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Article

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DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

The effects of alternating heads of state on structural transformation in sub-Saharan Africa

Saturnin Bertrand Nguenda Anya¹ and Fabrice Nzepang^{2*}

Abstract: The objective of this paper is to investigate the effect of alternating heads of state on structural transformation in sub-Saharan Africa (SSA). Indeed, the alternation of a head of state is an institutional tool likely to promote the reallocation of labor, innovation and human capital and thus improve structural change and intra-industry productivity, which are the two components of structural transformation. The primary data collected on the alternation of heads of state, the Africa sector database (ASD) and the World Development Indicators (WDI) allow us to illustrate our remarks using the two steps least squares (2SLS) method on a panel of 17 SSA countries. The results obtained show that the number of alternations of heads of state positively and significantly affects intra-industry productivity and structural change in SSA.

Subjects: Development Studies; Politics & Development; Regional Development; Development Theory; Economics and Development; Economics; Political Economy

Keywords: alternation of heads of state; intra-industry productivity; structural change; sub-Saharan Africa

1. Introduction

Alternation of power is a fundamental principle of democracy, and as an institutional factor, it is likely to affect the structural transformation of developing economies. Structural transformation means a reallocation of the economy's resources from low to high productivity sectors. In a broad sense, it is defined as a reallocation of economic activities and labor to major economic sectors such as manufacturing and services (Marcolino, 2022). The shift consists of a migration of labor and other resources to the modern sector. M. McMillan et al. (2014), (2017) understand it in its two components intra-industry and structural change. The intra-industry component shows the capacity of each sector to generate internal productivity while structural change expresses the diffusion of productivity to the whole economy. For Lin (2012), the structure of an economy is endogenous to the structure of its factor endowments and that sustainable economic development is determined by changes in factor endowments and continuous technological innovation. These changes are multidimensional and include the production matrix, social structure, institutional framework and relationship with the natural environment (Armah & Baek, 2019; Nissanke, 2019). According to Nissanke (2019), structural transformation is an evolutionary process that is not limited to the transformation of economic structures, but also to social transformation, by proceeding to share opportunities ex ante among the entire population, including the poorest segments, irrespective of gender, ethnicity, religion or any other divisive criteria. Structural transformation is therefore a necessity for developing countries, particularly those in sub-Saharan Africa (SSA), as it can generate sufficient employment, reduce poverty and inequality, and sustain growth (African Development Bank Group [AfDB], 2020; AfDB (dir.), 2017; CEA, 2016).

Thus, in SSA, structural transformation has emerged as one of the main concerns for its growth and development (Ibrahim, 2020). However, it is clear that since the early 2000s, this part of the

world has been seen as a continent on the rise, with declining poverty, an emerging middle class, growing political stability and some trade liberalization (Busse et al., 2017). Questions remain, however, about this growth spurt, which does not appear to be based on a strong mechanism to ensure its sustainability. Moreover, this growth does not lead the whole population on a path of productivity, as has been the case in the past in developed countries, creating a strong interest in this topic. Thus, the recent literature focuses much more on the factors that drive productivity and growth in an economy. Among many other determinants, political institutions in general and alternation of power in particular are cited in the literature as explanatory variables (Kouotou & Epo, 2019).

The relationship between alternation of power and structural transformation is situated in the framework of institutional economic theory. Indeed, institutional and political factors, particularly democracy, are now seen as the main explanatory variables of productivity (North, 1990) and therefore of structural transformation. Easterly (2001) even emphasizes that these institutional factors help to explain the backwardness of underdeveloped economies. Indeed, political alternation, which is defined as the orderly rotation of executive power between political parties and their leaders during elections, is increasingly seen as a determining and indispensable factor of democracy (Kpegli & Bator, 2019; Otjes & Willumsen, 2019; Ruel, 2021). Indeed, the alternation of heads of state is a principle which, when violated, seems to provide tangible evidence of an absence of democracy. The alternation of a head of state influences national development strategies through individuals and institutions that may play an active role in devaluing areas of development that do not appear to be important for national development goals. Influential individuals, for example, through government policies and collective actions, create new change processes based on the creation of ideas for change. Thus, the ideas of key actors or individuals, followed by the formation of a reform discourse, mediate new institutional changes. Often, the formation of a new institution then weakens the legitimacy of existing change processes and, as a result, institutional change can take place.

But more than 20 years after the start of democratic renewal in Africa, stylized facts show that country practice offers a mixed record (Senou, 2016). Indeed, many rulers do not intend to leave power once it is acquired and refuse to apply the texts favoring alternation at the top of the state. We are thus witnessing a manipulation of the constitution by those in power in order to keep the president of the Republic in place for life. The unconstitutional desire to remain in power, despite internal pressure and interference from the international community, proves that the alternation of leaders remains a problem for democracy in Africa. The question that remains is whether alternating leadership affects economic growth in SSA countries and what effect it has.

It is true that the idea that the benevolent dictator is a facilitator of economic growth remains widespread in the economic literature (Easterly, 2011). Autocratic leaders are often credited with achieving good economic results. The recent success of Asian economies, it is argued, is partly explained by the presence of benevolent dictators, in contrast to African economies whose economic growth is held back by malevolent dictators. However, recent literature increasingly casts serious doubt on the benevolent autocrat hypothesis. The recent empirical literature arrives at at least three important results. Firstly, the positive effect of the autocratic leader on growth occurs only in isolation; in general, economic growth is found to be lower under autocracy. Secondly, when autocratic leaders are compared to leaders of more democratic regimes, the positive effect of autocratic leaders on growth is rare and marginal. Thirdly, positive-growth autocrats are rare, and sometimes even rarer, while negative-growth autocrats abound (Easterly & Pennings, 2017; Rizio & Skali, 2020). The fragility of the benevolent dictator hypothesis, particularly in SSA, justifies the push for democracy as an engine of economic growth. In this context, the alternation of heads of state, an important modality of democracy, becomes an important lever for better economic performance.

