

Structural Transformation, Economic Growth and Employment Creation in Africa: An Empirical Analysis

Mohamed M. Yaïche

Ph.D. Economic Sciences, University of Sfax, Tunisia

Address: Higher Institute of Business Administration, Airport Road, P.B: 1013. Sfax, 3018.

Abstract— *Our work is part of the studies that deal with the issue of structural transformation and economic growth in Africa. More specifically, it seeks to provide evidence of the lack of decent employment in the relatively-high economic growth experienced by the African continent since the turn of the century. The methodology of our work consists of the following two approaches; (I) the first is descriptive and shows the shortcomings of economic growth in terms of job creation, which are explained in part by the absence of effective structural transformation, (ii) the second is econometric and consists, firstly, in determining, by means of different econometric models and methods, the elasticity of the relationship of employment to economic growth in Africa; secondly, and in order to show the role of structural transformation, we try to measure the effect of a change in the share of the manufacturing industry in the GDP on economic growth for a sample of African countries by using an extended model of Mankiew, Romer & Weil (1992).*

On the basis of all these empirical analyses, we have come up with a set of results. First, the high economic growth achieved in Africa over the last fifteen years has been very low in terms of creating decent employment. This is reflected in the weakness of the elasticity of employment growth compared to the one in other regions of the world, including that of South Asia. Second, Africa is the victim of unsuccessful structural transformation characterized by a very limited contribution of the manufacturing sector to economic growth and consequently to job creation.

Keywords— *Structural Transformation, Economic Growth, Job Creation, Elasticity of Employment to Growth, Africa.*

I. INTRODUCTION

In fact, no one can be unaware of the fact that Africa has seen its economic performance improve considerably since the beginning of the 21st century with the GDP rising on average by almost 5% during this period, making the African continent second in having a fast economic growth behind Asia. Paradoxically, however, this respectable growth has created very few jobs and unemployment has remained high, particularly among young people. This situation is the result of a growth which is driven mainly by capital-intensive sectors based on an extractive industry that has no downstream and upstream link with the economy. More specifically, this remarkable economic growth has been favored by a number of factors, including the relatively-high prices of commodities, the consolidation of domestic demand in relation to increased incomes and increased public spending (particularly in the fields of infrastructure and social services), the increase of agricultural production and, above all, an improvement, admittedly slow but gradual, in the governance and management of the political and economic plans. These factors partly explain the fact that this rapid economic growth has not resulted in a significant reduction of poverty levels and, above all, has not generated a massive number of jobs.

In this work, our goal is to show that if Africa's rapid economic growth is not a job creator, it is because the process of structural transformation that it is supposed to generate has failed. As a result, the manufacturing industry, as a labor-intensive sector with a strong upstream and downstream relationship with the rest of the economy, is still lagging behind and its contribution to the economy is still very limited.

Thus, to deal with this subject, our work will be organized in two sections. In the first, we highlight that since the beginning of the current century, Africa has recorded a rapid economic growth; however, this has not generated a decent-enough employment. To do this, we will follow two approaches: the first, which is a descriptive one, consists in examining the evolution of economic growth and job creation in Africa during the last fifteen years and comparing the evolution of these two factors with their evolution in other regions of the developing world whereas the second approach, which is econometric, determines the employment intensity of economic growth using different models and econometric methods for a sample of 46 African countries over a period of twenty years (1996-2015). An empirical analysis of this elasticity of employment to growth and its comparison with elasticity in other parts of the world will enable us to explain the employment deficiency of

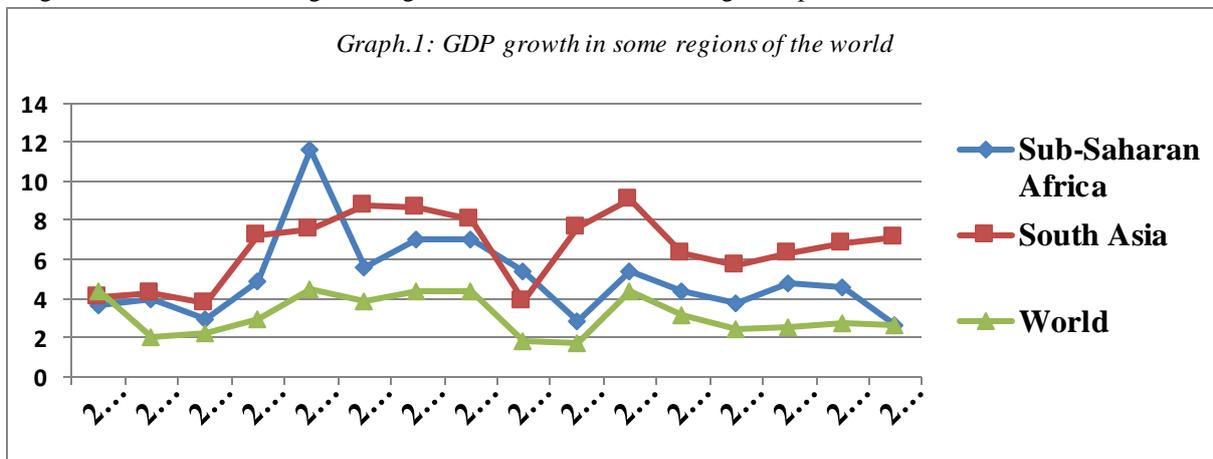
economic growth in Africa. In the second section, we will try to show that the employment deficiency of economic growth in Africa is due to the lack of a structural transformation towards the manufacturing industry. We will pursue both the descriptive and econometric approaches. First, we will examine the evolution of the structure of the economies of the African countries, particularly the sub-Saharan countries, to show that the structural transformation in Africa is not very successful. Then, secondly, we will adopt an empirical analysis using an econometric model that aims to measure the contribution of the manufacturing sector to economic growth for a sample of 29 African countries covering the period (1996-2015). The purpose of this empirical investigation is to show that Africa is characterized by a low contribution of the manufacturing industry to economic growth.

II. ECONOMIC GROWTH WITH LITTLE JOB CREATION

In this section, we will try to show that although Africa has recorded a rapid economic growth since the beginning of the century, this has not been beneficial to the creation of enough decent jobs. For this reason, we will follow two approaches: the first consists of a simple retrospective examination of the evolution of the status of economic growth and the creation of employment in Africa during the last fifteen years while the second consists in determining the employment intensity of economic growth in Africa using different econometric models and methods. An empirical analysis of this elasticity of employment to growth and its comparison with elasticity in other parts of the world will enable us to explain the employment deficiency of Africa's strong economic growth since the turn of the century.

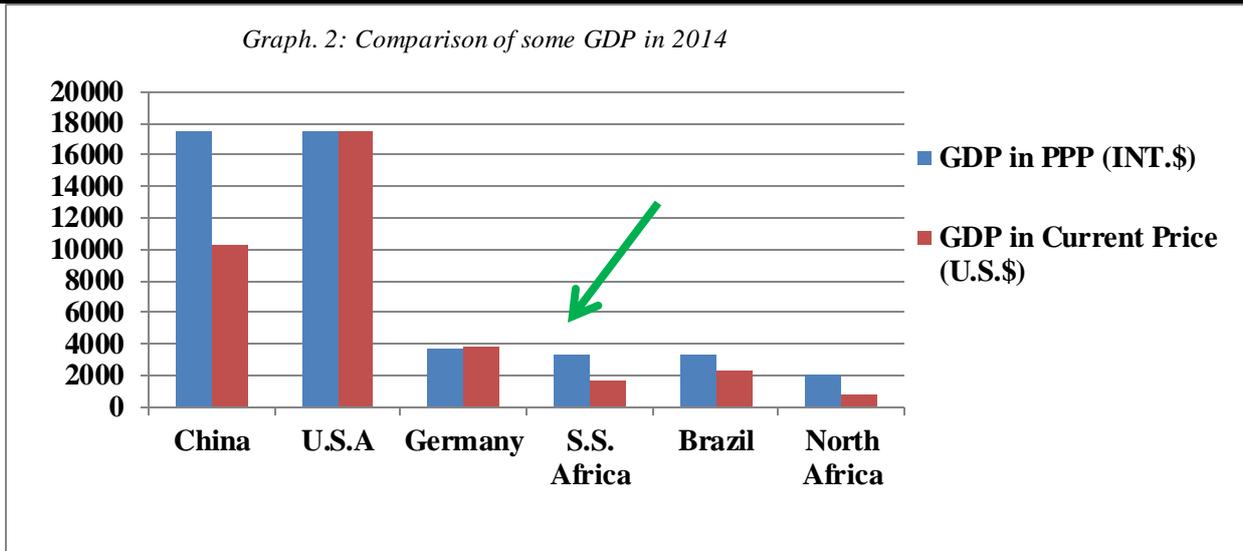
Economic Growth and Job Creation in Africa: An Inventory of Fixtures

Since the beginning of the 21st century, Africa has enjoyed a fairly strong economic growth. On average, this growth which was 5% per year in the countries of Sub-Saharan Africa reached even 11.6% in 2004 (see Graph.1). Globally, Africa ranks as the second fastest-growing region in the world, just behind South Asia. Moreover, some countries of the African continent are among the fastest growing economies in the world. On the other hand, African growth dropped in the last two years from 4.5% in 2014 to 3.0% in 2015. This decline of growth is mainly due, on the one hand, to the fall of commodity prices, particularly that of hydrocarbons and, on the other hand, to the weak growth of the main trading partners of African countries. In fact, the latest slowdown in growth was recorded in 2009, just after the global financial crisis, which abruptly cut through the 6.8% annual average GDP growth momentum that the region experienced between 2003 and 2008.



