration in power and economic growth: the gap between Lusophone/other linguistics-speaking and English-and-French-speaking countries*

The bar charts in Figure 2 designate average economic growth rates and average duration in power for English-speaking (17 countries), French-speaking (17 countries), and

Lusophone/other linguistics-speaking (7 countries) countries in sub-Saharan African from 1990 to 2016. Average duration in power for English-and-French-speaking countries was eight years while Heads of State in Lusophone/other linguistics -speaking countries spent eleven years in power. For average growth rates, English speaking countries expanded on average around 4%, French-speaking countries about three percentage points and Lusophone/other linguistics-speaking countries by 7%.

Figure 2: Average Economic growth and duration of Heads of State in power in English, French and Lusophone/other linguistics-speaking countries



Source: Computed by authors using data from the World Bank data and primary data collected from the political literature.

The peculiarity of the Lusophone/other linguistics-speaking countries where we observe high average duration in power and high growth rates suggest we expand the appreciation of this relationship. This therefore reinforces the urgency to pursue as suggested in this study a comparative analysis.

## 4. Results and discussions

### 4.1. Effects of the duration of Heads of State in power on the economic growth

Columns one, two and three in Table III show results for the Ordinary Least Squares (OLS), the Two Stage Least Square (2SLS) and Generalized Method of Moments (GMM) for the lineal model while Columns four, five and six post results for the non-linear model. The Hausman test indicates we retain the 2SLS estimator as providing unbiased estimates for static panels (Table VI in the annex). We thereon, comment results for Columns two and four respectively.

The results for static panels illustrates that in Africa, the relationship between the duration of Heads of State in power and economic growth is non-linear in nature. The linear model (column 2) suggest that this relationship is not significant. On the other hand, the quadratic model (column 5) reveals a significant and inverted-U shaped relation between duration of Heads of State in power and economic growth. The computed threshold years indicates that this is about twelve years. Before the twelfth year, the duration of Heads of State-economic growth yearly elasticity was 0.3%. Beyond this optimal threshold, each additional year spent in power significantly reduces growth with an elasticity of about 0.02%.

Concerning the estimated coefficients associated with the control variables, the quadratic models display results that are consistent with the literature (Table III, Columns 2 and 5) albeit growth in investment and inflation rate not being significant. The variable population growth rate related positively and significantly with GDP (Mankiw et al. 1992), and it is same for trade openness (Rodriguez and Rodrik 1999; Frankel and Romer 1999).

The results obtained with a dynamic panel (columns 3 and 6) confirm those obtained with a static panel. All model coefficients keep their signs and become even more significant. Also the

lagged economic growth of one period has a positive effect on the growth of the following year. The post-estimation tests all satisfy the validation conditions for the use of the GMM estimator in system. The p-value of the first-order residual autocorrelation test is less than 5%, the second-order autocorrelation test is greater than 10%, and the Hansen test is greater than 10%. Also, the number of instruments used is much lower than the number of countries (17 instruments for the linear model and 20 for the quadratic model). Our model is quite robust to the change of estimator due to the passage from a static panel to a dynamic panel.

