Industrial Policy, Institutions and Performance of Manufacturing Sector in Africa

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Abstract

This paper revisits the role played by political and economic institutions in the dynamic of industrial development in Africa. It empirically investigates the impact of industrial policies and institutional quality on manufacturing value added per capita across 51 African countries over the period 2003-2015 using dynamic panel techniques (system GMM). The empirical results suggest that the overall index of governance, as well as its indicators including Government Effectiveness, Regulatory Quality, and Rule of Law, have positive impacts on manufacturing value added per capita; but only the effect of regulatory quality indicator is found to be statistically significant. Furthermore, the overall index of infrastructure and its composite indices, including Transport composite Index and Electricity composite, have positive and significant effects on the manufacturing value added per capita. The results also suggest that trade openness have positive and significant impact on the manufacturing value added per capita. The effect of Intra-African trade openness is stronger than that of the Rest of the world. This confirms the great potential of the African Continental Free Trade Area to support expansion of manufacturing activities across the continent.

Keywords: Industrial Policies; Institutions; Manufacturing Sector; Structural Change.

JEL Classification: O25; O43; P48; L16; 014; L60

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1 Introduction

Several decades of development policies, primarily focused on agriculture, commodities and export-led growth have placed Africa at the low rungs of global value chains. The situation is underpinned by limited diversification toward a vibrant industrial sector that has the huge potential to contribute to lifting Africans out of poverty. Indeed, the contribution of industrial sector to Africa’s economic performance is very low and seems to weaken over time. A comparison of the different African economic sectors (agriculture, industry and services) in figure 1 shows that the contribution of industrial sector to GDP slightly fell on average over the period 1990-2015. At the same time, the contribution of the services sector to GDP shows an increasing trend at the expense of the industrial sector and agriculture sector. Within the industrial sector itself, the share of the manufacturing sector in GDP has dropped drastically between 1990 and 2015, from 17% to only 11% according to AfDB, OECD and UNDP (2017).

Today, there seems to be a broad consensus that a dynamic industrial sector, in particular a dynamic manufacturing sector, is essential to the structural transformation of African economies. “Industrial development is necessary for Africa to structurally transform its economies by reallocating resources from low-productivity sectors to higher ones” (AfDB, OECD and UNDP, 2017). A prerequisite for industrial-led development include effective and innovative industrial strategies that critically depend on institutions and policies, in particular industrial policies (UNECA, 2014).

There are several definitions for industrial policy in the literature that are different by the way of the state intervention in support of industrialization. Some definitions of industrial policy are specific and selective (so-called vertical) as they include only policies that aim to have a direct effect on particular industries or firms. For instance, Chang (1994) defines industrial policy as a policy aimed at particular industries to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole. Pack and Saggi (2006) define industrial policy as any type of selective government intervention or policy that attempts to alter the structure of production in favor of sectors that are expected to offer better prospects for economic growth in a way that would not occur in the absence of such intervention in the market equilibrium. Rodrik (2004) defines industrial policy as "restructuring policies in favor of the more dynamic activities." According to
UNECA (2016a) transformative industrial policy is "a policy that deliberately favors particular industries or firms over others to enhance efficiency and to promote productivity growth for the targeted industries as well as for the whole economy, but also to manage the industries' decline smoothly".

Other definitions of industrial policy are general (so-called horizontal) as they include many areas of public policy, such as education, R&D, and infrastructure that benefit all industries, but that are not deliberately designed to favor particular industries or firms (UNECA, 2016a). For instance, the World Bank (1993) defined industrial policy as “government efforts to alter the industrial structure to promote productivity-based growth”. According to UNIDO, UNCTAD and MovingUp (2011), industrial policy includes any government measures that are aimed at improving the competitiveness and capabilities of domestic firms and promoting structural transformation that are socially inclusive and environmentally sustainable.

The distinction between selective and general industrial policies is not strict in practice, because any industrial policy that may seem general always implicitly implies targeting or selection (UNECA, 2016a). The common feature is that industrial policy includes deliberate efforts to promote industrialization, whether targeting specific industries or not.

Industrial policies are critically needed to correct the widespread existence of market and coordination failures (UNECA, 2016a). Market failures that require state intervention include, among others, the existence of externalities, imperfect information and risks or uncertainties.

Positive externalities, in R&D, especially innovation, or negative externalities, in environment area, are often cited as market failures justifying a public intervention. Another case of market failure occurs in the presence of spatial externalities for sectors characterized by high fixed costs and significant economies of scale. Public intervention can strengthen cooperation between firms to generate externalities, overcome coordination failures to enhance long-term growth potential. (Buigues, 2012)

Imperfect information about the chances of success of companies does not allow commercial banks to make optimal decisions about the credit required by companies. In addition, there are investments in some specific areas of the economy, such as in green economy, that are very costly.
and very risky but useful for the society of which the State alone has the will and does not have adequate the capacity to engage in it.

Several other arguments of interdependence and capacity justifying the need of industrial policy in particular and direct intervention of the state in economic activity in general are widely discussed in UNECA (2016a). Most of the arguments are directly or indirectly related to those already mentioned above. The main debate today is about the level and the domains of state intervention.

The first objective of this paper is to revisit the recent evolution of industrial policies in Africa, to analyze the coherence of these policies, to draw lessons we can learn from the successes and failures of these policies, and to identify the challenges to address by current and future industrial policies. The second objective of the paper is to investigate through an econometric modeling the institutional variables, including governance indicators, infrastructure development indicators, and trade policy variables, that significantly affect manufacturing value-added per capita in the Africa continent.

**Figure 1: Evolution of value added of economic sectors (% of GDP) in Africa**

![Evolution of value added of economic sectors (% of GDP) in Africa](image)

Source: Author, using data from World Bank’s Online Database
2 Overview of industrial policy and institutions in Africa

This section presents a general overview of the landscape of type and nature of industrial policy and institutions on the Africa’s continent, with a critical view to the effectiveness of these policies. We also analyze the factors of success and failure of industrial policies implemented in Africa and we draw some lessons for the experiences so far. Finally, we examine the evolution of industrial policy in Africa during the last decade in terms of scope and structural reforms.

2.1 A general overview of industrial policy in Africa

Since the 1960s after the political independences to the present, industrialization strategies in Africa have varied greatly through time. The import substitution industrialisation (ISI) strategy dominated the period 1960 to 1980. ISI was characterized by a permanent intervention of governments in the process of industrialization. The instruments of ISI include, among others, nationalization of strategic industrial units, protectionism and a banking system oriented in financing industries (UNIDO, UNCTAD and MovingUp, 2011). The implementation of ISI in Africa did not led to the expected results. Public industries failed to drive economic growth, there was very limited technology transfer if any at all, and states faced very high deficits of budgets and balances of payments. In an attempt to address these issues, African countries were constrained, mainly by the World Bank and the IMF, to apply Structural Adjustment Programs (SAPs) from the 1980s. The SAPs were export-oriented, advocated for the reduction of the protection of local industries, the privatization of state-owned companies and the compression of public spending including public investment (UNECA, 1989). After a decade, these measures also led to consequences as bad as those of the ISI. African governments were focused on macroeconomic stability and institutional reforms to protect property rights and to ensure contract compliance, without defining coherent strategies for market failures that restricted economic activity (UNCTAD, 2000). SAPs were supposed to attract foreign capital and thus ensure the growth of a stable industrial sector in Africa. Elhiraika (2014) has shown that this has not been the case, except in the extractive industries. Africa has continued to depend on the export of raw material with
limited value addition. Moreover, markets liberalization and privatization of public enterprises did not generate adequate private investment and employment to expand output. Since the beginning of the 2000s, and given the failure or at least the mixed results of the structural adjustment programs, industrial policies have become a priority in the development plans of most of African countries, with more State interventions to support local industries to improve their competitiveness and to mitigate the widespread market failures. The renewed interest in industrial policy was marked at the continental level by the adoption in 2008 by Head of African States of the Accelerated Industrial Development Action Plan for Africa (AIDA).

Today, policies exist or are being developed at the national, regional and continental levels to address the challenge of Africa’s industrialization. At the national level, according to the AfDB, OECD, and UNDP (2017), at least 26 African countries have national industrialization strategies, and 19 of these strategies target light-manufacturing industries.

At the regional level, strategies for industrial development include, for instance, the SADC Industrialization Strategy & Roadmap 2015-2063, the East African Industrialisation Policy 2012-2032, and the West African Common Industrial Policy (WACIP). The general objectives of the regional strategies are to foster industrialisation through regional integration and competitiveness of the manufactured sector.

At the continental level, African countries have notably endorsed the African Development Bank’s African Development Strategy 2016-2020. This strategy aims to make competitiveness, capacity building and entrepreneurship the driving forces for industrialization. Industrialization is also an essential element of the first ten-year plan (2014-2023) for the implementation of Agenda 2063. The objectives of AIDA have been reaffirmed in the Africa’s Agenda 2063, which recommends the promotion of sectoral plans and regional value chains, as well as the promotion of consumption of local products to support the implementation of industrial policies at all levels. In 2016, the UN General Assembly adopted a resolution announcing the Third Industrial Development Decade for Africa. The objectives of this resolution will be pursued until 2025, under the auspices of the United Nations Industrial Development Organization (UNIDO) in Collaboration with the African Union (AU). The United Nations Economic Commission for Africa (ECA), the New Partnership
for Africa’s Development (NEPAD), and the Sustainable Development Goals (SDGs) have, in their respective programs, strategic focuses on the continent’s industrial development.

However, and despite the various policies, the fact is that very few African countries are able to effect a structural transformation of their economies based on industrialization. The best successful candidates in this regard are, among others, South Africa, Botswana, Ghana, Morocco and Mauritius, which are better ranked than some Asian competitors in terms of their ability to implement industrial policies (AfDB, OECD and UNDP, 2017). This raises the question of the nature of industrial policies on the continent and the quality of institutions in implementing these policies.

2.2 Role of institutions in industrial development in Africa

The role of governments and institutions in regulating market failures is more than a necessity for the industrialization of Africa. However, most low- and middle-income countries are particularly poorly ranked in terms of government effectiveness indicators, which also affects their ability to manage their industrial policies (Altenburg, 2011). The key problem of industrial policy in developing countries is that the capacity of the public sector to address market failures is much more limited, although the need to correct these deficiencies is much greater than in more developed countries. In addition, some countries lack institutions that hold governments to account for their policies. In such cases, particular interest groups can easily use these policies for their own benefits. There is therefore a particular need for inexpensive policies that are simple to implement and difficult to be captured by influential interest groups. Institutions therefore have an essential role in the development - from design to implementation and monitoring - of industrial policies in developing countries.

As mentioned in the UNECA (2014), unlike many Asian countries, which have used industrial policies to transform their economies in a relatively short period of time, Africa countries have followed schematic plans that give a general vision of industrial development but with more or less long term targets. The result is the lack of institutions that can generate processes and mechanisms to understand the ever-changing requirements of the industry. In fact, industrial policy in Africa
has focused more on policy outcomes than on the institutional frameworks used to develop, implement, monitor and enforce industrial policy. Industrial policy in Africa lacks coordination. The private sector is almost non-existent or omitted in the development of industrial policies in some countries. The experiences of some Asian countries, including Republic of Korea, Taiwan, Hong Kong, Singapore, and Malaysia, highlight the need for inclusive industrial policy processes, innovative and dynamic institutions that facilitate a continuous dialogue between stakeholders to identify long-term and challenges to industrialization, and to put in place effective and flexible mechanisms to address them. Coordination between levels of governments, firms and other public institutions play a key role in fostering industrialisation. All the policies (macroeconomic, trade, and education) need to be integrated in a coherent framework to promote efficiencies and synergies among all stakeholders.