Source: Author's conception, WDI: World Bank data (2017)

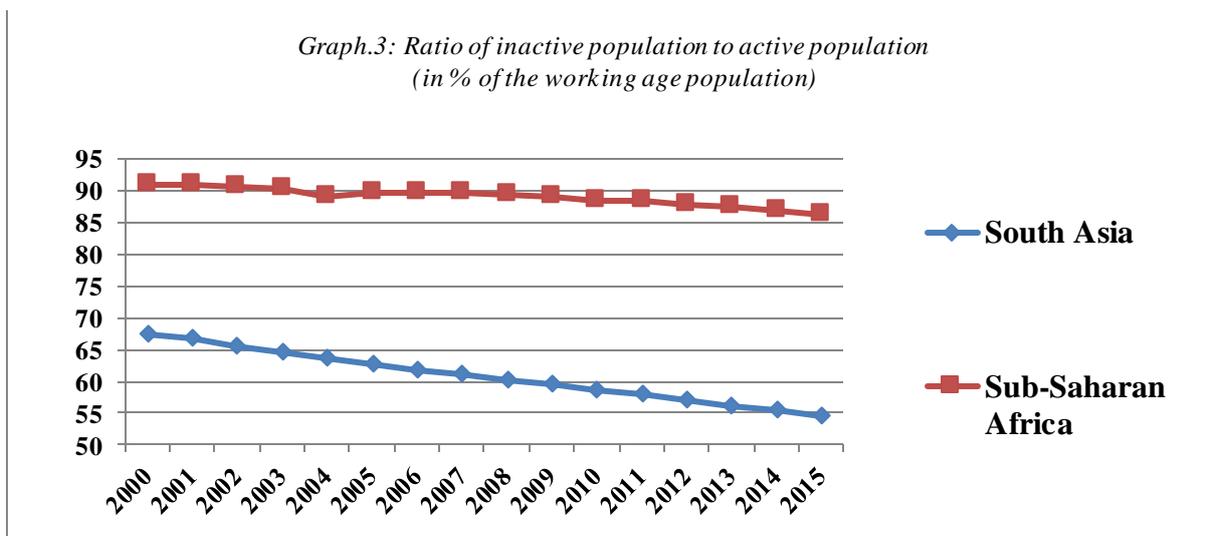
On the other hand, although inhabited by more than a billion people and representing 20% of the total surface area of the earth and composed of 54 countries, Africa has a particularly-low GDP compared to other regions. Indeed, at total purchasing power parity, Africa's GDP is located between that of Germany and Brazil (see Graph.2). Population growth is also steady in sub-Saharan Africa, the region with the highest rate in the world. As a result, GDP per capita growth has been lower than total GDP growth. In 2014, GDP per capita in purchasing power parity was \$ 3.513 for sub-Saharan Africa, while the world average was \$ 14.956.



Source: IMF "World Economic Outlook", April 2015.

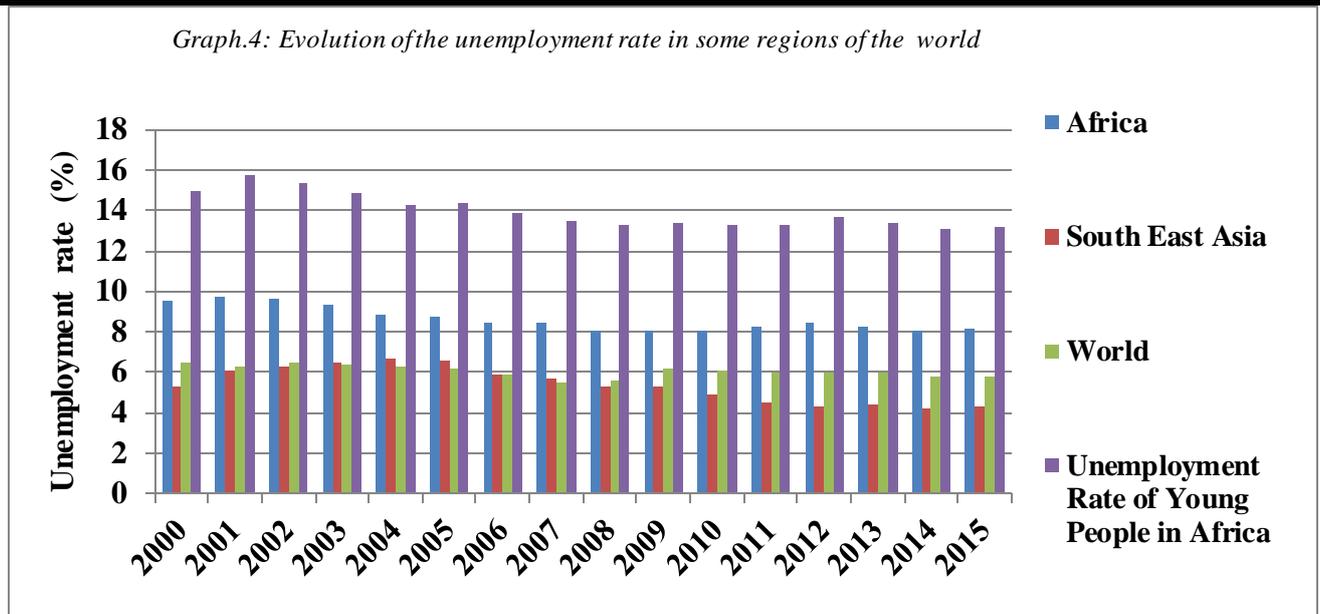
Thus, despite its rapid growth in the past 15 years, much of Africa's population still suffers from economic poverty and inequality. This proves that this strong growth has not resulted in the creation of the many jobs needed for the entire growing working-age population.

Indeed, the ratio of the inactive population to the active population (as a percentage of the working-age population) still remains among the highest ratios in the world and especially compared to that of the countries of South Asia (see Graph.3).



Source: Author's conception, WDI World Bank data (2017)

Moreover, despite the fact that this ratio has fallen during the last fifteen years from 90.75% to 86.12%, it remains well above the figures for South Asia, with 54.6% in 2015. As a result, the continent continues to suffer from high unemployment, especially among young people and women. An unemployment rate between 8 and 10% is much higher than that of the countries of Southeast Asia which has never reached 7% since the beginning of the century (see Graph.4).



Source: Author's conception, I.L.O. data "Trends Econometric Models database"

Since this growth has hardly generated enough quality jobs, it has led to an increasing dependence on the jobs of the informal sector. This sector, which continues to grow, is helped, among other things, by the persistence of corruption.

In this regard, according to the International Labor Organization (ILO, 2012) 60% of African workers are poor because they are "stuck" in the informal sector, which is synonymous with precariousness and exploitation. Precarious employment in Africa remains consistently high compared to other regions (ILO, 2013).

This is mainly due to an abundant supply of labor combined with a low social security coverage, making it difficult for many low-skilled workers to leave the labor market as they have no other means of survival. Since the continent has the youngest population in the world and this population has grown faster than anywhere else in the world, the youth unemployment rate is much higher than that of adults at 13.2% and respectively 8.2% in 2015 (see Graph.4). Generally, the lack of skills and the mismatch between training and the needs of the labor market are the main sources of unemployment among young jobseekers¹.

As a result, although in Africa the high rate of unemployment may be partly explained by the rapid growth of the labor force, it is largely due to the inability of the African economies to create productive employment. This situation results in a large under-utilization of capacity and the increase of the number of underpaid informal jobs, which constitutes a serious obstacle to the consolidation of long-term economic growth.

