Industrial Policy, Institutions and Performance of Manufacturing Sector in Africa

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Abstract

This paper empirically investigates the impact of horizontal industrial policies on manufacturing value added (MVA) per capita across 51 African countries from 2003-2015 using dynamic panel techniques, namely the system GMM. The paper focuses on the impact of domestic institutions on the performance of the manufacturing sector. Empirical results suggest that the overall index of quality of institutions, as well as three of six of its components, including government effectiveness, regulatory quality, and rule of law, have positive impacts on MVA per capita in all estimations performed. However, only governance effectiveness and regulatory quality are statistically significant. Furthermore, the overall index of infrastructure development and its components, including the transport composite index and electricity composite index, have positive and significant effects on MVA per capita. The results also suggest that trade openness has positive and significant impact on the MVA per capita. The effect of intra-African trade openness is stronger than that trade openness to the rest of the world. This confirms the potential of the African Continental Free Trade Area to support expansion of manufacturing activities across the continent. Finally, credit to private sector and education have positive and statistically significant impacts on performance of the manufacturing sector, while foreign direct investment and resource endowment exert statistically significant negative effects.

Keywords: Industrial Policy; Institutions; Manufacturing Sector; Structural Change.
JEL Classification: O25; O43; L60; L16

1. Introduction

Several decades of development policies, primarily focused on agriculture, commodities and export-led growth, have placed Africa on the low rungs of global value market chains. The situation is underpinned by limited diversification toward a vibrant industrial sector; diversification of the industrial sector has the potential to help lift Africans out of poverty. Yet, the contribution of the industrial sector to Africa's economic performance is not only low, it seems to be weakening over time. A comparison of different African economic sectors (agriculture, industry and services) using data from United Nations Conference on Trade and Development (UNCTAD) suggests that the contribution of the industrial sector to GDP fell slightly, on average, from 1990-2015. At the same time, the contribution of the services sector to GDP shows an increasing trend at the expense of the industrial and agriculture sectors. Indeed, the industrial sector's share of GDP in 2003 was 33%, and decreased to 29% in 2015, while the services' share of GDP increased from 50% in 1990 to 55% in 2015. Within the industrial sector, the share of the manufacturing sector in GDP dropped drastically between 1990 and 2015, from 17% to only 11% according to the African Economic Outlook 2017 (AfDB et al., 2017).

Today, a broad consensus exists 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 et al., 2017). A prerequisite for industrial-led development is effective and innovative industrial strategies, which, in turn, critically depend on institutions and industrial policies (UNECA, 2014). For UNECA (2016), industrial policies are critical to correct the widespread existence of market and coordination failures in Africa. Market failures that require state intervention include, among others, the existence of externalities, imperfect information and risks or uncertainties. The main debate today is about the level and the domain of state intervention.

Several definitions for industrial policy occur in the literature, differing in terms of the state intervention recommended to support industrialization. Some definitions of industrial policy are specific and selective (so-called "vertical") in that they include only policies that aim to have a direct effect on particular industries or firms. For example, Chang (1994, ch.3) defines industrial policy as a policy aimed at particular industries to achieve outcomes perceived by the state to be efficient for the economy as a whole. Pack and Saggi (2006, p. 2) define industrial policy as any government intervention in favor of sectors expected to offer better prospects for economic growth in a way that would not occur in the absence of such intervention. Rodrik (2004, p. 2) defines industrial policy as "restructuring policies in favor of the more dynamic activities."

Other definitions of industrial policy are general (so-called "horizontal") in that they include many areas of public policy, such as education, R&D and infrastructure that benefit all industries and are not designed to favor particular industries or firms (UNECA, 2016). For example, Preston (1993) defined industrial policy as “government efforts to alter the industrial structure to promote productivity-based growth.” According to UNIDO et al (2011), industrial policy includes any government measures aimed at improving the competitiveness and capabilities of domestic firms and promoting structural transformations 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, 2016). The common feature is that all industrial policies include deliberate efforts to promote industrialization, whether targeting specific industries or not.

The main objective of this paper is to empirically assess the impact of horizontal industrial policy variables on manufactured value added (MVA) per capita in Africa. The analysis focuses on the role of institutions to promote manufacturing sector. More specifically, the paper investigates to what extend the quality of institutions – as measured by government effectiveness, regulatory quality, political stability, voice and accountability, rule of law and control of corruption –, trade openness, regional integration, infrastructure assets, human capital, credit to private sector and foreign direct investment have affected per capita MVA 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 MVA per capita across African countries, remains scant. This paper is unique in several respects. First, it provides a comprehensive empirical analysis of general industrial policy and institutional drivers of MVA across African countries over the last two decades. Second, it 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. Finally, this study differs from others by using the system generalized methods of moments (GMM) estimation method, suitable for panel data models with potential endogeneity and non-stationarity issues. The system GMM framework also accounts for the dynamic aspects of manufacturing sector performance.

Results from the econometric model show that the overall index of the quality of institutions or governance and three of its six components, including government effectiveness, regulatory quality, and rule of law, have positive impacts on MVA per capita in all estimations performed. However, only government effectiveness and regulatory quality are statistically significant. Moreover, the results indicate that domestic credit to the private sector, education (measured as the mean years of schooling), trade openness, and infrastructure assets have positive and statistically significant impacts on MVA per capita. In contrast, resource endowment and foreign direct investment have significant negative impacts on performance of the manufacturing sector. Detailed analyses indicate that among infrastructure assets, transport, and electricity have significant impacts on manufacturing sector performance. We also found that trade openness to other countries within Africa has significantly larger impacts on MVA than trade openness to the rest of the world.

The rest of the paper is organized as follows. Section 2 assesses the theoretical underpinnings and empirical evidences of performance of manufacturing sector and horizontal industrial policies. Section 3 presents the empirical methodology and the data. Section 4 reports and discusses the estimation results. Section 5 concludes.

2. Theoretical underpinnings and empirical evidences

The critical role of institutions including industrial policy organizations in industrial development and specifically in promoting manufacturing sector is widely recognized in the literature. For instance, UNECA (2014) argued that sound and effective institutions are important in mitigating market failures, coordination failures, technology accumulation, and the acquisition of knowledge that constrains structural change. Moreover, AfDB et al. (2017) recommended African countries first address institutional issues 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 et al. (2008), the quality of institutions plays a critical role in the formulation and implementation of economic policies, and in 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). Wade (2009) notes the features of successful industrial policy include institutions that facilitate coordination between top industrial policy organizations and the private sector, combined with incentive schemes that target specific activities and possess an exit mechanism for withdrawal if ineffective.

Empirical evidence in Africa tends to support a positive impact of industrial policy on industrial development. For example, 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 et al., 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 some Asian countries, including the Republic of Korea, Taiwan, Hong Kong, Singapore, and Malaysia, show that government failure was avoided through transparent and accountable institutions. Successful experiences from these economies highlight 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, 2013). The success of industrial policy in East Asia can be partly attributed to government effectiveness (Noman and Stiglitz, 2015). Indeed, institutions fostered continuous dialogue with the private sector, 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.

Beverelli et al. (2017) and Lu et al. (2013) highlight the indirect impact of domestic institutions on manufacturing productivity through improving the business environment. Beverelli et al. (2017) show that countries with high quality of institutions have lower barriers to service trade, which improve manufacturing productivity. They argue that services are important intermediate inputs into manufacturing production and services trade openness depend on domestic institutions. Using a cross-sectional analysis of survey data from 1566 enterprises in 2003 in China, Lu et al. (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 found 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 researchers are critical of state intervention and do not recommend it. Criticisms include the contention that state interventions induce economic distortion through corruption and rent seeking (UNIDO et al., 2011) and that 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. For Sachs (2003), rather than focus on improving institutions in sub-Saharan Africa, it should: devote more effort to fighting AIDS, tuberculosis and malaria, diseases that significantly reduce foreign investment returns and increases the transaction costs of international trade and tourism; build more roads to connect remote populations to regional markets; and break down artificial political barriers that limit the size of markets.

In addition to institutions including industrial policy organizations, other determinants of value added or output in manufacturing have been empirically explored, both across countries and over time, by a sizeable body of literature. Using a sample of 38 countries, Chenery (1960), pioneer in this literature, showed that the industrial output per capita, and in particular the MVA per capita, varies positively with the level of per capita income, although the relationship did not apply to every country in the sample.