Lall and Kraemer-Mbula (2005) pointed out rather a low level of industrial capacity in Africa and the need to reconsider an industrial strategy focused on capacity building. He notes that Africa is becoming increasingly marginal in the technological dynamics of the global economy. For Robinson (2010), the reason why industrial policy failed in many African countries in the 1960s is the same as why economic policies were generally very bad in this region, thus these policies were motivated by political power. Industrial policy is not necessarily the result of a political balance but may be more about a redistribution of income or political power than a promotion of economic growth. The author thinks that the failure of industrial policies in Africa is the consequence of perverse political incentives. The success of industrial policies on the continent requires changes in political institutions or endogenous changes in the de facto power balance in society.

The successful industrial policy of East Asian countries reflects the very different political balance that has historically emerged in this part of the world compared to Latin America or sub-Saharan Africa. Collier and Venables (2007) believe that Africa lags behind in part because its economic reforms have lagged behind those of Asia. When export diversification began to prosper in Asia in the 1980s, no African country offered a comparable investment climate. Now, a number of African countries offer reasonable investment climates, but they cannot compete with Asian countries that have established businesses in new export sectors. Companies located in Africa also face higher costs in general than Asian competitors, mainly due to technological backwardness and severe infrastructure bottlenecks (Lall and Kraemer-Mbula, 2005).
For Altenburg (2011), industrial policies in developing countries are generally imposed by financial partners, often not taking into account the specificities of the local environment. The ability of governments to align financial partners with national strategies is therefore an important determinant of the success or failure of industrial policy in poor countries. It should be added that the initial conditions (in term of legal system, education for instance, colonial legacy) for private sector development tend to be less favorable in poor countries, in particular in African countries.\(^2\) On the supply side, technical and entrepreneurial skills tend to be scarce. The lack of specialized and efficient industries in complementary activities further increases costs and often reduces quality. On the demand side, low incomes and poor diversification of consumption patterns significantly limit the business opportunities.

Overall, most African countries are struggling to structurally transform their economies and to stimulate inclusive development despite some industrial policy efforts. Several authors point out the lack of institutional frameworks that do not allow for good coordination and monitoring of industrial policies. A number of Industrial Policy Organizations (IPO) have been created for better coordination of industrial policies. The role of these organizations is to implement government policies relating to the promotion of the industrial sector and to serve as support structures for businesses. The actions of Industrial Policy Organizations in promoting manufacturing industries have made notable progress in some African countries.

2.3 Successes, failures and lessons learned from Africa’s industrial policies

While some African countries have somewhat successfully implemented their industrial policies, the overall trend is more of failures. Notably, most of African countries have failed in their attempts to bring structural change to their economies despite the various industrial policies adopted. These countries are still characterized by the export of raw materials and agricultural and mining products (UNCTAD 2016). Using UNCTAD database online on trade, primary products

accounted for nearly three-quarters of all exports from African countries between 1995 and 2015. Various reasons are advanced to justify these failures on Africa.

Industrialization strategies have either not taken into account all the comparative advantages of the continent and changing comparative advantages or have lacked incentives for entrepreneurs. Many studies indicate that the low level of manufacturing output and exports from the continent may be partly explained by the fact that only the comparative advantage in natural resources is exploited (UNECA, 2011).

Institutional failure is seen as a major factor in the failures of industrial policies on the continent. For Rodrik and Subramanian (2003), institutions help regulate markets and correct market failures. Institutions regulate activities in various economic sectors, promote competition, ensure transparency and provide public goods. The failure of institutions in Africa implies that corruption, red tape, lack of protection of property rights and weak rule of law remain of common occurrence. Any incentive system designed to help private investors to engage in new activities may end up serving as a transfer mechanism to unscrupulous businessmen and interested bureaucrats (Rodrik, 2004). For Nnadozie (2003), the causes of the failure of the industrialization of Africa dates back to the colonial period whereby colonizers left legacy structures, institutions and conceptions set-up for extracting always more. The author argued that, at the independence, the structure of African economies was not aimed at transformation and the creation of added value, but rather the extraction and export of raw materials.

The experiences of some Asian countries, such as the Republic of Korea, Taiwan, Hong Kong, Singapore and Malaysia, highlight the need for inclusive industrial policies driven by sound institutions, such as legal certainty, efficient public administration, and effective anti-corruption strategies. These Asian countries resorted, at the beginning of their industrialization process between the 1960s and 1970s, to various government interventions, such as trade policies, sectoral policies, education and innovation policies (UNECA, 2011).

The case of Nigeria is an illustration of the failure of industrial policies in African countries (UNECA, 2014). This country has experienced enormous difficulties in the implementation of its industrial policies, because of the poor coordination among the actors, the weak participation of the private sector and vast gaps in the support given to the efforts of the private sector in industry.
Iwuagwu (2011) shows that the manufacturing sector in Nigeria, particularly since the 1980s, faces many challenges such as low capacity utilization, unreliable infrastructure (which adds to the costs of doing business), and lack of venture capital for young entrepreneurs, the high cost of capital, especially that provided by banks and other financial institutions. The numerous number of industrial policy institutions in the country has not produced satisfactory results. Senegal’s industrial sector also faces a number of problems, which regularly decreases the contribution of the manufacturing industry to GDP. Development plans do not include a revision of industrial policies, top-down coordination issues, political interference, weak private sector participation and lack of funding (UNECA, 2014).

Only few countries including, among others, South Africa, Mauritius, Morocco, and Tunisia, are often cited as good examples in the implementation of industrial policies on the continent (see for instance UNECA (2011) and UNECA (2014)).

The above examples illustrates that in developing/revising new industrial policies, African governments need to think about their intended results and learn from the past. Table I provides a summary of recent and ongoing industrial policies in some African countries.

### Table 1: National industrialisation strategies in Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>National strategy</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>New Economic Growth Model</td>
<td>2016-20</td>
</tr>
<tr>
<td>Angola</td>
<td>National Development Plan, within Vision 2025</td>
<td>2013-17</td>
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<tr>
<td>Botswana</td>
<td>Industrial Development Policy for Botswana</td>
<td>2014</td>
</tr>
<tr>
<td>Cameroon</td>
<td>Plan directeur d’industrialisation, within Vision 2035</td>
<td>2010-35</td>
</tr>
<tr>
<td>Cabo Verde</td>
<td>Growth and Poverty Reduction Strategy</td>
<td>2008-11</td>
</tr>
<tr>
<td>Côte d’Ivoire</td>
<td>National Development Plan</td>
<td>2016-20</td>
</tr>
<tr>
<td>Egypt</td>
<td>Industrial Development Strategy</td>
<td>2010-25</td>
</tr>
<tr>
<td>Equatorial</td>
<td>Plan Ecuatoguineano de Industrialización 2020</td>
<td>2011-20</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Industry Development Strategy</td>
<td>2002</td>
</tr>
<tr>
<td>Gabon</td>
<td>Stratégie Nationale d’Industrialisation, within the Plan Stratégique Gabon émergent</td>
<td>2013</td>
</tr>
<tr>
<td>Ghana</td>
<td>Ghana Industrial Policy</td>
<td>2020</td>
</tr>
<tr>
<td>Malawi</td>
<td>National Industrial Policy</td>
<td>2016</td>
</tr>
<tr>
<td>Mauritania</td>
<td>Stratégie pour le développement du secteur industriel en Mauritanie</td>
<td>2015-19</td>
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<tr>
<td>Mozambique</td>
<td>National Development Plan</td>
<td>2013-33</td>
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<tr>
<td>Namibia</td>
<td>Industrial Policy Implementation and Strategic Framework</td>
<td>2012-30</td>
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<tr>
<td>Nigeria</td>
<td>Nigeria Industrial Revolution Plan</td>
<td>2014-19</td>
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<td>Rwanda</td>
<td>Rwanda Industrial Master Plan</td>
<td>2009-20</td>
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<tr>
<td>Senegal</td>
<td>Accelerated Growth Strategy</td>
<td>2005</td>
</tr>
<tr>
<td>South Africa</td>
<td>Industrial Policy Action Plan</td>
<td>2014-17</td>
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<tr>
<td>Tanzania</td>
<td>Integrated Industrial Development Strategy</td>
<td>2011-25</td>
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<tr>
<td>Tunisia</td>
<td>National Industrial Strategy</td>
<td>2011-16</td>
</tr>
<tr>
<td>Uganda</td>
<td>Integrated Industrial Policy for Sustainable Industrial Development and Competitiveness</td>
<td></td>
</tr>
</tbody>
</table>
2.4 Synopsis case studies

This section presents case studies for six (06) countries that are seen, at some extent, as examples in terms of performance of their manufacturing sector. These countries are Mauritius, Swaziland, South Africa, Morocco, Tunisia and Egypt (see table 2 of section 3.2.2). More precisely, these case studies show how industrial policy institutions impact or have impacted the manufacturing sector of these African economies that have performed well in terms of manufacturing value added per capita and/or manufacturing value added as a percentage of GDP. These countries, with different characteristics in their industrial processes, present important lessons for the African continent.

2.4.1 Mauritius: a business environment conducive to private initiative

Mauritius has achieved a remarkable economic performance since the 1980s. Its GDP per capita at constant 2010 prices rose from 2363 US dollars in 1981 to 9469 US dollars in 2015. This represents an average annual growth of 4.2% and the 3rd best performance over this period. The country has undergone a sustained transformation from an exclusive agricultural monoculture of sugar cane to a strong and diversified economy, with a place of self-granted to the industrial sector. It has a Manufacturing Free Zone that became the first hiring sector with 90% of employments in 2001. This Free Zone produces (clothing, toys, light electronics) daily for the export market. A notable feature for Mauritius good performance was that the industrial policy was aimed at the diversification of exports. For example, the sugarcane industry diversified to include refineries, special sugar confectionery, a biomass industry and rum distilleries. The Mauritian manufacturing sector is one of the most dynamic in the continent. In 2012, the manufacturing sector alone...

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3 According to the World Bank database online and the author’s calculation.
5 Over the period 2003-2015, the average contribution of the manufacturing sector to GDP is about 16% and the average manufacturing value added per capita is about 1168 constant 2010 US dollars (2nd rank in the continent). Moreover, the country is often ranked at the top (among African countries) of the Global Competitiveness index established by the World Economic Forum of Davos.
accounted for 18% of GDP, 65% of Mauritius’ exports and 22% of the country’s total employment (UNECA, 2014).

The success of Mauritius is mainly due to its judicious policies (based on inclusive growth, human capital development and social mobility), the constant efforts of the public authorities to involve public and private actors debates in formulation and implementation of policies, the international links (duty-free and quota-free access to the European market). The special tax incentives make the country very attractive to international investors: an income tax, corporate tax and VAT fixed at the rate of 15%; non-taxable dividends and capital gains; exemption from customs duties and VAT on imported goods and equipment.

In addition, the country has a strong infrastructure and connectivity that facilitate the flow of products. These include a reliable logistics platform with modern infrastructure, a well-maintained road network, an efficient harbor with deep-water docks, an international airport with a modern terminal, and an airport hub for cargo with value high added. In addition, Mauritius is connected to the business world thanks to a high-speed Internet (undersea fiber optic cables, SAFE and LION).

2.4.2 Morocco: an example of a successful diversification

Morocco has managed to diversify its economy by making efforts to improve the coordination and implementation of industrial policy.

