TRENDS, PATTERNS AND KEY DRIVERS OF SECTORAL MANUFACTURING DEVELOPMENT IN AFRICA

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ABSTRACT

This paper extends and contributes to the literature on the drivers of structural components of manufacturing value added development in Africa. Given the problem of possible endogeneity, the estimation technique is the IV-SLS estimation procedure, with year fixed and sub-regional effects. It found that the key drivers of the sectoral MVA (as % of total MVA) differed substantially across the sectors in their impact in terms of sign and significance. A key finding is that, apart from chemical manufacturing that is linearly and negatively affected by the level of economic development, food, beverages and tobacco; machinery; textiles and clothing; and 'other' manufacturing were significantly affected by economic development to the third degree polynomial, with the first two with positive leading coefficient and the last two with negative leading coefficient. There was also a strong support for a non-monotonic, inverted U-shaped relationship between food, beverages and tobacco, textiles and clothing and other manufacturing MVA with tertiary education. Other drivers with differential impacts included primary and secondary education, natural resources dependence, FDI stock, science and technology proxy, ICT, social and political globalization, and energy use intensity. The paper thus offered some policy suggestions based on the conclusion.

JEL Classification: L16, L62, L64, L65, L66, L67, L69, O14, O55.

1. Introduction

RECENT research suggests that the industrial sector, especially manufacturing, is a key engine of growth in the development process, including that of Africa. As KPMG (2014) rightly notes, very few countries have been able to grow and accumulate wealth without investing in their manufacturing industries, and a strong and thriving manufacturing sector usually precipitates industrialization. This is because of the labour-intensive, export-focused nature of the industry. By increasingly adding value to commodities before they are sold, revenues are

boosted, thus raising average earnings per input. In addition, the manufacturing sector is more sustainable and less vulnerable to external shocks than primary commodities, for example. Indeed, recently, African countries have been buffeted by four very serious and interrelated external shocks, namely hikes in food prices, increases in energy prices, the global financial and economic crisis, and the ongoing collapse in commodity (especially oil) prices that started in 2014, whose economic and social costs in Africa have been quite substantial. These quadruple crises have refocused attention on Africa's high vulnerability to external shocks and the need for the promotion of industrialization, especially manufacturing. Manufactured exports have a much wider scope and more stable demand than primary commodity exports just as a strong manufacturing industry contributes to the development of the private sector, which further increases the economy's resilience to external shocks. In addition, manufacturing goods locally to supply the domestic market has a positive impact on the structure of the trade balance, improving external accounts.

Unfortunately, apart from the fact that manufacturing development in Africa has not improved over time, there have been less empirical studies investigating the structural components within the manufacturing sector, especially in Africa. Our study examines the trend, patterns and key drivers of sectoral manufacturing development in Africa. This will provide an industrial policy framework for structural change in manufacturing that can lead to sustained economic development in the long-run.

Reforms and evidence-based formulation and implementation of enterprise and industrial policies in African countries require a detailed understanding of the drivers of manufacturing value added at the level of individual industries. This paper therefore extends and contributes to the literature on structural components of manufacturing value added development in Africa in four ways. First, it documents recent trend in key sectoral manufacturing value added (MVA) development in African countries. Second, it analyses the patterns (increase, slow-down or decline; early, middle, late industries; regional processing, labour-intensive, global innovations for local markets, global technologies, or resource-intensive manufacturing) of the key structural components of MVA prevailing at certain economic development stages. Third, the paper empirically assesses the drivers of key sectoral[5] components of manufacturing value added in Africa using

[5] In this paper, 'sector' represents a component within manufacturing and is based on the two-digit level of the International Standard Industrial Classification (ISIC).

a time series cross-sectional data set of the countries for the period, 1990 to 2011 – and unlike many previous studies we employ a third degree polynomial of economic development and second degree polynomial of the indicators of education, in recognition of their recent stated theoretical and empirical relationships with MVA development (Haraguchi and Rezonja, 2011; Haraguchi, 2015a; UNIDO, 2015). Fourth, the paper offers policy suggestions in light of the evidence that would help African countries to effectively tackle the problems hindering the key sectors of manufacturing development in the continent with a view to scaling up and 'breaking into' substantial sectoral manufacturing development across the countries. To the best of our knowledge, the comprehensiveness of this study is, to date, unmatched in Africa in terms of focus, the scope of databases sourced and the range of variables covered.

This review is also important, as it will help point the way towards the attainment of Sustainable Development Goal (SDG) 9, which is to 'build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation'. This is more so, since the attainment of this goal is primary to feeding and industrializing Africans, creating quality jobs, promoting rapid and sustained economic growth, and investment inflows, skills development, and technology transfer in the continent. In particular, second objective of Goal 9 is promoting inclusive and sustainable industrialization and, by 2030, significantly raising industry's share of employment and gross domestic product, in line with national circumstances, and doubling its share in least developed countries.

The remainder of the paper is organized as follows: Section 2 discusses key stylized facts, while section 3 presents a brief review of the literature. Section 4 presents the theoretical framework, while section 5 discusses the empirical model and data; section 6 presents the empirical results and section 7 comprises the conclusion and policy implications.

2. Stylized Facts

This section presents some recent stylized facts about manufacturing value added (MVA as a share of GDP and sectoral manufacturing value added development. Figure 1 shows that Africa has the lowest MVA (%GDP) (averaging just 11% against East Asia and Pacific's 25% between 1995 and 2015) among the world's regions. Africa's MVA has also been on a declining trend. Africa produced just 1.4 percent of global manufacturing exports in 2014, and its share has remained within the narrow band of 1.0 to 1.5% since 2000. By contrast, China grew its share of global exports from 4.5% in 2000 to 15% in 2014. Also, according to

McKinsey Global Institute (MGI) (2016), Africa's total manufacturing output was worth around $500 billion and the vast majority of that was focused in five countries—Egypt, Morocco, Nigeria, South Africa, and Tunisia. It further indicated that 70% of this production was focused on meeting domestic needs and was consumed in the country of manufacture; some 10% was traded within Africa, and just 20% was exported beyond Africa.

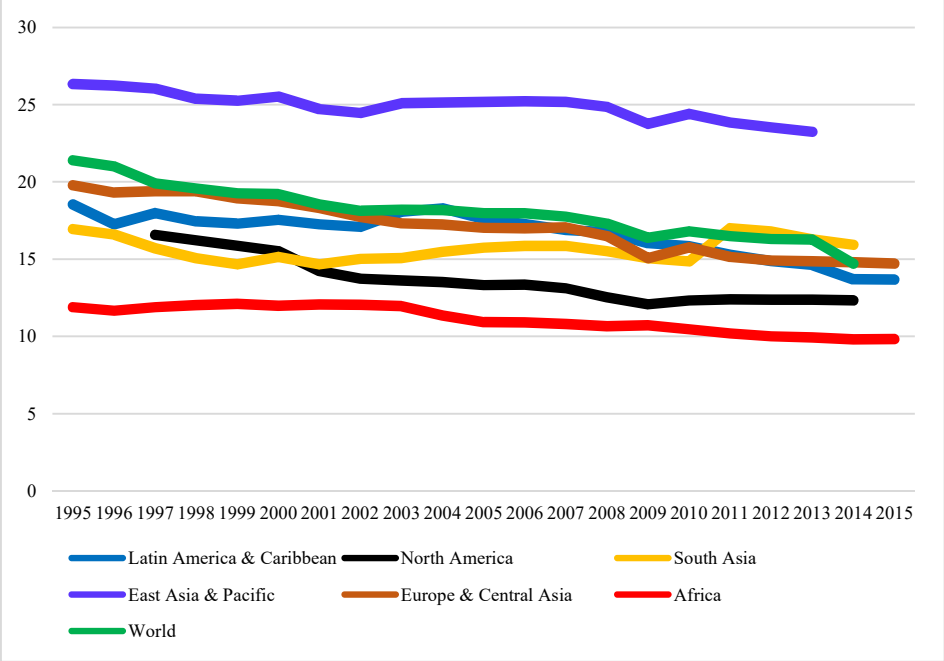

Figure 1: Regional trends in MVA as % of GDP, 1995-2015
Source: Authors, using data from the World Bank (2016)

However, these global sub-regional averages mask the global shares and structural differences. Figures 2 and 3, for example, show the distribution of value added (in 2010 constant prices) of selected manufacturing divisions among developing regions in 2010 and 2014, respectively. Africa not only has a very tiny but also the lowest sectoral manufacturing value added shares. Asia and the Pacific region have both huge and the largest share in all the manufacturing sectors in both years. Structural shares within regions presented in figures 4 and 5 indicate that among the various sectors, the food, beverages and tobacco a sector (stable and declining divisions) predominates in Africa as in other developing

regions while machinery and equipment (intensifying capital use sector) dominates in developed/industrialized economies.