More recently, Anyanwu et al. (2017) investigated the key determinants of MVA (as share of GDP) in North Africa for 1990 to 2014 using panel data analysis. They found that factors such as GDP per capita, secondary education, share of agricultural land, domestic credit to the private sector, trade openness, inward stock of FDI, population size, and information and communication technology (ICT) infrastructure all have significant positive effects on MVA (as share of GDP) in North Africa, while other factors such as natural resource rents, domestic investment rate, institutionalized democracy, and age dependency ratio, have significant negative effects on MVA in North Africa.

Several studies provide data for individual African countries. Anaman and Osei-Amponsah (2009) investigated the determinants of manufacturing output (as share of GDP) in Ghana based on annual time series data from 1974 to 2006 using cointegration and error correction model analysis. In the short run, export-import ratio and political stability were the main determinants of the level of output of the manufacturing industry. In the long run, the level of per capita real GDP was additionally a determinant of the level of output of the manufacturing industry. Using the same econometric methodology, Ilyas et al. (2010) investigated the determinants of MVA in Pakistan from 1965-2007. The authors found total factor productivity was the most significant determinant of MVA in both short- and long-term. In addition, the price level of investment significantly negatively affected MVA. Trade openness, however, had no significant effect. In the same vein, Loto (2012) investigated the determinants of output expansion in the Nigerian manufacturing industries between 1980 and 2010. The set of determinants used in this study included 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. This study found that inflation rate was the highest significant determinant of manufacturing output in Nigeria between 1980 and 2010. In addition, the study found a significantly positive 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, Katz (2000) also found a negative relationship between abundant natural resources and manufacturing development. UNIDO (2015) confirms that a larger population is generally favorable to manufacturing development, although there are differences in structural change within manufacturing between large and small countries. In addition, UNIDO (2015) and UNECA (2017) found that access to quality infrastructure, including ICT infrastructure, is an important determinant of MVA per capita. Indeed, an increase in access to ICT in the manufacturing sector can contribute to increases in MVA per capita by eliminating relative price distortions and facilitating the reallocation of resources, resulting in an increase in productivity.

Using panel regressions on a sample of 168 countries across the world from 1970-2010, Dabla-Norris et al. (2013) determined that population, trade openness and foreign direct investments in non-resource sectors are positively and significantly associated with MVA (as share of GDP). In addition, their findings show that natural resource output share, arable land, and age dependency are negatively and significantly correlated with MVA 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 significantly negatively associated with manufacturing share. Mensah et al. (2016) have confirmed that level of income and population size are positively and significantly associated with MVA (as share of GDP) in a panel of countries of Sub-Saharan Africa. In contrast to Dabla-Norris et al. (2013), they also found out that arable land is positively and significantly associated with MVA. Mensah et al. (2016) also show that general industrial policies such as education, trade openness, and financial development are key instruments in promoting structural transformation in Sub-Saharan Africa.

3. Empirical methodology and data

3.1 Methodology

To examine the impact of institutions on MVA in African countries, we used dynamic panel data estimation on a sample of African countries with data from 2003-2015. Based on existing literature, including Chenery (1960), Haraguchi and Rezonja (2013), Dabla- Norris et al. (2013), and Anyanwu et al. (2017), this study postulates the following econometric model:

$$\boldsymbol{mva_{i,t} = \alpha_i + \lambda_t + \phi . mva_{i,t-1} + \delta . institutions_{i,t} + \beta . X_{i,t} + v_{i,t}} \quad (\mathbf{1})$$

where subscripts $\boldsymbol{i}$ and $\boldsymbol{t}$ are country and time indicators, respectively. The dependent variable $\boldsymbol{mva_{i,t}}$ is the log 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.[1] **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. Energy is an essential input into industry's production. Manufacturing is more vulnerable to energy access issues because it is more energy intensive than other sectors. ICT development fosters reduction of production costs. 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 (REC) recognized as the building blocks of the African Union: 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). The other control variables in **X** are the (log) mean years of schooling as a proxy for human capital, domestic credit to the private sector as share of GDP, trade openness (imports plus exports to GDP), foreign direct investment net inflows as share of GDP, natural resource rents as share of GDP, and urbanization rate. The terms $\boldsymbol{\alpha_i}$ and $\boldsymbol{\lambda_t}$ are country-specific and time-specific effects, respectively, while $\boldsymbol{v_{i,t}}$ is the error term of the model and includes all other unobservable effects on MVA per capita.

We estimate equation 1 by system GMM method developed by Blundell and Bond (1998) and implemented in Stata software by Roodman (2009). The system GMM estimator uses a system of two equations, one differenced and one in levels. This estimator is designed to deal with endogeneity issues and is applicable to cases in which the number of periods is small relative to the number of cross-sectional observations. This the case in this study. 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.

[1] 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 the "adequate" quantitative proxy for the quality of institutions is.

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 proposed by Roodman (2009) must be met to consider a particular specification 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, in particular, 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. Indeed, the use of system GMM can generate instruments prolifically that result in an over-fitting of the model. Too many instruments can weaken the power of the Hansen test to detect over-identification of endogenous variables and to detect invalidity of the system GMM instruments. (iv) The second differences of residuals are not serially correlated (AR(2) test statistic is non-significant) and the residuals in level are 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). 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 in the MVA process from equation 1. Finally, conditional on passing all 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 example, 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 procedure, as in Andrews and Lu (2001).[2] However these procedures have the drawback of resulting in a higher number of instruments. For this reason, this study does not prefer these testing model and moment selection procedures.

3.2 Data

Data used in this study are taken from the UNIDO database (MVA), the UNDP database (mean years of schooling), the UNCTAD database (trade openness). For data on infrastructure, we

[2] The selection criteria considered by Andrews and Lu (2001) resemble the widely used BIC, HQIC, and AIC model selection criteria and include a downward testing model selection procedure.

rely on the Africa Infrastructure Development Index (AIDI), produced by the African Development Bank. The AIDI is based on four components: transport, electricity, ICT, and water and sanitation. Domestic credit to the private sector, foreign direct investment net inflows, natural resource rents, and urbanization rate are taken from the World Development Indicators (WDI) of the World Bank's online database. Institutional variables are taken from World Bank Governance Indicators (WGI). These indicators are described in the Appendix Section A1. Data on government indicators are available from 1996 but are missing (not constructed) for all countries for the years 1997, 1999 and 2001. Governance indicators are in units of a standard normal distribution, with mean zero, standard deviation of one, and range from approximately -2.5 to 2.5. In the analysis these indicators are rescaled to vary between -100 and 100 for easier interpretation. Variables on infrastructure are taken from the African Development Bank database and start from 2003. Other variables of interest are available from 1996 in the dataset.

Table 2: MVA for countries in the core sample

Country	MVA as % of GDP	MVA per capita	Country	MVA as % of GDP	MVA per capita	Country	MVA as % of GDP	MVA per capita
Angola	4.3	165	Gabon	5.2	363	Namibia	11.8	589
Burundi	10.5	24	Ghana	7.4	86	Niger	5.6	19
Benin	15.6	119	Guinea	10.7	71	Nigeria	6.8	160
Burkina	8.7	50	Gambia,	5.7	29	Rwanda	5.3	29
Botswana	5.7	387	Guinea-	12.4	62	Senegal	12.6	125
Central	16.1	71	Equatorial	0.1	17	Sierra	2.2	9
Cote	15.0	172	Kenya	11.7	110	Sao	6.6	88
Cameroon	14.9	185	Liberia	5.4	13	Eswatini	33.3	1232
Congo,	16.5	63	Libya	4.5	535	Seychell	8.0	950
Congo, R.	4.3	99	Lesotho	14.3	120	Chad	7.4	58
Comoros	1.5	21	Morocco	16.0	432	Togo	7.7	39
Cabo	5.4	169	Madagasc	13.3	58	Tunisia	16.4	656
Djibouti	2.7	42	Mali	14.5	101	Tanzani	6.9	43
Algeria	4.2	180	Mozambi	11.8	45	Uganda	9.1	52
Egypt,	16.1	377	Mauritani	7.6	98	South	13.8	948
Eritrea	6.4	34	Mauritius	15.8	1168	Zambia	8.3	115
Ethiopia	4.2	12	Malawi	10.6	37	Zimbab	12.1	80

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

Based on the available data series for infrastructure, we restrict our estimation period of from 2003 to 2015 for a panel of 51 African countries.[3] We restricted the panel sample to countries for which there are at least 10 years of data on MVA per capita and quality of institutions at the same time. Because of the use of system GMM estimation method (combining level and

[3] We still keep a pre-sample starting from 1996 for the dependent variable in order to use all available information in the lags used as instruments.

first difference equations), we also restrict the sample to countries with at least two complete observations for the overall variables of interest in first difference. Countries included in the core sample are listed in Table **2**.