Before the 2000s the industry accounted for about 15% of GDP and employed around 10% of the population. In 2015, it accounted for nearly 30% of GDP and 21% of employment. Moroccan industry has been the subject of many reforms. In 2009, the "Plan National Emergence II (PNE II)" is launched. This plan aims to diversify the Moroccan industry and to improve the efficiency of its various sectors. A new Industrial Plan, "Plan d’Accélération Industrielle (PAI) 2014-2020", is

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6 See « L’île Maurice, un investissement durable », Board of Investment, Mauritius 2015.
8 This plan replaced the « Plan National Emergence I », which failed to lead good results as expected.
underway. It seeks to create industrial ecosystems, and federate small and medium enterprises around industrial locomotives. The export promotion policy that has been in place since the 1980s has allowed several labor-intensive branches to develop, in this case textile and agro-food (El Mokri et al., 2016). Textiles and leather, former key sectors of the manufacturing industry, employ more than 40% of the industrial workforce, but represent only 20% of the value added of the processing industries. Agribusiness, now accounts for 35% of industrial GDP, or 8% of national GDP, of which 25% of production is for export. The manufacturing sector as a whole contributes 16% to the GDP over the period 1996-2015. The diversification policy has also led to the development of the automotive sector, which has been in the forefront of the country's exports since 2014.

The "Plan d'Accélération Industrielle (PAI) 2014-2020" is innovative in its approach: for each industrial sector, it is a question of favoring, around one or more leaders, the constitution of a galaxy of complementary SMEs in order to forming communities of shared interests that are better organized, more responsive and more competitive. This approach has also attracted powerful multinationals, such as the French group PSA Peugeot-Citroën, whose plant under construction in Kenitra, near Rabat, will produce 90,000 vehicles per year from 2019. The American aircraft manufacturer Boeing signed an investment agreement in September 2016 to develop in the Tangiers area, bringing in its wake the establishment of 120 subcontractors and suppliers, and the creation of more than 8,500 specialized jobs.

2.4.3 Tunisia: exports promotion by leader manufacturing industries

In Tunisia, the "Bureau tunisien de Mise à Niveau (BMN)" established in 1996, successfully accomplished the implementation of government policies within the framework of industry upgrading and coordination, accompanied by a framework to track performance along with financing mechanisms. The BMN has achieved good results, despite its limited autonomy due to its subordination to the Ministry of Industry.

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In the early 1970s, Tunisia opted for export promotion and modernization of the manufacturing sector. Currently, the export industry generates nearly 60% of industrial employment. The manufacturing sector contributes to 16% of GDP. Despite the diversity of the Tunisian industrial fabric, three sectors constitute the locomotives of national industrial exports: the textile, clothing, leather, footwear, food industries and finally the mechanical, electrical and electronic industries. These three pillar sectors account for 76% of industrial enterprises, 87% of exports, nearly 62% of foreign direct investment and more than 83% of employment.\(^\text{10}\)

The entry into force of the free trade agreement with the European Union, in January 2008, paved the way for many development opportunities for Tunisian industry but also rise competitiveness challenges.

2.4.4 Egypt: a successful example of state interventionism

Egypt embarked on import substitution industrialization (ISI) in the 1930s, following the Great Depression of 1929 and the sharp decline in world cotton prices that followed. ISI intensified in the post-independence years from the 1960s, with a massive wave of nationalization in industry and commerce. During this period, industrial policies were highly selective: the state not only indirectly influenced labor and investment flows in different economic sectors through discriminatory incentives (such as differential tax rates), but also directly as the largest investor in the country.

In 2004, a new wave of reforms was launched. The objectives were to stabilize the exchange rate, reduce and rationalize the tariff structure, drastically reduce income tax rates, and reform the business environment and promote the private sector. Nevertheless, the transition to a market economy has never been complete with the still important role of the public sector, the protection of national industries (for example in the textile and food industries) with substantial energy subsidies.

The performance of the Egyptian industry is quite good compared to other countries on the continent. Between 2003 and 2015, the industry contributes on average to about 35% of GDP, including 16% for the manufacturing sector. Textiles, food industries, chemical industries, oil, cement, and metals dominate the industry sector.

2.4.5 South Africa: the long-term positive effects of industrial policy

South Africa (SA) is another example of effective coordination of industrial policy and dialogue between public and private actors (UNECA, 2014). There is close coordination in the design, implementation, monitoring and evaluation of industrial policy. The existence of the action plans among various sectors accompanied by an M&E framework underlines the importance of the manufacturing industry and its ability to generate dynamic effects that are increasingly pronounced due to the depth of its intersectoral links. These action plans recognize the need to integrate technological progress into the manufacturing industry. The National Industrial Policy Framework (NIPF), which outlines the main principles of South Africa’s industrial policy and the Industrial Policy Action Plan (IPAP), can be cited.

South Africa industry is quite diversified with mining and manufacturing industry featuring on the top list. The example of the South African auto industry also shows how selective, sector-specific, well-designed policies can provide domestic consumers with world-class products at world prices without government subsidies, even though the traditional economy and the Washington Consensus warn against such policies (Barnes, Kaplinsky and Morris, 2004).

In addition to these programs, the Southern African Development Bank has also facilitated industrialization through its important role in financing new businesses. The case of South Africa shows that an effective industrial policy can result from trial and error and only have long-term effects (UNECA, 2011). The design, implementation, monitoring and evaluation of industrial policy in South Africa demonstrate a complex and effective coordination between public authorities, public bodies and private actors.

South Africa has a dynamic manufacturing industry with a contribution to GDP of around 14% in average over the period 2003-2015, the ninth largest in the continent. The mining industry also
occupies a prominent position alongside the automobile that benefits from foreign direct investment.

2.4.6 Swaziland: the paradox of industrialization

Swaziland has an important industrial sector in its economy with a manufacturing industry ranking first in terms of its contribution to GDP (around 36%) on the continent. However, the country also has the particularity of having a limited entrepreneurship that could be reinforced by an integrated industrial policy to develop local businesses and create productive jobs in the country. According to the 2013-14 Integrated Labor Force Survey, however, entrepreneurship remains limited, as self-employed workers represent only 20% of the total labor force. Although Swaziland is classified as a low- and middle-income country, about 63 per cent live below the poverty line according to AfDB, OECD, and UNDP (2017). Hence an industrial paradox!

The manufacturing industry remains the industry's leading subsector, covering various agro-industrial processing activities based on sugar (in particular concentrate for Coca-Cola beverages), citrus fruits, pineapples, meat, production of pulp, clothing and textiles. Recognizing the link between industrialization and entrepreneurship, the state has put in place various initiatives to develop and promote local entrepreneurship, with a focus on small and medium-sized enterprises (SMEs).

Despite the importance of manufacturing, the economy is relatively diversified, with manufacturing and services providing a share of output that is higher than most other countries in sub-Saharan Africa. However, the private sector is poorly developed, foreign direct investment (FDI) is low and SMEs rely on either public contracts or low value-added activities such as subsistence farming and wholesale and retail trade. The structural transformation of the economy has not significantly progressed over time. The slow transition to higher value-added industrial and service activities is a real challenge for the country's economy, which needs to strengthen its productive capacity to achieve sustained, equitable and sustainable growth.
2.5 Challenges and scopes of industrial policies in Africa over the last ten years

This section analyses the evolution of industrial policy in Africa during the last ten years in terms of constraints to industrialisation of Africa, structural reforms and time perspective.

2.5.1 Capacity constraints

Capacity constraints include productive capacity constraints; trade capacity constraints; institutional capacity constraints; and human/technical capacity constraints.

African countries must meet the conditions for efficient technology transfer in order to boost productivity and to succeed in their industrialization agendas. For most African industries, the lack of technological capabilities needed for innovation and the development of new industries is a major challenge (UNECA, 2013a, 2013b). Only a small group of countries, including South Africa, Tunisia, Egypt and Mauritius, have made remarkable progress in technological accumulation. This technological backwardness in most countries contributes to the reduction the competitiveness of several industries on the continent. Attracting foreign direct investment plays an important role in technology transfer. This requires the improvement of the institutional framework (removing the institutional constraints) in all that concerns the legal and regulatory environment in order to reduce corruption and improve the business climate. The political instability and security risks that many countries of the continent face also constitute as an obstacle in attracting potential foreign investors.

In addition to the technological and institutional constraints, there is also an important deficit in infrastructure, which is hugely hindering the development of industries on the African continent. Quality infrastructures contribute directly to industrialization through the infrastructural services that companies purchase (UNECA, 2017b). The lack of quality infrastructure as well as in quantity at several levels (energy, communications, transport including road rail, air and maritime) contribute to increase in transaction costs of Africa industries, reducing their competitiveness. It also appears that the existence of non-tradable sectors characterized by particularly low productivity can, in the presence of complementarities between factors, act as a constraint on the development of downstream sectors (Cadot et al, 2015). Thus, a deficient energy sector --- a frequent situation in Sub-Saharan Africa --- has crosscutting negative effects on the whole economy and in particular on the manufacturing sector, which is essential for structural
transformation. To meet this challenge, the United Nations system plans in Agenda 2030 to foster resilient infrastructure, promote sustainable industrialization that leaves no-one behind and encourages innovation (SDG9). Infrastructure development at the national, regional and continental levels can address another constraint, that of commercial capacity.

On the other hand, it must be emphasized that African countries find themselves marginalized in international trade. Technological limitations and international market conditions (unfavorable terms of trade) mean that African industry faces a relatively high level of competitiveness relative to its capabilities, in a context of deep globalization. African countries face competition from other countries that are better equipped with technology and skilled labor as is the case in Asian countries. The establishment of larger and effective regional blocs could create more opportunities in terms of outlets and stimulate intra-African trade. In this regard, UNECA-through ATPC, UNCTAD has been collaborating with the African Union Commission since 2012 on the plan for the establishment of a Continental Free Trade Area (See 2015 Report on Activities Undertaken by UNCTAD in Support of Africa).

Finally, another capacity constraint that must be highlighted is the lack of qualified human resources to generate the needed structural change. Training is not usually in line with the new requirements of the job market and the vision of new development policies. The shortage of skilled labor still affects all levels of the African industrial chain. Staatz (2011) estimates that low productivity in the agribusiness and agribusiness sector in Africa is partly due to schooling levels, which are well below the minimums required for good technical efficiency in production. It is estimated that the average number of years of schooling for men is 4 years, and for women in Africa, it is 1.5 to 4 years; levels which are well below those in Europe and Central Asia (World Bank, 2008).

2.5.2 Financial constraints

The industrial sector in Africa faces another major constraint that is related to limited financial resources. Indeed, in order to meet the demands of the highlighted capacity constraints mentioned above and to succeed in their industrialization policies, African countries need to explore other innovative financing mechanisms. The financial system is struggling to meet the financing needs of the African private sector. Financial markets are characterized by low capitalization, and banks do
not take enough risk in financing small and medium-sized businesses. It appears that financing costs are quite high in African countries, given the conditions of the financial markets. These conditions include the low level of financial market development, limited banking services and products, the preponderance of commercial credits, and the requirement for significant collateral. Compared with companies in Southeast Asia and China, industries in Africa have less access to credit and are less likely to buy inputs on credit or to finance investments with bank loans (Dinh and Clarke, 2012).

Also, it seems that there is a need to reorient the allocation of foreign capital flows to the African continent. In fact, about 51% of these flows are devoted to the service sector, and only slightly more than 20% to the processing sector (Phyllis Papadavid, 2017). The banking system should therefore be further enhanced by reviewing national legal and regulatory frameworks, opening the banking sector to competition, supporting capacity building initiatives in African banks, facilitating banker training and promoting the creation of different financing systems (African Union, 2008). It is indeed necessary that the various financial institutions engage in the financing of infant industries, and this requires a good mastery and improvement of risk management tools related to the needs of various stakeholders.

The introduction of new financing mechanisms, such as Public Private Partnership, solidarity taxes, and emerging donors other than traditional international financial institutions, can enable African countries to overcome a number of capacity constraints, accelerate technological upgrading and innovation, which will contribute to increased production and processing of local raw materials. By way of illustration, the use of public-private partnerships could help overcome some of the difficulties, particularly those related to the infrastructure deficit.