The empirical literature remains almost silent on the analysis of the effects of alternating heads of state on structural transformation. Existing works study the effects of alternation of power on economic growth. This is the case of Kouotou and Epo (2019) who analyze the impact of alternating leaders on economic growth in SSA, using a panel of 42 countries between 1970 and 2016. Using the generalized least squares method, they conclude that alternating leadership affects economic growth in an ambivalent way. Indeed, the authors find that the number of alternations in leadership has a positive effect on long-term growth. However, specificities exist according to linguistic and geographical areas which are signs of cultural differences. Although Kouotou and Epo (2019) conclude that alternation of heads of state positively affects economic growth, they stress that SSA countries should seek a good balance in the pace and conditions of alternation of leaders in power. On the other hand, the vast majority of studies concern the effects of democracy in general on economic growth or other economic indicators. These studies also produce contrasting results; on the one hand, some find a positive effect of democracy on economic growth (Acemoglu et al., 2018; Ben Doudou & Rahali, 2018; Gründler & Krieger, 2015; Kpegli & Bator, 2019), while on the other hand, others find a negative, ambiguous or zero effect (Boll & Sidki, 2021; Gandjon Fankem, 2018). These studies usually mobilize an index to measure democracy, but this approach does not distinguish which factor or element of democracy is more or less relevant. One way is to distinguish between the different realities or practices encompassed by the term democracy, and here some authors prefer to focus directly on the effects of the alternation.

The studies concerned distinguish between leadership alternation (personnel changes in control of the executive) and ideological alternation (rotation of power between parties or coalitions of different ideologies; Hoff et al., 2005). However, the vast majority of work mobilizes leadership alternation because it is easier to measure. With regard to the context of developing economies, more specifically SSA, studies that analyze the effects of alternation in power on economic growth do not take into account the structural aspect because although SSA has experienced strong growth for more than twenty years, this growth does not bring about structural transformation (AfDB, 2020; Cadot et al., 2016; Cadot & Melo, 2016). Taking into account the structure of economies rather than growth is a necessity. On the other hand, work that examines the determinants of structural transformation generally takes into account the economic, social and environmental dimensions (Armah & Baek, 2019) while ignoring the institutional dimension that is essential for economic development. This article follows this path and endeavors to highlight the effects of alternating heads of state on the structural transformation of sub-Saharan economies.

The objective of this paper is to analyze the effects of alternating heads of state on structural transformation in SSA. The contribution of this paper lies particularly in highlighting the effects of alternating heads of state on structural transformation in SSA, an aspect that remains poorly understood in the literature. This paper has a triple interest. Firstly, it positions the alternation of heads of state at the heart of development policies and the democratic process. Indeed, the alternation of heads of state is essential for the renewal of political institutions and public administrations, which are sources of political and managerial innovations likely to have an effect on the structural transformation of sub-Saharan economies. Second, it fills the gap in the empirical literature on the role of alternating heads of state as a fundamental determinant of structural transformation, an aspect that remains unexplored. Finally, it reinforces the idea that structural transformation, which is essential for the economic development of sub-Saharan economies, cannot be achieved without the improvement of political institutions.

The remainder of this article is presented as follows: section 2 presents the current state of affairs regarding the alternation of heads of state and structural transformation in sub-Saharan Africa, section 3 specifies the methodology adopted, section 4 presents and discusses the results obtained and section 5 concludes.

2. Alternation of heads of state and structural transformation: definition and overview in sub-Saharan Africa (SSA)

This section outlines the state of the alternation of heads of state and the dynamics of structural transformation in SSA. To do this, this section first presents the measurement of the alternation of heads of state and the measurement of structural transformation. Finally, this section presents an overview of these different variables.

2.1. Alternation of heads of state and structural transformation: definitions and measurements

The data needed to measure the alternation of heads of state are primary data collected by Kouotou and Epo (2019). These authors obtain the explanatory variable describing the alternation of leaders in power by reviewing the literature on the political history of African countries. This variable indicates the number of alternations in leadership since 1960. Indeed, history records this year as the year marking the beginning of the independence era for most countries. This alternation variable therefore takes the value 0 each year preceding the first accession of a new head of state to power in a given country. It takes the value 1 from the year of this first accession to the year preceding the second. It takes the value 2 from the second accession to the year before the third accession and so on. This variable reaches its highest value between the year of the last accession to power and 2016. The second variable is a dummy which is equal to 1 if the year of alternation considered is a year of planned alternation or election for the purpose of renewing the head of state and 0 otherwise. The detailed figures on these variables are presented in Annex 1 of this paper. We will readjust this variable so that the reference year is 1970 as this work covers the period 1970–2015.

The data on structural transformation comes from the Africa Sector Database (ASD) by Mensah and Szirmai (2018) which is an extension of the Groningen Growth and Development Center (GGDC) by Timmer and de Vries (2009). The DSA covers 11 sectors in 18 SSA countries but Zambia has been excluded as it is not included in the source of Kouotou and Epo (2019). The DSA provides value added and employment data on 11 key sectors in SSA economies over a long period but not generally beyond the year 2016. The two components of structural transformation have been extracted from these data using the Fabricant (1942) method. This is the most widely used and appropriate method for extracting the two components of structural transformation from sectoral employment and value added data (McMillan & Rodrik, 2011; M. McMillan et al., 2014) and is as follows:

$$\Delta Q = \sum_t (q_t^1 - q_t^0) s_t^0 + \sum_t (s_t^1 - s_t^0) q_t^1$$

Where ΔQ is the change in total productivity between two periods, q_t^k and s_t^k represent the value added and employment rate in industry t in period k respectively. The first term refers to the intra-industry productivity that M. S. McMillan et al. (2017) refer to as the “*fundamentals*” of the economy. The second term, which captures the reallocation of workers across industries, is the structural change.

Having presented how we obtained our different variables, it is now appropriate to give an overview of these different variables in SSA.

2.2. Alternation of heads of state and structural transformation in SSA: An overview

We present successively the relationship between the alternation of heads of state and each of the components of structural transformation, namely intra-industry productivity and structural change.