Economic Growth and Job Creation in Africa: An Econometric Analysis in Terms of the Elasticity of Employment to Growth

The economic indicators related to employment, particularly those that measure the ability of economies to generate sufficient employment opportunities for their populations, often provide valuable information on the overall economic performance of nations. Among the most widely-published indicators are unemployment rates, employment-to-population ratios and activity rates. Another indicator of the labor market, which, because it is a little less accessible, receives less attention in the literature, is the employment intensity of growth or the elasticity of employment to growth.

Thus, in order to explain the employment deficiency of economic growth in Africa, we will try to determine in what follows the level of employment intensity of growth on a sample of African countries. Thus, after having first presented the theoretical basis and the methodological context of the estimation of the elasticity of employment to growth, we will begin, secondly, an empirical analysis of this elasticity by different models and econometric methods. After that, we will compare our results of estimates with the results of other empirical studies concerning other regions of the world.

¹ ADB African Development Bank, 2012, "Economic Outlook for Africa"

According to the fundamental definition of the elasticity of employment to growth², we can define the "Arc elasticity" of a country (i) at a date (t) noted $\epsilon_{i,t}$ by the following simple formula:

$$\epsilon_{i,t} = \frac{(E_{i,t} - E_{i,t-1}) / E_{i,t-1}}{(Y_{i,t} - Y_{i,t-1}) / Y_{i,t-1}} \quad [1]$$

Where $E_{i,t}$ and $Y_{i,t}$ are respectively the employment and GDP of a country (i) at a date (t). The numerator simply gives the percentage of the change of employment in the country (i) between the periods (t) and (t-1), while the denominator gives the corresponding percentage change of output between the two periods in question³.

On the other hand, although this methodology is very simple, several authors (Islam and Nazara (2000) and Kapsos (2005)) have concluded that the elasticity of employment from one year to another calculated according to this formula, or even under its logarithmic form, tends to be highly unstable and may therefore be inappropriate for comparative purposes. To remedy this type of problem, several authors (Islam and Nazara (2000), Kapsos (2005), Crivelli and al. (2012), Madariaga (2013)⁴ ...) have adopted other more and more sophisticated econometric methods to estimate the elasticity of employment to growth.

Selected Models and Estimation Methodologies

Taking into account the availability of data for a sample of African countries, we opted for the model of Crivelli and al. (2012), which consists in estimating, first, the employment elasticity using time regressions for each country separately. Then, in a second step, inspired by the work of Kapsos (2005), Crivelli and al. (2012) and Madariaga (2013), we chose to estimate elasticity for the entire sample using panel data. Thus, the approach we have chosen requires three types of regressions:

1. The first consists in regressing the simple fundamental relationship that derives from the very definition of elasticity, namely:

$$Emp_t = \alpha + \beta GDP_t + u_t \quad [S1],$$

with t representing the time (t = 1996, ..., 2015), Emp_t the log of total employment, GDP_t the logarithm of GDP in year t and u_t : the error term, and (β) the coefficient which is to be estimated and which automatically represents the value of the elasticity. Our objective is to identify for each country in our sample of 46 African⁵ countries a value of the elasticity of employment to growth, then, to calculate the average value for the entire sample, which will give us a global idea about the employment intensity of economic growth in Africa.

2. The second model consists in adopting the relationship of Kapsos (2005) and Crivelli et al. (2012) in time series of each country:

$$\ln(E_t) = \alpha + \rho \ln(E_{t-1}) + \beta \ln(Y_t) + \omega_t \quad [S2],$$

with t representing the time (t = 1996 ... 2015), Emp_t the log of the total employment on date t, $Emp_{i,t-1}$ the log of the employment of year (t-1), which represents the lagged variable, and GDP_t the logarithm of GDP of year t and ω_t ; the error term and (ρ , β) are the coefficients to be estimated.

From this specification, the employment elasticity of each country's growth is calculated from the estimated coefficients as follows⁶:

$$\epsilon_{E/Y} = \frac{\beta}{1-\rho} \quad [2] \quad \text{when } \rho < 1 \text{ is checked}$$

² In the corresponding literature, the terms "employment elasticity to growth" and "growth intensity of employment" are used interchangeably to refer to the percentage change of the number of persons employed in an economy or region associated with a variation, as a percentage, of economic output as measured by gross domestic product.

³ Obviously, this means that this elasticity, as defined here, measures, in percentage terms, how much employment grows when GDP grows by 1%.

⁴ Islam, I. and S. Nazara (2000), "The Employment Intensity for the Indonesian Economy", ILO Working Paper, N° 343576, ILO, Geneva.

- Crivelli, E., D. Furceri and J. Toujas-Bernat  (2012), "Can Policies Affect Employment Intensity of Growth? A Cross Country Analysis", IMF Working Paper N° 12/2018, International Monetary Fund, Washington D.C.

- Madariaga, N. (2013), "Growth and Employment in Southern and Eastern Mediterranean Countries: Do Labor Productivity Gains Play a Role in Job Creation? Macroeconomics and Development, N° 8 September.

⁵ Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cape Verde, Cameroon, Comoros, Rep. of the Congo., Democratic Rep. of the Congo, Cote d'Ivoire, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Uganda, Central African Republic, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Chad, Togo, Tunisia, Zambia, Zimbabwe.

⁶ See, Crivelli & al. (2012) and Madariaga, N. (2013)

The third type of regression requires a specification inspired by the model used by Crivelli et al. (2012). This involves estimating equation [S3] below in panel data for the same sample of 46 African countries covering the same period (1996-2015), which is:

$$Emp_{i,t} = \alpha + \delta Emp_{i,t-1} + \mu GDP_{i,t} + \omega_{i,t} \quad [S3],$$

with i denoting the countries ($i = 1, 2, \dots, N$), t representing the time ($t = 1996, \dots, 2015$), $Emp_{i,t}$ the log of total employment for country i at time t , $Emp_{i,t-1}$ the log of employment of the year ($t-1$) which represents the lagged variable and $GDP_{i,t}$ the logarithm of GDP of country i for year t and $\omega_{i,t}$: the error term and (δ, μ) are the coefficients to be estimated. (The elasticity is also calculated by the same principle as the previous specification by following Equation [2]).

Our goal is in fact the determination of a single value which is representative of the employment intensity of economic growth in Africa as a whole.

Presentation and interpretation of the results obtained from the different types of regressions chosen

Estimating our specification [S1] with the OLS method for each country gave us the following results, which are presented in Table 1:

Table 1: Results of the estimation of elasticity with the (S1) specification

Country	Elasticity	Country	Elasticity	Country	Elasticity	Country	Elasticity
South Africa	0,4371*	Cote d'Ivoire	0,8859*	Malawi	0,6849*	Senegal	0,6284*
Algeria	0,6061*	Egypt	0,6879*	Mali	0,9794*	Sierra Leone	0,5381*
Angola	0,381*	Ethiopia	0,4052*	Morocco	0,2997*	Sudan	0,4166*
Benin	0,7944*	Gabon	0,5203*	Mauritius	0,2143*	Swaziland	0,7438*
Botswana	0,6083*	Gambia	0,9028*	Mauritania	0,6886*	Tanzania	0,3502*
Burkina Faso	0,5576*	Ghana	0,5003*	Mozambique	0,3126*	Chad	0,4323*
Burundi	1,193*	Guinea	1,2315*	Namibia	0,5576*	Togo	1,1178*
Cameroon	0,9544*	Guinea-Bissau	0,7871*	Niger	0,8392*	Tunisia	0,4495*
Cape Verde	0,5329*	Kenya	0,6564*	Nigeria	0,3399*	Zambia	0,3828*
Comores	1,3038*	Lesotho	0,1903*	Uganda	0,5477*	Zimbabwe	-0,4595*
Dem. Congo	0,6237*	Liberia	0,4526*	Central African Rep.	0,2083(n)	M46	0,60
Rep. of Congo	0,6898*	Madagascar	1,1086*	Rwanda	0,4311*	M40	0,55