2.5.3 Green industrialization

In Sub-Saharan Africa, about 60% of employment still comes from the agricultural sector. The labor force tends to move from the agricultural sector to relatively unproductive urban informal services sector rather than to high productivity manufacturing industries or modern market services. Sub-Saharan Africa’s share of manufacturing is the lowest in the world (less than 10%
over the last 30 years). Per capita manufactured exports from sub-Saharan Africa account for only about 10% of the average for developing countries. In North African countries, the share of production and employment is also high in agriculture and low in the manufacturing sector, relative to per capita income (Brahmbhatt, Haddaoui and Page, 2017). Huge challenges therefore remain on the continent.

In November 2015, world leaders gathered in New York and agreed on the need to build resilient infrastructure, promote sustainable industrialization and encourage innovation, thus becoming one of the Sustainable Development Goals (SDGs). To meet the challenge of industrialization, Africa therefore will need quality as well as high quantity of infrastructure that are resilient to climate changes.

Africa needs to meet the challenge of preserving the environment. Thus, African countries need to develop strategies for a resilient green economy in face of climate changes. For Altenburg (2011), green industrialization means eliminating subsidies that have adverse effects on the environment; the levying of ecological taxes to internalize environmental costs; the establishment of emissions trading schemes; promoting public and private environmental research; and the introduction of market incentive programs to accelerate the diffusion of new technologies that preserve the environment. According to Brahmbhatt, Haddaoui, and Page (2017), green entrepreneurship and green markets are emerging in Africa, but to accelerate and sustain momentum, African governments will need to develop supportive policies at two levels. First, governments need to put in place price policies and regulations that create appropriate market incentives for green processes and products, such as incentives for more efficient use of energy and water. Without such incentives, private green demand will be less than socially desirable because of the failures of the environmental market. Second, governments need to build their capacity, and develop the entrepreneurial spirit, taking into account the very different characteristics of the different types of businesses that exist in a typical African economy. By way of illustration, Ethiopia’s Climate-Resilient Green Economy (CRGE) strategy aims at maintaining rapid growth and expansion of its industrialization and employment, at the same time avoiding the traditional development trajectory by reducing greenhouse gas emissions and move towards sustainable land, soil and water. Ethiopia is ranked among the top in the race for the green economy (UNECA, 2016b).
South Africa has a Green Economy Accord signed in 2011 by union organizations, civil society, business and government. This agreement sets out 12 commitments to the green economy, including the deployment of solar water heaters and renewable energy, biofuels, recycling, reuse and waste recovery. It also includes initiatives related to clean coal technologies, electrification of poor communities, and reduction of open cooking and heating practices. The stakeholders also committed to promoting local economic activity, youth employment, and cooperatives and skills development.

In Ghana, the Environmental Protection Agency (EPA) is the main government department to promote environmental industrialisation. The department is responsible for implementing the Environmental Rating and Disclosure Program, which is used to establish the environmental record of material and industrial operations. The EPA program is implemented through the Ghana National Cleaner Production Center and the Manufacturing Industries Department.

2.5.4 Effective regional integration for foster industrialization in Africa

The promotion of intra-African trade can be a key determinant of Africa’s industrialization according to AfDB, OECD, and UNDP (2017). The ongoing work for the establishment of the African Continental Free Trade Area (AfCFTA) is an important step towards Africa’s integration agenda. It is considered as one of twelve pilot project of the African Union's Agenda 2063 and aims to facilitating free movement of goods, services and capital and leapfrog industrialization and increase economic development for the continent. Indeed, the African Continental Free Trade Area offers the potential to boost intra-African trade, stimulate investment and innovation, foster structural transformation, enhance economic growth and export diversification, and streamline overlapping trade regimes of the main regional economic communities (UNECA, AU and AfDB, 2017). The economies of most African countries lack an internal market large enough for their manufacturing (Anaman and Osei-Amponsah, 2014). These difficulties can ultimately be overcome when countries become competitive with global export markets. But in the early stages of industrial development, their small size makes it harder for domestic firms to compete with foreign firms that have an advantage of scale and operate in dense industrial clusters. Regional integration of markets could therefore help countries to overcome these difficulties and seize larger markets opportunities.
West African countries such as Burkina Faso and Mali are important producers and exporters of raw cotton. The emergence of a more competitive regional cotton textile and clothing industry could be facilitated by a customs union of the Economic Community of West African States (ECOWAS) and better intra-regional transport infrastructure.

It’s obvious that when domestic markets are too small to allow efficient substitution of imports as a starting point for industrialization, the integration of a regional market could be seen as a way out of this stalemate (Langhammer, Hiemenz, et al., 1990). However, a problem associated with regionalization is that the opening of the internal market to industrial imports by member countries results in a sacrifice of abandoned national industrial capacity. Such a loss must then be compensated by reciprocal preferences for industrial products granted by all member countries. Each country in the regional grouping is thus encouraged to specialize in the production of goods for which it has a comparative advantage.

An effective integration of African countries appears as a necessity to meet the challenge of industrialization. This includes, inter alia, improving business regulation to promote inter-country trade, the development of stock markets and financial markets in order to increase the volume of transactions, the reduction of trade restrictions including tariff and non-tariff barriers to trade, which will facilitate commercial networks; and the financing and realization of regional infrastructure, including road and rail links, ports, air links and information and communications technologies.

Infrastructure is crucial for economic transformation of each country. But the supply of some important infrastructure, such as energy production sites (in particular hydroelectric power and natural gas) and ports tend to be specific to locations (landlocked countries are particularly disadvantaged in seaports). Agreements allowing countries that are well equipped with such infrastructure to develop them on a large scale so that they can also serve neighboring countries at a lower cost (than what these countries could do themselves, even if they have the possibility) can promote a faster transformation of all the countries concerned. Second, just as national roads and other modes of transport integrate and expand a country’s domestic market, regional roads and other transport systems can be a boon for regional integration (Anaman and Osei-Amponsah, 2014).
Regional infrastructure development can reduce costs. Given the increased competition on the international markets due to globalization, African countries must, if they want access to export markets for manufactured products, take measures to reduce the direct and indirect trade costs to businesses in the continent. These indirect costs are mainly due to poor infrastructure, heavy regulatory constraints and political instability (UNECA, 2014).

2.5.5 Promoting gender parity for inclusive industrialization in Africa

Inclusive industrial policies, involving more women, especially in high value-added manufacturing industries, can address the huge challenges of industrialization in Africa. In addition to generating decent jobs and accelerating the reduction of poverty, industrialization has the power to transform women’s lives.

Butschek (2006) emphasizes that women’s participation played a key role in the industrialization of Europe, where women’s contribution to economic growth intensified during industrialization. The main branches of industry were textiles and iron. Female jobs were considered as extra income and wages remained relatively low compared to men. The contribution of women in the industrialization of Europe was possible through a basic level of women’s education. Moreover, female employment in industry was a strong incentive for institutional changes that improved the social and educational status of women in capitalist countries. The expansion of employment opportunities for women in these industries has improved conditions for women in the labor market. The availability of jobs in multinational and local export factories enables women to delay marriage and motherhood, increase their incomes and consumption levels, improve their mobility, expand their individual choice, exercise their personal independence.

Newman, Page, Rand, Shimeles, Söderbom, and Tarp (2016) point out the case of clothing industry in Bangladesh where more than three million women aged 16 to 30 are employed. It was the first industry to offer large-scale employment opportunities to women in a country where, traditionally, they were not allowed to work outside the family home. In addition to creating jobs, the arrival of clothing factories has affected decisions regarding school enrollment, marriage and the procreation of women. Young girls enter school in greater numbers, stay longer and postpone marriage. The
authors also point out that a similar transformation in women’s professional life took place in Lesotho. From the early 1980s to 2010, Lesotho’s manufacturing sector grew from about 6% to 18% of Gross Domestic Product. This result is mainly due to the strong growth in clothing exports and was accompanied by a significant increase in female employment. In recent years, the clothing industry has employed between 35,000 and 43,000 workers and women represent between 70 and 75 percent of the labor force. In some activities, such as cutting and sewing, women represent between 90 and 95% of workers.

Taking women into account in industrial development policies had also inspired some countries in the East Asia region. In Singapore, for example, women’s employment has grown in textiles, clothing and electronics. Between 1957 and 1979, women employment rate rose from 21.6% to 41.9%, with its share of total employment rising from 17.3 per cent to 33.6 per cent (Butschek, 2006). Africa must therefore draw on the examples mentioned above, in order to promote the employment of women through industrialization. In Africa, many women already work in traditional manufacturing, especially in textiles. African countries need to facilitate women’s access to funding that can expand and modernize women traditional activities. The goal is to create affirmative action programs in women’s funding to promote women’s economic empowerment and to remove the many barriers women face in accessing financing for their businesses. For example, inclusive industrial policies that place a priority on African women, who remain the vulnerable gender, can be an effective means of reducing poverty.

Reducing gender disparities and providing women with economic opportunities could lead to significant productivity gains and other development outcomes, including future generations (UNECA, 2017a). Gender inequalities in the labor market translate into lost profits for individuals, households and society, with huge economic consequences.
3 Industrial policy, institutions and manufacturing value added in Africa: an empirical investigation

In this section, we empirically assess the impact of industrial policy institutions on manufactured value added per capita in Africa using econometric modeling. The analysis focuses on the role of (general) industrial policy and institutions to promote manufacturing sector. More specifically, we empirically investigate to what extend governance indicators, trade openness, tariff rates, regional integration, infrastructure assets, human capital, credit to private sector and foreign direct investment have affected per capita manufacturing value added across African countries over the period 2003-2015.

Notwithstanding renewed interest on industrial policy to promote manufacturing sector and to achieve structural transformation, the empirical studies on the key determinants of manufacturing value added per capita across African countries, remains scant. This study contributes to this literature by providing a comprehensive empirical analysis of industrial policy and institutional drivers of manufacturing value added across African countries over the last two decades. This study contrasts with most empirical studies in the literature that tend to focus either on a specific region of Africa, such as the North Africa or Sub-Saharan Africa, or on a specific country. Furthermore, this study differs from others by using the system GMM estimation method, suitable for panel data models with potential endogeneity and non-stationarity issues. The system GMM framework also allows accounting for the dynamic aspects of the manufacturing sector performance.

3.1 Theoretical underpinnings and evidences

It is widely recognized in the literature the critical role of institutions including industrial policy organization in industrial development and specifically in promoting manufacturing sector. Indeed,

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11 According to the International Standard Industrial Classification (ISIC), the manufacturing sector comprises establishments engaged the fabrication, processing, or preparation of products from raw materials and commodities. This includes all foods, chemicals, textiles, machines, and equipment. This includes all refined metals and minerals derived from extracted ores. This includes all lumber, wood, and pulp products. According to UNIDO, manufacturing value added (MVA) of an economy is the total estimate of net-output of all resident manufacturing activity units obtained by adding up outputs and subtracting intermediate inputs.
UNECA (2014) argued that sound and effective institutions are important in mitigating market failures; coordination failures; technological accumulation and the acquisition of knowledge that constrain structural change. Moreover, AfDB, OECD, and UNDP (2017) suggested to African countries to first address the institutional challenge in order to achieve structural transformation through industrialization. This requires strong leadership and institutions, effective coordination between public and private agencies, regular monitoring and review of policies.

According to Esfahani and Ramírez (2003) and Haque, Kneller, et al. (2008), the quality of institutions plays a critical role in the formulation and implementation of economic policies and for capital accumulation. Devising sound industrial policy institutions is essential in promoting the reallocation of human, physical and financial resources to high value added sectors of the economy (Mbate, 2017). According to Wade (2009), the features of successful industrial policy include institutions that facilitate coordination between top political organs and the private sector and incentive schemes that target specific activities and possess an exit mechanism such that they are withdrawn if ineffective.