Table 1 presents the ranking of countries by the number of changes of heads of state, the contribution of structural change and the contribution of intra-industry productivity to total productivity growth in SSA. The middle column shows the ranking of SSA countries in descending order of the number of changes of heads of state. Panels (A) and (B) show the ranking of SSA countries according to the level of contribution of structural change and the level of contribution of

Table 1. Ranking of countries by number of alternating heads of state, contribution of structural change to growth and contribution of intra-industry productivity to total productivity growth in SSA

(A) Country rankings by number of changes of heads of state and contribution of structural change to total productivity growth in SSA			(B) Country rankings by number of alternating heads of state and contribution of intra-industry productivity to total productivity growth in SSA	
Countries	Average contribution of structural change to total productivity growth	Number of alternations from 1960 to 2015	Countries	Average contribution of intra-industry productivity to total productivity growth
Nigeria ¹¹	-3.43e-06	12	Nigeria ⁷	-0.299
Ghana ⁴	-0.1481	11	South Africa ⁶	-0.2534
South Africa ³	7.55e-06	11	Ghana ⁸	-0.7295
Uganda ¹⁰	-1.41e-06	7	Uganda ¹⁷	-6.9098
Burkina Faso ¹⁵	-6.99e-07	6	Burkina Faso ²	1.5555
Ethiopia ⁸	-5.76e-05	6	Ethiopia ¹⁶	-6.4153
Malawi ⁷	-4.88e-05	5	Mauritius ⁵	0.0753
Mauritius ⁹	-9.16e-05	5	Malawi ⁹	-0.801
Rwanda ¹²	-3.63e-06	5	Tanzania ¹	2.8886
Tanzania ¹⁶	-7.29e-07	5	Rwanda ¹⁴	-3.5146
Botswana ⁵	-0.00591	4	Senegal ¹⁰	-1.3779
Kenya ¹³	-9.62e-06	4	Kenya ¹¹	-1.6266
Lesotho ¹	0.00361	4	Mozambique ¹²	-1.933
Mozambique ²	0.000458	4	Lesotho ¹³	-3.2816
Senegal ¹⁴	-1.80e-07	4	Botswana ¹⁵	-3.8709
Namibia ⁶	-0.000153	3	Namibia ³	0.4028
Cameroon ¹⁷	-1.02e-08	2	Cameroon ⁴	0.3079

Sources: authors with data from Kouotou and Epo (2019) and ASD

intra-industry productivity to total productivity growth respectively. These rankings are indicated by the superscript numbers of the country names in each panel.

Table 1 shows that the dynamics of the alternation of heads of state are very heterogeneous in SSA. Nigeria, Ghana and South Africa are the three countries that have had the most changes of head of state, with 12 for Nigeria and 11 for the other two. Among the worst ranked countries are Senegal, Mozambique, Lesotho, Kenya and Botswana with 04 alternations, Namibia with 03 alternations and Cameroon which closes the ranking with 02 alternations. It also emerges from this ranking that two of the three French-speaking countries, Senegal and Cameroon, occupy the last places in the ranking and are ranked 15th and 17th respectively. The reading of the quadrant (A) shows that the three French-speaking countries of Senegal, Burkina Faso and Cameroon occupy 14th, 15th and 17th place respectively in terms of the contribution of structural change to total productivity growth. The Anglo-Saxon countries are at the top of the list, with Lesotho in first place, Mozambique in second place and South Africa in third place. When we look at the number of shifts and the contribution of structural change to total productivity growth together, we find that, apart from Burkina Faso and Uganda, the countries that rank well in terms of shifts also rank well in terms of the contribution of structural change to productivity growth. The same is true for

countries that rank poorly in terms of shifts, which also rank poorly in terms of the contribution of structural change to total productivity growth, apart from Namibia and Lesotho.

In quadrant (B), we see that the relationship between alternations of heads of state and the contribution of intra-industry productivity is ambiguous. Indeed, the two countries with the least number of alternations, Cameroon and Namibia, have a high intra-industry productivity contribution, while the effect is the opposite for some countries with a considerable number of alternations, such as Ethiopia and Uganda. Nevertheless, the three countries with the most shifts rank in the top half in terms of intra-industry productivity. For the other countries, the position in terms of intra-industry productivity is close to that of alternation because the difference between the numbers of alternations is small or zero. In addition to this country-specific presentation, it is possible to have a general overview of the evolution of the alternation of heads of state and the structural transformation in SSA.

Figure 1 presents jointly the evolution of the average number of head of states alternation and the average contributions of intra-industry productivity and structural change to total productivity in SSA. Each of the variables presented in this figure has its own scale for visibility. We are only interested in the dynamics here, and the fact that the structural change curve is generally above the intra-industry productivity curve does not always represent the reality.

Figure 1 shows that intra-industry productivity and structural change have a similar evolution. The dynamics of these two variables, which were ambiguous from 1970 to 1984, remained stagnant for the rest of the time. On the other hand, the average number of alternations of heads of state is increasing over the whole period of the study. The above observations show that the relationship between changes in heads of state and structural transformation in SSA countries remains complex and deserves further analysis.

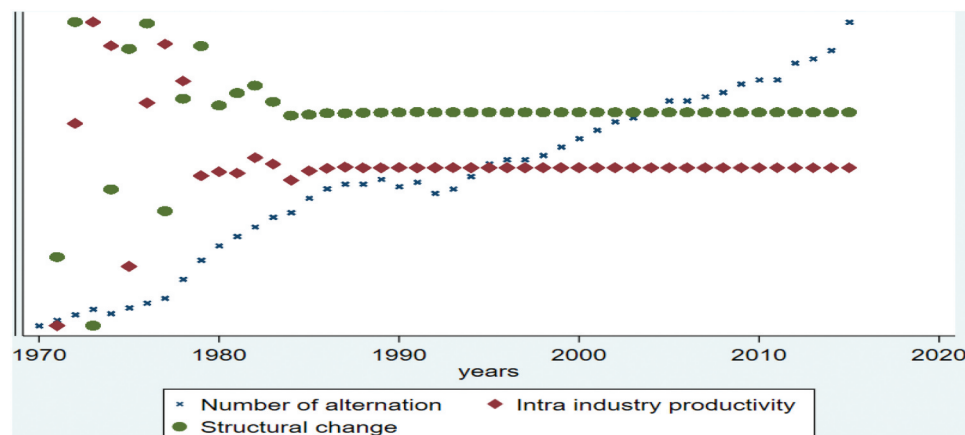
3. Methodology

The methodology covers two points: the first point presents the data sources and variables while the second point covers the model specification and estimation method.

