Manufacturing Sector, Natural Resources and Economic Growth in Africa

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Abstract

Empirical studies are devoted to the impact of the manufacturing sector on economic growth assume that the relationship between it and the product per capita is the same for countries exporting natural resources and "non-exporters". The objective of this paper is to establish the relationship between the value added of manufacturing and agricultural sectors and GDP per capita in African countries according to their endowments of natural resource. The article examines whether natural resources in African countries affect this relationship. To do this, we estimate panel data models using data from 40 African countries over the period 1980-2010 from WDI. The method consists to estimate a panel data model, drawing on the writings of Szirmai, (2011) and approaches proposed by Arellano and Bond (1991) and Bond and Blundell (1998), on the other hand. We find that manufacturing value added has a positive and significant impact on the level of per capita product if and only if the value of the share of minerals and fuels in total exports is less than a certain critical value. We identify 30 countries where the value added in the manufacturing sector increases output the per capita (group 1) and 10 countries where this relationship is not significant (group 2). Agricultural value added has a negative effect on the level of output per capita in Africa. In addition, investment in infrastructure increases the level of output per capita in the African countries. These countries have an interest in developing their manufacturing and to increase their investment in infrastructure to stimulate growth.

Keywords: Economic Growth, Manufacturing, Natural Resources, Panel data

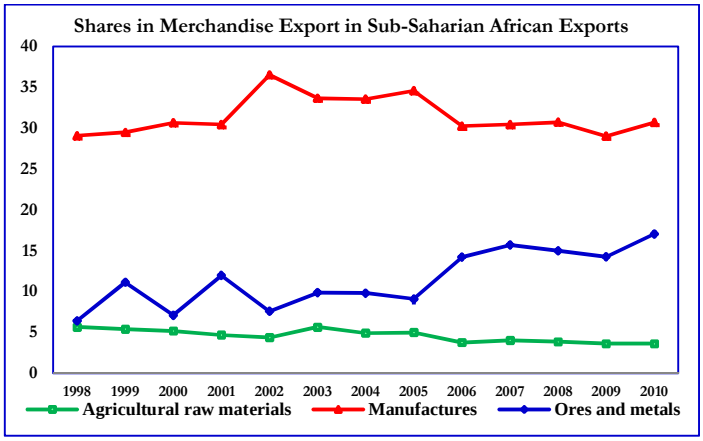
1. Introduction

Over the last fifty years, the question of industrialization in Africa has become a concern in the heart of the economic debate (Altenburg, 2011). This issue is particularly important because most African economies based on agriculture and low value-added exports of commodities cannot provide African countries with strong and sustainable economic growth. The industrialization of Africa will therefore accelerate the transition of African agriculture-based economy and the export of raw materials to a modern economy, create jobs, and ensure self-sufficiency and improving incomes and standards of living (UNCTAD, 2011). Indeed, in a modern economy, rapid and sustainable economic growth, almost always involved a process of industrialization and in particular the development of manufacturing (Szirmai, 2009). It is therefore necessary for African countries to make a structural change to significantly reduce poverty, provide jobs to its youth estimated between 7 and 10 million annually entering in the labor market (UNCTAD, 2011). To do this, it will then promote the growth of agricultural productivity on the one hand, and the development of other opportunities in agriculture, so in the processing of raw materials and services, other hand. That is to say, to pass low-productivity sectors to higher productivity sectors and within sectors to more productive activities.

Moreover, several empirical studies highlight the potential industrialization especially manufacturing in sustainable growth, employment and poverty reduction. Indeed, manufacturing activities are sources of technological advances, innovation in the modern economy, Gault and Zhang, (2010). Then, the manufacturing industry is a very important means of dissemination of new technologies in other

sectors of the economy, Shen (2007). Finally, synergy and training (demand[1], growth, and exports) on other sectors (agriculture, services) by the manufacturing activities are very important. The manufacturing sector is a source of technological change, but also has a higher potential for job creation as agriculture, Tybout (2000).

With several natural resources, Africa has experienced several industrialization policies. Indeed, after the oil shock of 1970, industrialization by import substitution (early 1960-end 1970) was no longer viable. Then in 1980 with the advent of the Structural Adjustment Programmes (SAPs), we are witnessing the abandonment of specific effects to promote industrialization in favor of the elimination of factors which barriers to exports and a further specification according to comparative advantage. Finally, under the weight of foreign debt most African countries adopted the Strategic Document for Poverty Reduction, which has completely changed the industrialization of African countries policies.