Empirical evidence in Africa tends to support the positive impact of industrial policy on industrial development. For instance, Export Processing Zones (EPZs) in Madagascar have been the main driving force behind export growth as they have resulted in lower labor costs, high productivity and increased foreign investment due to favorable incentives targeted at domestic and foreign firms (Cling, Razafindrakoto and Roubaud, 2005). The growth experience in Botswana in early 2000 is due to policies that enhance legal and fiscal frameworks conducive for investment in mining sector (Matshediso, 2005). Successful experiences from the East Asian countries show that government failure was avoided through transparent and accountable institutions. Successful experiences from emerging economies show the need for industrial policy to place greater emphasis on institutions and policies that promote strategic collaboration between the government and the private sector (UNECA, 2013a and 2013b). The success of industrial policy in East Asia can be partly attributed to government effectiveness (Noman and Stiglitz, 2015). Indeed, institution fostered continuous dialogue with the private sector, learning and accumulation of knowledge, industrialization through dynamic comparative advantage, infrastructure development and innovation. Similarly, Rodrik (2009) argues that industrial policy plays a key role in fostering structural change. The author attributes industrial development in South Korea and Taiwan to state interventions in coordinating
public and private investments, and education policies that enhanced skills. Institutions in East Asian countries favor the transfer of technology by better directing foreign direct investment (FDI) to labor-intensive sectors, particularly the manufacturing sector. This has not been the case for African countries where foreign direct investment has been focused almost exclusively on commodities.

Using a cross-sectional analysis over 1566 enterprises survey data in 2003 in China, Lu, Png, and Tao (2013) found that property rights protection (viewed as the most important aspect of institutions) had a significant positive impact on manufacturing enterprise productivity. The authors determined that enterprises most reliant on external environment had relatively higher productivity with stronger protection of property rights. In addition, enterprises with lower barriers to entry had relatively higher productivity in cities where property rights protection was stronger.

Despite the key role of industrial policy in fostering structural change, some studies addressed criticisms to state intervention and do not recommend it. These criticisms include the fact that state interventions induce economic distortion through corruption and rent seeking (UNIDO, UNCTAD and MovingUp, 2011) and industrial policy is likely to result in supporting inefficient firms. Moreover, Sachs (2003) argued that while good institutions are important, resolving the underlying problems of disease, geographic isolation and poor infrastructure is also critical to economic development. According to the author, rather than focus on improving institutions in sub-Saharan Africa, it should devote more effort to fighting against AIDS, tuberculosis and malaria that significantly reduces foreign investment returns and increases the transaction costs of international trade and tourism; build more roads to connect remote populations to regional markets; and to break down artificial political barriers that limit the size of markets.

Besides the institutions including industrial policy organizations that are viewed as an important determinant of the manufacturing performances, other determinants of value added or output in manufacturing have been explored, both across countries and over time, by a sizeable body of literature. Using a sample of 38 countries, Chenery (1960) show that the industrial output per capita, and in particular the manufacturing value added per capita, varies positively with the level of per capita income, though the relationship does not necessarily apply to every individual country in the sample.
More recently, Anyanwu et al. (2017) investigate the key determinants of manufacturing value added (as share of GDP) in North Africa for the period, 1990 to 2014 and using panel data analysis. The author found out that factors such as GDP per capita, secondary education, agricultural land, domestic credit to the private sector, trade openness, inward stock of FDI, population size, and ICT infrastructure/technology have significant positive effect on the manufacturing value added (as share of GDP) in North Africa, while other factors such as natural resource rents, domestic investment rate, institutionalized democracy, age dependency ratio have significant negative effects on manufacturing value added in North Africa.

Anaman and Osei-Amponsah (2009) investigated the determinants of manufacturing output (as share of GDP) in Ghana based on annual time series from 1974 to 2006 and using cointegration and error correction model analysis. In the short run, the authors determined that the export import ratio and political stability turned out to be the main determinants of the level of output of the manufacturing industry. In the long run, the level of per capita real GDP, the export import ratio and political stability turned out to be the main determinants of the level of output of the manufacturing industry. Using also the same econometric methodology, Ilyas et al. (2010) investigated the determinants of manufacturing value added in Pakistan over the 1965-2007 periods. The authors find total factor productivity as the most significant determinant of manufacturing value added both in the short and long run. In addition, the price level of investment affected manufacturing value added negatively and significantly. Trade openness, however, turned out to be non-significant. In the same vein, Loto (2012) investigates the determinants of output expansion in the Nigerian manufacturing industries between 1980 and 2010. The set of determinants used in this study includes the real GDP growth rate, per capita level of real GDP, gross domestic capital formation, rate of inflation capacity utilization, export of manufactured goods, and political stability. The main finding in this study is that that inflation rate plays the highest significant determinant of manufacturing output in Nigeria between 1980 and 2010. In addition there is a positive and significant relationship between manufacturing output and per capita real GDP.

Haraguchi and Rezonja (2013) and UNIDO (2012) ascertained that there is a positive association between GDP per capita and population on manufacturing activity, while natural resource endowments have negative impacts on most manufacturing industries. Comparing the pattern of
production specialization manufacturing industries across Latin American countries, As Katz (2000) also found out a negative relationship between endowment of abundant natural resources and manufacturing development. UNIDO (2015) confirms that a larger population is generally favorable 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. In addition, UNIDO (2015) and UNECA (2017a) found that the access to quality infrastructure including ICT technology is an important determinant of manufacturing value added per capita. Indeed, an increase in access to such ICT in the manufacturing sector can contribute to increase in manufacturing value added per capita by eliminating relative price distortions and facilitating the reallocation of resources, resulting to an increase in productivity.

Using a panel regressions on a sample of 168 countries across the world, but also on subsamples of countries across the world (including a subsample of 23 countries of sub-Saharan Africa and a subsample of Asian countries) over the 1970-2010 period, Dabla-Norris et al. (2013) determined that population, trade openness and foreign direct investments in non-resource sectors are positively and significantly associated with manufacturing value added. In addition, their finding show that natural resource output share, arable land, and age dependency are negatively and significantly correlated with manufacturing value added in those countries. These authors also find that the quality of political institutions, measured in their study by the degree of constraints on executive power, is negatively and significantly associated with the manufacturing share. Mensah, Adu, Amoah, Abrokwa, and Adu (2016) have confirmed that the level of income and population are positively and significantly associated with manufacturing added (as share of GDP) in a panel of countries of Sub-Saharan Africa. But they also found out that arable land is positively and significantly associated with manufacturing added. The authors also show that institutions and policy reforms such as education, trade openness, and financial development are key instruments in promoting structural transformation in Sub-Saharan Africa.
3.2 Empirical Methodology and Data

3.2.1 Methodology

To examine the impact of institutions on manufactured value added in African countries, our empirical methodology consists of dynamic panel data estimation on a sample of African countries over the period 2003-2015. Based on the existing literature mentioned above including among others, Chenery (1960), Haraguchi and Rezonja (2013), Dabla-Norris, Thomas, Garcia-Verdu, and Chen (2013), and Anyanwu et al. (2017), this study postulate the following econometric model:

\[ mva_{i,t} = \alpha_i + \lambda_t + \phi.mva_{i,t-1} + \delta.\text{institutions}_{i,t} + \beta.X_{i,t} + \nu_{i,t} \]  

(1)

where subscripts \( i \) and \( t \) are country and time indicators, respectively. \( mva_{i,t} \) is the manufacturing valued added per capita in constant 2010 USD. Institutions represent institutional variables including Voice and Accountability, Political Stability; Government Effectiveness; Regulatory Quality; Rule of Law; and Control of Corruption.\(^{12}\) \( X \) is a set of control variables. This set may include variables related to transport infrastructure, energy infrastructure, and ICT services and regional integration membership dummy variables. Regional integration zones are considered as a source of economic growth through the free trade if established since they reduce artificial political barriers that limit the size of markets. We consider the eight regional economic communities recognized as the building blocks of the African Union. These eight are namely: Arab Maghreb Union (AMU), Community of Sahel-Saharan States (CEN-SAD), Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), and Southern African Development Community (SADC). Energy is an essential input into industry’s production. In particular, manufacturing is more vulnerable to access to energy because it is more energy intensive than other sectors. ICT development foster reduction of production costs. The other control variables are education (measured by the mean years of schooling), domestic credit to the private sector, trade

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\(^{12}\) It is difficult to capture the full complexity of institutions. Hence, simplified institutional indicators and proxies are frequently used in empirical research. That said, there is no consensus on what is the “adequate” quantitative proxy for the quality of institutions.
openness, foreign direct investment stock, natural resource rents, and urban population. The terms $\alpha_t$ and $\lambda_t$ are country specific effect and time specific effect, respectively, while $v_{lt}$ is the error term of the model, which includes all other unobservable shocks to manufacturing value added per capita.

We use the system GMM method developed by Blundell and Bond (1998) to estimate the equation of the determinants of manufacturing value added per capita in Africa. The system GMM estimator uses a system of two equations, one differenced and one in levels. This estimator is designed to deal with endogeneity issue and applicable to the cases in which the number of periods is small relative to the number of cross-sectional observations. Roodman (2009) argues that, if all the moment conditions are valid, the system GMM estimator is consistent and likely to be more efficient than the difference GMM.

### 3.2.2 Data

Data used in this study are taken from the UNIDO database, the UNDP database, the UNCTAD database, the African Development Bank database and the World Development Indicators (WDI) of the World Bank’s online database. In particular, manufacturing valued added is taken from UNIDO database. The mean years of schooling is taken from the UNDP database. Trade openness is taken from the UNCTAD database. For data on infrastructure, we rely on Africa Infrastructure Development Index, AIDI (2018), produced by the African Development Bank. The AIDI is based on four components including Transport, Electricity, ICT, and Water and Sanitation. Domestic credit to the private sector, foreign direct investment stock, natural resource rents, and urban population are taken from the World Development Indicators (WDI) of the World Bank’s online database. Institutional variables are taken in particular from World Bank Governance Indicators (WGI). These indicators are described in the box below. Data on government indicators started from 1996 but are missing (not constructed) for all countries for the years 1997, 1999 and 2001. Variables on infrastructure are taken from the African Development Bank database and start from 2003. The other variables of interest are available from 1996 in our dataset for at least some countries.
Table 2: Manufacturing value added for countries in the core sample