Table 3: Summary Statistics for the main variables in the model, 2003-2015

Variables	Obs	Mean	S.D.	Min	Max
MVA per capita	663	209.94	299.02	6.52	1358.81
Quality of Institutions	663	-24.56	22.73	-71.13	35.2
Credit to private sector (% of GDP)	636	22.98	24.71	0.56	160.12
Natural resources rents (% of GDP)	652	14.03	13.77	0	63.49
Trade openness (% of GDP)	663	58.51	26.67	13.68	150.45
FDI, net inflows (% of GDP)	657	5.37	8.41	-6.05	89.48
Urbanization rate	659	41.55	17.48	8.91	87.16
Mean years of schooling	656	4.81	2	1.2	10.3
Infrastructure development Index	663	19.64	16.78	0.37	93.71

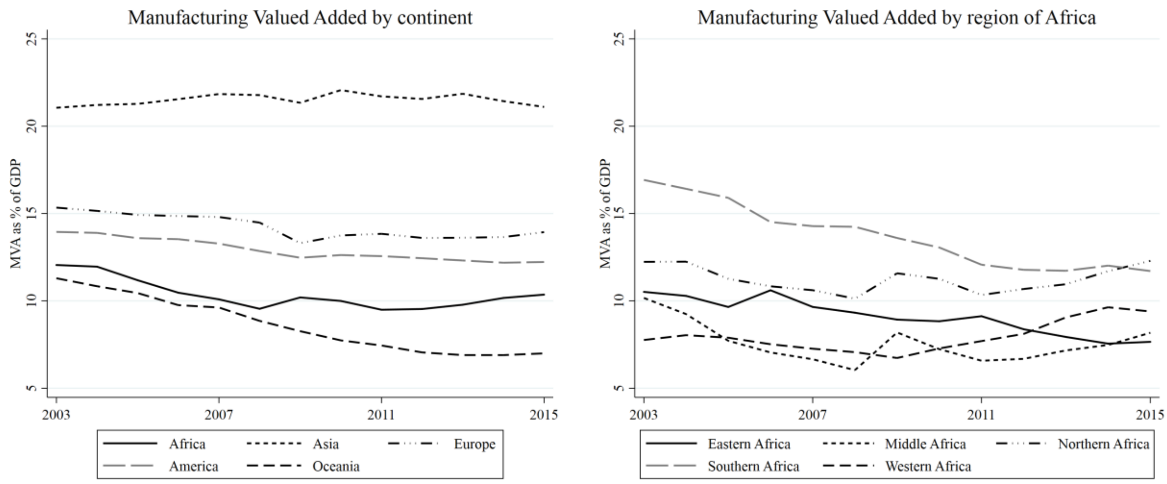
Summary descriptive statistics for the main variables used in our analysis are reported in Table **3** and the associated correlation matrix is reported in Table **4**. The quality of institutions is positively correlated with the MVA per capita, with a correlation coefficient of 0.49. Infrastructure index, (log) mean years of schooling, and credit to private sector are highly positively correlated with MVA per capita, with correlation coefficients greater than 0.5. Trade openness and urban population are moderately and positively correlated with MVA. In contrast, foreign direct investment net inflow and natural resource rents are negatively correlated with MVA per capita. Note that the per capita real GDP is not included in the regressors because it is highly correlated with MVA per capita and first lag of MVA per capita. Overall, the signs of correlation coefficients between MVA and the potential determinants are as expected.

Table 4: Correlation matrix for the main variables in the model, 2003-2015

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Log MVA per capita	1								
2. Quality of Institutions	0.49	1							
3. Credit to private sector (% of GDP)	0.56	0.56	1						
4. Natural resources rents (% of GDP)	-0.22	-0.52	-0.33	1					
5. Trade openness (% of GDP)	0.38	0.24	0.06	0.2	1				
6. FDI, net inflows (% of GDP)	-0.18	0.02	-0.05	0.19	0.27	1			
7. Urbanization rate	0.44	0.2	0.3	0.14	0.26	0.15	1		
8. Log Mean years of schooling	0.62	0.34	0.39	-0.04	0.39	0.03	0.44	1	
9. Infrastructure development Index	0.69	0.5	0.63	-0.23	0.25	-0.03	0.46	0.56	1

Recent stylized facts about 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 MVA 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, MVA has been consistently higher in Southern and Northern Africa (both always above 12%) than in Western Africa (which has never exceeded 10%). It averaged almost 14 and 11 percent in Southern and Northern Africa, respectively, compared to approximately 8 percent in Western Africa between 2003 and 2015. Among African countries, Swaziland, Mauritius, Seychelles and South Africa have the highest average of per capita MVA (in constant 2010 USD) over the period 2003-2015 (Table 2), while Sierra Leone, Liberia and Ethiopia have the lowest per capita MVA.

Figure 2: Manufacturing Valued Added by continent and by region of Africa



Source: Author, using data from UNIDO Online Database

4. Estimation results and discussion

In the model, the dummy variables for the Regional Economic Communities are assumed to be uncorrelated with the country-fixed effects. Some of these dummy variables are time-varying and others are time-invariant. All dummy variables, including the eight Regional Economic Communities recognized by the African Union and time, are included in the level equation only.[4] The lag of the dependent variable (i.e., the lag of MVA per capita) is treated as a GMM-style instrument and the remaining explanatory variables are treated exogenous at the current period and enter in the model as IV-style instruments. The collapse and laglimits sub-options

[4] It is common in the macro panel data models to include time dummy variables to remove universal time-related shocks from the errors, as suggested in Roodman (2009).

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 Δw as instruments for the levels equation. We found that the error terms in levels are serially correlated at order 1 but not at higher orders. This makes lag 2 of w an invalid instrument for lag 1 of Δw in the differentiated equation. In that case, Roodman (2009) recommends restricting the instrument set to lags 3 and longer of w.[5] 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.

4.1 Baseline estimations

The baseline estimations first consist of investigating the impact of the overall index of the quality of domestic institutions and its various components on manufacturing value added per capita. The empirical results of these baseline estimations are reported in Table **5**. The bottom rows of the table report the Hansen J-statistic and p-value of the overall validity of the instruments used and report the p-values of tests for AR(1) and AR(2) correlation in the first-differenced residuals. These tests indicate that our instruments are valid and autocorrelation restrictions are satisfactory at conventional levels. We also report the optimal lag-limits from the upward testing procedure and we found lag-limits of (3, 4) for all regressions in columns 1 to 7. Turning to the estimated coefficients, the results show that quality of institutions (the overall index) has a positive but statistically non-significant impact on the level of MVA per capita. Voice accountability and political stability have negative, but statistically non-significant, impacts on MVA per capita. The other components indices of the quality of institutions, including government effectiveness, regulatory quality, and rule of law, and control of corruption, have positive impacts on manufacturing valued added per capita, but only the impacts of government effectiveness and regulatory quality are statistically significant at conventional levels of significance.

[5] Obviously, autocorrelation of order 1 of the error terms in level also makes lag 1 of Δw 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 Δw in the levels equation.