Table III: Estimates of GDP growth in SSA

| Variables                                       | Dependent variable: GDP growth          |                     |                       |                      |                     |                       |
|---|---|---------------------|-----------------------|----------------------|---------------------|-----------------------|
|   | Linear model                            |                     |                       | Quadratic model      |                     |                       |
|   | OLS<br>(Col. 1)                         | 2SLS<br>(Col. 2)    | GMM<br>(Col. 3)       | OLS<br>(Col. 4)      | 2SLS<br>(Col. 5)    | GMM<br>(Col. 6)       |
| GDP growth (lagged one period)                  | -                                       | -                   | 0.239***<br>(0.0279)  | -                    | -                   | 0.225***<br>(0.0246)  |
| Investment growth                               | 0.008<br>(0.007)                        | -0.006<br>(0.118)   | 0.007***<br>(0.00134) | 0.008<br>(0.007)     | 0.003<br>(0.106)    | 0.006***<br>(0.001)   |
| Population growth                               | 1.649***<br>(0.317)                     | 1.574***<br>(0.364) | 1.370***<br>(0.147)   | 1.649***<br>(0.324)  | 1.567***<br>(0.350) | 1.616***<br>(0.145)   |
| Trade openness                                  | 5.707<br>(3.617)                        | 7.168*<br>(3.821)   | 4.565***<br>(0.710)   | 5.482*<br>(3.300)    | 7.154**<br>(3.505)  | 5.221***<br>(0.831)   |
| Inflation rate                                  | -0.0002***<br>(8.45*10 <sup>-05</sup> ) | -0.003<br>(0.005)   | -0.003***<br>(0.0003) | -0.0002*<br>(0.0001) | 0.003<br>(0.007)    | -0.002***<br>(0.0003) |
| Duration in power                               | -0.069<br>(0.053)                       | -0.074<br>(0.069)   | -0.086***<br>(0.0110) | 0.335**<br>(0.167)   | 0.348*<br>(0.200)   | 0.191***<br>(0.050)   |
| Duration in power (squared)                     | -                                       | -                   | -                     | -0.014**<br>(0.007)  | -0.014*<br>(0.008)  | -0.008***<br>(0.001)  |
| Constant term                                   | -23.27<br>(15.04)                       | -28.98*<br>(15.23)  | -18.86***<br>(3.047)  | -23.80*<br>(14.39)   | -30.64**<br>(14.93) | -22.84***<br>(3.593)  |
| Optimal time threshold to power ( <i>dur</i> *) | -                                       | -                   | -                     | 12.12                | 12.4                | 11.94                 |
| R-squared                                       | 0.091                                   | 0.071               | -                     | 0.115                | 0.115               | -                     |
| Observations                                    | 855                                     | 835                 | 833                   | 855                  | 835                 | 833                   |
| Number of countries                             | 41                                      | 41                  | 41                    | 41                   | 41                  | 41                    |
| Number of instruments                           | -                                       | -                   | 17                    | -                    | -                   | 20                    |
| AR (1)  | -                                       | -                   | 0.008                 | -                    | -                   | 0.008                 |
| AR (2)  | -                                       | -                   | 0.654                 | -                    | -                   | 0.543                 |
| Hansen  | -                                       | -                   | 0.164                 | -                    | -                   | 0.199                 |

Source: Authors using data from the World Bank and primary data collected from the political literature. Standard deviations corrected for heteroskedasticity and adjusted are reported in brackets. Significance at 1% (\*\*\*), 5% (\*\*), 10% (\*).

The results thus obtained seem conclusive. However, their robustness needs to be more assessed through the prism of a spatial analysis carried out in English-speaking, French-speaking and Lusophone/other linguistics-speaking African countries.

#### 4.2. Results specific to English-speaking, French-speaking and Lusophone/other linguistic-speaking countries

We also perform a spatial analysis to test the stability of our results given the heterogenous nature of African countries in terms of language. It should be noted, however, that at this level, dynamic panel estimations for each language area are not feasible as in the global analysis for Africa. Indeed, the number of countries included in each sample per zone becomes lower than the number of years of the study, and that makes biased the estimator by the method of GMM in system. We group the forty-one countries into three groups reflecting their language and re-run

equation (3). The results obtained in Table IV (Columns 4, 5 and 6) show that the estimates for English-and-French-speaking countries mimic the overall results while for Lusophone/other linguistics -speaking countries our results post an inverted U-shaped relation although not significant.

In the linear model for English-and-French-speaking countries (Table IV, Columns 1 and 2), the coefficients associated with the duration in power are not significant there by revealing the absence of a linear effect on growth. On the contrary, in the quadratic model (Table IV, Columns 4 and 5) the coefficients of the duration and duration squared variables are all significant and validates the presence of a non-linear inverted U-shaped effect. The thresholds number of years differs for English-and-French-speaking countries. While the optimal number of years of duration in power was eleven years for English-speaking countries, the threshold number of years for French-speaking countries was about fifteen years.