* Significant at 1%; (n) Not significant

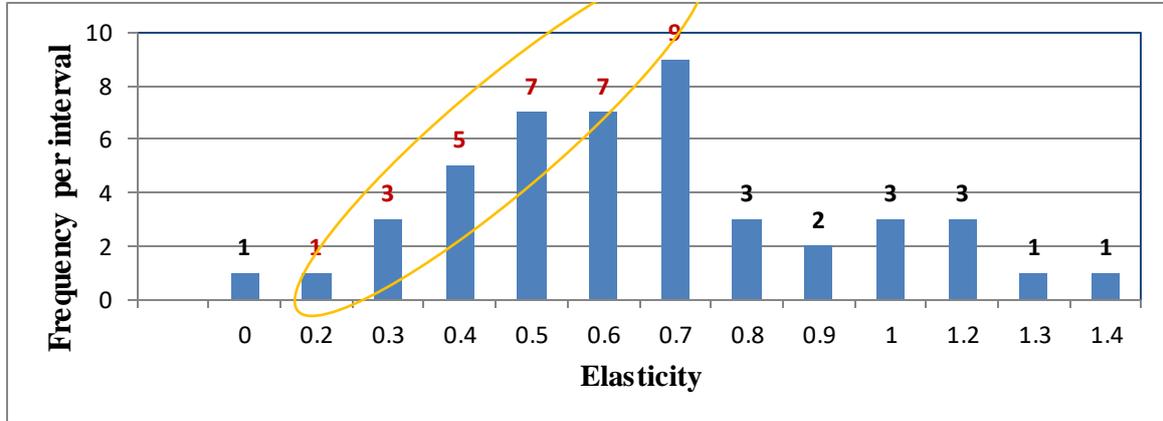
Source: Author

The examination of these results led us to the following observation: first, all the results are statistically significant except for that of the Central African Republic. Second, the elasticity values found are, as Kapsos indicated in his 2005 reference article, between 0 and 1, except for only 6 countries out of 46 (see Table 1). Third, according to the results of this specification, the employment intensity of economic growth in Africa is on average in the order of 0.60 if we take into account outliers (> 1 and < 0) and it will be close to 0.55 if not (These are respectively the M46 and M40 values at the bottom of Table 1). This relatively low average elasticity is, in fact, indicative of low-job-creating African economic growth since on a continental scale, an economic growth of only 1% increases employment on average by only 0.6%. On the other hand, according to Crivelli et al. (2012), whose study refers to the period (1990-2010), the countries of South Asia recorded an elasticity of 0.99⁷.

⁷However, the results of Kapsos (2005) found contradictory results. Indeed, for the period 1999-2003, it is concluded that the employment intensity of growth is higher in the countries of North Africa and the Middle East (from 0.51 to 0.91) than in Asia (from 0.42 to 0.7).

Finally, according to the graph showing the frequency of the employment elasticity values of the countries in our sample, we can draw the following two conclusions: (i) 70% of these countries (32 out of 46 countries) have an intensity of employment below 0.7 (Graph 5); (ii) 50% of the latter group of 32 countries have an elasticity between 0 and 0.5 only. This concentration around a much lower employment elasticity, 0.7 (the figure advanced by Khan (2001))⁸, proves once again that the growth of the majority of African countries is still considered as a weak creator of employment.

Graph.5: Distribution of the employment elasticity of growth in Africa according to the [S1] Specification



Source: Author

Concerning the next step of our approach, which consists in regressing Specification [S2], the estimation generated some technical problems since the mathematical condition ($\rho < 1$) necessary for the determination of the elasticity starting from estimated coefficients [2] is not always verified. Therefore, to remedy this problem, we chose to estimate the same specification [S2] but this time without the constant α . Then, we chose for each country the most reliable and statistically significant elasticity among one of the two results. The result of this work is summarized in Table 2.

Table 2: Retained results of elasticity estimation with the (S2) Specification

Country	Elasticity	Country	Elasticity	Country	Elasticity	Country	Elasticity
South Africa	0,4261	Cote d'Ivoire	0,2303	Malawi	0,5207	Senegal	0,3410*
Algeria	0,3909	Egypt	0,6192	Mali	1,1196	Sierra Leone	0,6401
Angola	0,3192**	Ethiopia	0,3690	Morocco	0,2818***	Sudan	0,3500*
Benin	0,8487	Gabon	0,7326	Mauritius	0,2801	Swaziland	0,7825**
Botswana	0,4585	Gambia	0,0000016	Mauritania	0,3500	Tanzania	0,2195
Burkina Faso	0,4477	Ghana	0,5233**	Mozambique	0,3825	Chad	0,2111
Burundi	0,3395	Guinea	0,3456	Namibia	0,3846	Togo	0,4276*
Cameroon	0,4321	Guinea-Bissau	1,0583	Niger	0,6920	Tunisia	0,4544
Cape Verde	0,4790	Kenya	0,3713	Nigeria	0,4242	Zambia	0,4572
Comoros	0,3826	Lesotho	0,3130	Uganda	0,6712*	Zimbabwe	0,4024
Dem. Congo	0,3854*	Liberia	0,3585	Central African Rep.	0,3001*	M46	0,4772
Rep. of Congo	0,6898*	Madagascar	1,2259**	Rwanda	0,3811*	M36	0,4930

* Significant at 1%; ** Significant at 5% and *** Significant at 10%. The crossed out numbers do not check the condition ($\rho > 1$) Source: Author

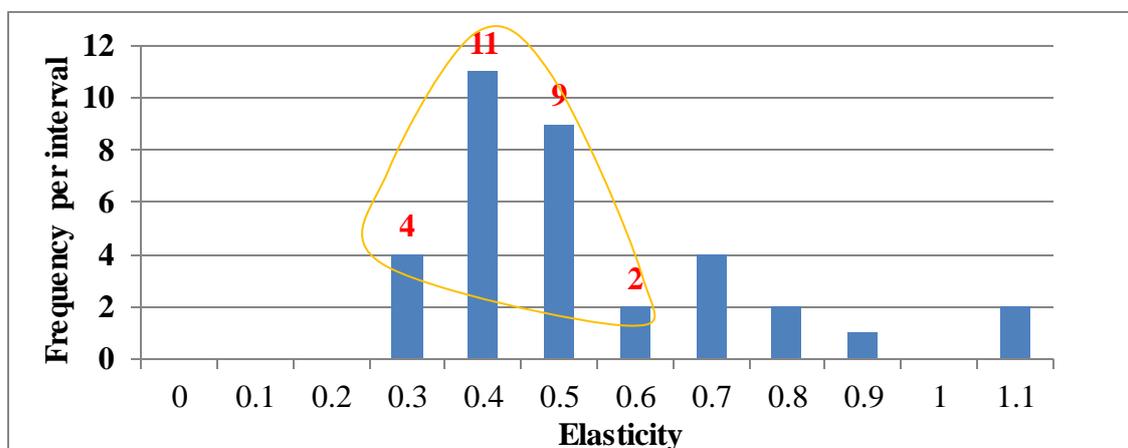
⁸ Khan, A.R. (2001), "Employment Policies for Poverty Reduction", Employment and Poverty Discussion Paper, No. 1, ILO, Geneva
 In this paper, Khan argues that employment elasticity in the developing economies should ideally be around 0.7 until these economies reach a higher average income status. Kahn also argues that labor-intensive economies, particularly those with a relatively high incidence of poverty, must achieve relatively higher employment intensity than economies with lower labor costs.

The synthesis of the results obtained led us to the following observations: first, the adoption of Specification [S2] (with the constant) did not give (for many countries) good results either from a point of view of significant statistic, or respect of the condition relating to the coefficient (ρ) or from the point of view of size⁹. Secondly, the estimation of the equation without a constant has improved the results for many countries. But still, the necessary condition remains untested for the 10 countries which are visible in Table 2 and whose figures are crossed out.

Two main lessons can be drawn from these results:

- i. The similarity of levels of elasticity of employment to growth within the majority of the African countries is much clearer than in the previous result. In fact, almost 70% of our selected samples, where the values are acceptable, have an elasticity of employment growth between 0.3 and 0.5 (see Graph.6).
- ii. The elasticity estimated by this method proves an even lower intensity than the previous one by recording an average of 0.47 over the entire sample of 46 countries (i.e. the value M46 of Table 2) or at most an average of 0.49 out of 36 countries with acceptable values (M36 in Table 2). Therefore, the hypothesis of African economic growth which is not highly job-creating is largely reinforced by these results.

Graph.6: Distribution of Employment Elasticity of Growth in Africa According to the [S2] Specification



Source: Author

Finally, the last step consists in estimating the [S3] specification in panel data for the same sample and the same period.

Before estimating a sample of panel data, it is necessary to check whether the data-generating process is homogeneous or heterogeneous. Econometrically, the specification tests come down to determining whether one has the right to assume that the studied theoretical model is perfectly identical for all the countries, or on the contrary, there are specificities for each country¹⁰.

The presence of specific effects for each individual makes the ordinary least squares estimators non-convergent. In these conditions, we need to access the estimate by the "Within" method if these effects are fixed, or the Generalized Least Squares method if these effects are random. The application of the existence of individual-specificity tests rejects the hypothesis of homogeneity of the variables.

