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The Political Economy of Industrialization in Sub-Saharan Africa: Evaluating the Role of Institutions

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Abstract: *Sub-Saharan Africa has recently witnessed rising growth rates, but the continent is still largely not industrialised. Mainstream empirical diagnosis has identified the paucity of physical and human capital as the main culprit. However, with the increasing inflow of capital into the continent, such arguments have become hackneyed. A possible culprit identified in the evolving development literature is the quality of institutions. How much has the quality of institutions, structured largely by the prevailing political economy of individual states, influenced Africa's industrial performance? This study deploys descriptive and analytical methodologies to proffer answers to these questions. The estimates obtained from the Pool Mean Group Panel Autoregressive Distributed Lag (PMG-ARDL) as well as the Augmented Mean Group (AMG) panel estimators point strongly to the fact that institutions are bane of industrialization in Sub-Saharan Africa (SSA). Specifically, we find evidence that in the long run, regulatory quality, rule of law and control of corruption all impact the manufacturing subsector negatively and significantly. The panacea is not only within the matrix of optimal resource allocation, but must integrate the entire political and sociological process, involving governments at all levels, non-governmental organisations (NGOs) and faith-based groups.*

Keywords: Industrialization; Sub-Saharan Africa; Institutions; Pool Mean Group Panel Autoregressive Distributed Lag (PMG-ARDL); Augmented Mean Group (AMG).
JEL Classification: O14, O43, P16

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1. Introduction

Africa has, in the last decade, been touted as a growing continent because both its growth trajectory and future estimated growth rates exhibited positive indices. In fact, so impressive were its growth trends that many analysts suggested that Africa had reached a critical phase in its development efforts. For instance, its annual real output growth rate rose from 1.8% in the 1980–1989 period to 2.6% in 1990–2000, and further to 5.3% in 2000–10 (UNCTAD, 2014). However, the underlying factors behind this robust growth performance have not changed radically from what it used to be even in the 1960s, prompting questions as to the nature and causes of this growth, and more importantly, issues of Africa's long term growth sustainability.

It is apparent that the key driver of the continent's remarkable growth performance in the last decade has been rising commodity prices. Indeed, from 2000–2010, over a third, i.e., 30%, of Africa's GDP was associated with the exploitation of natural resources (McKinsey & Company, 2010; AfDB, et al., 2011). Similarly, the exports of agricultural products, oil, minerals and metals account for about 70% of sub-Saharan Africa's export revenue (Mills & Herbst, 2012). Yet while growth rates are increasing, there is also a concurrent increase in unemployment and inequality, with a marginal reduction in poverty (AfDB, 2012).

A key requirement for Africa's long term growth sustainability is its ability to industrialise, conceptualised as the inherent capacity of a country to master and allocate within its border the whole industrial production processes, production of raw materials, fabrication of machines and tools required for the manufacture of the desired products and of other machines, skills to operate, maintain and reconstruct the machines and tools; skills to manage factories and to organise the production process (Ndebbio, 2006: 49).

Africa's growth must be underpinned by its ability to generate growth, not simply through natural resource exploitation, but for growth to manifest in practical terms, such as the concept of industrialization as defined above by Ndebbio. Its growth must be undergirded by radical structural transformation capable of altering the composition of output, away from agriculture to manufacturing and services. However, Africa's growth is currently fragile, largely due to its susceptibility to external shocks and the inability of the industrial sector to contribute meaningfully to growth

(Economic Commission for Africa, 2001). The indices of industrialization speak volumes of this internal and external vulnerability.

Traditional models of economic growth and industrialization devote a prime place to labour, capital and technology in the aggregate production function. But as North (2003) shows, the key constraints to economic development in developing countries are not only the paucity of capital or skilled labour, but, significantly, the quality of institutions which underlie the process of economic development. How much has the quality of institutions, structured largely by the prevailing political economy of individual states, influenced Africa's industrial performance? Are institutions in Africa a disincentive or a catalyst for industrialization?