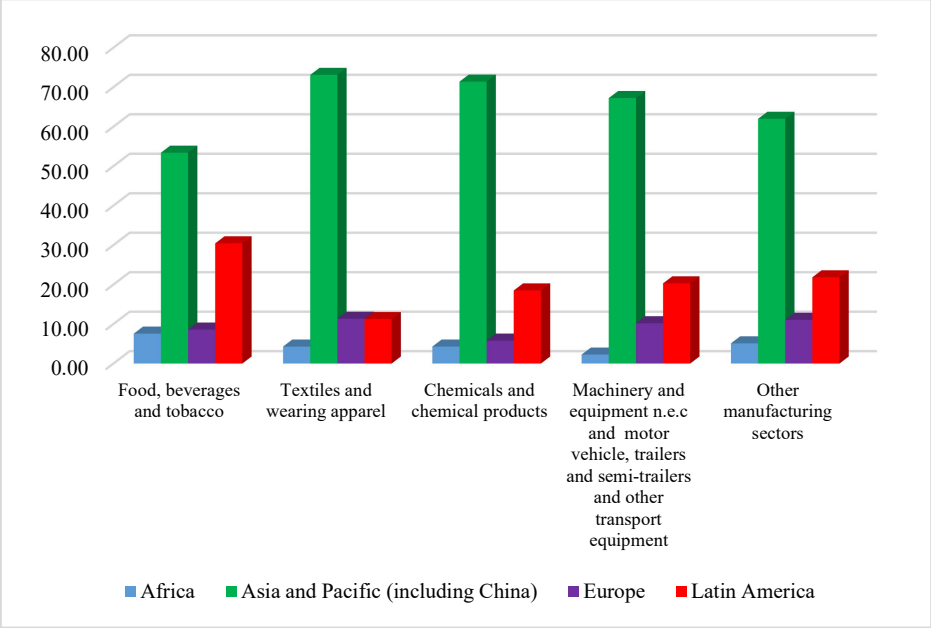

Figure 2: Distribution of value added (in 2010 constant prices) of selected manufacturing divisions among developing regions, 2010 (in percentage)
Source: Authors, based on data from UNIDO (2016) and World Bank (2016).

The structure of manufacturing value added between 1990 and 2011 (during which data was available) in Africa is shown in figure 6. Among the various sectors, the food, beverages and tobacco, a sector producing essential consumer foods has a strong presence in the continent than in industrialized countries. In industrialized countries, food manufacturing contributes well below 20% of the total value added of the manufacturing industry, however, its share averages about 38% in Africa between 1990 and 2011– the highest single component of manufacturing value added. The lowest single share relates to machinery and transport equipment at about 4%.

McKinsey Global Institute (2016) classified manufactured goods into five categories based on their specific traits: regional processing, global innovation for local markets, resource-intensive, labour-intensive tradables and global technologies. Regional processing includes agri-processing, beverages, fabricated

metals, and other industries that locate close to demand and sources of raw materials. Global innovations for local markets include chemicals, automotive, machinery, and other industries that are R&D intensive, with production close to demand. Resource-intensive includes energy and resource-intensive processing of commodities such as refined oil, cement, and basic metals. Labour-intensive tradables include apparel, footwear, textiles, and other goods that are highly tradable and require low-cost labour. Global technologies include computers, communications devices, and other high-R&D, high-value-density products.

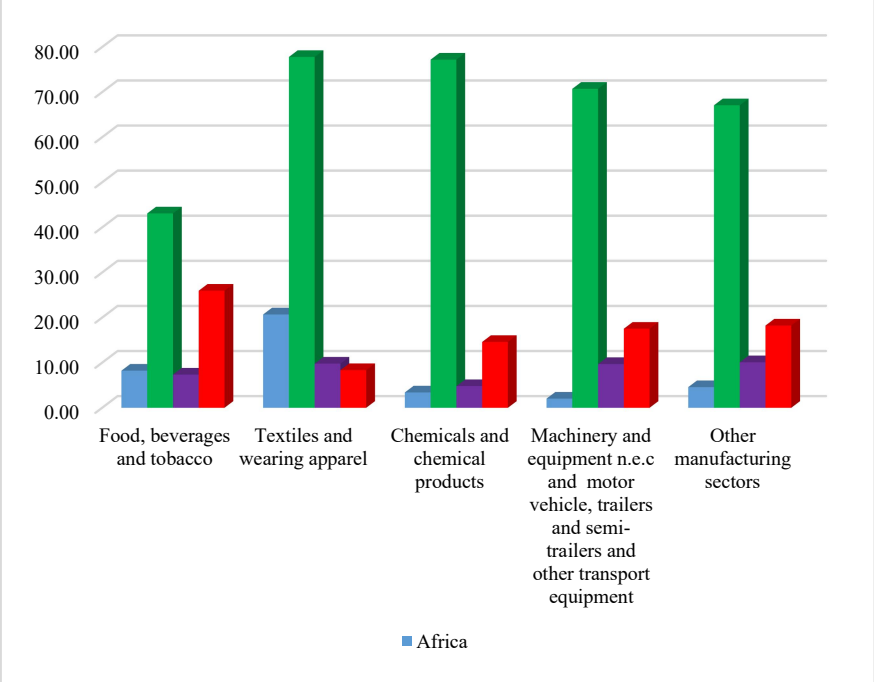

Figure 3: Distribution of value added (in 2010 constant prices) of selected manufacturing divisions among developing regions, 2014 (in percentage)
Source: Authors, based on data from UNIDO (2016) and World Bank (2016).

In terms of 2015 revenues from manufactured goods in Africa, regional processing sectors dominated at US$188 billion, with food and beverages accounting for 65%. Global innovation for local markets came second at US$137 billion with chemicals dominating at 42%, followed by automotive and machinery at 32% and 23%, respectively. Resource-intensive manufacturing ranked third at US110 billion with refined petroleum's share at 43%, followed by

minerals at 22%. Revenues from labour-intensive tradables stood at US$55 billion, dominated by textiles and apparel at 66%. Global technologies' revenue was only US10 billion, with communications equipment having the lion share of 80% (McKinsey Global Institute, 2016).

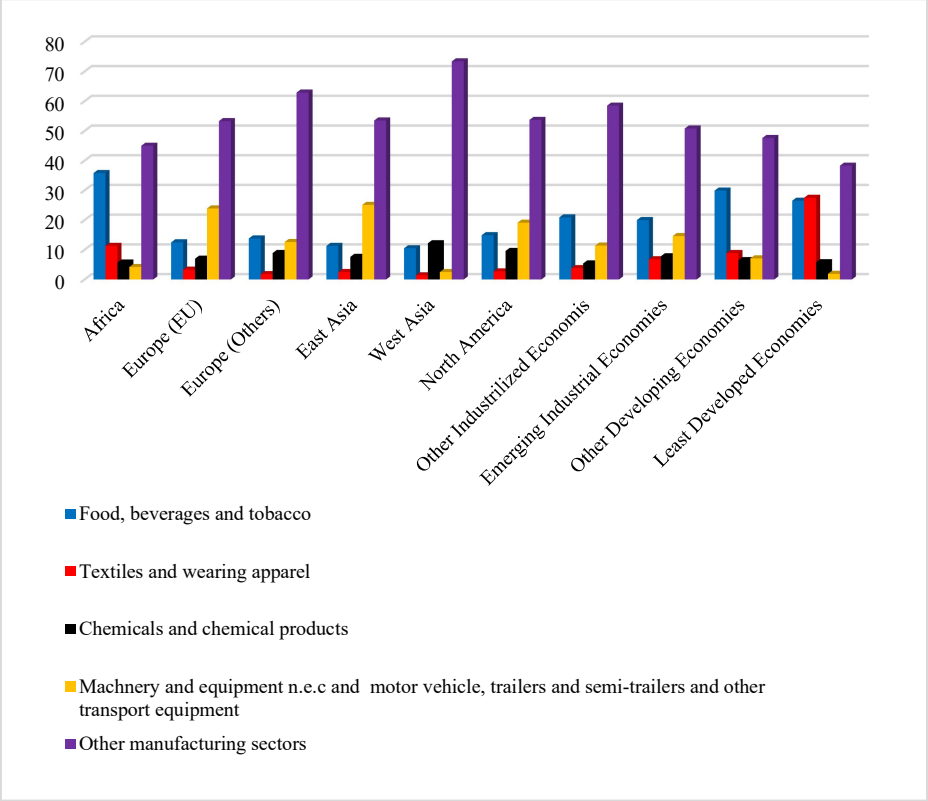

Figure 4: The structure of manufacturing value added in selected country groupings, 2005 (percentages)

Source: Authors, based on data from UNIDO (2016) and World Bank (2016).