Once the heterogeneity of the variables is detected, we have to choose between regression by the "within" method or by the method of Generalized Least Squares "GLS". To substitute between these two methods, we apply the Hausman specification test. By referring to the statistics of this test, the Eigen effects are fixed because we have accepted the

⁹ For example: the calculation of the elasticity relative to the Demo. Rep. of Congo has given an exorbitant figure of 76.8. (the same as for other countries such as Cameroon, Guinea or Zimbabwe)

¹⁰ The presence of specific effects for each individual makes ordinary least squares estimators non-convergent. In these conditions, we need to access the estimate by the "within" method if these effects are fixed, or the generalized least squares method if these effects are random. The application of the existence of individual-specificity tests rejects the hypothesis of homogeneity of the variables.

hypothesis of correlation between the country's specific effects and the explanatory variables. In this case, the "within" method used to estimate the fixed effects model is convergent and efficient.

As a consequence, the results of the estimation by applying a fixed-effect static regression panel as well as the Hausman test result are shown in the following table, namely Table 3:

Table.3: Results of the Fixed Effects Regression of the (S3) Specification

	Emp ₁	GDP	α	N	R ²	H
S3	0,985***	0,008***	-0,0514	873	0,9962	20,77***

*** Significance of 1%; ** Significance of 5%.

Source: Author

From these coefficients and using the formula [2] of elasticity, we obtain a growth elasticity of employment for the whole of our sample of 46 African countries in the order of **0.533**. This figure confirms the results obtained by the previous model. Hence, the following summary table:

Table.4: Summary Results of the Estimation of Employment Elasticity to Growth in Africa.

	Results obtained according to the different specifications		
	S1	S2	S3
Employment elasticity of growth in Africa	0,55 – 0,6	0,47 – 0,49	0,53
Elasticity (average of the 3 specifications)	0,52		

Source: Author

Comparison with other works on elasticity in other regions of the world

Two levels of comparisons are then distinguished; the first consists in comparing our results with those of the ILO, estimated in 2005 by Steven Kapsos, for the same sample of African countries but of course for a different period (1999-2003). The second is devoted to the comparison of the overall average value of employment elasticity of growth in Africa with an average elasticity in other Asian regions or Latin America. In this regard, we refer to the work of Crivelli et al. (IMF, 2012) and Madariaga (AFD, 2013).

In an ILO study, Kapsos (2005) conducted a broad empirical analysis of the total employment intensity of a large sample of 160 countries covering the period 1991-2003¹¹. We used the results of this study to calculate the average employment elasticity with respect to GDP for the same sample of 46 African countries. The average found from this study is (0.57). By comparing the values we have estimated through different specification and econometric methods, we can say that they are relatively similar. Nevertheless, it cannot be denied that at the level of each country's elasticity, there is sometimes a significant gap between the Kapsos results and ours. However, within the "Kapsos" study, there is sometimes, for the same country, an eminent difference between two types of elasticity relative to two different periods¹². This shows that the econometric results of elasticity are very sensitive to the period of study and, consequently, in spite of everything, they always remain unstable over time. The graph below (Graph.7) highlights the degree of similarity between the two results at the level of each country and at the aggregate level of employment intensity of growth in Africa, which remains insufficient. Based on the study carried out by Crivelli et al. (2012), we found that their comparison between regions revealed a large variation in the employment elasticity (with the highest estimates for South Asia (0.97)). On the other hand, employment elasticity figures are modest in low-income regions and are about three times as high as those in high-income regions.

¹¹ In fact, the analysis is divided into three sub-periods: 1991-1995, 1995-1999 and 1999-2003. We have chosen, in our comparative analysis, the results of the third period (1999-2003) as they are the closest to ours.

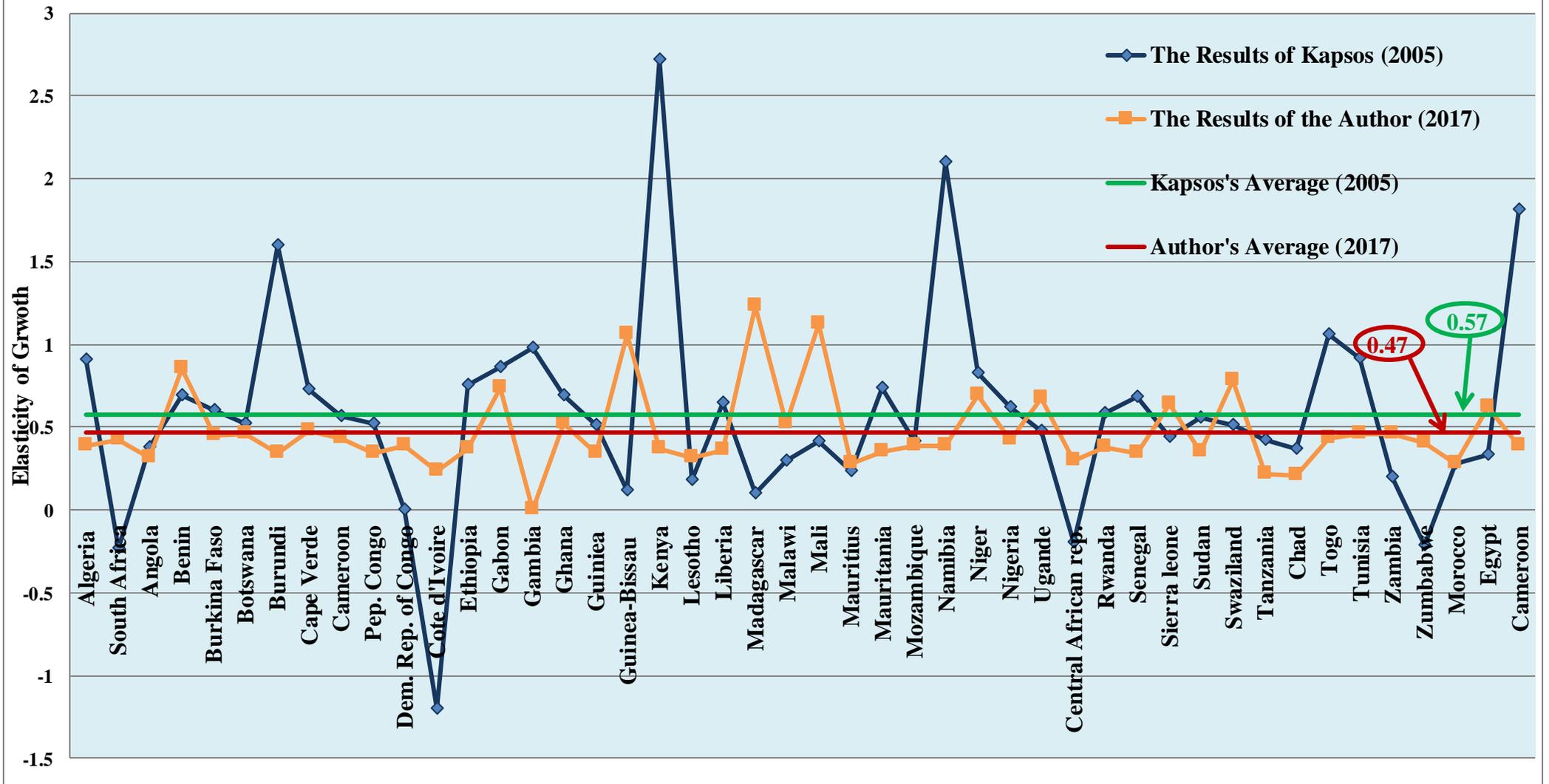
¹² For example: the estimated elasticity for the first, second and third periods respectively was for Morocco: (-0.09), (1.07) and (0.28); for Togo: (0.01), (0.87) and (1.06); for Namibia: (0.48), (-1.12) and (2.10), ... etc. (See Kapsos (2005) page 40 and 41)

However, according to the results of Madariaga (2013), the levels of elasticity of employment to growth, in the three zones of his sample¹³, are almost equal as they are around 0.6. In this respect, our results for African countries are themselves close to these levels. Therefore, with these relatively low magnitudes of elasticity in all of these areas, including Africa, one can expect a little growth in job creation.

Thus, examining these authors' results for the different regions of the world, apart from their differences, makes us conclude that the employment intensity of growth may empirically (and not only theoretically) reach higher levels (e.g. 0.97 in South Asia); this indicates a much richer economic growth in terms of employment.

¹³ The first zone: Southern and Eastern Mediterranean countries (Egypt, Morocco, Tunisia, Turkey and Syria.); the second zone: Latin America and the Caribbean (Argentina, Brazil, Chile, Colombia, Mexico, Costa Rica, Peru and Venezuela.) and the third zone: Emerging Asia (Malaysia, Philippines, Thailand, Vietnam, China and Indonesia).