A novelty of this paper is that it deploys a wide range of measures of institutions using World Governance Indicators (WGI) (Kaufmann, Kraay & Mastruzzi, 2020) to investigate the influence of institutions on industrialization in Sub-Saharan Africa (SSA). The extant literature on this subject lacks this approach (see, for instance, Beji & Belhadj, 2016). A clear gap in the literature suggests the need to employ these measures to analyse their effect on the industrial sector on a continent-wide level. We hypothesise that institutions (expressed formally by Africa's political economy) are a binding constraint on Africa's industrialization, and our findings show that this is the case in SSA. Specifically, we find evidence that in the long run, regulatory quality, rule of law and control of corruption all negatively and significantly impact the manufacturing subsector.

The paper proceeds as follows: section two presents an overview of the research context, namely, industrialization in SSA, while section three reviews the literature and the underlying relevant theory. Section four describes the data and estimation techniques, while in section five we present and discuss the analytical results. Section six concludes with some policy recommendations.

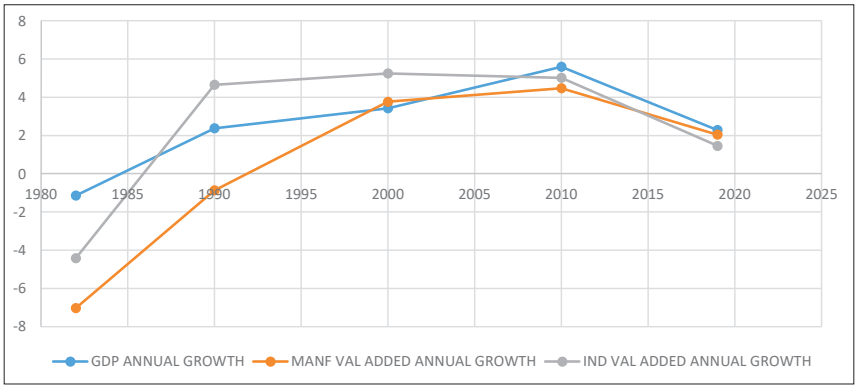
2. Research Background – Overview of Industrialization in Sub-Saharan Africa

Industrialization and economic development are linked, with the former process predictably birthing the latter. A radical and pervasive alteration of the underlying structure of production *via* industrialization (narrowed down specifically to manufacturing) inevitably results in economic development.

The industrialization process, as noted by Signé and Johnson (2018), guarantees the absorption of a large portion of the country's labour force, ensuring that they earn good jobs with rising real disposable incomes. With declining unemployment due to industrialization, poverty and other negative phenomena that create socioeconomic uncertainty are automatically contained. Besides, it significantly contributes to the accumulation of human and physical capital, while backward and forward linkages with other sectors in the economy are created. For instance, through industrialization, demand pressures are exerted on the agricultural, mining, energy and other sectors for the provision of industrial inputs.

The 1960s are generally regarded as the decade of Africa's political sovereignty, because during this period many countries across the continent gained independence. Industrialization, specifically the manufacturing sector, grew in the immediate aftermath of this general political development, largely driven by state-led policies of protectionism (e.g., import substitution industrialisation, or ISI) (Chete et al., 2014). However, by the middle of the 1980s, a significant policy shift in the introduction of neoliberal market fundamentalism, through the structural adjustment programme (SAP), was imposed by the World Bank and other global creditors on developing countries, ensuring that the gains from industrialization in the post-independence period were considerably eroded. Studies abound regarding the negative toll SAP unleashed on the economies of SSA and other developing countries (see, for instance, Effiom, Ekanem & Effiong, 2021; Toyo, 2001; Ekpo, 1991; Ndebbio, 1991). Only a few countries could point to any positive effects of these reforms on their economies. Figure 1 shows that for most of the 1980s, the declining trend of manufacturing value added (MVA) had a consequential negative effect on both industrial sector performance as well as on the real gross domestic product (GDP).