Table 5: Impact of institutional variables on MVA per capita

Depvar: Log MVA per capita	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log MVA per capita (first lag)	0.739***	0.752***	0.767***	0.734***	0.704***	0.742***	0.745***
	(0.067)	(0.079)	(0.088)	(0.067)	(0.061)	(0.069)	(0.072)
Credit to private sector (% of GDP)	0.180*	0.193*	0.174*	0.118	0.103	0.175*	0.187**
	(0.091)	(0.099)	(0.097)	(0.081)	(0.085)	(0.090)	(0.092)
Natural resources rents (% of GDP)	-0.428*	-0.439*	-0.437	-0.321	-0.386*	-0.416*	-0.441*
	(0.232)	(0.254)	(0.280)	(0.224)	(0.204)	(0.232)	(0.231)
Trade openness (% of GDP)	0.245**	0.229*	0.263*	0.231*	0.263**	0.243*	0.246**
	(0.122)	(0.119)	(0.140)	(0.121)	(0.118)	(0.122)	(0.121)
FDI, net inflows (% of GDP)	-0.548***	-0.505**	-0.498*	-0.561**	-0.609***	-0.546**	-0.535**
	(0.204)	(0.229)	(0.272)	(0.211)	(0.169)	(0.214)	(0.218)
Urbanization rate	0.131	0.165	0.23	0.09	0.022	0.129	0.146
	(0.236)	(0.224)	(0.232)	(0.229)	(0.283)	(0.233)	(0.234)
Log Mean years of schooling	0.200*	0.184*	0.165	0.216**	0.246**	0.199*	0.193*
	(0.103)	(0.101)	(0.100)	(0.106)	(0.114)	(0.103)	(0.100)
Infrastructure development index	0.576***	0.575**	0.530**	0.459**	0.624***	0.557**	0.574**
	(0.215)	(0.227)	(0.227)	(0.194)	(0.226)	(0.211)	(0.216)
Quality of institutions	0.067						
	(0.159)						
Voice and accountability		-0.035					
		(0.123)					
Political stability			-0.092				
			(0.073)				
Government effectiveness				0.311*			
				(0.172)			
Regulatory quality					0.380**		
					(0.144)		
Rule of law						0.077	
						(0.137)	
Control of corruption							0.01
							(0.106)
AMU	0.283**	0.255*	0.211	0.263**	0.325**	0.277**	0.274**
	(0.130)	(0.133)	(0.128)	(0.124)	(0.130)	(0.129)	(0.136)
CEN-SAD	0.073	0.062	0.053	0.1	0.091	0.073	0.066
	(0.057)	(0.052)	(0.049)	(0.062)	(0.060)	(0.056)	(0.054)
COMESA	0.065	0.053	0.054	0.087	0.086	0.065	0.063
	(0.068)	(0.065)	(0.065)	(0.069)	(0.076)	(0.068)	(0.067)
EAC	0.009	0.028	0.026	-0.039	-0.085	0.006	0.017
	(0.074)	(0.067)	(0.068)	(0.079)	(0.087)	(0.074)	(0.072)
ECCAS	0.255**	0.225**	0.193*	0.275**	0.312***	0.255**	0.241**
	(0.107)	(0.105)	(0.108)	(0.105)	(0.108)	(0.108)	(0.111)
ECOWAS	0.185	0.187	0.164	0.169	0.175	0.184*	0.189*
	(0.111)	(0.118)	(0.105)	(0.101)	(0.112)	(0.108)	(0.106)
IGAD	-0.007	-0.014	-0.033	-0.023	-0.006	-0.006	-0.01
	(0.087)	(0.082)	(0.080)	(0.086)	(0.091)	(0.085)	(0.087)
SADC	0.227**	0.231**	0.223**	0.203**	0.206**	0.226**	0.230**
	(0.093)	(0.103)	(0.108)	(0.083)	(0.092)	(0.092)	(0.094)
Countries\Observations	51\620	51\620	51\620	51\620	51\620	51\620	51\620
Number of instruments	32	32	32	32	32	32	32
laglimits(a b)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)
p-value of AR(1)\AR(2) statistic	0.00\0.89	0.00\0.88	0.00\0.83	0.00\1.00	0.00\1.00	0.00\0.84	0.00\0.88
Hansen J-statistic\p-value	1.33\0.52	1.54\0.46	2.08\0.35	1.28\0.53	0.77\0.68	1.36\0.51	1.41\0.49

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 (in parentheses). Time dummy variables 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, measured by the mean years of schooling, have positive and statistically significant impacts on MVA per capita, as expected. In contrast, foreign direct investment and natural resource rents have negative and statistically significant impact on MVA. Infrastructure development global index has a positive and statistically significant impact of MVA per capita. The effect of urbanization rate on MVA 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 MVA 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 MVA per capita are positive and statistically significant at the 10% level. Being a member of the Community of Sahel-Sahara States (CEN-SAD) has a positive but non-significant effect on MVA per capita, while being a member the Intergovernmental Authority on Development (IGAD) has a negative and statistically non-significant impact of MVA per capita.[6] 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 MVA 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 MVA per capita. All except the effects of Water and sanitary index, are statistically significant.

Third, we examine the impact of trade policy, including trade openness, both within Africa and to the rest of world. Results are reported in Table **7**. Results (see columns 2 and 3 in Table **7**) indicate that trade openness to Africa and to the rest of world have both positive and statistically significant impacts on MVA per capita. Notably, the magnitude of the impact of trade openness to Africa is larger than that of trade openness to the rest of world included as a separate variable or combined with trade openness to Africa. Moreover, the results indicate that the impact of

[6] 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.

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 latter is never statistically significant.

Table 6: Impact of infrastructure assets on MVA per capita

Depvar: Log MVA per capita	(1)	(2)	(3)	(4)	(5)	(6)
Log MVA per capita (first lag)	0.739***	0.706***	0.726***	0.726***	0.712***	0.724***
	(0.067)	(0.068)	(0.053)	(0.058)	(0.068)	(0.057)
Credit to private sector (% of GDP)	0.180*	0.342***	0.112	0.312***	0.326***	0.21
	(0.091)	(0.114)	(0.115)	(0.099)	(0.113)	(0.131)
Natural resources rents (% of GDP)	-0.428*	-0.545**	-0.587***	-0.446*	-0.391	-0.636***
	(0.232)	(0.209)	(0.195)	(0.227)	(0.237)	(0.219)
Trade openness (% of GDP)	0.245**	0.273**	0.283**	0.298**	0.283**	0.272**
	(0.122)	(0.123)	(0.115)	(0.122)	(0.129)	(0.114)
FDI, net inflows (% of GDP)	-0.548***	-0.649***	-0.593***	-0.625***	-0.631***	-0.600***
	(0.204)	(0.133)	(0.120)	(0.162)	(0.150)	(0.125)
Urbanization rate	0.131	0.163	0.115	0.294	0.203	0.112
	(0.236)	(0.313)	(0.254)	(0.285)	(0.340)	(0.263)
Log Mean years of schooling	0.200*	0.230**	0.224**	0.225**	0.243**	0.215**
	(0.103)	(0.112)	(0.104)	(0.112)	(0.120)	(0.102)
Quality of Institutions	0.067	0.007	0.191	0.148	0.134	0.06
	(0.159)	(0.183)	(0.183)	(0.177)	(0.175)	(0.197)
Infrastructure development index	0.576***					
	(0.215)					
Transport composite index		0.787**				0.636*
		(0.321)				(0.344)
Electricity composite index			0.545***			0.31
			(0.201)			(0.190)
ICT composite index				0.328		0.061
				(0.213)		(0.140)
Water and sanitary index					0.158	-0.086
					(0.217)	(0.191)
AMU	0.283**	0.378**	0.339**	0.305**	0.304**	0.378***
	(0.130)	(0.148)	(0.137)	(0.135)	(0.148)	(0.137)
CEN-SAD	0.073	0.043	0.085	0.087	0.088	0.052
	(0.057)	(0.061)	(0.062)	(0.066)	(0.069)	(0.052)
COMESA	0.065	0.043	0.105	0.135*	0.108	0.056
	(0.068)	(0.084)	(0.069)	(0.071)	(0.081)	(0.073)
EAC	0.009	-0.009	0.003	0.021	-0.004	-0.002
	(0.074)	(0.090)	(0.079)	(0.083)	(0.090)	(0.081)
ECCAS	0.255**	0.317***	0.288**	0.241**	0.242**	0.326***
	(0.107)	(0.114)	(0.109)	(0.110)	(0.114)	(0.109)
ECOWAS	0.185	0.222*	0.18	0.152	0.156	0.221*
	(0.111)	(0.132)	(0.129)	(0.130)	(0.139)	(0.118)
IGAD	-0.007	0.025	-0.039	-0.1	-0.067	0.022
	(0.087)	(0.108)	(0.104)	(0.124)	(0.125)	(0.090)
SADC	0.227**	0.253**	0.169*	0.195**	0.198*	0.224**
	(0.093)	(0.099)	(0.093)	(0.095)	(0.100)	(0.088)
Countries\Observations	51\620	51\620	51\620	51\620	51\620	51\620
Number of instruments	32	32	32	32	32	35
laglimits(a b)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)
p-value of AR(1)\AR(2) statistic	0.00\0.89	0.00\0.81	0.00\0.75	0.00\0.83	0.00\0.77	0.00\0.81
Hansen J-statistic\p-value	1.33\0.52	0.37\0.83	0.39\0.82	0.80\0.67	0.47\0.79	0.70\0.70

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 (in parentheses). Time dummies are included.