Table IV: Estimated results by linguistic zones

| Variables                              | Dependent variable: GDP growth |   |                                    |                            |   |                                    |
|--|--------------------------------|---|------------------------------------|----------------------------|---|------------------------------------|
|  | Linear model                   |   |                                    | Quadratic model            |   |                                    |
|  | English-speaking<br>Col. 1     | French-speaking<br>Col. 2               | Lusophone/other-speaking<br>Col. 3 | English-speaking<br>Col. 4 | French-speaking<br>Col. 5               | Lusophone/other-speaking<br>Col. 6 |
| Investment Growth                      | 0.003<br>(0.003)               | 0.091**<br>(0.0414)                     | 0.126***<br>(0.026)                | 0.003<br>(0.003)           | 0.089**<br>(0.042)                      | 0.115***<br>(0.021)                |
| Population Growth                      | 1.402*<br>(0.722)              | 1.707***<br>(0.339)                     | -0.251<br>(0.257)                  | 1.326*<br>(0.688)          | 1.730***<br>(0.317)                     | -0.323<br>(0.295)                  |
| Trade openness                         | 0.923<br>(1.310)               | -0.523<br>(1.033)                       | 10.12**<br>(4.852)                 | 0.807<br>(1.183)           | -0.348<br>(0.993)                       | 10.14***<br>(3.495)                |
| Inflation rate                         | -0.049**<br>(0.022)            | -0.0003***<br>(3.02*10 <sup>-05</sup> ) | -0.013<br>(0.066)                  | -0.049**<br>(0.022)        | -0.0003***<br>(1.63*10 <sup>-05</sup> ) | -0.029<br>(0.086)                  |
| Duration in Power                      | -0.029<br>(0.030)              | 0.001<br>(0.031)                        | -0.071<br>(0.168)                  | 0.152*<br>(0.078)          | 0.266***<br>(0.097)                     | 0.589<br>(0.414)                   |
| Duration in power (squared)            | -                              | -                                       | -                                  | -0.007**<br>(0.003)        | -0.009***<br>(0.003)                    | -0.020<br>(0.015)                  |
| Constant term                          | -2.323<br>(6.719)              | 0.313<br>(4.822)                        | -35.99*<br>(18.48)                 | -2.249<br>(6.038)          | -1.401<br>(4.732)                       | -38.20**<br>(14.83)                |
| Optimal time threshold ( <i>dur</i> *) | -                              | -                                       | -                                  | 10,85                      | 15,64                                   | -                                  |
| <i>R-squared</i>                       | 0.076                          | 0.197                                   | 0.209                              | 0.085                      | 0.214                                   | 0.234                              |
| Observations                           | 358                            | 396                                     | 122                                | 358                        | 396                                     | 122                                |
| Numb of countries                      | 17                             | 17                                      | 7                                  | 17                         | 17                                      | 7                                  |

Source: Authors using data from the World Bank and primary data collected from the political literature. Standard deviations corrected for heteroskedasticity and adjusted are reported in brackets. Significance at 1% (\*\*\*), 5% (\*\*), 10% (\*).

### 4.3. Discussion and interpretation of results through a holistic approach

#### *Overall interpretation for Sub-Saharan Africa*

Overall, in Sub-Saharan Africa, the duration of Heads of State in power relates to growth via an inverted U-shaped value with an optimal threshold of 12 years. Given that being the Heads of State requires significant resource mobilization, it's not trivial to argue that this dynamism and

efficiency will diminish over the years probably due to rent-seeking networks put in place. The corollary to this suggests that beyond a given threshold, most decisions are sub-optimal in nature and dampen growth. This situation is often reinforced by the actions of the ruler's collaborators who create counterproductive pockets of rent to maintain the system in power indefinitely. The limitation of durations of Heads of State in office is then seen as the democratic principle that, if respected will likely guarantee that leadership changes. This is consistent with the findings by Rodrik (1998) and Acemoglu et al (2014) who argue that democracy supports growth under the assumption that democratic practices can dislodge leaders who are prone to poor economic choices.

### *Interpretations specific to linguistic zones*

Differences in results by language refine our interpretations. Precisely, the interpretation made for Sub-Saharan African countries taken together is in reality only valid for English-and-French-speaking countries. Lusophone/other linguistics -speaking countries don't post significant results. The absence of a significant result for Lusophone/other linguistics -speaking countries is nevertheless justified by the fact that they have experienced little political alternation since the era of democracy. However, our study models are precisely estimated over the period from 1990 to 2016; they would therefore not be able to capture the effects of virtually unchanging developments. This peculiarity of the Lusophone/other linguistic countries is certainly because, in several of them (Eritrea, Ethiopia, and Somalia, for example), their national constitutions do not provide for any limit on the duration of terms of office (Center for Strategic African Studies 2018). As a result, some Heads of State have stayed in office for long periods without ever having to worry (Ethiopia and Somalia since 1991; Eritrea since 1993). Furthermore, even where constitutional term limits are in force, there has been nothing to prevent leaders from remaining in power for just as long. Equatorial Guinea, for example, has had only one leader since 1990, while Guinea Bissau has had only two (Table VII in the annex).