Figure 1: Real GDP, Manufacturing Value-Added and Industrial Value-Added Growth Rates (%) in SSA for Selected Years



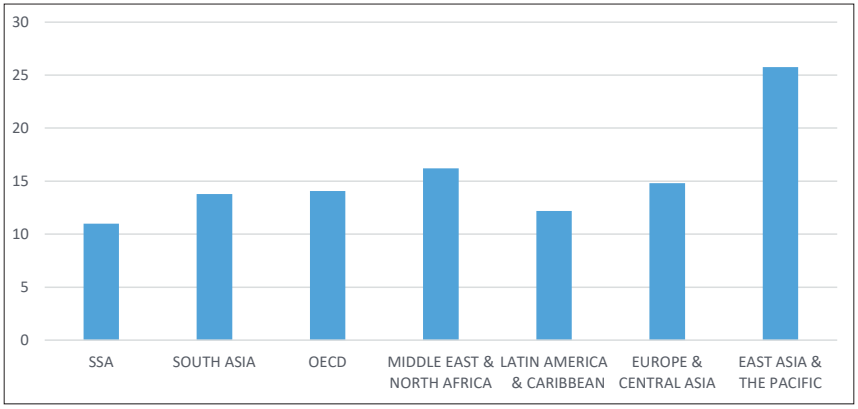
Notes: MANF VAL ADDED – manufacturing value-added (MVA); IND VAL ADDED – industrial value added.
Source: World Bank (2020) – WDI.

All indicators within the period were negative. Generally, throughout the 1990s and 2000s, industrial sector performance in SSA was at best stagnant, declining again from 2010 to 2019. It must be noted that in 2017, the share of manufacturing in SSA's GDP was less than 10% (WDI, 2020; Signé & Johnson, 2018), with only a paltry $145 billion of MVA. This is extremely poor when compared to other developing countries, for example, those of East Asia. Encouraging indices were, however, recorded for manufacturing; MVA posted positive annual growth for the most part in the 2000s. In fact, it reached a peak of 7.48% growth in 2013 before declining to 2.04% in 2019 (World Bank, 2020).

A possible explanation for the poor performance of the industrial sector is that much of the continent's industrial production is primary in natural products; manufacturing is largely resource-based and is responsible for close to 50% of the total manufacturing exports and MVA. Besides, the production function in SSA has a binding constraint – capital – which is largely imported from developed economies. Thus exchange rate constraints coupled with savings constraints, means that the manufacturing sector is perpetually consigned to manifest inefficiencies and excess capacity. Furthermore, capital expenditure (investment) in manufacturing has been irregular, with only four countries accounting for close to 70% of

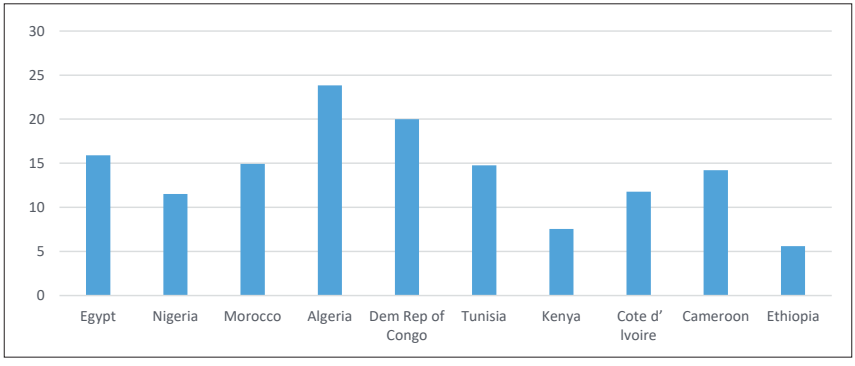
manufacturing activities (KPMG, 2015). Specifically, North and South Africa are responsible for a significant portion of Africa's aggregate MVA (Balchin et al., 2016, p.7; Balchin et al., 2016: 5; KPMG, 2015: 6). Figure 2 presents a regional comparison of the share of MVA in GDP and shows that SSA ranks last, with East Asia and the Pacific region posting impressive outlooks in terms of a robust manufacturing sector, compared to other regions. Figure 3 shows recent data of MVA in GDP for selected countries in SSA. Interestingly, except for the Democratic Republic of Congo (DRC), four North.