Table 7: Impact of trade policy on MVA per capita

Depvar: Log MVA per capita	(1)	(2)	(3)	(4)
Log MVA per capita (first lag)	0.739***	0.686***	0.735***	0.681***
	(0.067)	(0.098)	(0.086)	(0.081)
Credit to private sector (% of GDP)	0.180*	0.208*	0.103	0.233**
	(0.091)	(0.109)	(0.073)	(0.103)
Natural resources rents (% of GDP)	-0.428*	-0.331	-0.337	-0.397**
	(0.232)	(0.218)	(0.218)	(0.194)
Trade openness (% of GDP)	-0.548***	-0.524*	-0.449*	-0.579***
	(0.204)	(0.284)	(0.241)	(0.213)
FDI, net inflows (% of GDP)	0.131	0.326	0.103	0.304
	(0.236)	(0.223)	(0.214)	(0.241)
Urbanization rate	0.200*	0.229*	0.247**	0.229*
	(0.103)	(0.119)	(0.123)	(0.114)
Log Mean years of schooling	0.576***	0.862***	0.653**	0.839***
	(0.215)	(0.287)	(0.252)	(0.264)
Quality of Institutions	0.067	0.084	0.126	0.071
	(0.159)	(0.185)	(0.167)	(0.174)
Trade openness (%GDP)	0.245**			
	(0.122)			
Trade openness to Africa (%GDP)		0.496*		0.546**
		(0.279)		(0.251)
Trade openness to the RoW (%GDP)			0.034	0.103
			(0.105)	(0.097)
AMU	0.283**	0.379**	0.314*	0.372**
	(0.130)	(0.178)	(0.168)	(0.162)
CEN-SAD	0.073	0.102	0.078	0.1
	(0.057)	(0.071)	(0.062)	(0.065)
COMESA	0.065	0.072	0.028	0.081
	(0.068)	(0.077)	(0.063)	(0.074)
EAC	0.009	0.028	-0.037	0.034
	(0.074)	(0.068)	(0.090)	(0.069)
ECCAS	0.255**	0.344**	0.279**	0.349**
	(0.107)	(0.163)	(0.138)	(0.143)
ECOWAS	0.185	0.257*	0.205*	0.249*
	(0.111)	(0.134)	(0.121)	(0.128)
IGAD	-0.007	0.04	0.045	0.024
	(0.087)	(0.086)	(0.086)	(0.089)
SADC	0.227**	0.289**	0.288**	0.273**
	(0.093)	(0.122)	(0.137)	(0.113)
Countries\Observations	51\620	51\620	51\620	51\620
Number of instruments	32	33	33	34
laglimits(a b)	(3 4)	(3 5)	(3 5)	(3 5)
p-value of AR(1)\AR(2) statistic	0.00\0.89	0.00\0.79	0.00\0.94	0.00\0.76
Hansen J-statistic\p-value	1.33\0.52	4.17\0.24	4.18\0.24	3.82\0.28

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 (in parentheses). Time dummy variables are included.

4.2 Robustness checks

In this subsection, we verify the robustness of our main findings to lag-limits in GMM-style specification and to outliers. We also investigate the possible bias implied by the system GMM estimator we used by conducting a Monte Carlo simulation exercise. To save space, we report only the robustness analyses of the estimated coefficients and not those for the regional communities dummy variables in the table, although the latter are still included in the estimations.

To test the reliability of our results, we first perform alternative estimations using deeper lags as instruments for the lagged dependent variable. In particular, we estimate the model using three to thirteen lags (the length of the estimation period) of the dependent variable as instruments. Table **8** reports alternative results to the baseline estimations in Table **5**. The coefficient of the lagged dependent variable is slightly larger, and the coefficient of governance effectiveness becomes non-significant with increasing lag. The coefficient associated to voice and accountability remains non-significant but becomes positive, while the coefficient associated to control of corruption becomes negative. No other remarkable qualitative changes occur. We also estimated other regressions where we treated the institutional variables from the current period as predetermined and instrumented them with their own lags (GMM-style instruments). However, this leads to unsatisfactory model diagnostics or imprecise estimates for the effect of all institutional variables.

Second, we verified the robustness of our baseline estimates to outliers by re-estimating the model without observations identified as outliers. Outliers were any observation with a standardized residual in the level equation above 1.96 or below -1.96 and at the same time with a Cook's Distance above the rule-of-thumb value of 4/NT (four over the number of observations). Overall, the results in Table **9** show that most of the estimates are not qualitatively driven by outliers since they are close in magnitude to the baseline estimates in Table **5** and qualitatively almost the same. Only the sign of coefficients associated to voice and accountability and control of corruption have changed but these coefficients remain non-significant.

We also explore performance of our estimation method by conducting a Monte Carlo simulation exercise. Section A2 of the Appendix present the general set-up of our Monte Carlo

Simulation. Table **10** presents the average estimates, their standard deviations, and their relative bias using the simulated data and the system GMM. The results from the Monte Carlo simulation confirm that our baseline estimates in Table **5** using the system GMM are consistent since the relative bias for each parameter of interest in all estimations (except in some few cases) is less than 5%.

4.3 Discussion of the results and policy implications

The results of this study suggest that countries in Africa with better institutions or better governance indicators have, on average, higher MVA per capita. The results also indicate that government effectiveness and regulatory quality have positive and significant impacts on the performance of the manufacturing sector across Africa. In the Appendix Section A3, we present two case studies that illustrate the positive effects of good institutions on the performance of manufacturing sector. These findings, combined with the illustrate case studies, suggest that the ability of governments to formulate and implement sound policies, regulations to support businesses, and the credibility of the government's commitment to such policies play a critical role in promoting the manufacturing sector. Therefore, African countries should scale up their efforts to improve their governance in general, and their governance effectiveness and regulatory framework in particular. These results are in line with Biggs and Shah (2006) who provide evidence that private support institutions can improve small and medium enterprise (SME) growth and performance in Sub-Saharan Africa (SSA) by improving the business environment.

The results clearly indicate the importance of infrastructure assets in boosting MVA. While most of the governance indicators themselves do not have significant impact on MVA per capita, infrastructure development indices, particularly transport composite index and electricity composite index, have positive and significant impacts on MVA per capita. This result implies that good governance will also result in infrastructure development that can magnify the impact on MVA per capita.

Trade openness has a positive and significant impact on MVA in Africa. In particular, trade openness to African markets has a stronger positive impact on MVA 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 to promote the manufacturing sector. This calls for scaling up efforts to effectively implement Africa's behind the border Agenda (e.g., the African Continental Free Trade Area).

The findings confirm the significant positive impact of credit to the private sector on MVA per capita. This is consistent with the finding of Levine et al. (2000) that financial intermediary development positively and significantly affects economic growth by, for example, 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 the private sector significantly increases of a country's level of MVA per capita. Based on this finding, policy makers should favor incentives that reduce financial transaction costs and allow financial institutions to provide more credit to the private sector. These incentives may include lending rate reductions and mechanisms for properly evaluating credit projects to the private sector.

Natural resource rents have significant negative impacts on MVA per capita. This result is in line with Dabla-Norris et al. (2013) and UNIDO (2012) who showed that abundant natural resource endowments have strong negative effects on the manufacturing sector. Indeed, natural resource exports often lead to exchange rate appreciation, making manufacturing products less competitive (the so-called Dutch disease). 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 other sectors of the economy, particularly 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.[7] Indeed, countries that are endowed with natural resources received, on average, more FDI in terms of percent GDP from 2003-2015. Given this, policy makers should implement incentives to redirect FDI into manufacturing industries and other labor-intensive industries.

[7] 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 benefits 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. (2004) argue that FDI benefits 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 the manufacturing sector widely found in the literature. The positive and significant impact of the level of education on MVA is expected since human capital facilitates technology adoption and more educated workers increase productivity, as argued by Acemoglu et al. (2014). To further contribute to the development of the manufacturing sector, formal education needs to complement technical and professional trainings in line with the needs of employment in the manufacturing sector.