3.1. Data sources and variables

The data for this study comes from three sources. The first is that of Kouotou and Epo (2019), available in Appendix A; it provides data on the number of times heads of state have alternated and the year of the expected alternation or election year; it covers the period 1970–2016. We have extracted the data for the period 1970–2015 covered by this study. The second source is the DSA by Mensah and Szirmai (2018), which is an extension of the Groningen Growth and Development Center (GGDC) by Timmer and de Vries (2009). The DSA covers 11 sectors in 18 SSA countries but

Figure 1. Evolution of the average number of alternating heads of state and the average contributions of intra-industry productivity and structural change to total productivity in SSA.



Zambia has been excluded as it is not included in the source of Kouotou and Epo (2019). The DSA allows us to have intra-industry productivity and structural change, which are the two components of structural transformation, thanks to the method of Fabricant (1942). Finally, the World Development Indicators (WDI) of the World Bank provides additional explanatory variables. In summary, our data covers 17 SSA countries over the period 1970–2015. Intra-industry productivity and structural change are the two variables to be explained while the number of alternations of heads of state represents our variable of interest.

The control variables are net foreign direct investment (FDI) inflows, gross domestic product (GDP) growth rate per capita, public debt as a percentage of GDP, natural resource profits as a percentage of GDP and the year of expected changeover. FDI captures external capital flows and is measured as a percentage of GDP. It is possible that the massive inflow of capital stimulates intra-industry productivity. GDP, on the other hand, initially expresses the economic size of countries. Natural resource profits as a percentage of GDP expresses the specificity of SSA countries as natural resource exporters. Finally, public debt takes into account the level of indebtedness of SSA countries. Indeed, it is possible that public debt increases following a change of government when the new head of state wants to carry out major works.

3.2. Model specification and estimation method

Our modelling is based on that of Moussir and Chatri (2019) which is based on the framework of endogenous growth theory. This framework defends the idea that technical progress depends on several factors likely to sustain growth in the long run. The institutional theory is part of this framework and postulates that the quality of institutions can influence the productivity of production factors. These institutions, which generate the system of governance, are based on various values, one of the most important being democracy (North, 1990). Moreover, the literature is unanimous on the fact that structural transformation, which is a dynamic phenomenon, must be assessed by a dynamic model (Lectard, 2016). According to the panel structure of our data, the specification of the model is as follows:

$$y_{it} = \tau_0 + \beta y_{it-1} + \omega x_{it} + v_{it} \quad (1)$$

$$\text{avec } i = 1 \dots N, t = 1 \dots T$$

Where, y_{it} is the dependent variable (intra-industry productivity in the first equation and structural change in the second, y_{it-1} is the lagged dependent variable, τ_0 is a constant, ω is an $N \times 1$ vector of estimated parameters, i is the country, t is the period and x_{it} is the (i, t) observation on K explanatory variables (including the alternating variables and the control variables). β is the parameter that measures the sensibility of y_{it} between the lagged dependent variable and v_{it} is the error term. The inclusion of the lagged dependent variable as an explanatory variable leads to changes in interpretation. Without the lagged variable, the independent variables represent the set of information producing the observed y_{it} . With the lag, “any impact of x_{it} represents the effect of new information”.

As McMillan and Rodrik (2011) point out, at the beginning of the structural transformation process there is first an improvement in intra-industry productivity. It is following this improvement that the mechanism of reallocation of labor from low to high productivity sectors occurs. This precision means that intra-industry productivity is an explanatory variable for structural change and does not allow us to estimate the two equations separately. We thus obtain a system of two equations where the first equation is included in the second equation of the following form:

$$\begin{cases} y_{ait} = \tau_{a0} + \beta_a y_{ait-1} + \omega_a x_{ait} + v_{ait} \\ y_{bit} = \tau_{b0} + \beta_b y_{bit-1} + \omega_b x_{bit} + \theta y_{ait} + v_{bit} \end{cases} \quad (2)$$

In this system of equations, y_{ait} represents intra-industry productivity, y_{bit} represents structural change and θ represents the share of structural change explained by intra-industry productivity. The other variables and parameters retain the same meaning as in equation (1) provided that the equation for estimating intra-industry productivity is differentiated from the equation for estimating structural change marked by the subscripts a and b . The fact that y_{bit} depends on y_{ait} creates endogeneity and implies that the error terms of the equation system must be correlated.

The method of instrumental variables makes it possible to estimate such a system in reduced form. While it allows for the endogeneity of some variables, it is unable to correct for the problems associated with the heteroscedasticity of the variance of the system error. There are methods that allow for both problems at the same time, although this depends on the identification of the system. If the equation is correctly identified, indirect least squares (ILS) or two steps least squares (2SLS) are applicable. On the other hand, only 2SLS is applicable if the model is over-identified (Bourbonnais, 2015). In our case, the 2SLS method is appropriate. Indeed, the 2SLS method is designed for the estimation of structural equations. In the implementation of this method, all dependent variables are considered as endogenous and correlated with the error terms of the equation system while the variables declared as exogenous are treated as instruments of the endogenous variables (StataCorp, 2009). The 2SLS method combines the instrumental variables method to correct for endogeneity problems and generalized least squares to account for the correlation of the error terms of the equation system (StataCorp, 2009).