Graph.7: The Employment Elasticity of Growth in 46 African Countries: Comparison with the Results of Kapsos (2005)



In conclusion, this weak growth of job creation in Africa remains a phenomenon to be explained by other means or by other structural, institutional factors the improvement of which is likely to consolidate growth and improve its quality in terms of job creation. In this regard, Madariaga (2013) states that: *"The estimation of the elasticity of employment to growth only bears witness to a correlation link. The link between economic growth, employment growth and unemployment is indeed much more complex [...]. We have already mentioned the demographic factors and the blockage on the labor market [...] to which is added an important institutional factor"*.

For our part, in the following part of this work, we try to look for some responses to the insufficient job creation of the economic growth in Africa although the latter is very high in light of the weak structural evolution of the economies of these countries as well as in the failure of their institutional framework.

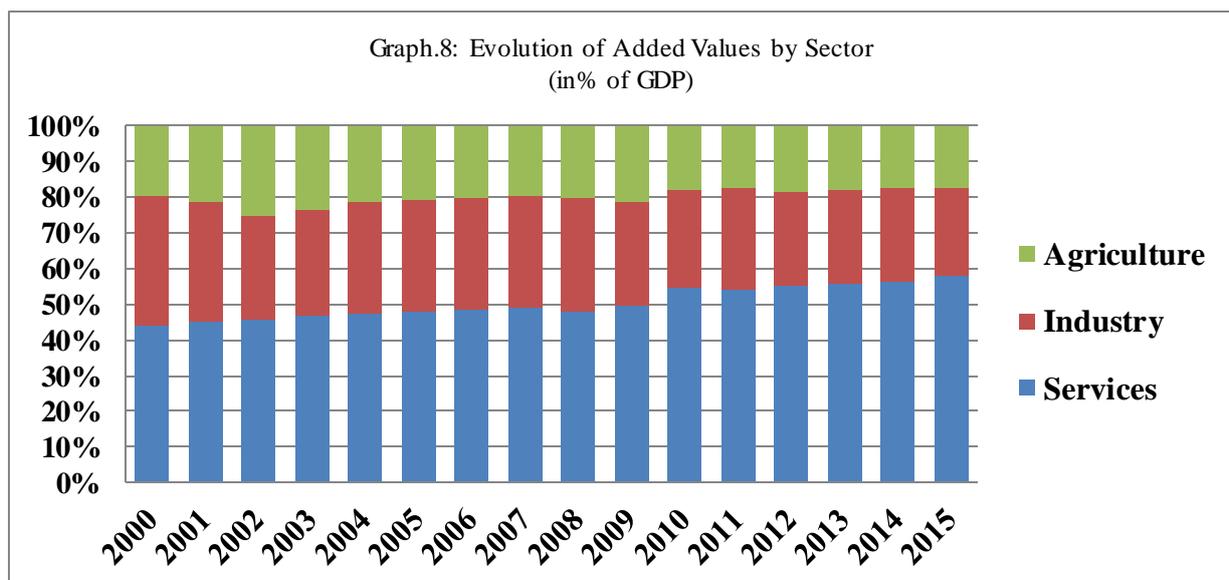
III. UNSUCCESSFUL STRUCTURAL TRANSFORMATION

Above all, it is important to mention that the term "structural transformation" (or "economic transformation") has been used regularly in the economic literature for several decades. However, this concept may have different meanings (Silva and Teixeira, 2008; Syrquin, 2010; Lin, 2011 and 2012). Along the present work this expression shall mean a process in which the relative importance of different sectors and activities of national economy changes in both as regards the composition of the economy that the use of factors. This is a relative expansion of manufacturing sectors and high productivity services at the expense of low productivity agriculture and low value-added extractive activities. In addition, the development of manufacturing activities has historically been at the heart of the process of structural transformation.

Thus, in this second section, we will try to show that the employment deficiency of economic growth in Africa is due to the lack of a structural transformation towards the manufacturing industry which generally has a high productivity. First, we will continue the descriptive analysis of the evolution of the structure of the economies of a sample of African countries, particularly, Sub-Saharan Africa. Then, secondly, we will adopt an empirical analysis using an econometric model to measure the contribution of the manufacturing sector to the economic growth of a sample of African countries.

Structural Transformation in Africa: A State of Play

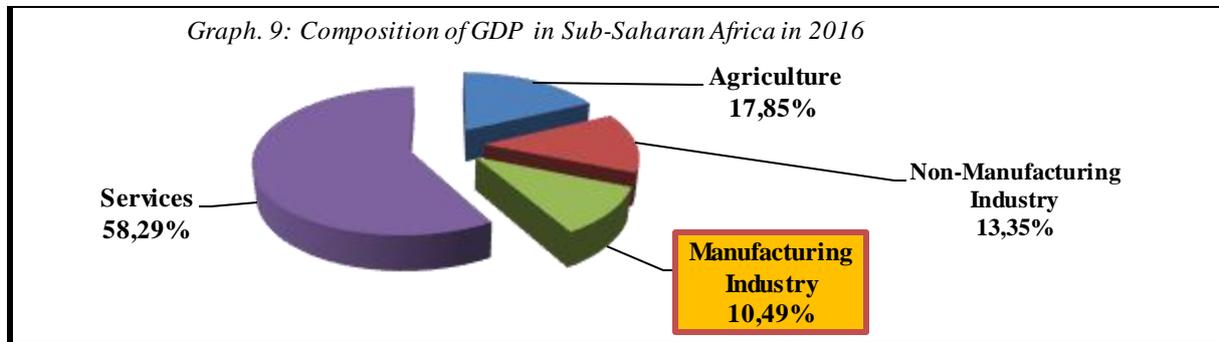
By disaggregating GDP to distinguish the respective shares of agriculture, industry and services over the period 2000-2015, the limited nature of Africa's structural transformation is highlighted. More specifically, it is worth noting that the industrial sector has kept the same weight in the African economy even though there is a kind of deindustrialization that has settled in the recent years. In fact, the share of the added value of the industrial sector in the total GDP has oscillated along the last fifteen years between 35 and 25%, while agriculture has accounted for almost 20% of the GDP over this period (see Graph.8).



Source: Author's conception, World Bank data (2017)

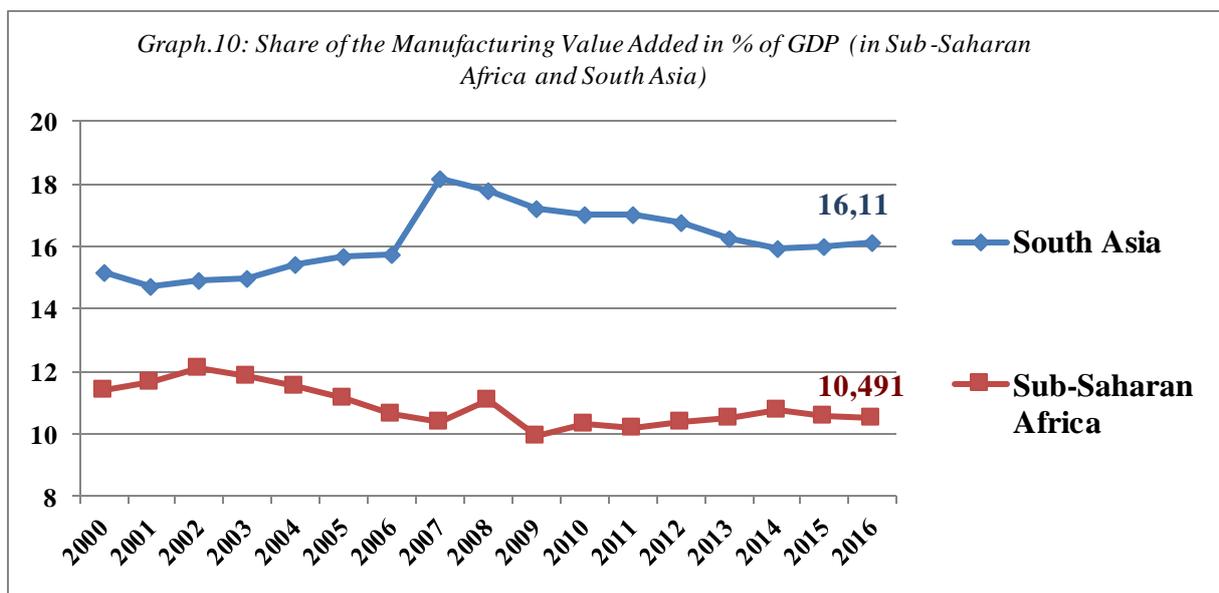
However, this relatively high share of industrial production is mainly due to the extractive industries and the share of manufacturing industry has never exceeded 10% (see Graphs.8 and 9). In contrast, the service sector has the highest growth

in African economies, accounting for about the half of the GDP (see Graph.9). In fact, the main services generating economic growth are transport, telecommunications, financial services and tourism. Countries such as Nigeria, Tanzania and Uganda, are among those that have benefited most from the dynamism of the service sector. Besides, although the service sector reached 58% of GDP in 2016, sub-Saharan Africa still has a long way to go to catch up with the developed countries where this sector accounts for more than 70% of their GDP.