## **5. Conclusion**

The objective of this work was to analyze how the duration of Heads of State in power relates to economic growth in Sub-Saharan African. We adopt both linear and non-linear (quadratic) models to verify this affirmation for a panel of forty-one countries in SSA over the period 1990 and 2016.

The results show that overall, the relationship between the duration of Heads of State in power and economic growth in Sub-Saharan Africa is a non-linear inverted U-shaped relationship. Before the optimal threshold of 12 years, each year spent in power suggest a positive elasticity of about 0.3%. Above this period, the effect is negative with an elasticity of -0.02%. Spatially, English-and-French-speaking countries impersonate similar results to those for SSA. Their respective optimal years are eleven and fifteen years respectively.

## References

- Abdoulaye, D. (2014) « Démocratie et croissance économique dans les pays de l'UEMOA : quels liens » [http://www.ecoasso.org/articles/Abdoulaye\\_Dramane1.pdf](http://www.ecoasso.org/articles/Abdoulaye_Dramane1.pdf)
- Acemoglu, D. and S., Robinson (2006) *Economic origins of dictatorship and democracy* Cambridge: Cambridge University Press.
- Acemoglu, D., Johnson, S., Robinson, J.A. and P. Yared (2009) "Re-evaluating the modernization hypothesis" *Journal of Monetary Economics*, 56, 1043–1058.
- Acemoglu, D., Naidu, S., Restrepo, P. and J.A. Robinson (2014) "Democracy does cause growth" NBER Working Paper 2000-4, National Bureau of Economic Research, Inc.
- Alesina, A., and D., Rodrik (1994) "Distributive politics and economic growth" *Quarterly Journal of Economics*, CIX (2), 465-490.
- Anupama, G. (2019) « Démocratie, ouverture commerciale et croissance économique : étude transnationale » *ZENITH International Journal of Multidisciplinary Research*, 9(4), 236-248
- Archigo's Learner's Data (2014) <https://www.rochester.edu/college/faculty/hgoemans/data.htm>
- Asiedu, E. and D., Lien (2011) "Democracy, foreign direct investment and natural resources" *Journal of International Economics*, 84, 99–111.
- Barro, R.J. (1991) "Economic growth in a cross section of countries" *Quarterly Journal of Economics*, 106(2), 407-443.
- Barro, R.J. (1996) "Democracy and growth" *Journal of Economic Growth*, 1(1), 1-27.
- Barro, R.J. (1997) "Determinants of economic growth: a cross-country empirical study" *MIT Press*, Cambridge, Mass.
- Barro, R.J. (1999) "Determinant of democracy" *Journal of Political Economy*, 107, 158-183.
- Baum, M.A., and D.A., Lake (2003) "The political economy of growth: democracy and human capital" *American Journal of Political Science*, 47, (2), 333–347.
- Besley, B. and M., Kudamatsu (2008) "Making autocracy work" *Harvard University Press*, 452-510.
- Borner, S. and B., Weder (1995) *Political credibility and economic development*. New York: Macmillan Press.
- Brunetti, A. (1997) "Political variables in cross-country growth analysis" *Journal of Economic Survey*, 11, 163-90.
- Centre d'Etudes Stratégiques de l'Afrique. (2018) Limites et durée de mandat des dirigeants africains liés à la stabilité. Centre d'Etudes Stratégiques de l'Afrique, <https://africacenter.org/fr/spotlight/limites-et-duree-de-mandat-des-dirigeants-africains-lies-a-la-stabilite>.
- Clark, J.M. (1917) "Business acceleration and the law of demand: a technical factor in economic cycles" *Journal of Political Economy*, 25, No. 3, 217-35.
- Commission Economique pour l'Afrique (2009) *Rapport sur la gouvernance en Afrique II*, Commission Economique pour l'Afrique, Addis-Abeba.
- Cordemans, N. and J., Wautersinflation (2018) "Are inflation and economic activity out of sync in the euro area?" *Economic Review*, National Bank of Belgium, Issue I, pages 79-96, June.
- De Haan, J. (2007) "Political institutions and economic growth reconsidered" *Public Choice*, 131, 281–92.
- De Kadt, D. and S.B., Wittels (2019) "Democratisation and economic production in Sub-Saharan Africa" *Political Science Methods and Research*, 7(1), 63-84.
- Diebolt, C. (2016) "Cliometrica after 10 Years: definition and principles of Cliometric Research" *Cliometrica*, 10(1), 1-4.
- Doces, J.A. (2019) « Démocratie, consommation et croissance en Afrique subsaharienne » *Revue des Etudes Internationales*, <https://journals.sagepub.com/doi/abs/10.1177/2233865919871702>
- Doucouliafos, H. and M.A., Ulubasoglu (2008) "Democracy and economic growth: a meta-analysis" *American Journal of Political Science*, 52(1), 61–83.
- Feng, Y. (2004) "Democracy, governance and economic performance: Theory and evidence" *Journal of Economic Literature*, 42(4), 1120-1121.