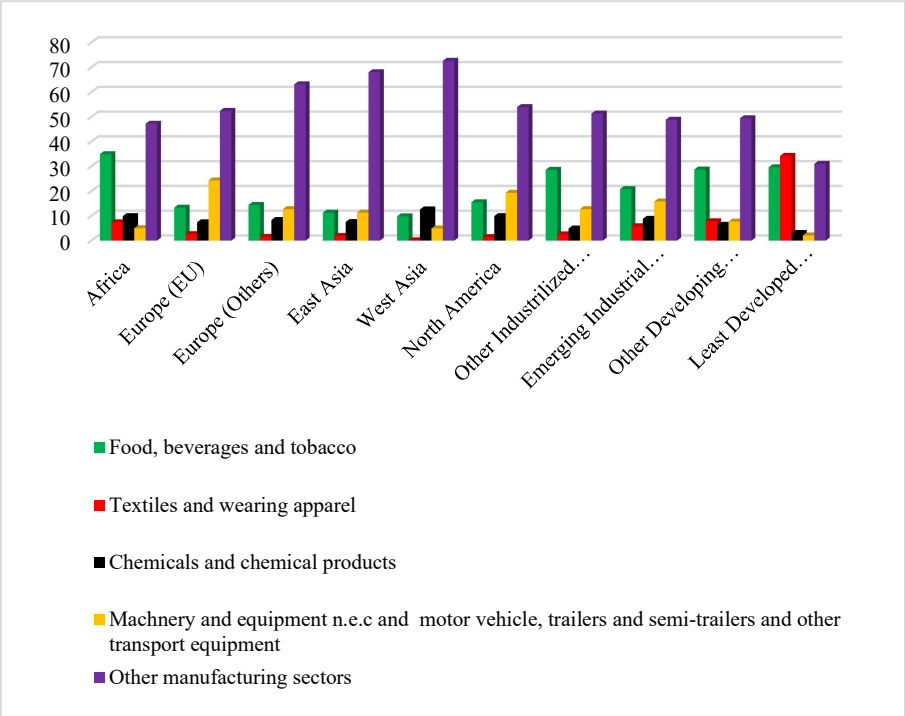

Figure 5: The structure of manufacturing value added in selected country groupings, 2010 (in percentage)

Source: Authors, based on data from UNIDO (2016) and World Bank (2016).

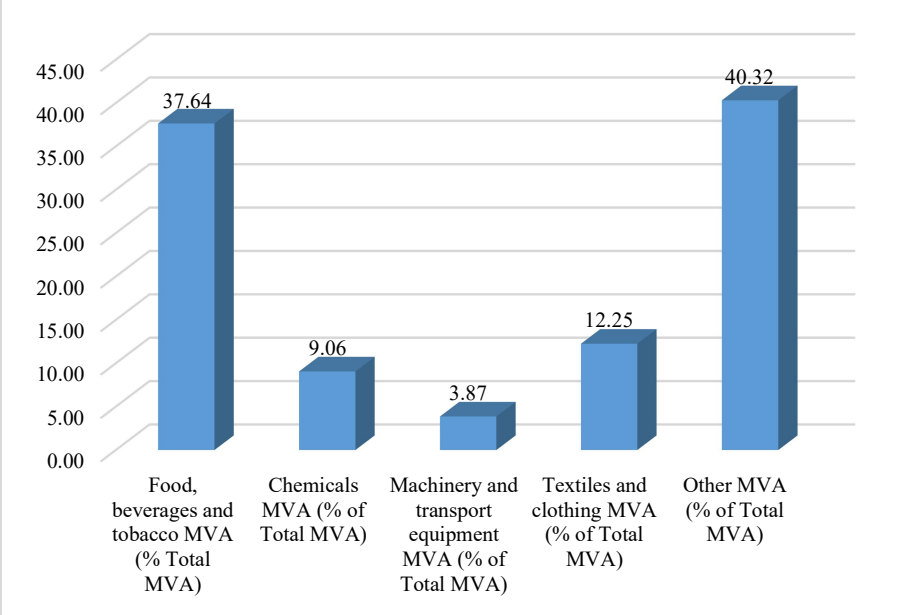

Figure 6: The structure of total manufacturing value added in Africa, 1990-2011
Source: Authors, using data from World Bank (2016)

3. Review of Literature on Key Drivers of Sectoral Manufacturing Value-Added Development

According to Chenery and Syrquin (1975), structural change in manufacturing is attributable to (a) the demand and supply changes associated with income level, (b) the country's given demographic and geographic conditions, and (c) the country's created conditions. As Katz (2000) elaborated, a country's geographic and demographic conditions imply natural advantages or disadvantages in the development of certain industries. As an illustration, holding other conditions constant, an endowment of abundant natural resources usually works against manufacturing development as found by Haraguchi and Rezonja (2010) and UNIDO (2012). Lin and Chang (2009) have also elaborated on the fact that country-created conditions such as history, culture and policy matter for manufacturing development.

The European Commission (2009a, b) examines the key drivers of per capita value added in various sectors for twenty-five EU countries. Those sectors are food, beverages, tobacco; textiles, clothing, leather, wood and wood products; pulp and paper; publishing, printing, and reproduction; coke and refined

petroleum; chemicals; rubber and plastics; other non-metallic mineral production; basic metals; fabricated metal products; machinery and equipment; office machinery and computers; electric machinery; radio and television; medical instruments; motor vehicles, trailers and other transport equipment; furniture and recycling; electricity, gas, and water supply; construction; and sale and repair of motor vehicles. The findings indicate that exports and intermediate demand are the two most important demand side manufacturing sector output drivers, while imports and government expenditure have very little impact on growth in manufacturing sectors. In new member states, fiscal deficits reduce output growth in a number of industries. Other results show that real interest rates have a robust negative correlation with sectoral manufacturing output growth.

Tkalec and Vizek (2009) analyse the impact of macroeconomic policies on manufacturing production in 22 manufacturing sectors of Croatia, using quarterly data from 1998:1Q to 2008:3Q. Their results suggest that changes in fiscal conditions (especially government consumption expenditure), the real effective exchange rate and personal consumption mostly affect low technological intensity industries (food and tobacco; textiles and clothing; leather products; wood, wood products and cork; paper and paper products, publishing, furniture and other manufacturing). Production in high technological intensity industries (chemicals and chemical products, machinery and equipment, electrical and optical products, transport vehicles, etc.) is, in general, elastic to changes in domestic investments, foreign demand and fiscal policy. In particular, personal consumption expenditure is positively and significantly correlated with output of food and beverages sector while real long-term interest rates negatively and significantly correlate with it. Production of tobacco products is positively and significantly correlated with personal consumption expenditure and real long-term interest rates but government consumption expenditure is negatively and significantly correlated with it.

Recently, Haraguchi and Rezonja (2011a and b; 2013) and Haraguchi (2016) reworked the original cross-country analysis in Chenery (1960) and Chenery and Syrquin (1975), explaining a measure of manufacturing activity by 18 sectors (food and beverages, tobacco, paper, coke and refined petroleum, fabricated metals, motor vehicles, furniture, textiles and wearing apparel, wood products, printing and publishing, machinery and equipment, precision instruments, chemicals, rubber and plastic, non-metallic minerals, basic metals, and electrical machinery and apparatus) at the 2 digit ISIC level by a country's income level, population size, a measure of natural resource endowment and dummy variable

for geography. The analysis is conducted separately for small and large economies based on absolute size of GDP for the period, 1963 to 2006. The results indicate that for most manufacturing activities, the coefficient on income is positive and significant and on income squared it is negative indicating a rising role for each manufacturing activity with income controlling for other factors, which peaks at a different income level for different manufacturing activities. Manufacturing industries are therefore classified into early, middle and late depending on the level of GDP per capita at which each reaches its peak share in GDP.

The results show the marginal effects of the key variables (income level, population density and resource endowments) included in the model for small and large countries. They show that the marginal income effect in small countries is positive and significant in all manufacturing industries, with the exception of the chemicals industry. Also, apart from the chemicals industry, the non-linear term for per capita income is negative and significant, indicating that with the growth in GDP per capita, value added per capita initially grows and begins to decline after reaching its peak. The marginal income effect is highest in the rubber and plastic industry and lowest in the food and beverages industry. Their results also indicate that the marginal effect of population density is significant and positive for textiles, machinery and equipment, motor vehicles, printing and publishing, chemicals and wearing apparel, and negative for furniture, wood products, basic metals, electrical machinery and apparatus, non-metallic minerals, paper and rubber and plastic. In addition, the level of natural resource endowments is significant and positively associated with the value added level of non-metallic minerals, coke and refined petroleum, basic metals, fabricated metals, wood products, and precision instruments while negatively associated with that of electrical machinery and apparatus, chemicals, motor vehicles and printing and publishing.