The share of manufactured goods in exports for all developing countries rose from 25% to nearly 85% between 1980 and 2005 (Martin, 2001). In SSA, the share of commodity exports in total exports has been a downward trend over the period 1998-2010. The share of manufactures in exports remained stagnant at about 32%. The export of gold and metals has been an upward trend over the period.

Despite these different phases of industrialization, the relations linking the manufacturing sector growth are not yet established in staffing or not in natural resources. Therefore, it became essential to ask how the manufacturing and agricultural sectors do they affect economic growth in African countries according to their natural resource endowments? The answer to this question is all the more necessary it will better appreciate the impact of the manufacturing sector on economic growth.

This paper answer several questions: (i) the level of development of the manufacturing sector there affect economic growth in Africa? (ii) the relationship between manufacturing and she depends on staffing or not natural resources of African countries economic growth? (iii) between agriculture and manufacturing, which contributes most to the GDP per capita?

To do this, a panel model that takes into account the endogeneity problems that may exist between the variables of interest was used. The most appropriate method used in this study to ensure the robustness of the estimated elasticities is the system GMM method proposed by Arellano and Bond (1991) and Blundell and Bond (1998).

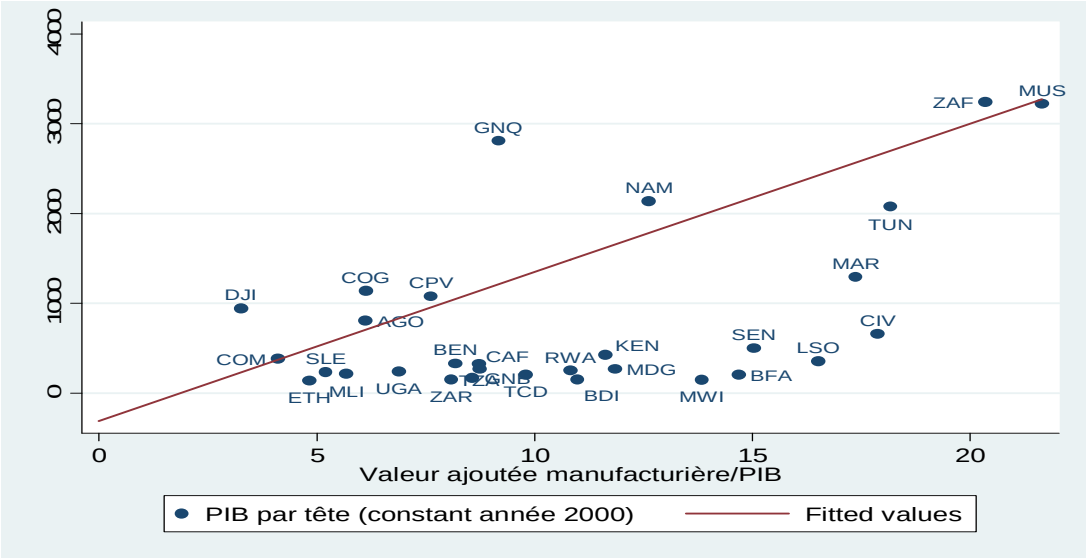
[1] According to Engel's law, as and as per capita income increases, the share of agriculture in total household expenditure decreases and the share of manufactures rose.

2. Results obtained

In group 1 consists of 30 countries, as shown in Figure 1, the value added of manufacturing in GDP is positively correlated with the level of GDP per capita. A simple OLS estimation of the value added in GDP (VAM / GDP) on GDP per capita gives the following results:

$$\frac{PIB}{Capita} = -220 + \underset{[0,004]}{95,52^*}\frac{VAM}{GDP}$$ with a p-value = **0.004** associated with the VAM in GDP ratio. In this group, manufacturing value added is positively related to income per capita. In the second group we do not present the results here, this relationship is not significant.

Figure 1: Manufacturing value added in GDP and GDP per capita in group 1



Notes: Each country is represented by the couple manufacturing value added in GDP (ordered) and GDP per capita (constant 2000 $) (x-axis). For these countries, the share of minerals and fuels in total exports is less than 25%. **Source**: Author's construction based on data from WDI, World Bank, online database, extraction October 2012.

Moreover, starting from a production function transform Cobb Douglas, the dependent variable, namely GDP per capita takes the following generative process:

$$\boldsymbol{Y_{it} = \alpha_0 + X_{it}\beta + \lambda_i + \upsilon_t + \varepsilon_{it}} \quad ; \quad \boldsymbol{i=1,\ldots N;\ t=1,\ldots,\ T}$$

With Y_{it} = real GDP per capita, X_{it}= matrix of explanatory variables, N = total number of countries, T = number of periods, λ_i = individual country effect, υ_t= time effect, α_0 and elements of β are the parameters estimating; ε_{it}= the error term, which is assumed zero mean and constant variance σ_ε^2. For lack of data, groups were operated on five times. The data cover the period from 1980 to 2010 and therefore T = 20.