5. Conclusion

In this paper, we empirically investigate the impact of horizontal industry policies, with a focus on the quality of institutions, on MVA per capita across African countries from 2003-2015 and using a system GMM approach. Empirical results from the econometric model suggest that the quality of institutions, as measured by average of government effectiveness, regulatory quality, political stability, voice and accountability, rule of law and control of corruption, positively influenced MVA per capita in Africa from 2003-2015. However, only the effect of government effectiveness and regulatory quality are positive statistically significant. The results show that African countries with better infrastructure assets, particularly in transport and electricity, have higher MVA per capita. Trade openness to Africa has a stronger effect on MVA per capita than trade openness to the rest of the world.

We derived some policy implications for African countries from the empirical results to better redirect industrial policy and boost performance of the manufacturing sector in Africa. In particular, good governance is key in promoting the manufacturing sector in Africa. Notwithstanding, good governance also needs to result 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.

Future research could focus on the impact of institutions on manufacturing value added by sub-sectors. Future research could also focus on the impact of some selective or sectoral industrial policies, for example specific import tariffs and subsidies, on targeted industries.

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References

Acemoglu, D., F. A. Gallego, and J. A. Robinson (2014). Institutions, human capital, and development. *Annu. Rev. Econ*. 6(1), 875-912.

AfDB, OECD, and UNDP (2017). *African economic outlook: Entrepreneurship and industrialisation*. African Development Bank.

Alfaro, L., A. Chanda, S. Kalemli-Ozcan, and S. Sayek (2004). FDI and economic growth: the role of local financial markets. *Journal of international economics* 64(1), 89-112.

Anaman, K. A. and C. Osei-Amponsah (2009). *Determinants of the output of the manufacturing industry in Ghana from 1974 to 2006*. Institute of Economic Affairs (IEA Ghana).

Andrews, D. W. and B. Lu (2001). Consistent model and moment selection procedures for gmm estimation with application to dynamic panel data models. *Journal of Econometrics* 101(1), 123-164.

Andrews, D. W. K. (1999). Consistent moment selection procedures for generalized method of moments estimation. *Econometrica* 67(3), 543-564.

Anyanwu, J. C. et al. (2017). MVA development in North Africa: Analysis of key drivers. *Asian Development Policy Review* 5(4), 281-298.

Beverelli, C., Fiorini, M., & Hoekman, B. (2017). Services trade policy and manufacturing productivity: The role of institutions. *Journal of International Economics*, 104, 166-182.

Biggs, T., & Shah, M. K. (2006). *African small and medium enterprises, networks, and manufacturing performance*. The World Bank.

Blundell, R., and S. Bond. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115-43.

Borensztein, E., J. De Gregorio, and J.-W. Lee (1998). How does foreign direct investment affect economic growth? *Journal of international Economics* 45(1), 115-135.

Chang, H-J. (1994). *The Political Economy of Industrial Policy*. London and Basingstoke: Macmillan.

Chenery, H. B. (1960). Patterns of industrial growth. *The American Economic Review* 50(4), 624-654.

Cling, J.-P., M. Razafindrakoto, and F. Roubaud (2005). Export processing zones in Madagascar: a success story under threat? *World development* 33(5), 785-803.

Dabla-Norris, E., A. H. Thomas, R. Garcia-Verdu, and Y. Chen (2013). Benchmarking structural transformation across the world. *IMF Working Paper* WP/13/176.

De Mello, L. R. (1999). Foreign direct investment-led growth: evidence from time series and panel data. *Oxford economic papers* 51(1), 133-151.

Esfahani, H. S. and M. T. Ramírez (2003). Institutions, infrastructure, and economic growth. *Journal of development Economics* 70(2), 443-477.

Haque, M. E., R. Kneller, et al. (2008). Public investment and growth: the role of corruption. *Centre for Growth and Business Cycle Research Discussion Paper Series*, 98.

Haraguchi, N. and G. Rezonja (2013). Emerging patterns of structural change in manufacturing. *Pathways to Industrialization in the Twenty-First Century: New Challenges and Emerging Paradigms*, 102.

Ilyas, M., H. K. Ahmad, M. Afzal, and T. Mahmood (2010). Determinants of MVA in Pakistan: An application of bounds testing approach to cointegration. *Pakistan Economic and Social Review*, 209-223.

Katz, J. (2000). Structural change and labor productivity growth in Latin American manufacturing industries 1970-96. *World Development* 28(9), 1583-1596.

Loto, M. (2012). The determinants of output expansion in the Nigerian manufacturing industries. *Journal of Emerging Trends in Economics and Management Sciences* 3(6), 991.

Levine, R., N. Loayza, and T. Beck (2000). Financial intermediation and growth: Causality and causes. *Journal of monetary Economics* 46(1), 31-77.

Lu, Y., I. P. Png, and Z. Tao (2013). Do institutions not matter in china? Evidence from manufacturing enterprises. *Journal of Comparative Economics* 41(1), 74-90.

Matshediso, I. (2005). A review of mineral development and investment policies of Botswana. *Resources Policy* 30(3), 203-207.

Mbate, M. (2016). Structural change and industrial policy: A case study of Ethiopia's leather sector. *Journal of African Trade,* 3(1-2), 85-100.

Mensah, J. T., G. Adu, A. Amoah, K. K. Abrokwa, and J. Adu (2016). What drives structural transformation in Sub-Saharan Africa? *African Development Review* 28(2), 157169.

Noman, A., & Stiglitz, J. E. (Eds.). (2015). *Industrial policy and economic transformation in Africa*. Columbia University Press.

Pack, H. and K. Saggi (2006). Is there a case for industrial policy? a critical survey. *The World Bank Research Observer* 21(2), 267-297.

Rodrik, D. (2004). Industrial policy for the twenty-first century. *KSG Faculty Research Working Paper Series* RWP04-047.

Rodrik, D. (2009). Industrial policy: don't ask why, ask how. *Middle East Development Journal* 1(01), 129.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal* 9(1), 86136.

Sachs, J. (2003). Institutions matter, but not for everything. *Finance and Development* 40(2), 38-41.

UNECA (2013). *Making the most of Africa's commodities: Industrializing for growth, jobs and economic transformation*. Addis Ababa: United Nations. Economic Commission for Africa.

UNECA (2014). *Dynamic industrial policy in Africa: innovative institutions, effective processes and flexible mechanisms*. Addis Ababa: United Nations. Economic Commission for Africa.

UNECA (2016). *Transformative industrial policy for Africa*. Addis Ababa: United Nations. Economic Commission for Africa.

UNECA (2017). *Economic Report on Africa 2017: Urbanization and Industrialization for Africa's Transformation*. New York: United Nations.

UNIDO (2012). *Promoting industrial diversification in resource intensive economies: The experiences of Sub-Saharan Africa and central Asia regions*. United Nations Industrial Development Organization.

UNIDO (2015). *Industrial development report 2016: The role of technology and innovation in inclusive and sustainable industrial development*. United Nations Industrial Development Organization.

UNIDO, UNCTAD and MovingUp (2011). *Fostering industrial development in Africa in the new global environment*. The Economic Development in Africa Report.

Wade, R. H. (2009). Rethinking industrial policy for low-income countries. *African Development Review* 21(2), 352366.

Preston, L. T. (1993). *The East Asian miracle: Economic growth and public policy* (Vol. 1). World Bank Publications.