With respect to large countries, apart from basic metals and precision instruments, the results indicate that the income effect is positive and significant. The non-linear term of income is negative for those industries but not significant for chemicals, printing and publishing, fabricated metals, and electrical machinery and apparatus. The marginal effect of income is highest in the wearing apparel sectors and lowest in the chemicals sector. The effect of population density on industries' value added is significant in the food and beverages, paper, printing and publishing, precision instruments, chemicals, non-metallic minerals, coke and refined petroleum, electrical machinery and apparatus, fabricated

metals, machinery and equipment, basic metals, and motor vehicles sectors. Among these, the marginal effect is negative in the paper and printing and publishing industry. The marginal effect of natural resource endowment is negatively significant in the rubber and plastic, chemicals, fabricated metals, coke and refined petroleum, motor vehicles, non-metallic minerals, food and beverages, tobacco, paper, electrical machinery, and apparatus and basic metals sectors, but positive significant in the machinery and equipment sector. Thus, their comparative results between small and large countries show that, in general, higher population density supports the industrialization of large countries while it tends to mostly support the development of non-resource-based industries in small countries. On the other hand, natural resource endowment usually has a negative effect on the development of manufacturing industries in large countries, except for the machinery and equipment sector. But this factor can be supportive of the growth of resource-based industries in small countries.

Using a 159-country data spanning 1963 to 2007, Haraguchi and Rezonja (2012, 2015b) find that the relationship between the shares of textiles, machinery and equipment, and motor vehicles, trailers, semi-trailers and other transport equipment manufacturing and the level of economic development (log of real GDP per capita) is approximated by a third degree polynomial. There is a negative significant relationship between the level of real GDP per capita and the sectoral manufacturing shares while there is a significant positive relationship between the quadratic real GDP per capita and the sectoral manufacturing shares. The cubic real GDP per capita has a significant negative relationship with MVA in the sectors. The results for population density and natural resource endowments remain the same as in Haraguchi and Rezonja (2011a; 2013) and Haraguchi (2016). The results suggest that densely populated countries possess logistical and agglomeration advantages, which would be especially conducive to the development of industries that involve relatively complex and lengthy production processes and supply chains, such as the machinery and equipment and electrical machinery industries. On the other hand, high natural resource endowments have negative impacts on most manufacturing industries. At the same time, country-created conditions such as institutions, history and policies, produce systematic and consistent differences in the potential levels of manufacturing development across countries over a long period of time. The authors classified development stages of manufacturing industries into early (food and beverages, tobacco, textiles, wearing apparel, wood products, publishing, furniture, and non-metallic minerals), middle (coke and refined petroleum, paper,

basic metals, and fabricated metals), and late (rubber and plastic, motor vehicles, chemicals, machinery and equipment, electrical machinery and apparatus, and precision instruments) industries. Rising sectors are rubber and plastics, while declining ones are tobacco and textiles with stables ones being food and beverages. Chemicals, fabricated machinery and apparatus are among capital-intensive ones.

Ahmed (2012), in a study of Malaysia (1971-2000), finds that the factors affecting output growth in Malaysian food industries are individual contributions of capital, labour, and materials, as well as the combined contributions of the quality of these inputs expressed as total factor productivity growth. His findings indicate the low quality of inputs into the food industries, which are input-driven rather than total factor productivity growth-driven. With respect to agro-manufacturing (food, beverages and tobacco), Anyanwu and Kponnou (2017) find an inverted U-shaped relationship with real per capita GDP. Key positive drivers for the entire continent of Africa include domestic investment rate, government consumption expenditure, household consumption expenditure, social and political globalization, dependence on oil, natural gas, coal and forest resources, arable land, and ICT infrastructure/ technology access. Major negative drivers are trade openness, domestic credit to the private sector and population size.

As the US Energy Information Administration (2016) states, the industrial sector uses more delivered energy than any other end-use sector, consuming about 54% of the world's total delivered energy. In the industrial sector, energy is used for a wide range of purposes, including process and assembly, steam and cogeneration, process heating and cooling, and lighting, heating, and air conditioning for buildings. In food, beverage, and tobacco (FBT) product manufacturing, energy is principally used for process heat, drying/separation, refrigeration, and motors, among others (Green and Zhang, 2013). Food, pulp and paper, basic chemicals, refining, iron and steel, nonferrous metals (primarily aluminium), and non-metallic minerals (primarily cement) industries are energy-intensive and together, they account for about half of all industrial sector-delivered energy use globally— Sari, Ewing and Soytas (2008), Ziramba (2009), Qazi, Ahmed and Mudassar (2012), Elijah and Nsikak (2013), Abid and Mraihi (2015), and Olufemi (2015).

The above review shows that the few studies that had been carried out on the key drivers of sectoral manufacturing value added had been outside Africa. In contrast to these papers, we examine key drivers of sectoral manufacturing value

added Africa, using a broader set of fundamental as well as policy and institutional drivers. From a policy perspective, the results of this paper will serve as a useful platform to formulate series of new agenda and policies for sectoral manufacturing development in African countries.

4. Theoretical Framework

The model used by Chenery (1960) to estimate value added per capita for manufacturing industries as a dependent variable, captured the universal effects of income and country size (population) with the argument that supply and demand factors are embedded in the level of income. His linear logarithmic regression equation was stated as follows:

$$logV_i = log\alpha_{i0} + \alpha_{i0} logY + \alpha_{i2} logN \qquad (1)$$

Where V_i is per capita value added for manufacturing industry i and α_{i1} and α_{i2} represent growth elasticity and size elasticity, respectively.

Chenery used cross-section data of 38 countries available for any year between 1950 and 1956 on this equation, which became the basis for subsequent structural change research; its modifications have been widely used in later studies. For example, Chenery and Talyor (1968) included a quadratic term for income as the decline in elasticities with rising income became apparent. Chenery and Syrquin (1975, 1989) later applied a more general equation, which allows a non-linear effect for population and includes dummy variables to identify period effects:

$$x = \alpha + \beta_1 lny + \beta_2 (lny)^2 + \lambda_1 lnyN + \lambda_2 (lnN)^2 + \Sigma\omega_i T_i \qquad (2)$$

Where x is a respective dependent variable, covering different aspects of structural change (usually expressed as a share in GDP), y is per capita GNP in 1980 US dollars, N is population in millions, and T is a dummy variable for time periods taking a non-zero value for different periods.

As discussed by Haraguchi and Rezonja (2010, 2011a, b; 2012, 2015) and Haraguchi (2016), in the long term, it is assumed that industries undergo three development stages—pre-take off, growth and decline—following a pattern of a cubic function. While those industries which can sustain growth over a long period of time may have a more linear development trajectory, other industries which experience growth from a very early stage of development and only

decline at a later stage, may indicate a more quadratic pattern. As a result, they used equation 3 for each manufacturing industry in the group of large economies:

$$lnRVA_{ct}^{i} = \alpha_1 + \alpha_2 lnRGDP_{ct} + \alpha_3 lnRGDP_{ct}^{2} + \alpha_4 lnRGDP_{ct}^{3} + \alpha_c + \varepsilon_{ct}^{i} \qquad (3)$$

Where *RVA* indicates real value added per capita; *RGDP* stands for real GDP per capita; $RGDP^2$ denotes squared real GDP per capita; $RGDP^3$ signifies cubic real GDP per capita; α_c is country fixed effect; and ε^{i}_{ct} is the unexplained residual.

However, as the European Commission (2009) states, sectoral manufacturing performance is driven by a myriad of distinct sources. Though, no single comprehensive theory exists which can explain the role of these elements within a jointly integrated economic model, six groups of related factors can be identified, including macroeconomic conditions, inputs to production, research and development (R&D) and innovation, market structure, openness and barriers to trade, and demand side factors. Figure 7 illustrates these six major dimensions and the corresponding sub-categories of growth drivers. Macroeconomic conditions (aggregate fluctuations in GDP and employment, interest rates, exchange rates, government spending, corporate tax rates, and the change in relative prices) affect sectoral growth and performance by defining the environment within which companies and industries operate. Inputs to production– physical capital and labour (including ICT and non-ICT assets and high or low-skilled workers)— constitute the resource base of firms and sectors. R&D and innovation (R&D expenditures and technological regimes) affect changes in the production function and the process of value-creation, more generally. Market structure, such as entry, exit, firm turnover; distribution of firms according size, industry concentration, regulatory impact and political regime determines the kind and degree of competition within the industry as well as the impact on consumer welfare and selection among heterogeneous suppliers. Openness and barriers to trade, including export openness, import penetration, FDI inflows, liberalization of trade in services, and political and social globalization indicate differences with respect to the degree of global competition and transactions between international partners within an industry. Demand side factors such as consumer expenditures, population, investment spending, government spending, net exports and demand for intermediary inputs guide the allocation of scarce resources among competing uses.