In the implementation of this method, in addition to the two dependent variables that are automatically treated as endogenous, the number of shifts is also considered as endogenous and its instrument is the expected shift year. The year of alternation variable is exogenous because it is correlated with the number of alternations, but not with the structural transformation. In fact, it allows for unplanned changes of government such as coups d'état and the ensuing unrest such as civil wars. Furthermore, the GDP growth rate, public debt, natural resource profits and FDI are considered exogenous. Indeed, although SSA has experienced massive capital inflows since independence, a high debt ratio, and a positive growth rate over the last twenty years, structural transformation has not been effective (AfDB, 2020; Cadot & Melo, 2016).

The stationarity of the variables should be studied before any estimation. Indeed, the variable number of alternation of heads of state is a cumulative variable and therefore non-stationary. However, the current literature shows that it is necessary to take into account the dependencies between the individuals of the panel. This is why we first perform the Pesaran (2015) test to check the dependencies between individuals in the panel for each variable. The rejection of the null hypothesis of this test allows us to conclude that there is independence between the individuals of the panel. Table 2 below shows the results of the Pesaran (2015) tests for our different variables.

The results of Pesaran's (2015) tests show that all individuals in the panel are independent for our variables over the selected study period. Indeed, all statistics are significant at the 1% level. This means that in the following, we can use first generation unit root tests without compromising the results. First generation unit root tests are those that rely on the assumption of inter-individual independence of the residuals, an assumption that makes it very easy to establish the statistical test distributions and to obtain generally asymptotic or semi-asymptotic normal distributions (Mignon and Hurlin, 2005). In this work, we apply the Fisher test. This test poses the null hypothesis that all panels contain a unit root (Mignon and Hurlin, 2005). In addition, the Fisher test is adapted in two cases corresponding to this study. The first case corresponds to panels with a time horizon much longer than the individual dimension and the second case corresponds to non-cylindrical panels (StataCorp, 2009). For the finite individual dimension N , the alternative hypothesis is that at least one panel is stationary. The results of the Fisher unit root tests are presented in Table 3. The test results show that all variables are stationary at the 1% level.

Table 2. Cross section dependency tests

Variables	Probability	Conclusion
Structural change	0.000	Independent
Intra industry productivity	0.000	Independent
The number of alternating heads of state	0.002	Independent
The year of alternation	0.000	Independent
GDP per capita growth rate	0.018	Independent
Value of natural resources as a percentage of GDP per capita	0.007	Independent
Public debt	0.000	Independent

Sources: authors with data from Kouotou and Epo (2019), WDI and ASD

Table 3. Unit root tests

Variables	Conclusion
Structural change	I (0)
Intra industry productivity	I (0)
The number of alternating heads of state	I (1)
The year of alternation	I (0)
GDP per capita growth rate	I (0)
Value of natural resources as a percentage of GDP per capita	I (0)
Public debt	I (0)

Sources: authors with data from Kouotou and Epo (2019), WDI and ASD

All variables are stationary in level except the number of alternation of heads of state which is stationary in first difference. We now present the different results of this work.

4. Results and comments

We first present the descriptive statistics, and then the econometric results. Table 4 presents the means and standard deviations of the different variables.

We delimit the sub-periods to the year 2000 because it is around this date that SSA countries experience strong economic growth (AfDB, 2020; Cadot et al., 2016; Page, 2015). Table 4 shows that, regardless of the sub-period considered, structural change has always contributed negatively to total productivity growth in contrast to intra-industry productivity which had a negative effect only in the period 2000–2015. Moreover, the average number of shifts is higher in the period 2000–2015 than in the period 1970–2000 and in the whole study period (4.8, 2.9 and 3.6 respectively). Moreover, the standard deviations of the number of shifts are very high, revealing a wide disparity between countries in this respect. With regard to FDI and GDP growth rates, it should be noted that their values were higher on average over the period 2000–2015. The share of natural resource profits in GDP declined over time from 1,895 between 1970 and 2000 to 1,486 between 2000 and 2015. Public debt is almost stable over the period. In the following, we present the econometric evaluations of the effects of alternating heads of state on structural change and intra-industry productivity in SSA. Table 5 presents the econometric results of the effects of the alternation of heads of state on structural change and intra-industry productivity, estimated by the 2SLS method.

Table 5 shows that the estimated system of equations is robust with Fisher statistics equal to 30.17 for the first equation and 58 for the second equation. These statistics have a zero probability, which implies that the parameters of the two equations are significantly different from zero and

Table 4. Descriptive statistics

Variables	Means	Standard deviation
Between 1970 and 2000		
Intra-industry productivity	0.1231	2.8089
Structural change	−0.0133	0.6294
Number of alternations	2.94	2.30
Foreign direct investment	1.15	1.898
GDP per capita growth rate	1.423	6.059
Value of natural resources as a percentage of GDP per capita	1.895	1.725
Public debt	35.088	16.286
Between 2000 and 2015		
Intra-industry productivity	−0.0000186	0.000143
Structural change	−0.000007	0.000061
Number of alternations	4.796	2.734
Foreign direct investment	3.369	4.436
GDP per capita growth rate	3.116	2.792
Value of natural resources as a percentage of GDP per capita	1.486	1.123
Public debt	36.055	9.564
All the period		
Intra-industry productivity	0.0823	2.2965
Structural change	−0.00886	0.5145
Number of alternations	3.6	2.6
Foreign direct investment	1.897	3.21
GDP per capita growth rate	2.012	5.29
Value of natural resources as a percentage of GDP per capita	1.753	1.555
Public debt	35.42	14.32

Sources: authors with data from Kouotou and Epo (2019), WDI and ASD

that there is no identification problem. Indeed, one condition for identification is that the number of exogenous variables exceeds the number of endogenous variables. It is therefore appropriate to comment on the results obtained. With regard to the intra-industry productivity equation, the results show that an alternation of heads of state significantly increases intra-industry productivity by 7.3%. Indeed, the alternation of heads of state is likely to bring about a new dynamic in the management of economic affairs and new political measures through the renewal of the personnel of the state and its top hierarchy. Through influential individuals, the alternation of a head of state creates new developmental policy agendas and discourses that are expressed at the expense of old ones. These new development programs and discourses generally have the consequences of promoting economic growth in the targeted sectors of activity, making economic agents enthusiastic through the mitigation of lobbying and networks. The results also show that intra-industry productivity in year t depends significantly, positively on its value in $t-1$ and negatively on its value in $t-2$. Although the result in $t-2$ seems surprising, it can be explained. If the productivity generated in $t-2$ in a sector induces a reallocation of resources to that sector, future productivity may fall because of reallocations due to domestic or international competition. But the fact that this negative effect occurs only two years later expresses the low level of innovation and ineffective managerial practices of sub-Saharan economies to sustain their productivity (AfDB, 2020). These problems also arise when the alternation of heads of state is not systematic; creating networks and lobbying between the government and certain private sector agents to the detriment of