Table 8: Impact of institutional variables on MVA per capita (alternative GMM-style lag-limits)

Depvar: Log MVA per capita	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log MVA per capita (first lag)	0.806***	0.811***	0.819***	0.811***	0.808***	0.804***	0.807***
	(0.046)	(0.055)	(0.049)	(0.049)	(0.050)	(0.047)	(0.048)
Credit to private sector (% of GDP)	0.160*	0.153	0.167	0.112	0.064	0.152	0.167*
	(0.094)	(0.102)	(0.104)	(0.089)	(0.089)	(0.092)	(0.095)
Natural resources rents (% of GDP)	-0.429*	-0.35	-0.423*	-0.354*	-0.322	-0.405*	-0.432**
	(0.224)	(0.268)	(0.244)	(0.204)	(0.208)	(0.218)	(0.208)
Trade openness (% of GDP)	0.206*	0.147	0.209*	0.196*	0.190*	0.200*	0.205*
	(0.110)	(0.115)	(0.109)	(0.107)	(0.113)	(0.110)	(0.104)
FDI, net inflows (% of GDP)	-0.414**	-0.329	-0.404*	-0.419**	-0.427**	-0.406**	-0.408**
	(0.192)	(0.232)	(0.208)	(0.185)	(0.210)	(0.188)	(0.199)
Urbanization rate	0.112	0.182	0.193	0.062	0.042	0.103	0.118
	(0.184)	(0.170)	(0.189)	(0.189)	(0.225)	(0.183)	(0.191)
Log Mean years of schooling	0.168*	0.141	0.143*	0.179*	0.175	0.168*	0.165*
	(0.095)	(0.086)	(0.075)	(0.101)	(0.106)	(0.097)	(0.088)
Infrastructure development index	0.339*	0.356*	0.325**	0.255	0.395**	0.334*	0.347*
	(0.177)	(0.185)	(0.162)	(0.182)	(0.188)	(0.170)	(0.178)
Quality of institutions	0.022						
	(0.116)						
Voice and accountability		0.024					
		(0.122)					
Political stability			-0.087				
			(0.067)				
Government effectiveness				0.176			
				(0.152)			
Regulatory quality					0.214**		
					(0.106)		
Rule of law						0.064	
						(0.107)	
Control of corruption							-0.015
							(0.089)
Countries\Observations	51\620	51\620	51\620	51\620	51\620	51\620	51\620
Number of instruments	41	41	41	41	41	41	41
laglimits(a b)	(3 13)	(3 13)	(3 13)	(3 13)	(3 13)	(3 13)	(3 13)
p-value of AR(1)\AR(2) statistic	0.00\0.88	0.00\0.94	0.00\0.81	0.00\0.97	0.00\0.99	0.00\0.86	0.00\0.88
Hansen J-statistic\p-value	12.13\0.3	11.52\0.4	11.42\0.4	12.44\0.3	12.24\0.3	12.24\0.3	11.41\0.4

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 (in parentheses). Regional Economic Community's dummies and time dummies are included.

Table 9: Impact of institutional variables on MVA per capita (controlling for the influence of outliers)

Depvar: Log MVA per capita	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log MVA per capita (first lag)	0.609***	0.608***	0.605***	0.607***	0.662***	0.606***	0.605***
	(0.079)	(0.087)	(0.095)	(0.060)	(0.083)	(0.079)	(0.088)
Credit to private sector (% of GDP)	0.248**	0.284**	0.305**	0.145	0.113	0.260**	0.305**
	(0.107)	(0.122)	(0.139)	(0.096)	(0.083)	(0.109)	(0.129)
Natural resources rents (% of GDP)	-0.411*	-0.486*	-0.552*	-0.291	-0.207	-0.452*	-0.533*
	(0.242)	(0.280)	(0.281)	(0.202)	(0.173)	(0.254)	(0.278)
Trade openness (% of GDP)	0.285**	0.297**	0.339***	0.230**	0.230**	0.289**	0.310***
	(0.110)	(0.111)	(0.114)	(0.099)	(0.097)	(0.109)	(0.113)
FDI, net inflows (% of GDP)	-0.641***	-0.623***	-0.652***	-0.626***	-0.594***	-0.641***	-0.624***
	(0.197)	(0.208)	(0.206)	(0.133)	(0.203)	(0.194)	(0.210)
Urbanization rate	0.22	0.298	0.33	0.263	0.105	0.284	0.311
	(0.244)	(0.259)	(0.312)	(0.242)	(0.248)	(0.241)	(0.264)
Log Mean years of schooling	0.254**	0.244*	0.254*	0.253**	0.252**	0.247*	0.249*
	(0.126)	(0.137)	(0.127)	(0.116)	(0.111)	(0.124)	(0.129)
Infrastructure development index	1.083***	1.099***	1.092***	0.876***	0.857***	1.083***	1.126***
	(0.315)	(0.343)	(0.352)	(0.242)	(0.274)	(0.308)	(0.339)
Quality of institutions	0.18						
	(0.187)						
Voice and accountability		0.035					
		(0.163)					
Political stability			-0.055				
			(0.093)				
Government effectiveness				0.511**			
				(0.201)			
Regulatory quality					0.408**		
					(0.157)		
Rule of law						0.136	
						(0.161)	
Control of corruption							-0.058
							(0.138)
Countries\Observations	51\595	51\595	51\598	51\597	51\597	51\594	51\595
Number of instruments	32	32	32	32	32	32	32
laglimits(a b)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)	(3 4)
p-value of AR(1)\AR(2) statistic	0.00\0.30	0.00\0.46	0.00\0.70	0.00\0.43	0.00\0.33	0.00\0.47	0.00\0.51
Hansen J-statistic\p-value	2.18\0.34	2.38\0.30	2.51\0.29	1.02\0.60	0.87\0.65	2.39\0.30	2.46\0.29

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 (in parentheses). Regional Economic Community's dummy variables and time dummy variables are included.

Table 10: Impact of institutional variables on MVA per capita (Monte Carlo Simulation)

Depvar: Log MVA per capita	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log MVA per capita (first lag)	0.739 (0.058) [0.05]	0.75 (0.053) [-0.16]	0.765 (0.046) [-0.22]	0.733 (0.052) [-0.16]	0.702 (0.058) [-0.27]	0.74 (0.060) [-0.24]	0.744 (0.055) [-0.23]
Credit to private sector (% of GDP)	0.181 (0.056) [0.92]	0.192 (0.056) [-0.85]	0.174 (0.051) [0.23]	0.119 (0.057) [0.77]	0.106 (0.060) [2.94]	0.177 (0.058) [1.11]	0.188 (0.055) [0.63]
Natural resources rents (% of GDP)	-0.424 (0.107) [-1.08]	-0.44 (0.102) [0.22]	-0.437 (0.090) [-0.10]	-0.32 (0.102) [-0.18]	-0.392 (0.109) [1.45]	-0.418 (0.107) [0.52]	-0.444 (0.110) [0.66]
Trade openness (% of GDP)	0.245 (0.052) [0.12]	0.228 (0.048) [-0.57]	0.261 (0.045) [-0.72]	0.231 (0.049) [-0.04]	0.265 (0.054) [0.66]	0.245 (0.051) [0.88]	0.248 (0.053) [0.67]
FDI, net inflows (% of GDP)	-0.548 (0.119) [-0.08]	-0.503 (0.111) [-0.43]	-0.499 (0.102) [0.24]	-0.56 (0.114) [-0.22]	-0.607 (0.125) [-0.26]	-0.541 (0.114) [-0.78]	-0.536 (0.112) [0.04]
Urbanization rate	0.129 (0.096) [-1.48]	0.163 (0.093) [-1.06]	0.232 (0.094) [0.63]	0.091 (0.094) [0.18]	0.025 (0.108) [13.24]	0.126 (0.094) [-2.29]	0.143 (0.092) [-1.93]
Log Mean years of schooling	0.202 (0.046) [0.80]	0.188 (0.043) [1.79]	0.166 (0.038) [0.58]	0.216 (0.043) [0.09]	0.246 (0.049) [-0.01]	0.201 (0.045) [1.05]	0.195 (0.043) [1.10]
Infrastructure development index	0.572 (0.163) [-0.74]	0.574 (0.151) [-0.13]	0.534 (0.133) [0.84]	0.461 (0.144) [0.30]	0.625 (0.167) [0.23]	0.559 (0.163) [0.38]	0.575 (0.160) [0.20]
Quality of institutions	0.068 (0.069) [2.41]						
Voice and accountability		-0.037 (0.046) [4.09]					
Political stability			-0.093 (0.035) [0.72]				
Government effectiveness				0.311 (0.080) [-0.12]			
Regulatory quality					0.376 (0.085) [-0.93]		
Rule of law						0.078 (0.064) [1.44]	
Control of corruption							0.012 (0.063) [14.75]
Countries\Observations	51\620	51\620	51\620	51\620	51\620	51\620	51\620
Number of simulations	1000	1000	1000	1000	1000	1000	1000

Notes: This table presents the average estimates obtained from 1000 Monte Carlo simulations of samples for MVA per capita. Standard errors are in parentheses and relative bias in percent are in brackets. Regional Economic Community dummy variables and time dummy variables are included.