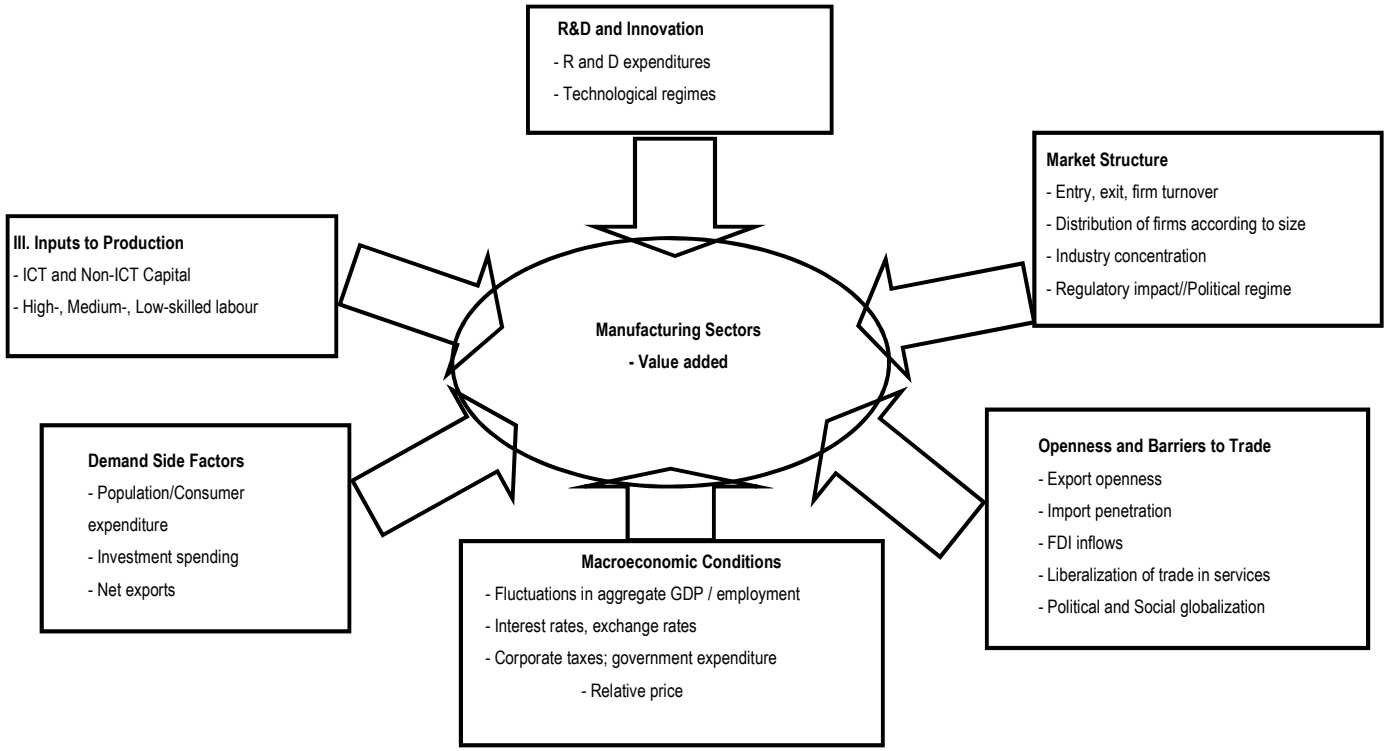

Figure 7: Stylized model of the drivers of manufacturing sectors
Source: Adapted from European Commission (2009) and the Literature.

5. Empirical Model and Data

Based on the foregoing and the extensions of Haraguchi and Rezonja (2010, 2011a; 2015) and Haraguchi (2016), the modified relationship is expressed in equation 4:

$$ShareMVA_{it} = \alpha_0 + \beta_1(\log rgdppc_{it}) + \beta_2(\log rgdppc_{it})^2 + \beta_3(\log rgdppc_{it})^3 + \beta_4(X_{it}) + \lambda_i + \varepsilon_{it}$$
$$(i = 1,....,N; t = 1,.....,T),.....(4)$$

Where $ShareMVA_{it}$ is sectoral MVA share as percentage of total *MVA* in country *i* at time *t*; α_0 is the constant term; β_1, β_2, and β_3 are the elasticities of sectoral *MVA* shares with respect to real per capita GDP in 2011, *rgdppc*, its quadratic and cubic terms, respectively; *X* is the control variables, including primary school enrolment, secondary school enrolment and tertiary education enrolment (education), natural resource rents as percentage of GDP (oil, mining, natural gas, coal, and forest), domestic investment rate, domestic credit to the private sector (as % of GDP), trade openness, and FDI stock (as % of GDP). Other control variables are social globalization index, political globalization index, institutionalized democracy (polity2), total population (in log), age dependency (old), age dependency (young), information and communications technology (ICT) accessibility (proxied by mobile phone subscriptions/ per 100 and fixed phone subscriptions) and energy intensity level of primary energy (MJ/$2011 PPP GDP). In addition, λ_i denotes year fixed effects, while ε_{it} is an error term capturing all other omitted factors, with $E(\varepsilon_{it}) = 0$ for all *i* and *t*.

Thus, in addition to GDP per capita, we included square and cubic terms of GDP per capita in the equation in order for the results to denote possible patterns of manufacturing development in Africa, depending on the statistical significance of these GDP per capita terms. The effect of educational attainment (see Lee and Wolpin, 2006) on MVA is captured by including the shares of primary, secondary and tertiary education enrolments. Increased human capital leads to improved productivity, both in sectors and overall, while it allows for operating more complicated tasks and producing outputs that are 'high-skill'. High levels of human capital increase the scope that new technologies are appropriate. Also, while human capital could imply positive externalities, it is observed that foreign direct investments (FDIs) tend to be located in human capital-rich places. Thus, to benefit from FDI knowledge externalities and technology transfer requires that domestic firms have sufficiently high human capital levels or absorptive capacity. The education proxies may enter the equation in non-linear forms depending on the manufacturing sector (Anyanwu, 2016).

Included also is domestic investment ratio. The European Commission (2009b) notes that the average investment ratio, used a proxy for the capital

intensity, is expected to be positive as it reflects primarily the neglected capital costs. According to Tkalec and Vizek (2009), high technological intensity industries strongly react to changes in investments. The degree of financial sector development is proxied by the ratio of domestic credit to the private sector to GDP, which is posited to enable investment in higher productivity activities, greater diversification, and risk sharing, and hence facilitate resource allocation across the economy (Levine, 2005).

The estimates also included natural resources endowments by including the share of oil, mining, natural gas, coal and forest in GDP to account for the fact that a large fraction of economic activity in resource-rich economies in Africa is subsumed by the rents from natural resources extraction. It is posited that the endowment of abundant natural resources normally works against manufacturing development, holding other conditions constant (Haraguchi and Rezonja 2011a, b; UNIDO 2012). UNIDO (2015) shows that high natural resource endowments do not have a positive effect on a single industry, but they have particularly strong negative effects on electrical machinery and apparatus, motor vehicles (for large countries) and chemicals, which are key in deepening and sustaining industrialization from the upper middle-income stage. This is largely because exports of resource commodities often lead to currency appreciation, making tradable manufacturing products less competitive. We also include proportion of agricultural land, whose product supplies manufacturing industries hence an expected positive relationship.

The study included factor endowments, such as population. Chenery and Taylor (1968) show that a country's population size tends to have overarching influence on economic structural change. UNIDO (2015) shows that a larger population is generally conducive to manufacturing development though there are differences in structural change within manufacturing between large and small countries. Large countries, at higher incomes, tend to have a divergent pattern of thriving and other industries, while in small countries, growth in most manufacturing industries slows at higher incomes. Our estimates include age dependency ratios (i.e., the non-working old and young populations as fractions of the labour force) since they can affect labour supply, savings and consumption behaviour.