- Fischer, S. (1993) "The role of macroeconomic factors in growth" *Journal of Monetary Economics*, 32, 485-512.
- Fosu, A.K. (2008) "Democracy and growth in Africa: Implications of increasing electoral competitiveness" *Economics Letters*, 100(3), 442-444.
- Frankel, J.A. and D.H., Romer. (1999). "Does trade cause growth" *American Economic Review*, 89, 3, 379-399.
- Freund, C. and M., Jaud (2014) "Regime change, democracy and growth" Working Paper Series n° WP14-1, Peterson Institute for International Economics.
- Giavazzi, F. and G., Tabellini (2005) "Economic and political liberalizations" *Journal of Monetary Economics*, 52, 1297-1330.
- Gonzales, A., Teräsvirta, T. and D., Van Dijk (2005) "Panel smooth transition regression Models" *WP Series in Economics and Finance* 604, Stockholm School of Economics.
- Guadalupe-Lanas, J., Cruz-Cárdenas, J., Arévalo-Chávez, P. and A., Palacio-Fierro (2018) « Est-ce le régime politique favorable à la croissance économique? » *Revue Internationale des Questions de Développement*, 17(3), 384-398.
- Hansen, B. (1999) "Threshold effects in non-dynamic panels: estimation, testing, and inference". *Journal of Econometrics*, 93, 334-368.
- Helliwell, J. (1994) "Empirical linkages between democracy and economic growth" *British Journal of Political Science*, 24, 225-248.
- Heo, U. and A.C., Tan (2001) "Democracy and economic growth: a causal analysis" *Comparative Politics*, 33(4), 463-473.
- Karl, T.L. (1990) "Dilemmas of democratization in Latin America" *Comparative Politics*, 23(1), 1-21.
- Keneck-Massil, J. (2019) « Changement constitutionnel et durée au pouvoir en Afrique : une approche économique » *Revue d'Economie Politique*, 129, 105-135
- Knutsen, C.H. (2011) "Democracy and economic growth: A changing relationship?" In *Governing the Global Economy: Politics, Institutions, and Economic Development*, ed. Dag Harald Claes, & Carl Henrik Knutsen. London: Routledge, 171– 188.
- Kurzman, C., Werum, R. and R.E., Burkhart (2002) "Democracy's effect on economic growth: a pooled time-series analysis, 1951-1980" *Studies in Comparative International Development*, 37(1), 3-33.
- Limi Kouotou, H. and B.N., Epo (2019) « Démocratie et croissance économique en Afrique subsaharienne : l'effet de l'alternance des chefs d'Etat au pouvoir » *Région et Développement*, N° 50, 67-88
- Loada, A. (2003) « La limitation du nombre de mandats présidentiels en Afrique francophone » *Revue Electronique Afrilex*, N° 3, pp.139-174.
- Lucas, R. (1988) "On the mechanics of economic development" *Journal of Monetary Economics*, 22, 3-42
- Luo, Z. and A., Przeworski (2019) "Why are the fastest growing countries autocracies?" *The Journal of Politics*, 81(2).
- Madsen, B.J., Raschky, P.A. and A., Skali (2015) "Does democracy drive income in the world, 1500–2000?" *European Economic Review*, 78, 175-195.
- Mankiw, N.G., Romer, D. and D.N., Weil (1992) "A contribution to the empirics of economic growth" *Quarterly Journal of Economics*, 107(2), 407-437
- Mesquita, B., Morrow, J.D., Randolph, S. and A., Smith (2001) "Political competition and economic growth" *Journal of Democracy*, 12, 58-72.
- Minier, J.A. (1998) "Democracy and growth: alternative approaches" *Journal of Economic Growth*, 3, 241–266.
- Mo. (2001) "Corruption and economic growth" *Journal of Comparative Economics*, 29.
- Narayan, P.K., Narayan, S. and R., Smyth (2011) "Does democracy facilitate economic growth or does economic growth facilitate democracy? An empirical study of Sub-Saharan Africa" *Economic Modelling*, 28, 900–910.
- Nelson, J. (1987) "Political development" In *Understanding Political Development*. eds. M. Weiner and S. P. Huntington. Boston: Little Brown.