Source: Author's conception, WDI, World Bank, (consulted in August 2017)

An examination of the available data on the composition of the GDP in Africa made us conclude that one of the essential characteristics of the manufacturing sector in Africa is its very limited role in the economy, unlike what happens in the other developing regions. In particular, the share of the manufacturing value added in the GDP is low, compared to other regions, such as South Asia. In 2000, this sector accounted for 11.39% of Sub-Saharan Africa's GDP, and in 2016, it accounted for 10.49%. On the contrary, the manufacturing sector seems to play a greater role in the economic activities of the developing countries, whether in Asia or Latin America. In South Asia, for example, the share of the manufacturing value added in the GDP increased from 15.15% in 2000 to 16.02% in 2015, or even to a peak of 18.16% in 2007 (see Graph.10).



Source: Author's conception, WDI World Bank (consulted in August 2017)

In conclusion, the African economic performance has improved significantly: the GDP has increased by an average of almost 5% in the last fifteen years, making the African continent second to see a rapid growth, behind Asia. However, this substantial growth has created very few jobs and unemployment remains high especially among young people. This situation is the result of growth driven mainly by capital-intensive sectors based on an extractive industry that has no link, downstream and upstream, with the economy. On the other hand, the labor-intensive sectors are lagging behind since the economic growth has not generated the jobs and incomes needed to reduce the high unemployment and poverty rates on the continent. In other words, the key finding is that structural transformation in Africa is limited, and has not contributed to growth, contrary to what occurred in South Asia.

Contribution of the Manufacturing Industry to Economic Growth in Africa: An Empirical Analysis

Now, we will empirically examine the contribution of the manufacturing sector to economic growth in Africa. To do this, we have chosen, through an econometric model, to measure the effect of a change in the share of the manufacturing industry in the GDP on the economic growth of a sample of 29 African countries¹⁴ over a period of twenty years (1996-2015).

Presentation of the Model

In our empirical study, we have chosen the contribution of the manufacturing industry to Africa's economic growth in order to adopt a model that has its roots in the work of Mankiew, Romer and Weil (1992) as expanded by several authors during the 1990s. The advantage of this model lies in the fact that, on the one hand, it can help us examine the effects of our key variable, the "manufacturing industry", while taking into account the effects of other key controlling variables of economic growth and, on the other hand, it has been widely used in recent empirical research studies that seek to verify the determinants of economic growth. Very often, the explanatory variables included in the specifications are deduced from both theoretical and empirical literatures on the determinants of economic growth.

Thus, the regression to be performed is based on the following function form¹⁵:

$$PIBH_{i,t} = \alpha + \beta MAN_{i,t} + \delta INVEST_{i,t} + \gamma EDUC_{i,t} + \rho G_{i,t} + \varphi OUV_{i,t} + \varepsilon_{i,t} \quad [3]$$

where i denotes the countries ($i = 1, 2, \dots, N$) and t represents the time ($t = 1, \dots, T$), GDPH: the logarithm of GDP per capita, MAN: the logarithm of the share of the value added of the manufacturing industry in the GDP, INVEST: the logarithm of GFCF in % of GDP, EDU: the logarithm of the secondary school enrollment ratio (gross rate), G: the logarithm of the ratio of public consumption to GDP, OUV: the logarithm of the opening ratio in % of GDP (exports + imports / GDP); $\varepsilon_{i,t}$ is the error term and $(\beta, \delta, \gamma, \rho, \varphi)$ is the vector of the coefficients to be estimated.

Subsequently, we will regress this long-term relationship in panel data, taking into account the non-stationarity of the series for our sample of 29 African countries over a period of twenty years (1996-2015).

The selected variables are:

- GDP per capita, as a specific variable (calculated in 2010 in constant dollars).
- The added value of the manufacturing industry as a percentage of GDP.
- GFCF as a percentage of GDP chosen as the physical capital index.
- Human capital refers to the set of abilities learned by individuals which increases their productive efficiency. The secondary school enrollment rate is chosen as the index of the enrollment rate, which, in turn, is considered as proxy for human capital (Mankiew et al., 1992).
- Public expenditure G includes expenditure on infrastructure, communication and transport. This element is the heart of Barro's (1990) model whereas external openness, which depends on trade policy, is represented by a rate calculated from the sum of imports and exports deflated by the GDP.

Estimation Methodology

A co-integration analysis on panel data provided a natural conceptual framework for the examination of the relationship between economic growth and its determinants.

Unit root tests

Verification of the stationarity of the data of all the variables is a necessary step in any study. In this respect, we have opted for a panel stationarity test procedure provided by Im et al. (2003)¹⁶. These tests are the most widely used when the temporal dimension is limited. The authors proposed tests that help detect the presence of a unit root in models using Fisher's ADF statistics. The results of these tests are presented in the following table:

¹⁴ South Africa, Algeria, Angola, Benin, Botswana, Burkina Faso, Cameroon, Congo, Cote d'Ivoire, Egypt, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Malawi, Mauritania, Morocco, Mozambique, Namibia, Nigeria, Uganda, Central African Republic, Senegal, Tanzania, Chad, Togo, Tunisia, Zimbabwe.

¹⁵ A similar specification was verified by Ben Amar, M. and Hamdi, M.T. (2016) for another sample and covering another period.

¹⁶ Im, K.S., Pesaran, M.H. and Shin, Y. (2003), "Testing for Unit Roots in Heterogeneous Panels", Journal of Econometrics, Vol.115, pp. 53-74

Table.5: The Results of Unit Root Tests

Variables	PIBH	MAN	INVEST	EDU	G	OUV
Level	1,0431	2,5729	2,9257	3,2040	0,9264	-0,6330
first difference	-10,9563***	-17,539***	-15,259***	-13,044***	-7,7184***	-14,493***

* Significance of 10%, ** Significance of 5%, and *** Significance of 1%

Source: Author's calculation based on the results of the IPS test.

From Table 5, which displays the IPS test results, it can be concluded that not all the variables are stationary in level. The variables of the equation become stationary after a first differentiation, so they are all integrated of order 1.

Then, after having established that all the series are integrated of the same order (1), we test the existence of a stable long-term linear relationship between these series.

Co-integration tests

Once the first order integration of the series is verified, we can proceed to the co-integration tests. The application of the Pedroni test (2004) gives us the following results:

Table 6: The Results of the Co-integration Test

STATISTICS	WITHOUT TREND
Panel v-Statistic	3,2750***
Panel roh-Statistic	1,3291
Panel PP-Statistic	-27,950***
Panel ADF-Statistic	-7,8293***
Group roh-Statistic	3,5095
Group PP-Statistic	-32,0901***
Group ADF-Statistic	-7,8888***

* Significance of 10%, ** Significance of 5% and *** Significance of 1%

Source: Author's calculation based on the "Pedroni" test results.

According to Pedroni (1999), for small samples, the most powerful test is the one similar to the ADF (Group ADF-Statistics) test. The co-integration tests of Pedroni (2004)¹⁷ presented in the previous table show that there is a co-integration relationship between real GDP per capita and its determinants described by our theoretical model.

According to the results of our estimation (see Table 7), the level of manufacturing industry development, which is measured by the value added of the manufacturing industry as a percentage of GDP, has a positive and statistically significant effect on the level of the GDP per capita. As a result, a 1% increase of the value added of the manufacturing industry increases the GDP by 0.025%.

Obviously, the manufacturing industry positively contributes to the economic growth of these countries, but it is clearly weak and therefore contributes only modestly to economic growth and consequently to job creation in Africa.

Table.7: The Results of the Regression with the DOLS Method (GDP per capita as endogenous variable)

Variables	MAN	INVEST	EDU	G	OUV	R ²
Coefficients	0,02509*	0,4192***	0,16196***	-0,1395***	0,0833***	0,99

*significance of 10%, **significance of 5% and ***significance of 1%

Source: Author's calculation by the DOLS regression method.

¹⁷ In this estimation, we are content to check whether at least one co-integration relation exists.