Figure 2: Comparison of MVA (% GDP) for Selected Regions, 2019



Source: World Bank (2020) – WDI data (Data for each region, except the OECD, excludes that of high-income countries).

Figure 3: MVA (% GDP) for Selected Countries in SSA, 2019



Source: World Bank (2020) – WDI data.

African countries (Algeria, Egypt, Morocco and Tunisia) demonstrate strong industrial sector performance compared to countries from other regional blocs. In tandem with their strong MVA, these countries also export more manufactured goods relative to their peers on the continent. For instance, in 2019 Tunisia's manufactured exports, as a percentage of its merchandise exports, stood at over 81%, followed by Morocco (70.84%) and Egypt (45.17%). South Africa's share stood at 43%, Kenya dominated the Eastern bloc with 30.77%, while Nigeria's was 10.74% (World Bank, 2020). On a general note, manufacturing in Africa has experienced growth exceeding 3.5% annually between 2005 and 2014, and recent data reveal that manufacturing exports have witnessed significant increases above aggregate output.

3. Literature Review

3.1 Strategic drivers of industrialization

The Global Manufacturing Competitiveness Index (Deloitte, 2016: 17) documents 12 strategic variables which are necessary for competitiveness in manufacturing. In descending order of importance, these are talent (human capital), cost competitiveness, workforce productivity, supplier networks, legal and regulatory systems (institutions); education infrastructure; physical infrastructure; economic, trade, financial and tax systems; innovation policy and infrastructure; energy policies; local market attractiveness, and healthcare systems.

We comment on a few of these drivers, particularly noting the prime position accorded to human capital, whether in talent or workforce productivity. Empirical studies abound, which show that the quality and stock of a nation's labour force are both directly related to its productivity and innovation levels (Mariz Pére et al., 2012; McGuirk, Lenihan & Hart, 2015; Glaeser et al., 2004). In particular, Diebolt and Hippe (2018) conclude that past and present stocks of human capital are responsible for the current disparities in regional development in many countries and regions in Europe. Low levels of education, high illiteracy, and debilitating health conditions in a large segment of the population could pose a major hindrance to firm productivity across sectors in the economy as well as acting as limitations to adapting and adopting new technologies. In fact, Karambakuwa, Ncwadi

and Phiri (2018) affirm this conclusion empirically by showing that human capital has an insignificant effect on growth in some selected countries in SSA.

The African Development Bank (AfDB) notes that Africa has been sluggish in developing its science and technology sectors, recording a meagre 0.42% of research and development spending as a proportion of GDP. To make any significant contribution to growth, governments must target a one % increase. Yet, despite accounting for 13.4% of the global population, Africa produces a paltry 1.1% of the world's scientific knowledge, with only three of its universities ranked among the top 500 globally. A more disturbing statistic is that Africa boasts of only 35 engineers and scientists per million inhabitants, compared to 2,457 in Europe, 168 in Brazil and 4,103 in the United States (US) (AfDB, 2014). This shortage of skills manifests in the relative obscurity of the continent in terms of quoted documents. For instance, South Africa ranks first (and the 35th in the world) with 107,976 documents, followed by Tunisia (51st, with 32,250 documents) and Nigeria (52nd, with 35,223 documents). This standing is a far cry from countries like the US (1st, with 6.1 million documents), Japan (4th, with 1.6 million documents) and France (6th, with 1.1 million documents). This picture is more discouraging when it is seen that no African nation was among the top 20 in terms of patent applications in 2011, while Japan had a whopping 238,323 and New Zealand had 4,710 (AfDB, 2014). These negative indices of Africa's human capital partly account for its low levels of industrialization, and more specifically, its low ranking in global productivity and competitiveness. The underlying paradox is that between 1999 and 2009, there was a three-fold increase in the number of African university graduates – their numbers rose from 1.6 million to 4.9 million, but this came with a concurrent increase in the unemployment rate of educated youths (AfDB, 2014).