- North, D.C. (1990) *Institutions, institutional change and economic performance*. Cambridge University Press, UK
- Papaioannou, E. and G., Siourounis (2008) “Democratisation and growth” *The Economic Journal*, 118 (532), 1520–1551.
- Persson, T. and G., Tabellini (1994) “Is inequality harmful for growth? theory and evidence” *American Economic Review*, 84 (3), 600-621.
- Persson, T. and G., Tabellini (2009) “Democratic capital: the nexus of political and economic change” *American Economic Journal, Macroeconomics*, 1(2), 88-126.
- Przeworski, A. and F., Limongi (1993) “Political regimes and economic growth” *The Journal of Economic Perspectives*, 7(3), 51-69.
- Przeworski, A., Alvarez, M.E., Cheibub, J.A. and F. Limongi (2000) *Democracy and development: political institutions and well-being in the World, 1950-1990*, Cambridge University Press.
- Pye, L.W. (1966) *Aspects of political development*, Boston: Little, Brown. Rock,
- Ricardo, D. (1817) *Des principes de l'économie politique et de l'impôt*. www.uqac.quebec.ca
- Rodriguez, F. and D., Rodrik (1999) “Trade policy and economic growth: a sceptic’s guide to the cross-national evidence” NBER, WP n°7081.
- Rodrik, D. (1998) “Globalisation, social conflict and economic growth” *The World Economy*, 21(2), 143–158.
- Rodrik, D. (1999) “Democracies pay higher wages” *Quarterly Journal of Economics*, 114(3), 707-38.
- Rodrik, D. and R., Wacziarg (2005) “Do democratic transitions produce bad economic outcomes?” *American Economic Review*, 95(2):50-55.
- Romer, P. (1986) “Increasing returns and long-run growth” *Journal of Political Economy*, 94(5), 1002-37
- Sandalcilar, A.R. (2013) “Democracy and growth: evidence from transition economies” *American International Journal of Contemporary Research*, 3(1), 63-75.
- Senou, J.I. (2016) « Le nouvel avatar démocratique en Afrique : l’obsession du second mandat » *Revue française de droit constitutionnel*, 2016/3 (N° 107), p. 633-652.
- Sirowy, L. and A., Inkeles. (1990) “The effect of democracy on economic growth and inequality: a review” *Studies in Comparative International Development*, 25, 126-57.
- Smith, A. (1776) *Recherche sur la nature et les causes de la richesse des nations*, Traduction française de Garnier, G., (1991), www.uqac.quebec.ca.
- Solow, R.M. (1956) “A contribution to the theory of economic growth” *The Quarterly Journal of Economics*, 70(1), 65-94.
- Tavares, J. and R., Wacziarg (2001) “How democracy affects growth?” *European Economic Review*, 45, 1341-1378.
- Vencovsky, D. (2007) “Presidential Term Limits in Africa” *Conflict Trends*, Issue 2,15–21.
- Wade, R. (1990) *Governing the market: economic theory and the role of government in East Asian industrialization*. Princeton: Princeton University Press.
- World Bank. (2018) *World Development Indicators*.  
<https://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>
- Zuazu, I. (2019) “The growth effect of democracy and technology: An industry disaggregated approach” *European Journal of Political Economy*, 56, 115-131.