Table 5. Two steps least squares estimation results

Equation	Obs	Parms	“R-sq”	F-Stat	P
Intra-industry productivity	690	5	0.5097	30.17	0.000
Structural change	690	5	0.6348	58	0.000
Intra-industry productivity equation					
	Coef.	Std. Err.	t	P> t	
Number of alternating heads of state	0.073**	0.027	2.73	0.007	
GDP per capita growth rate	0.0005	0.002	0.25	0.802	
Net FDI inflows	−0.004	0.003	−1.18	0.236	
Intra-industry productivity	−	−	−	−	
L1.	0.378***	0.049	7.7	0.000	
L2.	−0.406***	0.042	−9.58	0.000	
Natural resources	−0.0002**	0.0001	−2.07	0.039	
Public debt	−0.00005	0.000	−0.35	0.725	
Constante	−0.265***	0.103	−2.57	0.010	
Structural change equation					
Number of alternating heads of state	0.033***	0.01	3.42	0.001	
Net FDI inflows	−0.0012	0.0011	−1	0.318	
Structural change	−	−	−	−	
L1.	−6.879	8.288	−0.83	0.408	
L2.	0.215***	0.081	2.65	0.008	
Natural resources	−0.00006	0.00003	−2.26	0.024	
Public debt	0.00003	0.000004	0.74	0.459	
Intra-industry productivity	−0.326***	0.035	−9.44	0.000	
Constant	−0.129***	0.039	−3.28	0.001	

Sources: authors with data from Kouotou and Epo (2019), WDI and ASD

* P < 10%, ** P < 5%, *** P < 1%

economic efficiency. Furthermore, the results show that among the control variables, only natural resource profits promote intra-industry productivity. Indeed, natural resource revenues play an important role in development policies in SSA.

As for the structural change equation, the results show that an additional head of state alternation significantly increases structural change by 3.5%. This result can be explained by the fact that the alternation of a head of state can reduce the power of lobbies and networks that prevent or slow down the redeployment of production factors in all sectors of the economy. This is the case, for example, in licensing policies, where lobbies and networks have a very strong influence. Furthermore, when alternation is systematically made, the chances of different social categories being represented in the government are high, allowing the different capabilities of these social categories to be expressed. Moreover, contrary to the first equation, the structural change in year t depends positively and significantly on its value in $t-2$ and negatively on its value in $t-1$. We also notice that intra-industry productivity negatively affects the structural change in SSA. Indeed, the latter decreases by 3.26% when intra-industry productivity increases by one unit. This result can be explained by the fact that the total productivity level is not high enough in SSA (Cadot et al., 2016). According to AfDB (2020), the level of productivity has not been strong enough in SSA to generate a real structural transformation process. However, the positive effect of the number of head of state alternations on intra-industry productivity and structural change in SSA supports the idea that institutional alternation is a source of economic

progress (Kouotou & Epo, 2019; North, 1990) and challenges the benevolent autocrat argument. Another important result is that public debt in SSA contributes to increased structural change.

5. Conclusion

The objective of this paper is to assess the effects of head of state alternation on structural transformation in sub-Saharan Africa (SSA). According to the new institutional economics, the alternation of a head of state is an institutional tool that is interpreted as a policy innovation, likely to promote labor reallocation, innovation, human capital and thus structural transformation. Data from Kouotou and Epo (2019), the ASD and the WDI allow us to verify our statements on a panel of 17 SSA economies over the period 1970–2015 using the two steps least squares method (2SLS). The results obtained show that the number of alternations of heads of state positively and significantly affects intra-industry productivity and structural change in SSA. These results support the idea that institutional alternation is a source of economic progress (Kouotou & Epo, 2019; North, 1990) and challenge the benevolent autocrat argument and suggest that head of state alternation is likely to promote structural transformation in SSA. Indeed, alternation of heads of state is likely to bring about a new dynamic in the management of economic affairs and new policy measures through the renewal of state personnel. In addition, alternation can create new development programs and policy discourses that work to the detriment of old ones. Thus, these results suggest that alternation of heads of state is likely to promote structural transformation in SSA. From these results, two policy proposals emerge. First, this paper recommends that sub-Saharan economies should promote alternation of heads of state and ensure that this alternation takes place systematically. However, taking into account the socio-political consequences of alternation such as civil wars and coups in their measures would improve the accuracy of the results.

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Appendix A: Data from Kouotou and Epo (2019) on the alternation of heads of state in SSA
Data on the number of alternations of heads of state in SSA from 1970 to 1993

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
South Africa	3	3	3	3	3	4	4	4	5	6	6	6
Benin	8	8	9	9	9	9	9	9	9	9	9	9
Botswana	1	1	1	1	1	1	1	1	1	1	2	2
Burkina Faso	1	1	1	1	1	1	1	1	1	1	2	2
Burundi	1	1	1	1	1	1	2	2	2	2	2	2
Cabo Verde						1	1	1	1	1	1	1
Cameroon	1	1	1	1	1	1	1	1	1	1	1	1
Comores						1	2	2	3	3	3	3
Congo Rép. D.	2	2	2	2	2	2	2	2	2	2	2	2
Congo Rép.	2	2	2	2	2	2	2	3	3	4	4	4
Ivory Coast	1	1	1	1	1	1	1	1	1	1	1	1
Djibouti								1	1	1	1	1
Eritrea	0	0	0	0	0	0	0	0	0	0	0	0
Éthiopie					1	1	1	2	2	2	2	2
Gabon	2	2	2	2	2	2	2	2	2	2	2	2
Gambia	3	3	3	3	3	3	3	3	3	3	3	3
Ghana	4	4	5	5	5	5	5	5	6	7	7	8
Equatorial Guinea	1	1	1	1	1	1	1	1	1	2	2	2