<table>
<thead>
<tr>
<th>Country</th>
<th>%GDP</th>
<th>per capita</th>
<th>Country</th>
<th>%GDP</th>
<th>per capita</th>
<th>Country</th>
<th>%GDP</th>
<th>per capita</th>
</tr>
</thead>
<tbody>
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<td>Angola</td>
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<td>165</td>
<td>Gabon</td>
<td>5.2</td>
<td>363</td>
<td>Namibia</td>
<td>11.8</td>
<td>589</td>
</tr>
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<td>24</td>
<td>Ghana</td>
<td>7.4</td>
<td>86</td>
<td>Niger</td>
<td>5.6</td>
<td>19</td>
</tr>
<tr>
<td>Benin</td>
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<td>119</td>
<td>Guinea</td>
<td>10.7</td>
<td>71</td>
<td>Nigeria</td>
<td>6.8</td>
<td>160</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>8.7</td>
<td>50</td>
<td>Guinea-B.</td>
<td>12.4</td>
<td>62</td>
<td>Rwanda</td>
<td>5.3</td>
<td>29</td>
</tr>
<tr>
<td>Botswana</td>
<td>5.7</td>
<td>387</td>
<td>Equatorial G.</td>
<td>0.1</td>
<td>17</td>
<td>Senegal</td>
<td>12.6</td>
<td>125</td>
</tr>
<tr>
<td>Central African R.</td>
<td>16.1</td>
<td>71</td>
<td>Kenya</td>
<td>11.7</td>
<td>110</td>
<td>Sao Tome &amp; P</td>
<td>6.6</td>
<td>88</td>
</tr>
<tr>
<td>Cote d'Ivoire</td>
<td>15.0</td>
<td>172</td>
<td>Liberia</td>
<td>5.4</td>
<td>13</td>
<td>Swaziland</td>
<td>33.3</td>
<td>1232</td>
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<tr>
<td>Cameroon</td>
<td>14.9</td>
<td>185</td>
<td>Libya</td>
<td>4.5</td>
<td>535</td>
<td>Seychelles</td>
<td>8.0</td>
<td>950</td>
</tr>
<tr>
<td>Congo, Dem. Rep.</td>
<td>16.5</td>
<td>63</td>
<td>Lesotho</td>
<td>14.3</td>
<td>120</td>
<td>Chad</td>
<td>7.4</td>
<td>58</td>
</tr>
<tr>
<td>Congo, Rep.</td>
<td>4.3</td>
<td>99</td>
<td>Morocco</td>
<td>16.0</td>
<td>432</td>
<td>Togo</td>
<td>7.7</td>
<td>39</td>
</tr>
<tr>
<td>Comoros</td>
<td>1.5</td>
<td>21</td>
<td>Madagascar</td>
<td>13.3</td>
<td>58</td>
<td>Tunisia</td>
<td>16.4</td>
<td>656</td>
</tr>
<tr>
<td>Cabo Verde</td>
<td>5.4</td>
<td>169</td>
<td>Mali</td>
<td>14.5</td>
<td>101</td>
<td>Tanzania</td>
<td>6.9</td>
<td>43</td>
</tr>
<tr>
<td>Djibouti</td>
<td>2.7</td>
<td>42</td>
<td>Mozambique</td>
<td>11.8</td>
<td>45</td>
<td>Uganda</td>
<td>9.1</td>
<td>52</td>
</tr>
<tr>
<td>Algeria</td>
<td>4.2</td>
<td>180</td>
<td>Mauritania</td>
<td>7.6</td>
<td>98</td>
<td>South Africa</td>
<td>13.8</td>
<td>948</td>
</tr>
<tr>
<td>Egypt, Arab Rep.</td>
<td>16.1</td>
<td>377</td>
<td>Mauritius</td>
<td>15.8</td>
<td>1168</td>
<td>Zambia</td>
<td>8.3</td>
<td>115</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>4.2</td>
<td>12</td>
<td>Malawi</td>
<td>10.6</td>
<td>37</td>
<td>Zimbabwe</td>
<td>12.1</td>
<td>80</td>
</tr>
</tbody>
</table>

Note: This table lists the countries that make up the core sample, together with the average over the period 2003-2015 of manufacturing value added per capita in 2010 USD and in percent of GDP.

Based on the available data series for infrastructure, we restrict our estimation period from 2003 to 2015 with a panel of 51 African countries. We restricted the panel sample to countries for which there is at least 10 years of data on manufacturing value added per capita and the quality of institutions at the same time. We also restricted the sample to countries with at least one complete observation for the overall variables of interest in first difference. Countries included in the core sample are listed in table 2.

---

13 Although satisfying this condition, Somalia has been excluded in the core sample because there are too missing data for the other variables of interest for this country.
The summary descriptive statistics of the baseline variables are reported in table 3 and the correlation matrix is reported in table 4. We can see that the quality of institutions is positively correlated with the manufacturing value added per capita, with a correlation coefficient of 0.49. Infrastructure index, level of education, and credit to private sector are highly and positively correlated with manufacturing value added per capita, with correlation coefficients larger than 0.5. Trade openness and urban population are moderately and positively correlated with manufacturing value added. In contrast, foreign direct investment net inflow and natural resource rents are negatively correlated with manufacturing value added per capita. Overall, the signs of correlation coefficients between manufacturing value added and the potential determinants are expected.
Recent stylized facts about manufacturing value added (MVA) as a share of GDP clearly show the underperformance of Africa’s manufacturing sector compared to other continents. Figure 2 shows that Africa has one of the lowest value added as share of GDP among the world’s continents. Africa’s MVA has also been on a declining trend. However, these continental averages mask the sub-regional and country differences. For example, as figure 2 shows, manufacturing value added has been consistently higher in Southern and Northern Africa (both always above 12%) than in Western Africa (which never exceeded 10%). It averaged almost 14 and 11 percent in Southern and Northern Africa, respectively, as against only about 8 percent in Western Africa between 2003 and 2015. Among African countries and in terms of per capita, Swaziland, Mauritius, Seychelles and South Africa have the highest average of per capita manufacturing value added (in constant 2010 USD) over the period 2003-2015 (see table 2), while Sierra Leone, Liberia and Ethiopia have the lowest per capita manufacturing value added.

### Table 3: Summary Statistics, 2003-2015

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs</th>
<th>Mean</th>
<th>S.d</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of MVA per capita</td>
<td>663</td>
<td>4.566</td>
<td>1.238</td>
<td>1.875</td>
<td>7.214</td>
</tr>
<tr>
<td>Institutions index</td>
<td>663</td>
<td>-0.614</td>
<td>0.568</td>
<td>-1.778</td>
<td>0.880</td>
</tr>
<tr>
<td>Credit to private sector (%GDP)</td>
<td>632</td>
<td>0.230</td>
<td>0.248</td>
<td>0.006</td>
<td>1.601</td>
</tr>
<tr>
<td>Natural resources rents (%GDP)</td>
<td>652</td>
<td>0.140</td>
<td>0.138</td>
<td>0.000</td>
<td>0.635</td>
</tr>
<tr>
<td>Trade openness (%GDP)</td>
<td>663</td>
<td>0.585</td>
<td>0.267</td>
<td>0.137</td>
<td>1.504</td>
</tr>
<tr>
<td>FDI, net inflows (%GDP)</td>
<td>653</td>
<td>0.054</td>
<td>0.084</td>
<td>-0.060</td>
<td>0.895</td>
</tr>
<tr>
<td>Urban population (% of total)</td>
<td>659</td>
<td>0.416</td>
<td>0.175</td>
<td>0.089</td>
<td>0.872</td>
</tr>
<tr>
<td>Education</td>
<td>656</td>
<td>4.807</td>
<td>2.003</td>
<td>1.200</td>
<td>10.300</td>
</tr>
<tr>
<td>Infrastructure Index</td>
<td>663</td>
<td>0.196</td>
<td>0.168</td>
<td>0.004</td>
<td>0.937</td>
</tr>
</tbody>
</table>

### Table 4: Correlation matrix, 2003-2015

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Log of MVA per capita</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Institutions index</td>
<td>0.49</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Credit to private sector (%GDP)</td>
<td>0.56</td>
<td>0.56</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Natural resources rents (%GDP)</td>
<td>-0.22</td>
<td>-0.52</td>
<td>-0.33</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Trade openness (%GDP)</td>
<td>0.38</td>
<td>0.24</td>
<td>0.06</td>
<td>0.20</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. FDI, net inflows (%GDP)</td>
<td>-0.18</td>
<td>0.02</td>
<td>-0.05</td>
<td>0.19</td>
<td>0.27</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Urban population (% of total)</td>
<td>0.44</td>
<td>0.20</td>
<td>0.29</td>
<td>0.14</td>
<td>0.26</td>
<td>0.15</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Education</td>
<td>0.68</td>
<td>0.42</td>
<td>0.46</td>
<td>-0.05</td>
<td>0.40</td>
<td>-0.00</td>
<td>0.44</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>9. Infrastructure Index</td>
<td>0.69</td>
<td>0.50</td>
<td>0.63</td>
<td>-0.23</td>
<td>0.25</td>
<td>-0.03</td>
<td>0.46</td>
<td>0.65</td>
<td>1.00</td>
</tr>
</tbody>
</table>
To illustrate the positive association between institutions and manufacturing sector performance, Figure 3 shows a graph of manufacturing value added per capita and governance/institution indicators for the 51 African countries in our core sample, averaged from 2003-2015. There is a positive correlation between manufacturing value added per capita and each of the various indicators of quality of institutions.

**Figure 2: Manufacturing Valued Added by continent and by region of Africa, 2003-2015**

**Figure 3: Relationship between manufacturing value added per capita and governance indicators among African countries**
3.3 Empirical results

The system GMM requires that all the variables in the model are stationary, at least in first differences. This is the case for all of the variables we use in the model. Moreover, in this study, T is small and N large enough that non-stationarity in first level for some variables should not be a problem. The system GMM also requires identification of explanatory variables that are endogenous (entering as GMM-style) and those that are exogenous (entering as IV-style). In this work, only the lag of the dependent variable (i.e. the lag of manufacturing value added per capita) is enters in the model as GMM-style. The remaining explanatory variables enter as IV-style.

The use of system GMM can generate instruments prolifically that results in an over-fitting of the model. Roodman (2009) argues that "too many" instruments can weakens the power of the Hansen test to detect overidentification of endogenous variables and to detect invalidity of the system GMM instruments. The author warns researchers to keep the number of instruments far below the number of individual units in the panel, as a minimally arbitrary rule of thumb.
The consistency of the System GMM estimator relies on the validity of the instruments in the level and difference equations. Therefore, the specification tests in system GMM are critical in the selection of the most credible model. In this study, the following criteria partly proposed by Roodman (2009) must be met to consider a particular specification to be valid: (i) The Hansen J test does not reject the null hypothesis of the valid instruments; (ii) The Difference-in-Hansen J test for the instruments’ validity of the excluded subgroups in the level equation --- particularly the subgroup of instruments stemming from the dependent variable is not rejected; (iii) As a rule of thumb, the number of instruments should never exceed the number of individual units in the panel and ideally should stay far below that number; (iv) The second differences of residuals are not serially correlated (AR(2) test statistic is non-significant) and the residuals in level are obviously serially correlated (AR(1) test statistic is significant); and (v) Good estimates of the true parameter of the lagged dependent variable should lie in or near the range between the Within Group or Fixed Effects (downward) and the OLS value (upward). Or, failing that, a credible estimate of the lagged dependent coefficient, in absolute value, should also be below 1.00 because values above 1.00 imply an unstable dynamic, with accelerating divergence away from equilibrium values. Finally, conditional on passing all of the previous tests, the most credible lag limits for the GMM style variable are chosen based on consistent model and moment selection procedures for GMM, for instance, the upward testing procedure as referenced in Andrews (1999). The Upward testing model and moment selection procedure progresses from the smaller lag-limits to the largest lag-limits until we do not reject the null hypothesis that the moment conditions considered are all correct. One can also consider model and moment selection procedures, for instance the downward testing, as in Andrews and Lu (2001).\textsuperscript{14} However these procedures have the drawback to result in higher number of instruments. For this reason, we do no prefer these testing model and moment selection procedures.

We first estimate the model using the following baseline variables: manufacturing value added per capita in 2010 USD, index of quality of institutions, Credit to private sector as share of GDP, natural resources rents as share of GDP, trade openness, foreign direct investment as share of GDP, urban population as percent of population, level of education measure by the mean year of schooling, infrastructure development index, and the dummies of Regional Economic Communities

\textsuperscript{14} The selection criteria considered by these authors resemble the widely used BIC, HQIC, and AIC model selection criteria and also include a downward testing model selection procedure.
recognized by the African Union. These later and the year fixed effects are introduced in the level equation only when estimating the model.\textsuperscript{15} The endogenous dependent variable is specified separately for both the first-differenced and the level equation. The collapse and lag limits sub-options in gmmstyle are used to limit the number of instruments. In the model specification, gmmstyle(w, laglimits(a b)) specifies lags a through b of w as instruments for the differentiated equation and lag a-1 (only) of $\Delta w$ as instruments for the levels equation. We found that the error terms in levels are themselves serially correlated of order 1 but not at higher orders. This makes, for instance, lag 2 of w an invalid instrument for lag 1 of $\Delta w$ in the differentiated equation. In that case, Roodman (2009) recommends restricting the instrument set to lags 3 and longer of w.\textsuperscript{16} Note that data for the dependent variable are available prior to the starting period of estimation. Therefore, the instruments for the lag dependent variable by deeper lags are available even for starting period of the estimation.