## Annex

Table V: Stationarity tests on variables

|                           | Tests                     | Statistics              | P-value |
|---------------------------|---------------------------|-------------------------|---------|
|                           | GDP growth                | Inverse chi-squared(92) | 789.0   |
| Inverse normal            |                           | -21.61                  | 0.000   |
| Inverse logit t(179)      |                           | -32.29                  | 0.000   |
| Modified inv. chi-squared |                           | 52.11                   | 0.000   |
| Investment growth         | Inverse chi-squared(92)   | 785.5                   | 0.000   |
|                           | Inverse normal            | -22.14                  | 0.000   |
|                           | Inverse logit t(179)      | -33.69                  | 0.000   |
|                           | Modified inv. chi-squared | 54.94                   | 0.000   |
| Population growth         | Inverse chi-squared(92)   | 362.7                   | 0.000   |
|                           | Inverse normal            | -4.729                  | 0.000   |
|                           | Inverse logit t(179)      | -10.42                  | 0.000   |
|                           | Modified inv. chi-squared | 19.95                   | 0.000   |
| Trade openness            | Inverse chi-squared(92)   | 115.3                   | 0.037   |
|                           | Inverse normal            | -1.749                  | 0.040   |
|                           | Inverse logit t(179)      | -1.993                  | 0.023   |
|                           | Modified inv. chi-squared | 1.887                   | 0.029   |
| Inflation rate            | Inverse chi-squared(92)   | 754.4                   | 0.000   |
|                           | Inverse normal            | -21.80                  | 0.000   |
|                           | Inverse logit t(179)      | -30.93                  | 0.000   |
|                           | Modified inv. chi-squared | 49.52                   | 0.000   |
| Duration in power         | Inverse chi-squared(92)   | 179.9                   | 0.000   |
|                           | Inverse normal            | -5.639                  | 0.000   |
|                           | Inverse logit t(179)      | -6.167                  | 0.000   |
|                           | Modified inv. chi-squared | 6.477                   | 0.000   |

Source: computed by authors using data from the World Bank.

Table VI: Hausman test of convergence between the OLS estimator and the 2SLS estimator

| Variables                          | Linear model               |        | Quadratic model            |        |
|------------------------------------|----------------------------|--------|----------------------------|--------|
|                                    | Difference<br>(2SLS - OLS) | S.E.   | Difference<br>(2SLS - OLS) | S.E.   |
| <i>Investment growth</i>           | -0.0149                    | 0.0725 | -0.0053                    | 0.0684 |
| <i>Population growth</i>           | -0.0742                    | 0.2127 | -0.0823                    | 0.2066 |
| <i>Trade openness</i>              | 1.4602                     | 0.7898 | 1.6720                     | 0.7925 |
| <i>Inflation rate</i>              | -0.00318                   | 0.0215 | 0.0027                     | 0.0215 |
| <i>Duration in power</i>           | -0.0049                    | 0.0142 | 0.0137                     | 0.0540 |
| <i>Duration in power (squared)</i> | -                          | -      | -0.00054                   | 0.0021 |
| $\chi^2$                           |                            | 12.72  |                            | 16.08  |
| Prob > $\chi^2$                    |                            | 0.0261 |                            | 0.0133 |

Source: Computed by authors using data from the World Bank data. Null hypothesis-Ho: difference in coefficients not systematic)