A second strategic variable necessary in speeding the process of industrialization in SSA is reducing the cost of doing business – ranging from the continuum of prospective projects to actual production, and finally to distribution. Production across many countries in SSA is not cost-effective, reflecting the parlous general state of infrastructure. For instance, small and medium scale enterprises (SMEs), largely regarded as engines of growth, innovation, and employment, are burdened with outrageous business operation costs. This leaves most of them with a high mortality rate in the

first five years of operation, as seen in Nigeria (Effiom & Edet, 2018). Most of these costs are due to inadequate or a lack of infrastructure in transport, telecommunications, shipment, energy etc. In particular, the World Bank (2005) found that so many indirect costs connected to operating expenses (transportation, telecommunication, energy, land, security, marketing, bribes etc.) constitute a heavy hindrance in terms of net profitability and productivity in many African countries and led to a lag in competitiveness. The World Bank concluded that comparative advantages for SSA are largely affected by productivity cost differentials that do not emerge from relative factor endowment. A major source of differentials is a business environment that includes a web of policies, varying quality of the labour force, geography, institutions, and physical infrastructure. Corroborating the significant influence of these factors on firm and industry performance, Collier (2000) observes that firms in sectors whose products are tradable, and which use less natural resources in production will be more affected by the business environment compared to those in extractive and primary sectors, because of the larger required inputs in infrastructure, logistics and regulations.

Cost mitigation would require substantial government involvement, as identified by Effiom and Agala (2020), and even the intervention of the private sector through public private partnerships (Effiom, 2020). With considerable gaps in road, power and port infrastructure, and a complex maze of red tape, governments in SSA must play a leading role in cost mitigations to ensure cost-effectiveness in industry operations. One way in which SSA states have reacted is through the establishment of special economic zones (SEZs) boasting quality infrastructure, tax waivers as well as shielding from external competition, such as in Nigeria (since 1992), Zambia (2006) and Ethiopia (2015) (World Bank, 2005). An input supply network is another strategic enabler of industrialization. While natural production function in SSA (due to resource endowments) is skewed towards the use of labour and other raw materials found in abundance, any meaningful breakthrough in manufacturing requires critical but less abundant capital inputs, which must be factored into the input supply chain. In Africa, capital input for the manufacturing sector must be imported; this has implications for cost-effectiveness and product competitiveness. This explains why SSA has remained trapped for so long in the narrow confines of raw commodity production. Historically, failures in export promotion and ISI policies in SSA were traceable to the lack of capital and equipment

meant to drive the process of industrialization, needed to substitute imported goods. In the end, exports could not be promoted beyond traditional export commodities, nor could manufactured imports be substituted, because of the dearth of human and physical capital. Ogujiuba, Nwogwugwu and Dike (2011) as well as Reinert (2007) submit several reasons as to why the ISI policy failed in SSA, key among which was that core technologies were generally imported, with the process of industrialization thus lacking an indigenous foundation.

A fourth major driver of industrialization is the quality of institutions, embodied in legal, regulatory, and informal systems. We devote the next subsection to a more critical analysis of institutions since they constitute a key factor of our investigation.

3.2 Institutions as strategic drivers of industrialization

Development theories in neoclassical economics, notably Harrod-Domar and the Rostow linear stages of growth models, ascribe a prime position to capital accumulation *via* savings. They generally prescribe that for an economy to maintain long run growth, policies must be directed to significantly mobilise savings, chiefly by increasing the proportion of the national income not consumed, some of which should be channelled to investment. As noted by Todara and Smith (2012), these theories informed the massive injections of capital into the successful rebuilding Europe in the aftermath of the Second World War; thus, this policy was enthusiastically recommended as the developmental recipe for developing nations. But the ensuing results were woefully disappointing. What went wrong? Studies showed that although capital was a significant factor in growth stimulation, it was nonetheless a first order (necessary) and not in itself a sufficient condition for catalysing growth. A second order (sufficient condition) which was not contemplated or assumed implicitly by neoclassical theory was the existence in Europe the requisite "structural, institutional, and attitudinal conditions (e.g., well-integrated commodity and money markets, highly developed transport facilities, a well-trained and educated workforce, the motivation to succeed, an efficient government bureaucracy)" (Todara & Smith, 2012: 114–15). All these helped convert the massive capital mobilised by the Marshall Plan into unprecedented levels of output. In summary, Europe had, in its arsenal of productive inputs, a set of institutions congenial