The empirical results of the baseline estimation are reported in table 5. The results show that quality of institutions (the overall index) has a positive but statistically non-significant impact on the level of manufacturing value added per capita. Political stability, Voice accountability and Control of Corruption have negative, but statistically non-significant, impact on manufacturing value added per capita. The other components indices of the quality of institutions, including Government Effectiveness, Regulatory Quality and Rule of Law, have positive impacts on manufacturing valued added per capita, but only the impact of Regulatory Quality is statically significant.

\textbf{Table 5: Manufacturing value added and institutions, 2003-2015}

<table>
<thead>
<tr>
<th>Dep. Variable: MVA per capita</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag of Log of MVA per capita</td>
<td>0.738***</td>
<td>0.749***</td>
<td>0.760***</td>
<td>0.732***</td>
<td>0.705***</td>
<td>0.740***</td>
<td>0.743***</td>
</tr>
<tr>
<td></td>
<td>(0.068)</td>
<td>(0.082)</td>
<td>(0.087)</td>
<td>(0.067)</td>
<td>(0.059)</td>
<td>(0.069)</td>
<td>(0.072)</td>
</tr>
<tr>
<td>Credit to private sector (%GDP)</td>
<td>0.172*</td>
<td>0.186*</td>
<td>0.170*</td>
<td>0.119</td>
<td>0.100</td>
<td>0.168*</td>
<td>0.178*</td>
</tr>
<tr>
<td></td>
<td>(0.096)</td>
<td>(0.104)</td>
<td>(0.099)</td>
<td>(0.089)</td>
<td>(0.093)</td>
<td>(0.094)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Natural resources rents (%GDP)</td>
<td>-0.498**</td>
<td>-0.503*</td>
<td>-0.500*</td>
<td>-0.405*</td>
<td>-0.468**</td>
<td>-0.487*</td>
<td>-0.509**</td>
</tr>
<tr>
<td></td>
<td>(0.247)</td>
<td>(0.277)</td>
<td>(0.296)</td>
<td>(0.234)</td>
<td>(0.205)</td>
<td>(0.246)</td>
<td>(0.246)</td>
</tr>
<tr>
<td>Trade openness (%GDP)</td>
<td>0.244**</td>
<td>0.224*</td>
<td>0.266*</td>
<td>0.236*</td>
<td>0.264**</td>
<td>0.243**</td>
<td>0.245**</td>
</tr>
<tr>
<td></td>
<td>(0.119)</td>
<td>(0.116)</td>
<td>(0.136)</td>
<td>(0.117)</td>
<td>(0.113)</td>
<td>(0.119)</td>
<td>(0.118)</td>
</tr>
</tbody>
</table>

\textsuperscript{15} Roodman (2009) suggests to include time dummies to remove universal time-related shocks from the errors.
\textsuperscript{16} Obviously, autocorrelation of order 1 of the error terms in level also makes lag 1 of $\Delta w$ an invalid instrument for lag 1 of w in the levels equation. Therefore, we also restrict the instrument set to lags 2 and longer of $\Delta w$ in the levels equation.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI, net inflows (%GDP)</td>
<td>-0.522*** (-0.192)</td>
</tr>
<tr>
<td>Urban population (% of total)</td>
<td>0.138 (0.200)</td>
</tr>
<tr>
<td>Mean years of schooling</td>
<td>0.062** (0.027)</td>
</tr>
<tr>
<td>Infrastructure Index</td>
<td>0.425** (0.210)</td>
</tr>
<tr>
<td>Institutions index</td>
<td>0.018 (0.065)</td>
</tr>
<tr>
<td>Voice and Accountability</td>
<td>-0.020 (0.049)</td>
</tr>
<tr>
<td>Political Stability</td>
<td>-0.035 (0.029)</td>
</tr>
<tr>
<td>Government Effectiveness</td>
<td>0.107 (0.068)</td>
</tr>
<tr>
<td>Regulatory Quality</td>
<td>0.133** (0.056)</td>
</tr>
<tr>
<td>Rule of Law</td>
<td>0.023 (0.056)</td>
</tr>
<tr>
<td>Control of Corruption</td>
<td>-0.001 (0.044)</td>
</tr>
<tr>
<td>AMU</td>
<td>0.312** (0.143)</td>
</tr>
<tr>
<td>CEN-SAD</td>
<td>0.090 (0.059)</td>
</tr>
<tr>
<td>COMESA</td>
<td>0.085 (0.066)</td>
</tr>
<tr>
<td>EAC</td>
<td>0.024 (0.066)</td>
</tr>
<tr>
<td>ECCAS</td>
<td>0.266** (0.112)</td>
</tr>
<tr>
<td>ECOWAS</td>
<td>0.198* (0.114)</td>
</tr>
<tr>
<td>IGAD</td>
<td>-0.021 (0.084)</td>
</tr>
<tr>
<td>SADC</td>
<td>0.222** (0.092)</td>
</tr>
</tbody>
</table>

Notes: *** (**) (*) denotes significance at the 1 (5) (10) percent level. All models are estimated using two-step system GMM estimator with robust and small-sample bias corrected standard errors. Time dummies are included.

Turning to the remaining explanatory variables for manufacturing valued added, the results show that domestic credit to the private sector and the level of education (given by the mean years of schooling) have positive and statistically significant impacts on manufacturing value added per capita, as expected. In contrast, foreign direct investment and natural resource rents have negative
and statistically significant impact on manufacturing value added. Infrastructure development global index has a positive and statistically significant impact of manufacturing value added per capita. The effect of urbanization rate on manufacturing value added per capita is positive but statistically non-significant. Being a member of the Arab Maghreb Union (AMU), the Economic Community of Central African States (ECCAS), and the Southern African Development Community (SADC) have positive and statistically significant impacts on manufacturing value added per capita. The impacts of being a member the Common Market for Eastern and Southern Africa (COMESA) and the Economic Community of West African States (ECOWAS) on manufacturing value added per capita are positive and somewhat statistically significant at 10% level. Being a member of the Community of Sahel-Saharan States (CEN-SAD) has positive but non-significant effect on manufacturing value added per capita, while being a member the Intergovernmental Authority on Development (IGAD) has a negative and statistically non-significant impact of manufacturing value added per capita.\(^\text{17}\) The effect of being a member the East African Community (EAC) is statistically non-significant and somewhat negative.

Second, we turn to examine the impact of infrastructure development composite indices on the manufacturing value added per capita. The model is estimated by including one at a time each composite index instead on the global infrastructure development index. The results are reported in table 6. When included one by one, the various component indices of infrastructure, including Transport composite Index, Electricity composite Index, ICT composite Index and Water and sanitary Index, have all positive impacts on manufacturing value added per capita. The effects are statistically significant except the effects of ICT composite Index Water and sanitary Index.

<table>
<thead>
<tr>
<th>Dep. Variable: MVA per capita</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag of Log of MVA per capita</td>
<td>0.738***</td>
<td>0.708***</td>
<td>0.725***</td>
<td>0.722***</td>
<td>0.705***</td>
<td>0.720***</td>
</tr>
<tr>
<td></td>
<td>(0.068)</td>
<td>(0.066)</td>
<td>(0.053)</td>
<td>(0.058)</td>
<td>(0.071)</td>
<td>(0.057)</td>
</tr>
<tr>
<td>Credit to private sector (%GDP)</td>
<td>0.172*</td>
<td>0.288**</td>
<td>0.139</td>
<td>0.267**</td>
<td>0.274**</td>
<td>0.242*</td>
</tr>
<tr>
<td></td>
<td>(0.096)</td>
<td>(0.109)</td>
<td>(0.116)</td>
<td>(0.104)</td>
<td>(0.119)</td>
<td>(0.134)</td>
</tr>
<tr>
<td>Natural resources rents (%GDP)</td>
<td>-0.498**</td>
<td>-0.607***</td>
<td>-0.615***</td>
<td>-0.533**</td>
<td>-0.496**</td>
<td>-0.673***</td>
</tr>
<tr>
<td></td>
<td>(0.247)</td>
<td>(0.212)</td>
<td>(0.200)</td>
<td>(0.220)</td>
<td>(0.229)</td>
<td>(0.219)</td>
</tr>
<tr>
<td>Trade openness (%GDP)</td>
<td>0.244**</td>
<td>0.259**</td>
<td>0.277**</td>
<td>0.283**</td>
<td>0.273**</td>
<td>0.267**</td>
</tr>
<tr>
<td></td>
<td>(0.119)</td>
<td>(0.118)</td>
<td>(0.111)</td>
<td>(0.114)</td>
<td>(0.123)</td>
<td>(0.110)</td>
</tr>
</tbody>
</table>

\(^{17}\) The fact that the specific effect of being a member of IGAD is negative in all regressions is likely due to persistent violent conflicts and security crises in this region.
FDI, net inflows (%GDP)  \(-0.522^{***} -0.598^{***} -0.567^{***} -0.582^{***} -0.588^{***} -0.585^{***}\) 
(0.192) (0.128) (0.123) (0.145) (0.134) (0.118) 
Urban population (% of total)  
0.138 0.142 0.149 0.224 0.162 0.137 
(0.200) (0.248) (0.219) (0.239) (0.268) (0.232) 
Mean years of schooling  
0.062** 0.070** 0.066** 0.074*** 0.079*** 0.066** 
(0.027) (0.026) (0.025) (0.027) (0.029) (0.026) 
Institutions index  
0.018 -0.007 0.053 0.043 0.039 0.002 
(0.065) (0.077) (0.073) (0.072) (0.075) (0.082) 
Infrastructure Index  \(0.425^{**} (0.210)\) 
Transport composite Index  \(0.675^{**} (0.295)\) 
Electricity composite Index  
0.360* (0.196) 
ICT composite Index  
0.158 (0.185) -0.037 (0.142) 
Water and sanitary Index  
0.130 (0.205) -0.102 (0.184) 
AMU  
0.312** 0.401*** 0.356** 0.351** 0.357** 0.401*** 
(0.143) (0.149) (0.138) (0.144) (0.153) (0.142) 
CEN-SAD  
0.090 0.069 0.099 0.106 0.113 0.065 
(0.059) (0.058) (0.061) (0.066) (0.068) (0.052) 
COMESA  
0.085 0.059 0.119* 0.136** 0.117 0.067 
(0.066) (0.076) (0.064) (0.064) (0.073) (0.069) 
EAC  
0.024 0.010 0.023 0.027 0.014 0.012 
(0.066) (0.079) (0.071) (0.073) (0.078) (0.076) 
ECCAS  
0.266** 0.328*** 0.288*** 0.269** 0.276** 0.330*** 
(0.112) (0.106) (0.106) (0.111) (0.108) (0.107) 
ECOWAS  
0.198* 0.239* 0.190 0.184 0.193 0.231* 
(0.114) (0.124) (0.124) (0.131) (0.136) (0.116) 
IGAD  
-0.021 0.018 -0.053 -0.085 -0.064 0.011 
(0.084) (0.096) (0.100) (0.111) (0.108) (0.089) 
SADC  
0.222** 0.254*** 0.180* 0.197** 0.209** 0.230** 
(0.092) (0.094) (0.090) (0.092) (0.093) (0.087) 

Notes: *** (**) (*) denotes significance at the 1 (5) (10) percent level. All models are estimated using two-step system GMM estimator with robust and small-sample bias corrected standard errors. Time dummies are included.