Table VII: Data on the duration of Heads of State in power in Sub-Saharan Africa

|                                   | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Afrique du Sud                    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    |
| Angola                            | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   | 35   | 36   | 37   |
| Bénin                             | 18   | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    |
| Botswana                          | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| Burkina Faso                      | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 0    | 1    | 2    |
| Burundi                           | 3    | 4    | 5    | 0    | 0    | 1    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 0    | 1    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   |
| Cabo Verde                        | 15   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    |
| Cameroun                          | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   |
| Comores                           | 1    | 2    | 3    | 4    | 5    | 0    | 0    | 1    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 3    | 4    | 0    |
| Congo, République démocratique du | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 0    | 1    | 2    | 3    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   |
| Congo, République du              | 11   | 12   | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   |
| Côte d'Ivoire                     | 30   | 31   | 32   | 0    | 1    | 2    | 3    | 4    | 5    | 0    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 0    | 1    | 2    | 3    | 4    | 5    |
| Djibouti                          | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   |
| Erythrée                          | 31   | 32   | 33   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   |
| Ethiopie                          | 13   | 0    | 1    | 2    | 3    | 0    | 1    | 2    | 3    | 4    | 5    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 0    | 1    | 2    | 3    |
| Gabon                             | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   | 35   | 36   | 37   | 38   | 39   | 40   | 41   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    |
| Gambie                            | 20   | 21   | 22   | 23   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   |
| Ghana                             | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 0    | 1    | 2    | 0    | 1    | 2    | 3    | 4    |
| Guinée                            | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    |
| Guinée équatoriale                | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   | 35   | 36   | 37   |
| Guinée-Bissau                     | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 0    | 0    | 1    | 2    | 0    | 1    | 0    | 1    | 2    | 3    | 0    | 1    | 2    | 0    | 1    | 0    | 1    | 2    |
| Kenya                             | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   |
| Lesotho                           | 0    | 1    | 2    | 3    | 4    | 0    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   |
| Madagascar                        | 14   | 15   | 16   | 0    | 1    | 2    | 0    | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    |
| Malawi                            | 24   | 25   | 26   | 27   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    |
| Mali                              | 22   | 0    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 0    | 1    | 2    | 3    |
| Maurice                           |      |      | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 0    | 1    | 2    | 0    | 1    |
| Mozambique                        | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    |
| Namibie                           | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    |
| Niger                             | 3    | 4    | 5    | 0    | 1    | 2    | 0    | 1    | 2    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 0    | 0    | 1    | 2    | 3    | 4    | 5    |
| Nigéria                           | 5    | 6    | 7    | 0    | 1    | 2    | 3    | 4    | 5    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 0    | 1    | 2    | 0    | 1    | 2    | 3    | 4    | 0    | 1    |
| Ouganda                           | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   |
| République centrafricaine         | 9    | 10   | 11   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 0    | 1    | 0    |
| Rwanda                            | 12   | 13   | 14   | 15   | 0    | 1    | 2    | 3    | 4    | 5    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   |
| Sao Tomé-et-Principe              | 15   | 0    | 1    | 2    | 3    | 0    | 1    | 2    | 3    | 4    | 5    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 0    |
| Sénégal                           | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 0    | 1    | 2    | 3    | 4    |
| Seychelles                        | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 0    |
| Sierra Leone                      | 5    | 6    | 0    | 1    | 2    | 3    | 0    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |
| Somalie                           | 21   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 0    | 1    | 2    | 3    | 0    | 1    | 2    | 3    | 4    | 0    | 1    | 2    | 0    | 1    | 2    | 3    | 4    |
| Soudan du Sud                     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   |
| Royaume d'eSwatini                | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   |
| Tanzanie                          | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    | 1    |
| Tchad                             | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   |
| Togo                              | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   | 35   | 36   | 37   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   |
| Zambie                            | 26   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 0    | 1    | 2    | 3    | 4    | 5    | 0    | 1    | 2    | 0    | 1    | 2    | 0    | 0    | 1    |
| Zimbabwe                          | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   |

Source: Computed by authors using primary data collected from the literature.

Table VIII: Sub-Saharan African countries by language area in the study

| Anglophone<br>(17) | Francophone<br>(17)               | Lusophone/others<br>(7) |
|--------------------|-----------------------------------|-------------------------|
| South Africa       | Benin                             | Angola                  |
| Botswana           | Burkina Faso                      | Cabo Verde              |
| The Gambia         | Burundi                           | Eritrea                 |
| Ghana              | Comoros                           | Ethiopia                |
| Kenya              | Congo, Democratic Republic of the | Equatorial Guinea       |
| Lesotho            | Congo, Republic of the            | Guinea-Bissau           |
| Malawi             | Ivory Coast                       | Mozambique              |
| Mauritius          | Djibouti                          |                         |
| Namibia            | Gabon                             |                         |
| Nigeria            | Madagascar                        |                         |
| Uganda             | Mali                              |                         |
| Seychelles         | Niger                             |                         |
| Sierra Leone       | Central African Republic          |                         |
| Swaziland          | Rwanda                            |                         |
| Tanzania           | Senegal                           |                         |
| Zambia             | Chad                              |                         |
| Zimbabwe           | Togo                              |                         |

Source: Compiled by authors.