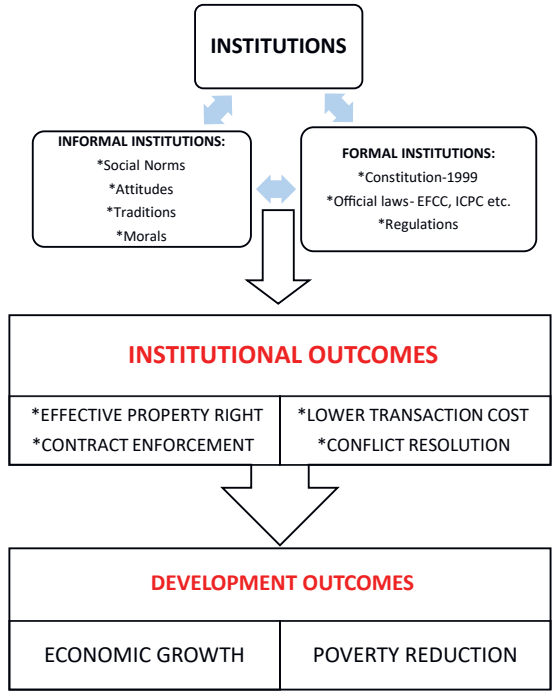
to output growth and capital productivity. Douglas North and other scholars would latter elaborate on the dynamics and place of institutions in the industrial growth of an economy.

Institutions are defined by North (1981: 201-202) as "a set of rules, compliance procedures, and moral and ethical behavioural norms designed to *constrain* the behaviour of individuals in the interests of maximizing the wealth or utility of principals." *Constraints* are key, for as North (2003) observes, institutions or constraints would be irrelevant in a world without friction, for then everyone would behave ideally and optimally. Institutions exist to constrain human behaviour to acceptable and predictable actions for the ultimate good of the society. They harbour or create the incentives and disincentives that direct human interactions, thereby reducing uncertainty in social, political, or economic terms.

Broadly categorised into formal and informal components, the former consists of regulations, laws, constitutions, and whatever possesses the character of permanence, preciseness, specificity, and durability. Meanwhile, Soysa and Jütting (2006) as well as Helmke and Levitsky (2003) conceive of informal institutions as behavioural regularity based on socially shared rules, usually unwritten, that are created, communicated, and enforced outside of officially sanctioned channels (see also Effiom & Ubi, 2015). Informal institutions are not expressed in formal terms and their effectiveness is not derived from any external enforcement; rather, they are self-enforcing via mechanisms of responsibility, seen for example in community networks or fiduciary relationships. They are socially sanctioned norms of behaviour that include customs, conventions, traditions, taboos, and attitudes. In several ways, informal norms are far more important than formal rules, the latter being only marginally guiding daily actions and behaviour. Indeed, the effectiveness of formal rules of engagement is largely dependent on informal norms.

Figure 4 below provides a conceptual clarification of the relations between formal and informal institutions and development outcomes. A key message here is that formal institutions, which are embodied in codified laws, rules, regulations and even the bodies through which the government executes its policies, are not sufficient to guarantee the needed development; informal norms are complementary in this regard. SSA's states are not in want of institutions, but their efficiency is largely compromised through state capture by particularistic interests and the erosion of its autonomy and embeddedness (Effiom & Ubi, 2017).

Figure 4: Conceptual Relationship between Formal/Informal Institutions and Development Outcomes



Source: Adapted from Effiom and Ubi (2015).