(Continued)

(Continued)													
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	
Guinea-Bissau				1	1	1	1	1	1	1	2	2	
Kenya	2	2	2	2	2	2	2	2	3	3	3	3	
Lesotho	1	1	1	1	1	1	1	1	1	1	1	1	
Madagascar	0	0	1	1	1	2	3	3	3	3	3	3	
Malawi	1	1	1	1	1	1	1	1	1	1	1	1	
Mali	2	2	2	2	2	2	2	2	2	2	2	2	
Mauritius													
Mozambique						1	1	1	1	1	1	1	
Namibia													
Niger	1	1	1	1	2	2	2	2	2	2	2	2	
Nigeria	2	2	2	2	2	3	4	4	4	5	5	5	
Uganda	2	3	3	3	3	3	3	3	3	4	5	5	
Central African Republic	2	2	2	2	2	2	2	2	2	3	3	4	
Rwanda	1	1	1	2	2	2	2	2	3	3	3	3	
Senegal	1	1	1	1	1	1	1	1	1	1	1	2	
Seychelles							1	2	2	2	2	2	
Sierra Leone		1	1	1	1	1	1	1	1	1	1	1	
Somalia	2	2	2	2	2	2	2	2	2	2	2	2	
Swaziland	0	0	0	0	0	0	0	0	0	0	0	0	

(Continued)

(Continued)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Tanzania	1	1	1	1	1	1	1	1	1	1	1	1
Chad	1	1	1	1	1	2	2	2	2	3	3	3
Togo	3	3	3	3	3	3	3	3	3	3	3	3
Zimbabwe	1	1	1	1	1	2	3	3	4	5	6	6

Data on the number of alternations of heads of state in SSA from 1994 to 2016

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
South Africa	6	6	7	7	7	7	7	8	8	8	8	8
Benin	9	9	9	9	9	9	9	9	9	10	10	10
Botswana	2	2	2	2	2	2	2	2	2	2	2	2
Burkina Faso	3	4	4	4	4	5	5	5	5	5	5	5
Burundi	2	2	2	2	2	3	3	3	3	3	3	4
Cabo Verde	1	1	1	1	1	1	1	1	1	2	2	2
Cameroon	2	2	2	2	2	2	2	2	2	2	2	2
Comores	3	3	3	3	3	3	3	4	4	4	4	4
Congo Rép. D.	2	2	2	2	2	2	2	2	2	2	2	2
Congo Rép.	4	4	4	4	4	4	4	4	4	4	5	5
Ivory Coast	1	1	1	1	1	1	1	1	1	1	1	2
Djibouti	1	1	1	1	1	1	1	1	1	1	1	1
Eritrea	0	0	0	0	0	0	0	0	0	0	0	1
Éthiopie	2	2	2	2	2	2	2	2	2	3	3	3
Gabon	2	2	2	2	2	2	2	2	2	2	2	2
Gambie	3	3	3	3	3	3	3	3	3	3	3	3
Ghana	8	8	8	8	8	8	8	8	8	8	8	8
Equatorial Guinea	2	2	2	2	2	2	2	2	2	2	2	2

(Continued)

(Continued)													
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	
Guinea-Bissau	2	2	3	3	3	3	3	3	3	3	3	3	
Kenya	3	3	3	3	3	3	3	3	3	3	3	3	
Lesotho	1	1	1	1	1	1	1	1	2	2	2	2	
Madagascar	3	3	3	3	3	3	3	3	3	3	3	4	
Malawi	1	1	1	1	1	1	1	1	1	1	1	1	
Mali	2	2	2	2	2	2	2	2	2	3	4	4	
Mauritius											1	1	
Mozambique	1	1	1	1	2	2	2	2	2	2	2	2	
Namibia									1	1	1	1	
Niger	2	2	2	2	2	3	3	3	3	3	3	4	
Nigeria	5	6	6	7	7	7	7	7	7	7	7	8	
Uganda	5	5	5	6	7	7	7	7	7	7	7	7	
Central African Republic	4	4	4	4	4	4	4	4	4	4	4	5	
Rwanda	3	3	3	3	3	3	3	3	3	3	3	3	
Senegal	2	2	2	2	2	2	2	2	2	2	2	2	
Seychelles	2	2	2	2	2	2	2	2	2	2	2	2	
Sierra Leone	1	1	1	2	2	2	2	2	2	2	3	3	
Somalia	2	2	2	2	2	2	2	2	2	3	3	3	
Swaziland	1	2	2	2	3	3	3	3	3	3	3	3	

(Continued)

(Continued)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Tanzania	1	1	1	2	2	2	2	2	2	2	2	2
Chad	4	4	4	4	4	4	4	4	5	5	5	5
Togo	3	3	3	3	3	3	3	3	3	3	3	3
Zimbabwe	6	6	6	6	6	7	7	7	7	7	7	7

Sources: **Data from** Kouotou and Epo (2019)

Data from 1970 to 1993 on the alternation year (1 in alternation year and 0 otherwise)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
South Africa	9	9	9	9	9	10	10	10	10	10	10	10
Benin	10	10	11	11	11	11	11	11	11	11	11	11
Botswana	2	2	2	2	3	3	3	3	3	3	3	3
Burkina Faso	5	5	5	5	5	5	5	5	5	5	5	5
Burundi	5	5	6	6	6	6	6	6	6	7	7	8
Cabo Verde	2	2	2	2	2	2	2	3	3	3	3	3
Cameroon	2	2	2	2	2	2	2	2	2	2	2	2
Comores	4	5	6	6	7	7	7	7	7	7	7	7
Congo Rép. D.	2	2	2	3	3	3	3	4	4	4	4	4
Congo Rép.	5	5	5	6	6	6	6	6	6	6	6	6
Ivory Coast	2	2	2	2	2	3	4	4	4	4	4	4
Djibouti	1	1	1	1	1	2	2	2	2	2	2	2
Eritrea	1	1	1	1	1	1	1	1	1	1	1	1
Éthiopie	3	4	4	4	4	4	4	5	5	5	5	5
Gabon	2	2	2	2	2	2	2	2	2	2	2	2
Gambia	4	4	4	4	4	4	4	4	4	4	4	4
Ghana	8	8	8	8	8	8	8	9	9	9	9	9
Equatorial Guinea	2	2	2	2	2	2	2	2	2	2	2	2