Following the widely held view that globalization can facilitate technology transfer and contribute to efficiencies in production, we include different globalization indicators. Two principal economic globalization indicators included are international trade openness (measured as the ratio of exports plus

imports to GDP) (Matsuyama, 2009) and inward FDI stock (as percent of GDP). FDI can provide access to technology, to brand names, to global markets and has the potential to provide spillovers to the domestic economy (UNIDO, 2015). FDI may affect sectoral MVA through various mechanisms: boosting productivity in the long run; filling expectations of demand increase; strengthening competition and weakening oligopoly/monopoly elements; diffusing knowledge of new production processes; stimulating the entry of firms in other sectors (horizontal linkages); and creating the right conditions to enhance structural change. Also included are KOF's indices of social globalization and political globalization.

The accessibility to ICT technology and infrastructure or service can influence sectoral MVA by either facilitating or obstructing the reallocation of resources. To capture this, the study includes telecommunications network as proxied by mobile phone and fixed phone subscriptions. An increase in access to such ICT in a manufacturing sector can contribute to increase in sectoral MVA by eliminating relative price distortions and facilitating the reallocation of labour and other inputs, thereby raising sector productivity. R&D is proxied by the number of publications in scientific and technical journals. Institutionalized democracy is represented by polity2 and it is expected to be positively correlated with MVA.

As the US National Association of Manufacturers (2005) noted, energy is the lifeblood of manufacturing. Manufacturing industries convert fuels to thermal, electric or motive energy to manufacture their products. Energy enables manufacturing industries to transform raw materials into final consumer goods. Such raw materials pass through a number of intermediate stages, with these intermediates representing the bulk of industrial energy consumption. Thus, energy performs the work of adding value to intermediate products as they are progressively transformed into final consumer products. Energy is captured by energy intensity level of primary energy (MJ/$2011 PPP GDP).

One possible problem with the pooled OLS estimate is that it assumes that all of the right-hand side variables in the model — including real per capita GDP — are exogenous to sectoral MVA. However, it is possible that real per capita GDP may be endogenous to sectoral MVA. Reverse causality may be taking place: real per capita GDP may be increasing sectoral MVA, but sectoral MVA may also be affecting the level of real per capita GDP. Without accounting for this reverse causality, the estimated coefficients may be biased. One way of accounting for possible endogenous regressors is to pursue an instrumental variables approach. Therefore, to deal with this problem, we estimate the equation, 'instrumentalizing' real per capita GDP variable with its six lagged

levels, using a two-step (IV) estimation method, including time (year) fixed effects.

The IV estimates are presented in column 3 of table 2. The consistency of the IV-2SLS estimators depends on whether the instruments are valid in the MVA regression. The study examines this by considering the tests of over-identifying restrictions. The no rejection of the null hypothesis implies that instrumental variables are not correlated with the residual and are satisfying the orthogonality conditions required. The IV-2SLS results pass the relevant tests.

Table 1: Descriptive statistics of main regression variables

Variable	*Observations*	*Mean*	*Median*	*Stand Dev.*
Machinery and transport equipment (% of total MVA)	267	3.87	2.4	4.16
Food, beverages and tobacco MVA (% of total MVA)	349	37.64	35.3	18.81
Textiles and clothing (% of Total MVA)	350	12.25	8.6	11.83
Chemicals (% of Total MVA)	295	9.06	7.5	7.77
Other manufacturing (% of total MVA)	354	40.32	36.2	19.10
Log of real GDP per capita	1106	7.82	7.65	1.02
Primary school enrolment ratio	927	91.20	96.1	26.88
Secondary school enrolment ratio	683	38.61	32.8	25.97
Tertiary school enrolment	606	6.22	3.4	8.07
Oil rent (%GDP)	1103	6.12	0	14.74
Mining rent (%GDP)	1134	1.19	0	3.45
Natural gas rent (%GDP)	1120	0.54	0	2.10
Coal rent (%GDP)	1124	0.04	0	0.34
Forest rent (%GDP)	1109	6.71	0	8.46
Log of scientific and technical journals	1110	2.87	2.89	2.04
Domestic investment (%GDP)	1070	21.52	19.5	17.17
Domestic credit to private sector (%GDP)	1077	19.57	13	21.46
Government consumption expenditure	1043	16.05	14.7	7.67
Trade openness	1091	76.55	64.1	49.18
FDI stock (%GDP)	1148	38.02	16.2	115.60
Social globalization index	1163	25.85	23.4	11.24
Political globalization index	1163	53.06	51.91	18.97
Institutional democracy (polity2)	1120	-0.001	-1.0	5.50
Log of population	1188	15.63	15.95	1.56
Age dependency ratio (Old)	1188	6.38	5.9	1.58
Age dependency ratio (Young)	1188	80.16	83.1	15.45
Mobile phone subscriptions (per 100 people)	1160	14.24	0.8	26.34
Log of fixed telephone subscriptions	1144	0.09	-0.11	1.39
Log of primary energy use intensity	1154	2.08	1.97	0.69

Source: Authors' calculations, using estimation data.

The data for African countries (1990 to 2011) for the variables in equation 4 are largely drawn from the World Bank (2016), except institutional democracy (polity2) from Polity IV Project Online (2015) (see also Marshall et al., 2016),

KOF's indices of social globalization (comprising personal contacts, information flows, and cultural proximity) and political globalization (comprising embassies in country, membership in international organizations, participation in UN Security Council Missions, and international treaties) developed by Dreher (2006) (see also Dreher et al., 2008). The descriptive statistics are presented in table 1. It reports the observations, sample mean, median and standard deviation of the variables used in the estimations.

6. Empirical Results

Coefficient estimates of sectoral MVA shares are presented in tables 2a (machinery and transport equipment and food, beverages and tobacco), 2b (textiles and clothing and chemicals) and 2c (other manufacturing sectors. The result shows that the key drivers of sectoral MVA (as % of total MVA) differ substantially across the sectors in their impact in terms of sign and significance. A key novel finding is that, apart from chemical manufacturing that is linearly and negatively affected by the level of economic development, both food, beverages and tobacco; machinery; textiles and clothing; and 'other' manufacturing sectors are significantly affected by economic development to the third degree polynomial, with the first two with positive leading coefficient and the last two with negative leading coefficient.

Primary education has a significant U-shaped relationship with machinery and transport equipment, while exhibiting an inverted U-shaped relationship with chemical manufacturing value added development. The level of primary education has a significant positive relationship with textiles and apparel manufacturing value added development. Secondary education has a U-shaped relationship with chemicals manufacturing value added development. Its level is positively and significantly correlated with machinery and transport equipment but negatively and significantly correlated with food, beverages and tobacco and 'other' manufacturing sectors. There is also a strong support for a non-monotonic, inverted U-shaped relationship between food, beverages and tobacco, textiles and clothing and other manufacturing MVA with tertiary education. The level of tertiary education is positive for machinery and transport equipment, textiles and clothing, and 'other' manufacturing sectors while the quadratic terms are negative. On the other hand, level of tertiary education is negative for food, beverages and tobacco, and chemicals value added development.

With respect to the role of natural resources, our results indicate varied differences with respect to the different sectors. For example, oil and mining rents

have positive significant relationship with machinery and transport equipment, and food, beverages and tobacco value added development but negatively and significantly related to textiles and clothing apparel. Oil rents are also positively and significantly correlated with 'other' manufacturing sectors.

Natural gas rents are negatively and significantly associated with machinery and transport equipment value addition but the opposite relationship with 'other' manufacturing sectors' value addition. While coal rents have significant negative association with 'other' manufacturing sectors' value added, forest rents have positive and significant relationship with these sectors. The proxy for R&D (the number of publications in scientific and technical journals) has a significantly negative association with food, beverages and tobacco and 'other manufacturing sector value added development but has significant positive association with textiles and clothing and chemicals value added development.

Domestic investment has significant positive association with machinery and transport equipment manufacturing value added, it has significantly negative association with chemicals value added development. Government consumption expenditure has positive and significant association with food, beverages and tobacco and chemicals value added but the opposite relationship with textiles and clothing and 'other' manufacturing sectors' value added. Trade openness is significantly and negatively associated with machinery and transport equipment and 'other' manufacturing vale added. The credit variable has a positive and statistically significant association with machinery and transport equipment but a significant negative association with textiles and clothing value added development). We find that inward stock of foreign direct investment (FDI) is significantly and positively related to machinery and transport equipment and chemicals value added but the opposite is true with respect to food, beverages and tobacco and chemicals value added.

One of the novel and innovative aspects of this paper is the inclusion of other aspects of globalization, namely social and political globalization. We find that social and political globalization are significantly and positively associated with machinery and transport equipment, food, beverages and tobacco value added development. This shows that African countries' establishment of embassies in foreign countries, membership in international organizations, participation in UN Security Council Missions, and international treaties help to generate influences that increase MVA in these sectors. But political globalization is significantly and positively associated with chemicals value added.