Third, we also examine the impact of trade policy, including trade openess, trade openness to Africa, trade openness to the rest of World, and average tariff rates on selected manufactured groups of products: chemical products, machinery and transport equipment, and other manufactured goods. Tariffs are taxes imposed by a government on the country's imports and the

\[\text{Notes: *** (**) (*) denotes significance at the 1 (5) (10) percent level. All models are estimated using two-step system GMM estimator with robust and small-sample bias corrected standard errors. Time dummies are included.}\]

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purpose of which is often to protect domestic industries from cheap imports.\textsuperscript{19} The results are reported in table 7. The results in columns (2) and (3) indicate that trade openness to Africa and trade openness to the rest of World have both positive statistically significant impacts on manufacturing value added per capita. But it can be noted that the magnitude of the impact of trade openness to Africa is larger than the impact of trade openness to the rest of World, that both variables be included in separate or together estimates. Moreover, the results indicate that the impact of trade openness to Africa is significant when it is included in the estimation without trade openness to the rest of World, while the impact of the later is always statistically non-significant.

For the column (5) of table 7, i.e. when the estimation includes tariffs variables, we reported the estimation from the difference GMM instead of the system GMM. For this later, the stability restriction and the validity of the instrument set are not satisfied. The impacts of import tariff rates on manufacturing, which must be taken with caution, tend to be positive though statistically non-significant. The effects of import tariff rates on chemical products and machinery and transport equipment tend to be negative and non-significant. In contrast, import tariff rates on other manufactured goods tend to be positive and non-significant.

Table 7: Manufacturing value added and trade policy, 2003-2015

<table>
<thead>
<tr>
<th>Dep. Variable: MVA per capita</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag of Log of MVA per capita</td>
<td>0.738***</td>
<td>0.690***</td>
<td>0.774***</td>
<td>0.734***</td>
<td>0.571**</td>
</tr>
<tr>
<td>Credit to private sector (%GDP)</td>
<td>0.172*</td>
<td>0.193*</td>
<td>0.085</td>
<td>0.181</td>
<td>-0.007</td>
</tr>
<tr>
<td>Natural resources rents (%GDP)</td>
<td>-0.498**</td>
<td>-0.400*</td>
<td>-0.305</td>
<td>-0.362</td>
<td>-0.076</td>
</tr>
<tr>
<td>FDI, net inflows (%GDP)</td>
<td>-0.522***</td>
<td>-0.481*</td>
<td>-0.348</td>
<td>-0.451</td>
<td>-0.042</td>
</tr>
<tr>
<td>Urban population (% of total)</td>
<td>0.138</td>
<td>0.326*</td>
<td>0.093</td>
<td>0.232</td>
<td>0.217</td>
</tr>
<tr>
<td>Mean years of schooling</td>
<td>0.062**</td>
<td>0.068**</td>
<td>0.057</td>
<td>0.057</td>
<td>0.025</td>
</tr>
<tr>
<td>Infrastructure Index</td>
<td>0.425**</td>
<td>0.697***</td>
<td>0.434</td>
<td>0.572*</td>
<td>-0.007</td>
</tr>
<tr>
<td>Institutions index</td>
<td>0.018</td>
<td>0.024</td>
<td>0.041</td>
<td>0.018</td>
<td>0.003</td>
</tr>
</tbody>
</table>

\textsuperscript{19} Average tariff rates are used to measure the degree of protectionism within an economy. The higher the tariff, the greater the protection afforded to the country’s import-competing industries. As mentioned in the “Statistical Concept and Methodology” note for this indicator from World Bank’s Online Database "Simple averages are often a better indicator of tariff protection than weighted averages, which are biased downward because higher tariffs discourage trade and reduce the weights applied to these tariffs". Hence simple average tariff rates are used in this study.
Table:

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade openness (%GDP)</td>
<td>0.244**</td>
<td>(0.119)</td>
</tr>
<tr>
<td>Trade openness, Africa (%GDP)</td>
<td>0.477*</td>
<td>(0.268)</td>
</tr>
<tr>
<td>Trade openness, RoW (%GDP)</td>
<td>0.046</td>
<td>(0.089)</td>
</tr>
<tr>
<td>Tariff rate, Chemical products</td>
<td>-0.172</td>
<td>(0.369)</td>
</tr>
<tr>
<td>Tariff rate, Machinery and transport eq.</td>
<td>-0.272</td>
<td>(0.357)</td>
</tr>
<tr>
<td>Tariff rate, Other manufactured goods</td>
<td>0.416</td>
<td>(0.390)</td>
</tr>
<tr>
<td>AMU</td>
<td>0.312**</td>
<td>(0.143)</td>
</tr>
<tr>
<td>CEN-SAD</td>
<td>0.090</td>
<td>(0.059)</td>
</tr>
<tr>
<td>COMESA</td>
<td>0.085</td>
<td>(0.066)</td>
</tr>
<tr>
<td>EAC</td>
<td>0.024</td>
<td>(0.066)</td>
</tr>
<tr>
<td>ECCAS</td>
<td>0.266**</td>
<td>(0.112)</td>
</tr>
<tr>
<td>ECOWAS</td>
<td>0.198*</td>
<td>(0.114)</td>
</tr>
<tr>
<td>IGAD</td>
<td>-0.021</td>
<td>(0.084)</td>
</tr>
<tr>
<td>SADC</td>
<td>0.222**</td>
<td>(0.092)</td>
</tr>
</tbody>
</table>

Notes: *** (**) (*) denotes significance at the 1 (5) (10) percent level. All models are estimated using two-step system GMM estimator with robust and small-sample bias corrected standard errors. Time dummies are included.

3.4 Discussion of the results and policy implications

In this section, the implications of the previous empirical results are discussed in some details.

The results of this study suggest that countries with better institutions or better governance indicators in Africa have on average higher manufacturing value added per capita. The results also indicate that “Regulatory Quality” in particular, has a positive and significant impact on the performance of manufacturing sector across Africa. This suggest that quality of regulatory environment, captured by the ability of governments to formulate and implement sound policies and regulations to support businesses, play a critical role in promoting manufacturing sector.
Therefore, African countries should scale up their efforts in improving their governance in general, and their regulatory framework in particular. One should note that our results on the effects of institutional indicators contrast with the finding of Dabla-Norris et al. (2013) that the quality of political institutions, measured in their study by the degree of constraints on executive power, is negatively and significantly associated with the manufacturing share.

The results clearly show the importance of infrastructure assets in boosting manufacturing value added. While most of governance indicators themselves do no have significant impact on manufacturing value added per capita, all of our infrastructure development indices, except Water and sanitary Index, have positive and significant impact on manufacturing value added per capita. This result would imply that good governance should also result in infrastructure development in order to magnify its impact on manufacturing value added per capita.

Trade openness has a positive and significant impact on manufacturing value added in Africa. Trade openness to African markets has positive and stronger impact on manufacturing value added than trade openness to the rest of world. This interesting finding suggests that industrial policy in African countries should focus more, at least in the short term, on fostering intra-trade in order to promote the manufacturing sector. This calls to scale up efforts to effectively implement the Africa’s behind the border Agenda (e.g. the African Continental Free Trade Area). Tariff rates on chemical products and tariff rates on machinery and transport equipment tend to have negative impact on manufacturing valued added per capita. While tariff rate on other manufactured goods tend to have positive effect on manufacturing value added per capita. In general, most of African countries do not produce most machinery and transport equipment or chemical products that their industries need. This could then explain the fact that import tariff rate on these products tend to increase production costs and therefore negatively affect the performance of manufacturing sector. Thus, for the African manufacturing sector to be competitive, removing tariffs on inputs used by the sector is critical. The results for (other manufactured goods composed mainly by processed products in Africa) implies that trade tariffs to import-competing goods from the non African countries should also be maintain in the short run at a level so that to protect domestic manufacturing industries from external competition as well as to efficiently promote manufacturing activities. However tariffs on machinery, technology and non-domestically produced goods should be maintained at low or moderate levels.
The findings confirm positive and statistically significant impact of credit to private sector on manufacturing value added per capita. This is consistent with the finding of Levine et al. (2000). These authors found that financial intermediary development affect positively and significantly economic growth, for instance by reducing the costs of researching potential investments, mobilizing savings, and conducting exchanges. Financial constraint is still a major handicap to the development of the industrial sector in Africa. Our empirical results clearly indicate that improving access to credit for private sector leads to significantly increase of a country’s level of manufacturing value added per capita. Based on this finding, policy makers should favor incentives to reduce financial transaction costs allowing financial institutions to provide more credit to private sector. These incentives may include, among others, lending rates reduction and mechanisms for properly evaluating credit projects to private sector.

Natural resource rents have negative and significant impact at 5% level on manufacturing value added per capita. This result is in line with Dabla-Norris et al. (2013) and UNIDO (2012) who showed that abundant natural resource endowments have particularly strong negative effects on manufacturing sector. Indeed, natural resource exports often lead to exchange rate appreciation (the so called Dutch disease), making manufacturing products less competitive. The findings in relation to natural resource rents suggest that African resource-rich countries need more efficient management of the revenues from their natural resources. This is required to avoid underinvestment in physical and human capital in the other sectors of the economy, in particular in the manufacturing sector. Efficient management of natural resources requires better governance and promotion of value chains. The negative effect of FDI combined with the negative effect of natural resources rent is possibly due to the fact that FDI is generally directed to extractive industries. Indeed, countries that are endowed with natural resources receive in average more FDI in percent of GDP over the period 2003-2-0015. Base on that, policy makers should implement incentives to redirect FDI into manufacturing industries and other labor-intensive industries.

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20 Some studies in the literature have found that FDI enhances economic performance only under certain conditions. For instance, Borensztein et al. (1998) argue that FDI benefit to the host country only when the host country has a minimum threshold stock of human capital or education that allows it to exploit FDI spillovers. De Mello (1999) argues that FDI enhances economic performance when domestic capital and foreign capital are complements, while Alfaro et al. argue that FDI benefit to the host country when the financial sector is well developed.
Finally, our results confirm the key role of human capital accumulation on the performance of manufacturing sector widely found in the literature. The positive and significant impact of the level of education on manufacturing value added is expected since human capital facilitates technology adoption and more educated workers increases productivity, as argued by Acemoglu et al. (2014). To further contribute to the development of the manufacturing sector, formal education need to be complement with technical and professional trainings in line with the needs of employment in the manufacturing sector.

3.5 Conclusion

In this paper, we revisited the industrial policies implemented in African countries since the 1960s and we emphasized on the role that institutions in Africa have played in the dynamic of industrialisation on the continent. We also empirically investigated the impact of institutions and industrial policies on manufacturing value added per capita across African countries over the period 2003-2015 and using a system GMM approach.

The empirical results from the econometric model suggest that quality of institutions --- measured by government effectiveness, regulatory quality, political stability, Voice and Accountability, Rule of Law and control of corruption --- has a positive effect on manufacturing valued added per capita. However, only the effect of the Regulatory quality is found to be statistically significant. The results also show that African countries with better infrastructure assets, in particular in Transport and Electricity, have higher manufacturing value added per capita. Trade openness to Africa has stronger effect on manufacturing value added per capita than trade openness to the rest of the world.

Finally, we derived some policy implications for African countries from the empirical results in order to better redirect the industrial policy and to boost the performance of the manufacturing sector in Africa. In particular, promoting good governance is a key a instrument in promoting manufacturing sector in Africa. Notwithstanding, the good governance needs to also results in better infrastructure development in order to magnify its impact on manufacturing valued added per
capita. The empirical results also demonstrate the importance of establishing an effective Continental Free Trade Area (CFTA) to scale up value added activities across the continent.
Reference