(Continued)

(Continued)													
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
Guinea-Bissau	3	3	3	3	3	4	5	5	5	6	6	7	
Kenya	3	3	3	3	3	3	3	3	4	4	4	4	
Lesotho	2	3	4	4	4	4	4	4	4	4	4	4	
Madagascar	4	4	5	6	6	6	6	6	7	7	7	7	
Malawi	2	2	2	2	2	2	2	2	2	2	3	3	
Mali	4	4	4	4	4	4	4	4	5	5	5	5	
Mauritius	1	1	1	1	1	1	1	1	2	3	3	3	
Mozambique	2	2	2	2	2	2	2	2	2	2	2	3	
Namibia	1	1	1	1	1	1	1	1	1	1	1	2	
Niger	4	4	5	5	5	6	6	6	6	6	6	6	
Nigeria	8	8	8	8	8	9	9	9	9	9	9	9	
Uganda	7	7	7	7	7	7	7	7	7	7	7	7	
Central African Republic	5	5	5	5	5	5	5	5	5	6	6	6	
Rwanda	4	4	4	4	4	4	5	5	5	5	5	5	
Senegal	2	2	2	2	2	2	3	3	3	3	3	3	
Seychelles	2	2	2	2	2	2	2	2	2	2	3	3	
Sierra Leone	3	3	4	5	5	5	5	5	5	5	5	5	
Somalia	3	3	3	3	3	3	4	4	4	4	5	5	
South Sudan												1	
Swaziland	3	3	3	3	3	3	3	3	3	3	3	3	

(Continued)

(Continued)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Tanzania	2	3	3	3	3	3	3	3	3	3	3	4
Chad	5	5	5	5	5	5	5	5	5	5	5	5
Togo	3	3	3	3	3	3	3	3	3	3	3	4
Zimbabwe	7	7	7	7	7	7	7	7	7	7	7	7

Data from 1994 to 2016 on the sandwich year (1 in sandwich year and 0 otherwise)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
South Africa	10	10	10	11	11	11	11	11	11	11	11
Benin	12	12	12	12	12	12	12	12	12	12	13
Botswana	3	3	4	4	4	4	4	4	4	4	4
Burkina Faso	5	5	5	5	5	5	5	5	6	6	6
Burundi	8	8	8	8	8	8	8	8	8	8	8
Cabo Verde	3	3	3	3	3	4	4	4	4	4	4
Cameroon	2	2	2	2	2	2	2	2	2	2	2
Comores	8	8	8	8	8	9	9	9	9	9	10
Congo Rép. D.	4	4	4	4	4	4	4	4	4	4	4
Congo Rép.	6	6	6	6	6	6	6	6	6	6	6
Ivory Coast	4	4	4	4	4	5	5	5	5	5	5
Djibouti	2	2	2	2	2	2	2	2	2	2	2
Eritrea	1	1	1	1	1	1	1	1	1	1	1
Éthiopie	5	5	5	5	5	5	5	6	6	6	6
Gabon	2	2	2	3	3	3	3	3	3	3	3
Gambie	4	4	4	4	4	4	4	4	4	4	4
Ghana	9	9	9	10	10	10	11	11	11	11	11
Equatorial Guinea	2	2	2	2	2	2	2	2	2	2	2

(Continued)

(Continued)												
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Guinea-Bissau	7	7	7	8	8	8	9	9	10	10	10	
Kenya	4	4	4	4	4	4	4	4	4	4	4	
Lesotho	4	4	4	4	4	4	4	4	4	4	4	
Madagascar	7	7	7	8	8	8	8	8	9	9	9	
Malawi	3	3	3	3	3	3	4	4	5	5	5	
Mali	5	5	5	5	5	5	6	7	7	7	7	
Mauritius	3	3	3	3	3	3	4	4	4	5	5	
Mozambique	3	3	3	3	3	3	3	3	3	4	4	
Namibia	2	2	2	2	2	2	2	2	2	3	3	
Niger	6	6	6	6	7	8	8	8	8	8	8	
Nigeria	9	10	10	10	11	11	11	11	11	12	12	
Uganda	7	7	7	7	7	7	7	7	7	7	7	
Central African Republic	6	6	6	6	6	6	6	7	8	8	9	
Rwanda	5	5	5	5	5	5	5	5	5	5	5	
Senegal	3	3	3	3	3	3	4	4	4	4	4	
Seychelles	3	3	3	3	3	3	3	3	3	3	4	
Sierra Leone	5	6	6	6	6	6	6	6	6	6	6	
Somalia	5	5	5	6	6	6	7	7	7	7	7	
South Sudan	1	1	1	1	1	1	1	1	1	1	1	

(Continued)

(Continued)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Swaziland	3	3	3	3	3	3	3	3	3	3	3
Tanzania	4	4	4	4	4	4	4	4	4	5	5
Chad	5	5	5	5	5	5	5	5	5	5	5
Togo	4	4	4	4	4	4	4	4	4	4	4
Zimbabwe	7	7	7	7	7	7	7	7	7	7	7

Sources: **Data from** Kouotou and Epo (2019)

Appendix B: Countries included in the study

Botswana	Ghana	Mauritius	Rwanda	Uganda
Burkina Faso	Kenya	Mozambique	Senegal	
Cameroon	Lesotho	Namibia	South Africa	
Ethiopia	Malawi	Nigeria	Tanzania	

Sources: **authors with data from** Kouotou and Epo (2019) **and ASD**



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