This very weak effect can be explained by the underdevelopment of the manufacturing sector in our continent because of the absence or dysfunction of the adopted industrial policies. Hence, this empirical result comes to justify and confirm, first, the low contribution of the manufacturing industry to the creation of wealth and therefore the low job creation, and secondly, it succeeds in confirming the level of weak structural transformation that African economies have been able to achieve so far.

Theoretically, the accumulation of physical and human capital has a positive effect on economic growth. In fact, our empirical results are consistent with this rule, with statistically significant coefficients. Besides, according to the results (of Table 7), a 1% improvement in physical capital will increase per capita GDP by 0.41% and a 1% increase in human capital will increase GDP per capita by 0.16%. On the other hand, the openness to the outside has a positive and statistically significant effect on the per capita GDP growth. This positive effect of openness to the outside can be explained by the policy of dismantling restrictions on foreign trade which has a favorable effect on economic growth.

Finally, the negative and statistically significant sign of the 'public expenditure' variable as a percentage of GDP is expected because in the vast majority of African countries, the state of the infrastructure is so poor that any increase in the level of public spending can only have a negative effect on the per capita GDP growth.

Therefore, the main conclusion of this empirical investigation can be summed up in one sentence: Africa is characterized by a low contribution of the manufacturing industry to economic growth. This result highlights the real problem of the failure of structural change in Africa. This blockage of the structural transformation process may, in theory, be explained by a probable failure of the institutional framework of the industrial policy. For this reason, this component will be the subject of the following section.

IV. CONCLUSION

We have shown in the first place that since the beginning of this century, Africa has seen its economic performance improve markedly by recording an average annual growth of almost 5% during this period, making the African continent the second to have a rapid growth, behind Asia. However, this respectable growth has created only very few jobs since unemployment remains high especially among young people. This situation is the result of growth driven mainly by capital-intensive sectors based on an extractive industry that has no link downstream and upstream with the economy. On the other hand, the supposedly labor-intensive manufacturing sector is lagging behind. Economic growth has therefore not generated the jobs and incomes needed to reduce the high unemployment and poverty rates in the continent. In other words, the key finding is that structural transformation in Africa is limited, and has not contributed to growth, compared to developments in South Asia.

Our first empirical study to determine the elasticity of employment to growth in Africa endorses and explains this paradox. Indeed, this study resulted in elasticity of the order of 0.52 compared to the results found by other authors for other regions (Kapsos 2005, Crivelli et al. 2012 and Madariaga 2013). Apart from these differences, we concluded that, first, the employment intensity of growth in Africa is relatively low and, secondly, it can normally reach much higher levels (such as the 0.97 level reached by South Asia), which implies a much richer job growth.

The second empirical study, which aimed to measure the contribution of the manufacturing sector to economic growth, led us to the following result: a 1% increase of the value added of the manufacturing industry only increases the GDP per capita growth by 0.025%. Therefore, this empirical result comes, first, to justify and confirm the low contribution of the manufacturing industry in the creation of wealth and therefore the low job creation and, secondly, to confirm that the employment deficiency of growth in Africa is well and truly explained by an unsuccessful structural transformation. This blockage of the process of structural transformation is partly due to the inefficiency of the States through their institutions to succeed in such a process¹⁸.

REFERENCES

- [1] BAfD, OCDE, PNUD et CEA. 2013. Transformation Structurelle et ressources naturelles. Perspectives économiques en Afrique, 375 pp.
- [2] BAfD, OCDE, PNUD. 2014. Les chaînes de valeur mondiales et l'industrialisation de l'Afrique. Perspectives économiques en Afrique, 28 pp.

¹⁸ Hamdi, M.T. & Yaiche M.M. (2015), «Le cadre institutionnel de la politique industrielle et la performance économique: fondements théoriques et vérification empirique pour un échantillon de pays africains », 4th Congress of African Economists (Industrial Policies and Economic Performance), Accra-Ghana, from 16 to 18 November.

- [3] Ben Amar M. & Hamdi M.T. 2016. Transformation structurelle, croissance inclusive et développement humain en Afrique », 10^{ème} journées Scientifiques de l'Université de Toulon, 26 et 27 Avril.
- [4] E.C.A (Economic Commission for Africa), 2011. Industrial policies for the structural transformation of African Economies: Options and practice ». Addis Ababa.
- [5] Crivelli, E., D. Furceri and J. Toujas-Bernaté. 2012. Can Policies Affect Employment Intensity of Growth? A Cross Country Analysis. IMF Working Paper. Nb12, 2018, IMF, Washington D.C.
- [6] El-Hadj Bah. 2007. Structural Transformation in Developed and Developing Countries. MPRA Paper, n° 10655. <https://mpra.ub.uni-muenchen.de/10655/> .
- [7] Goujon M. et Kafando Ch. 2011. Caractéristiques structurelles et industrialisation en Afrique : Une première exploration. CERDI, Etudes et Documents, (E 2011,33). 15pp.
- [8] Hamdi M.T. et Ben Amar M. 2012, « Développement humain durable, qualité de la croissance économique et transformation structurelle en Afrique », Revue européenne du droit social, n°17, pp. 160-172.
- [9] Hamdi M.T. et Yaïche M. M. 2014. L'intensification du commerce intra-africain: quelle utilité pour les pays du grand Maghreb (cas du Maroc et de la Tunisie)? Revue Marocaine d'Audit et de Développement, n°38, septembre.
- [10] Hamdi M.T. et Yaïche M.M. 2015. Le cadre institutionnel de la politique industrielle et la performance économique: fondements théoriques et vérification empirique pour un échantillon de pays africains. 4th Congress of African Economists (Industrial Policies and Economic Performance), Accra-Ghana, from 16 to 18 November.
- [11] Hamdi M.T. et Yaïche M.M. 2017. Politique industrielle et performance économique en Afrique : le rôle du cadre institutionnel. Journal of African Transformation, Reflections on Policy and Practice. Vol.2, Numbers 1&2, 2017. United Nations, Economic Commission for Africa.
- [12] Hausman, J. A. 1978. Specification tests in econometrics. *Econometrica*, Vol. 46, N°6, Nov., pp. 1251-1271.
- [13] Islam, I. and S. Nazara. 2000. The Employment Intensity for the Indonesian Economy. ILO Working Paper, n°343576, BIT, Geneva.
- [14] Kapsos, S. 2005. The Employment Intensity of Growth: Trends and Macroeconomic Determinants. ILO Employment Strategy Paper n°2005/12, OIT, Genève.
- [15] Khan, A.R. 2001. Employment Policies for Poverty Reduction. Employment and Poverty Discussion Paper, n°1, ILO, Geneva.
- [16] Madariaga, N. 2013. Croissance et Emploi dans les pays du Sud et de l'Est de la Méditerranée : les gains de productivité du travail jouent-ils un rôle dans la création d'emplois ? In *Macroéconomie et Développement*, n°8, Septembre.
- [17] Mankiw, G.N., Romer, D. and Weil D.N. 1992. A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(7), pp 407-438.
- [18] Mc Millan, M. and Headey, D. 2014. Introduction – Understanding Structural Transformation in Africa. *World Development*, 63: 1-10.
- [19] Mc Millan, M. and Rodrik, D. 2011. Globalization, Structural Change and Productivity Growth. NBER Working Paper, n°11143, NBER, Cambridge, MA.
- [20] Nations Unies & Union africaine. 2014. Politique Industrielle dynamique en Afrique. Rapport économique sur l'Afrique. E.C.A.
- [21] Nations Unies & Union Africaine. 2015. Rapport économique sur l'Afrique : L'industrialisation par le commerce. E.C.A.
- [22] North, D.C. 2005. Understanding the process of Economic Change. Princeton University Press, traduction française : « Le processus du changement économique », Paris, Editions d'Organisation.
- [23] O.I.T. (Organisation Internationale du Travail) .2011. Croissance performante, emploi et travail décent en Afrique : une nouvelle vision s'impose ». 12^{ème} Réunion régionale africaine, Johannesburg, Afrique du Sud, 11-14 octobre 2011.
- [24] ONUDI (Organisation des Nations Unies pour le Développement Industriel). 2013. Rapport sur le développement industriel 2013. Soutenir la croissance de l'emploi : Le rôle du secteur manufacturier et du changement structurel un tour d'horizon. 45 pp.
- [25] Rodrik, D. 2014. An African Growth Miracle. NBER Working Paper N°20188, April 2014.
- [26] Silva, E.G. and Teixeira A.C. 2008. Surveying structural change: Seminal contributions and bibliometric account. *Structural Change and Economic Dynamics*, 19: 273-300.
- [27] Syrquin, M. 2006. Structural Transformation. David Alexander Clark Ed. The Elgar Companion to Development Studies, UK, pp.601-607.
- [28] World Bank. 2017. « World Development Indicators ».