The results show that different models are estimated globally significant in terms of the Wald statistic or Fisher (p-value <5%). Also, we validate the presence of AR effects (1) and AR (2) estimated by the GMM system models. Moreover, the Sargan tests or Hansen validate the choice of instruments. More explanatory variables are statistically significant. Indeed, the econometric analysis in the group 1 indicates that the value added of the manufacturing sector in GDP has a positive and highly significant impact on the level of per capita product. The estimated elasticity is 0.65. This means that a 1 percentage point increase in manufacturing value added per capita product increased by 0.65 points.

With regard to the added value of agriculture in GDP, it has a negative and significant effect on output per capita. Indeed, the elasticity associated with this variable is -0.92. This result highlights the need to invest in the growth sector that represents the manufacturing source of innovation and create jobs.

In addition, different models highlight that investment is the engine of economic growth in the countries concerned, Barro (1990). Also, infrastructure follow economic growth as in most empirical studies dedicated to growth. For these two variables characterizing the investment, estimated elasticity's are very significant and close to 0.18 points. Also, the degree of openness of the countries considered in a non-significant impact on the growth of output per capita.

Table 1: Results of the estimation by GMM in system (GMMS)

Dependent Variable: **Log (GDP per capita)**	Group 1: **(Nat. Res <25%)**	Group 1: **(Nat. Res >=25%)**
Log(VAM)	**0.654**	0.526
	(3.18)***	(0.88)
Log(VAGRI)	**-0.919**	**-2.29**
	(12.81)***	(2.00)*
Log(1+Phone)	**0.18**	-0.76
	(2.16)**	(1.16)
Log(FBCF/GDP)	**0.175**	**0.312**
	(2.03)*	(1.90)*
Inflation	**0.00005**	-0.0052
	(3.31)***	(1.46)
Log(Trade/ GDP)	0.059	-0.26363
	(0.69)	(0.83)
Constant	**6.63701**	**13.021**
	(7.09)***	(3.43)**
Observations (country)	177(30)	47.(9)
Wald chi2/Fisher	92.21***	17,41***
Hansen J test(p-value)	0.359***	0.991***
Arellano & Bond test AR(1) (p-value)	0.670***	0.462***
Arellano & Bond test AR(2) (p-value)	0.381***	0.782***

*: Significant at 10%, ** significant at 5%; ***: significant at 1% absolute value of the t-statistic (.)

Sources: Author's calculations based on data from World Development Indicators (WDI); Hansen test or J Sargan: Ho: No correlation of instruments with residues; (test validity of instruments); Arellano & Bond Test: Ho: Lack of effect for AR residues.

The econometric analysis in the group 2 indicates that compared to group 1, the impact of manufacturing value added is insignificant Product per capita. However, the added value of agriculture in GDP, as in group 1, has a negative and significant effect on output per capita. Indeed, the elasticity associated with this variable is -2.3.

In addition, investment is the engine of economic growth in the countries considered. The estimated elasticity for estimated by GMM method and system models in first differences are very significant and is 0.31 points (Table 1).

3. Conclusion and recommendations

The objective of this paper is to establish the relationship between the value added in the manufacturing and agricultural sectors and per capita GDP of African countries according to their natural resource endowments to propose actions for policy makers. This study concludes that the MVA has an impact differentiate as endowments in natural resources.

We show that the manufacturing value added has a positive and significant impact on the level of per capita product if and only if the value of the share of minerals and fuels in total exports is less than a certain critical value. The added value of the agricultural sector has a negative effect on the level of GDP per capita. In addition, control variables such as the share of investment in GDP and investment in infrastructure improve the level of per capita product.

Recommendations for immediate lessons learned from this study are as follows.

The results show that government actions will include:

1. Consider the manufacturing sector as a top priority. Through its training on other sectors of the economy effects, it can drastically change the structure of African economies.

2. Reorient the mining and oil rents to finance investment. Invest more in infrastructure source of economic growth, the development of R & D and technology acquisition. Indeed, the policies must develop infrastructure and basic services necessary for private sector development and promotion of agriculture.

3. Implement a policy to increase the technological absorption capacity in agriculture to increase productivity in this sector. This requires the promotion of human capital through the technological capacity of the sector.

4. Improve the business climate in different countries doing to reduce stress including those related to access to finance, access to land, access to electricity.

5. Establish bodies quality standards, support for research and development and delivery of services to improve productivity in the manufacturing sector with the aim of producing goods of medium and high technology.

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