Table 2a: IV-2SLS estimates of the key drivers of the sectoral components of MVA (% GDP) in Africa (with time and sub-regional fixed effects), 1990-2011

Variable	*Machinery and Trans Equip.*	*Food, Beverages and Tobacco*
Real GDP per capita		
Real GDP per capita^2	341.592 (2.76***)	1726.833 (2.96***)
Real GDP per capita^3	-48.402 (-3.07***)	-204.8513 (-2.78***)
Primary school enrolment	2.222 (3.33***)	8.034 (2.60***)
Primary school enrolment^2	-0.437 (-4.05***)	0.061 (0.75)
Secondary school enrolment	0.002 (3.76***)	
Secondary school enrolment^2	0.156 (5.78***)	-0.366 (-1.99**)
Tertiary school enrolment		
Tertiary school enrolment^2	0.476 (2.92***)	-3.141 (-3.32***)
Oil rent (%GDP)	-0.009 (-2.64***)	0.093 (4.45***)
Mineral rent (%GDP)	0.160 (3.39***)	2.410 (8.34***)
Natural gas rent (%GDP)	0.519 (3.65***)	1.581 (2.62***)
Coal rent (%GDP)	-0.774 (-4.43***)	-0.850 (-0.91)
Forest rent (%GDP)		6.185 (0.38)
Scientific and technical journals	0.021 (0.17)	0.093 (0.24)
Domestic investment (%GDP)	-0.429 (-0.98)	-7.159 (-2.85***)
Government consumption	0.385 (7.67***)	0.035 (0.14)
expenditure	0.059 (0.91)	0.855 (2.71***)
Trade openness	-0.068 (-3.46***)	-0.088 (-0.76)
Credit to private sector (%GDP)	0.048 (1.86*)	0.087 (0.68)
FDI stock (%GDP)	0.064 (2.48**)	-0.498 (-3.30***)
Social globalization	0.175 (3.19***)	0.898 (2.52**)
Political globalization	0.065 (3.44***)	0.220 (1.81*)
Institutional democracy	-0.106 (-1.95*)	-3.950 (-1.94*)
Institutional democracy^2		0.143 (1.66*)
Population	0.123 (0.13)	-11.114 (-2.15**)
Age dependency ratio (Old)	-5.181 (-7.90***)	0.364 (0.19)
Age dependency ratio (young)	-0.417 (-6.41***)	0.383 (1.36)
Mobile cellular subscriptions	-0.171 (-6.54***)	-0.042 (-0.40)
Fixed telephone subscriptions	-3.614 (-5.86***)	2.280 (0.68)
Primary energy use intensity	-0.980 (-0.80)	58.943 (7.61***)
Constant	-697.238 (-2.07**)	-4734.881 (-2.99***)
Year and sub-regional dummies	*Yes*	*Yes*
R-squared	0.9538	0.8975
F-stat/Wald chi^2	1820.50	1023.03
Prob > chi^2	0.0000	0.0000
N	88	117
Tests of over-identifying restrictions		
- Sargan	1.73951 (p=0.8839)	2.99682 (p=0.5584)
- Basmann	0.665472 (p=0.9848)	1.65609 (p=0.7987)
Tests of endogeneity		
- Durbin	3.64248 (p=0.3027)	4.75308 (p=0.1908)
- Wu-Hausman	0.503756 (p=0.6822)	0.903356 (p=0.4445)

Note: t-values are in parentheses; ***=1% significant level; **=5% signif. level; *=10% signif. level.

Table 2b: IV-2SLS estimates of the key drivers of the sectoral components of MVA (%GDP) in Africa (with time and sub-regional fixed effects), 1990-2011

Variable	*Textiles and Clothing*	*Chemicals*
Real GDP per capita	-1780.941 (-6.96***)	-4.843 (-3.48***)
Real GDP per capita^2	218.513 (6.76***)	
Real GDP per capita^3	-8.864 (-6.56***)	
Primary school enrolment	0.084 (2.32**)	0.526 (3.74***)
Primary school enrolment^2	-0.082 (-1.17)	-0.002 (-2.72***)
Secondary school enrolment	1.301 (3.22***)	-0.359 (-3.07***)
Secondary school enrolment^2	-0.037 (-4.09***)	0.003 (2.54**)
Tertiary school enrolment	-0.662 (-5.72***)	-0.118 (-0.67)
Tertiary school enrolment^2	-0.795 (-2.96***)	
Oil rent (%GDP)	0.454 (1.20)	-0.058 (-0.54)
Mineral rent (%GDP)	3.177 (0.45)	0.302 (0.59)
Natural gas rent (%GDP)	-0.204 (-1.27)	0.324 (1.06)
Coal rent (%GDP)	4.420 (4.17***)	
Forest rent (%GDP)	-0.057 (-0.52)	-0.004 (-0.02)
Scientific and technical journals	-0.780 (-5.89***)	2.712 (4.51***)
Domestic investment (%GDP)	-0.004 (-0.11)	-0.308 (-2.94***)
Government consumption expenditure	-0.132 (-2.35**)	0.688 (6.53***)
Trade openness	0.024 (0.37)	-0.009 (-0.31)
Credit to private sector (%GDP)	-0.205 (-1.39)	-0.016 (-0.29)
FDI Stock (%GDP)	0.020 (0.45)	-0.210 (-3.23***)
Social globalization	0.243 (1.66*)	-0.140 (-0.95)
Political globalization	-2.997 (-1.38)	0.149 (3.82***)
Institutional democracy	4.551 (5.88***)	-0.440 (-3.73***)
Institutional democracy^2	-0.536 (-5.52***)	
Population	-0.321 (-7.13***)	1.093 (0.76)
Age dependency ratio (old)	-1.383 (-0.98)	3.777 (5.01***)
Age dependency ratio (young)	-18.168 (-5.42***)	-0.003 (-0.03)
Mobile cellular subscriptions	4937.808 (7.10***)	0.108 (2.15**)
Fixed telephone subscriptions		4.058 (3.29***)
Primary energy use intensity		-42.757 (-4.00***)
Primary energy use intensity^2		8.309 (3.27***)
Constant		1.167 (0.04)
Year and sub-regional dummies	*Yes*	*Yes*
R-Squared	0.9571	0.8939
F-stat/Wald chi^2	2773.77	826.82
Prob > chi^2	0.0000	0.0000
N	125	98
Tests of over-identifying restrictions		
- Sargan	7.44004 (p=0.1899)	0.214308 (p=0.6434)
- Basmann	4.4301 (p=0.4893)	0.103006 (p=0.7483)
Tests of endogeneity		
- Durbin	0.075442 (p=0.9946)	1.41463 (p=0.2343)
- Wu-Hausman	0.014494 (p=0.9976)	0.68838 (p=0.4109)

Note: t-values are in parentheses; ***= 1% significant level; **=5% significant level; *=10% significant level.

Table 2c: IV-2SLS estimates of the key drivers of the sectoral components of MVA (%GDP) in Africa (with time and sub-regional fixed effects), 1990-2011

Variable	*Other Manufacturing Sectors*
Real GDP per capita	-2209.228 (-3.88***)
Real GDP per capita^2	301.296 (4.17***)
Real GDP per capita^3	-13.350 (-4.40***)
Primary school enrolment	-0.102 (-1.34)
Primary school enrolment^2	
Secondary school enrolment	-0.328 (-1.95*)
Secondary school enrolment^2	
Tertiary school enrolment	3.506 (3.81***)
Tertiary school enrolment^2	-0.060 (-3.20***)
Oil rent (%GDP)	-1.535 (-7.33***)
Mineral rent (%GDP)	-0.629 (-1.56)
Natural gas rent (%GDP)	3.959 (5.30***)
Coal rent (%GDP)	-30.684 (-2.51**)
Forest rent (%GDP)	0.848 (2.20**)
Scientific and technical journals	-4.356 (-1.91*)
Domestic investment (%GDP)	0.140 (0.72)
Government consumption expenditure	-0.585 (-2.03**)
Trade openness	-0.238 (-2.61***)
Credit to private sector (%GDP)	0.138 (1.36)
FDI Stock (%GDP)	0.355 (3.41***)
Social globalization	0.422 (1.41)
Political globalization	0.094 (0.97)
Institutional democracy	8.836 (5.01***)
Institutional democracy^2	-0.339 (-4.72***)
Population	2.834 (0.60)
Age dependency ratio (Old)	-2.061 (-1.21)
Age dependency ratio (young)	0.367 (1.72*)
Mobile cellular subscriptions	0.030 (0.41)
Fixed telephone subscriptions	-11.907 (-4.81***)
Primary energy use intensity	-32.218 (-4.77***)
Constant	5297.412 (3.48***)
Year and sub-regional dummies	Yes
R-Squared	0.9658
F-stat/Wald chi^2	2850.07
Prob > chi^2	0.0000
N	101
Tests of over-identifying restrictions	
- Sargan	10.9706 (p=0.2777)
- Basmann	5.36164 (p=0.8017)
Tests of endogeneity	
- Durbin	3.64408 (p=0.3026)
- Wu-Hausman	0.623841 (p=0.6029)

Note: t-values are in parentheses; ***=1% significant level; **=5% significant level; *=10% signify. level.
Source: Authors' estimations.