APPENDIX

A.1 Description of Worldwide Governance Indicators

Worldwide Governance Indicators capture six key dimensions of governance that can be grouped into three areas or governance. Each indicator ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance.

(a) The process by which governments are selected, monitored, and replaced:

1. Voice and Accountability – capturing perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
2. Political Stability and Absence of Violence/Terrorism – capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.

(b) The capacity of the government to effectively formulate and implement sound policies:

3. Government Effectiveness – capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
4. Regulatory Quality – capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

(c) The respect of citizens and the state for the institutions that govern economic and social interactions among them:

5. Rule of Law – capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
6. Control of Corruption – capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

A.2 Monte Carlo Simulation

Our general set-up of Monte Carlo Simulation is as follows. We simulate 1000 samples for $\{mva_{i,t}\}$ using the data generating process:

$$mva_{i,t} = \alpha_i + \phi.mva_{i,t-1} + \beta.X_{i,t} + v_{i,t} \quad (2)$$

with

$$v_{i,t} = \rho_v.v_{i,t-1} + e_{i,t} \quad (3)$$

Where X is now the whole set of regressors except the lagged dependent variable. We fix ϕ and β to their values obtained from the GMM estimates in Table 5. We further assume that $\alpha_i \sim N(0, \sigma_\alpha)$ and $e_{i,t} \sim N(0, \sigma_e)$. These distributions approximate the estimated variances of the fixed effects α_i and the time varying shock $v_{i,t}$ in our sample. Each sample comprises 51 countries and 13 observations for each country, which matches the dimensions of our panel. We assume that initial values for the dependent variables,

$$mva_i^0 = (mva_{i,-1}, mva_{i,-2}, mva_{i,-3}, mva_{i,-4})',$$

are draw from a normal distribution, i.e., $mva_i^0 \sim (\mu_{mva_i^0}, \Sigma_{mva_i^0})$, to match their empirical counterparts. Here there are four (4) initial values since lags 3 and 4 are used as instruments in the baseline estimation in Table 5.

As our Monte Carlo simulation aims to mimic the 51 African countries, it seems reasonable to consider a model with deterministic regressors for each replication. As the regressors contain (irregular) gaps, the simulation of the dependent variable over the period is not possible. To deal with this issue, missing values in regressors X are imputed using linear interpolation when simulating $\{mva_{i,t}\}$.

The steps for the Monte Carlo simulations performed are as follows.

1. The values of the parameters ϕ, β, σ_α, ρ_v, σ_e, $\mu_{mva_i^0}$, and $\Sigma_{mva_i^0}$ are known/given. The exogenous variables $X_{i,t}$ are also known/given.

2. Draw random initial values of mva_i^0 from its distribution. Also draw random values for the individual fixed effects $\{\alpha_i\}$ and for all error terms $\{v_{i,t}\}$ for i = 1, …, N and t = 1, …, T. Then calculate $\{mva_{i,t}\}$ for i = 1, …, N and t = 1, …, T.

3. From the generated $\{mva_{i,t}\}$ and the given the exogenous variables $\{X_{i,t}\}$, estimate the parameters ϕ and β.

4. Repeat steps 2-3 many times (e.g., $M = 1000$).

5. Calculate the mean estimate, the relative bias and the standard deviation for each parameter.

A.3 Case Studies: two illustrative examples

In this subsection, we illustrate the positive effects of good institutions on MVA per capita with two examples: Mauritius and Rwanda. We highlight the positive effects of institutions on MVA by comparing growth experiences of MVA per capita in the two countries to those of countries with similar MVA per capita in 2003 (the starting date of our estimation period). Mauritius is ranked as the top country in Africa in term of quality of institutions averaged over the period 2003 to 2015. Rwanda is ranked as the top country in Africa in term of improvement in quality of institutions between 2003 and 2015. After 2003, both countries experienced rapid growth of MVA per capita relative to countries with similar MVA in 2003. These countries, with different characteristics in their industrial processes, present important lessons for the African continent.

Mauritius has maintained good performance in the manufacturing sector from 2003-2015. The average MVA per capita at constant 2010 prices over this period is approximately 1168 US dollars, the 2nd highest performance in the continent. The Mauritius manufacturing sector has been one of the most dynamic compared to countries with similar MVA in 2003. Its MVA per capita at constant 2010 prices was 1123 US dollars in 2003 and grew at an average annual growth of 1.1%, compared to an average growth of -1.4% among the five countries with the closest MVA per capita to Mauritius in 2003 (Eswatini, Seychelles, South Africa, Libya, and Tunisia). Among these countries, only Eswatini has an average annual growth larger than that of Mauritius, but with a less diversified manufacturing sector. In 2015, the Mauritius manufacturing sector alone accounted for 14% of its GDP, despite a decrease of 4 percentage points compared to 2003.

According to UNECA (2014), the manufacturing sector accounted for 65% of Mauritius' exports and 22% of the country's total employment in 2012. The country has undergone a sustained transformation from an exclusive agricultural monoculture of sugar cane to a strong and diversified economy, where the industrial sector has a key role to play. Mauritius has a Manufacturing Free Zone that became its 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 its 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 success of the Mauritius manufacturing sector is mainly due to its judicious policies (based on inclusive growth, human capital development and social mobility), the constant efforts of public authorities to involve public and private actors' debates in the formulation and implementation of policies, and international links (duty-free and quota-free access to the European market). Special tax incentives make the country very attractive to international investors. These incentives include income tax, corporate tax and VAT fixed at the rate of 15%; non-taxable dividends and capital gains; and, exemption from customs duties and VAT on imported goods and equipment. The country has 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. In addition, Mauritius is connected to the business world thanks to a high-speed Internet (undersea fiber optic cables, SAFE and LION).

Rwanda's manufacturing sector growth was even more remarkable following improvement in its quality of institutions between 2003 and 2015. MVA per capita in 2003 was $21.6, and had a 3.9% average annual growth rate between 2003 and 2015, The manufacturing sector's share of GDP increased by two percentage points from 5 per cent to 7 per cent. The five countries with the closest MVA per capita in 2003 (Comoros, Burundi, Niger, Malawi, and Gambia) had an average MVA growth rate of 1.3% during the same period. Given the estimate in Table 5, if Burundi, for example, which is near the first quartile in regulatory quality, could increase its regulatory quality to the level found in Rwanda (near the third quartile), the MVA per capita would have increased by 11% more on average over the sample period of 13 years, which represents an additional average increase of around 0.9%.

The relatively good performance of Rwanda's manufacturing sector can be explained by the functioning of several industrial policy institutions that have been set up by the Ministry of Commerce and Industry to promote the industrial sector and, in particular, the manufacturing sector. These industrial policy institutions are mentioned in the National Industrial Policy of 2011. They include, among others, the National Agricultural Export Development Board (NAEB) operational since 2011, the Rwanda Standards Board (RSB) established in 2002, the National Institute for Research and Development Agency (NIRDA), established in 2008 for industrial research on bio-fuel that will boost the energy supply and to reduce the dependence of the economy vis-a-vis to fossil fuels (often susceptible to price volatilities) and the Rwanda Development Board (RDB). The latter, established in 2008, provides exporters with trade and market information as well as advice and recommendations to the government on practical measures to stimulate export trade. The Private Sector Federation of Rwanda (PSF) is another important industrial policy institution that supports the private sector development. The support includes building human capacity for the private sector, facilitating sustainable funding sources for the private sector, and providing economic dispute arbitration.

The Ministry of Trade and Industry has developed several key policies and strategies aimed at improving the business environment. Good governance and zero-tolerance for corruption has given Rwanda a competitive business environment compared to its regional neighbors. Vision 2020 sets out particularly to strengthen education and infrastructure. Vision 2020 targets a gross domestic investment rate of 29 percent of GDP by 2020. According to the National Industrial Policy carried out by the Ministry of Trade and Industry, in 2010, the investment rate stood at 21 percent of GDP in comparison to 13 percent in 2000. The ICT infrastructure has been an important driver of economic growth as well as manufacturing growth in recent years. In 2011, the Rwanda Technology Authority announced completion of a 2,300 km nationwide fibre optic cable, providing faster internet access (UNECA, 2016).