The next assessed whether the quality of political institutions affects manufacturing development in Africa. Institutional democracy has a significant U-shaped relationship with food, beverages and tobacco and inverted U-shaped relationship with 'other' manufacturing sector's vale added. However, the level of institutional democracy has a significant positive association with textiles and clothing value added but a significant negative association with machinery and transport equipment, food, beverages and tobacco value added. The results also indicate that population is only significantly and negatively associated with food, beverages and tobacco value added. Age dependency (old and young) has negative and significant association with machinery and transport equipment value added. Age dependency (old) has positive and significant association with textiles and clothing and chemicals value added while age dependency (young) has significant negative relationship with 'other' manufacturing value added.

ICT infrastructure has general negative effects. For example, mobile and fixed phone subscriptions are significantly and negatively associated with machinery and transport equipment manufacturing. Mobile and fixed phone subscriptions are significantly and negatively associated with textile and clothing manufacturing while fixed phone subscriptions are negatively associated with 'other' manufacturing value added. This is hardly surprising, since most phone access (especially mobile phone subscriptions) is used, especially by the youth, for social media and Internet 'browsing'. Primary energy use intensity has a significant positive association with food, beverages and tobacco manufacturing only. It has a significant U-shaped relationship with chemicals manufacturing but a significant negatively association with textile and clothing and 'other' manufacturing sectors' value added.

7. Conclusion and Policy Recommendations

What are the implications of these results for African countries? First, the results confirmed that the level of prosperity (higher economic development) promotes sectoral MVA in African countries. Therefore, African countries must take measures to increase their national incomes. To increase per capita income, African countries must deepen macroeconomic and structural reforms to increase their competitiveness, create increasing and more quality jobs and hence increase participation in economic activity, dismantle existing structural bottlenecks to private and public investment, and scale-up investments in hard and soft infrastructure to enhance local production and regional integration. Other measures are to structurally transform the economy for increased competitiveness

in knowledge-intensive manufacturing, and increase productivity, especially in agriculture, through creating incentives and opportunities for the private sector and increasing government support to small farm holders in terms of finance, formalization of land ownership, and technical advice.

Second, there is the need for education beyond the primary level to tertiary level for increased sectoral manufacturing development. Indeed, it is necessary to complement lower level education with higher education with the necessary skilled workforce capable of operating state-of-the-art technologies in manufacturing. This calls for explicit incentives such as vocational or engineering scholarships and demand-driven courses to train workers in the technical standards in the manufacturing sector. In addition, skill policies have to be aligned with Africa's broader socioeconomic development agenda. This requires strong coordination between stakeholders engaged in policy-making, both public and private sectors.

Third, for long-term sectoral MVA development, African countries with abundant natural resources need prudent institutions to manage revenues from resource rents so as to avoid undue currency appreciation and underinvestment in physical and human capital. Indeed, efficient management of natural resources in Africa requires actions throughout the value chain. In particular, a new natural resources management framework is needed for better governance, sectoral linkages, economic growth and human, capacity and infrastructure development – with strong parliamentary legislation, oversight, and representation throughout the resources value chain. Given that oil, mineral resources and natural gas are non-renewable resources, it is vital to negotiate more beneficial and transparent contracts with oil/mining Multinational Corporations operating in Africa, and ensure that these companies do not evade taxes. For greater returns to African countries in terms of royalties/rents, for example, the governments should engage in auctions for oil/mining/natural gas/forest rights. In this regard, international financial institutions like the African Development Bank have a critical role to play in helping these countries acquire the much-needed capacity not only to negotiate beneficial contracts but also for effective management of natural resource rents. Other measures to promote efficient and effective allocation of public expenditure include promoting high levels of transparency, ensuring that the political system has a centralized system of financial authority and control, and the legislation of a 'fiscal constitution' that imposes ceilings (and perhaps also floors) on public spending from resource rents.

Fourth, given the finding that domestic investment rate reduces chemicals value added sectoral MVA in Africa, effectiveness of domestic must remain an active goal of governments in the sub-region. Efforts must be made to improve the efficiency and effectiveness of public institutions, if these are to serve as genuine partners with the private sector. Sustainable domestic investment needs increased human capital investment to enhance the health and welfare of populations and generate the skills required in a competitive global environment. Adoption of high level best practice principles in investment is imperative. Those broad principles should include the following key elements: a nationally coordinated approach to the development of significant strategic projects and programs; and the promotion of competitive markets. Others relate to decision-making based on rigorous cost-benefit analysis to ensure the highest economic and social benefits to the nation over the long term; a commitment to transparency at all stages of the decision-making and project implementation processes; and a public and private sector financial management regime with clear accountabilities and responsibilities.

Fifth, to make government consumption expenditure work for sectoral MVA in Africa, achieving government expenditure effectiveness must remain an active goal of governments in Africa. Adoption of high level best practice principles to inform the development of these processes will help African governments achieve this. Those broad principles should include the following key elements: a nationally coordinated approach to the development of significant strategic projects and programs; and the promotion of competitive markets. Others relate to decision-making based on rigorous cost-benefit analysis to ensure the highest economic and social benefits to the nation over the long term; a commitment to transparency at all stages of the decision-making and project implementation processes; and a public sector financial management regime with clear accountabilities and responsibilities. At the same time, efforts to reform the fiscal system for consolidation by both the executive and legislative arms of government are imperative to reduce government consumption expenditure to avoid wastes, corruption and crowding out resources for public sector investment and gender equality. In addition, public spending on education (as well as on health and other human capacity), when targeted at women, especially the poor, can produce a quadruple dividend, increasing sectoral MVA and industrializing Africa in the short run and increasing the chances for women and the youth as well as household in general to access formal jobs and thus break free from poverty trap.

Sixth, for domestic credit to work for the sectoral MVA, lending rates reduction is imperative, especially through a more financial competitive environment while developing the requisite lending expertise, mechanisms for monitoring, and supervisory and regulatory skills of operators of the African financial system. Seventh, to make globalization work for increased sectoral MVA, local resources need to be deployed in adequate quantities to produce high-technology and more sophisticated goods for the external market. In addition, domestic production capabilities have to be put into place in order to exploit intra-regional trade opportunities, increase response to international competition, and improve technology. Indeed, African countries need to promote increased regional trade, especially through the removal of cross-border barriers and infrastructure bottlenecks. Since inward FDI inflows promote some sectoral manufacturing development, to attract increased FDI to Africa, high priority should be given to improvements in governance systems and the quality of human capital development. Efforts should be made to improve the efficiency and effectiveness of public institutions, while increasing investment in the quality of human capital so as to generate the requisite skills required in a competitive global environment. In addition, governments should respect private property rights, allow the rule of law to prevail, be accountable for their actions as well as improve the legal, judicial, and regulatory, and infrastructural environment.

Eight, the promotion of effective liberal (not just electoral) democracy will help in the design of policies friendly to sectoral MVA development. This requires political will, commitment, good governance (including the control of corruption, transparency and accountability, the rule of law, government effectiveness, and political stability), inclusive development, collaborative spirit to formulate and faithfully implement the requisite policies, strategies, plans and collective action as well as the institutional changes needed for increased gender equality in education. Other critical measures to promote liberal democracy (contrary to the prevailing 'anocracies') and check civil violence in North Africa include promoting and maintaining effective rule of law, deepening macroeconomic and structural reforms and increasing investments to raise national income, and implementing greater economic and political inclusion, especially in North Africa. Democracy will thrive and will be sustained and stable when there is the willingness to lose (contestation) and when there are capacities to challenge and enforce the rules of the game. Contestation means that parties are able to win but are willing to lose. In other words, opposition parties have to be able to compete effectively with incumbents, with the credible potential to

hold incumbents accountable while voters and parties must be willing to lose elections. Also, laws must be effectively enforced. This means that a sturdy, thriving, durable and stable democracy requires a government with the capacity to enforce both the rules of the game and the policies produced through those rules against violation or nullification either by abusive agents of the government itself or by private actors, whether common criminals, would-be warlords or the military.

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