But how relevant are these broad categorisations of institutions to industrialization in SSA? In many ways, studies have shown that in several countries, the binding constraint on industrialization and growth is not the dearth of capital, but the absence of effective institutions, both formal and informal. While capital can and has been imported into SSA *via* foreign direct investment (FDI), portfolio investment, overseas development assistance (ODA) and remittances, institutions cannot be imported. They must be indigenous to the continent and its peoples; their quality either make or mar the efficiency of imported capital. And it must be noted at this point that even with the stringent conditions required to access most foreign capital, such efforts have ultimately been compromised by more dominant and pervasive informal institutional characteristics.

In comparing the results of industrial policy (basically ISI) between SSA and East Asian countries, several studies (Effiom & Ubi, 2017; Ogujiuba, Nwogwugwu & Dike, 2011) conclude that while policy instruments were similar (e.g., state intervention in industrial enterprises) in both continents, the difference in outcomes could be attributed to the political economy of rent generation and application *via* government industrial policy. Specifically, while Schumpeterian rent-seeking (which motivates industrial entrepreneurship) underpinned East Asian industrial policy, in SSA profits were generated *via* static rent-seeking and distributed through patronage mechanisms to a coterie of elites (Ogujiuba et al., 2011; Mkandawire, 2001). Similar conclusions were found by Collier and Gunning (1999), who identified two dominant constraints on industrialization in SSA: weak capabilities as well as institutional and associated incentives. Government inefficiencies (manifested in state capture by particularistic interests) dot SSA's socio-economic and political landscape, castrating genuine efforts geared towards industrialization. Government institutions have been utilised as vehicles for political and economic patronage, resulting in massive plundering with little or no resources left for productive investments. In an investigation into whether ethnicity is a binding constraint on industrialization in Africa's largest economy (Nigeria), Effiom et al. (2021) concluded that "the burden for Nigeria's under-industrialization should be placed at the doorsteps of vested interests, neo-colonial dependence, and the distorted, dependency worldview of the ruling class responsible for industrial policy formulation". In the end, agents respond to the ensuing macroeconomic instability by resorting to capital flight and risk reduction mechanisms (Effiom, Achu & Edet, 2020; Lawanson, 2007).

Table 1 highlights key governance and institutional indicators in SSA and compares some with the newly industrialised countries (NICs) of Southeast Asia. A sordid picture for SSA emerges: only Mauritius had a clean slate of positive estimates across all five measures of institutional quality, affirmed by the fact that it in 2019, it boasted the third largest GDP per capita ($10,200) in Africa, after Equatorial Guinea and the Seychelles (AfDB, 2020). Not surprising, in July 2020, Mauritius was declared by the World Bank as a high-income country – with the second highest GDP per capita in Africa after the Seychelles. However, South Africa did post a positive estimate for government effectiveness, regulatory quality, and control of corruption. A stark contrast, however, is underlined by a cursory

evaluation of the performance of the four Asian Tigers plus Malaysia, which posted positive estimates across all measures of institutions (apart from Hong Kong, which scored a negative value for political stability). Our perfunctory evidential conclusion is that strong institutions are associated with industrialization and economic development, and *vice versa*.

Table 1: Institutional Measures for Selected Countries in SSA, 2019

Institutional Measures	Political Stability	Government Effectiveness	Regulatory Quality	Rule of Law	Control of Corruption
Angola	-0.31	-1.12	-0.89	-1.05	-1.05
Ghana	**0.10**	-0.21	-0.11	**0.05**	-0.08
Nigeria	-1.93	-1.09	-0.86	-0.90	-1.09
Senegal	**0.06**	-0.06	-0.11	-0.19	**0.05**
Cote d'Ivoire	-0.96	-0.48	-0.24	-0.57	-0.53
Kenya	-1.12	-0.38	-0.28	-0.45	-0.78
Tanzania	-0.36	-0.88	-0.64	-0.58	-0.39
Uganda	-0.65	-0.59	-0.37	-0.31	-1.17
South Africa	-0.22	**0.37**	**0.16**	-0.08	**0.08**
Zimbabwe	-0.92	-1.21	-1.46	-1.26	-1.24
Zambia	-0.10	-0.68	-0.55	-0.46	-0.64
Mauritius	**0.82**	**0.87**	**1.00**	**0.76**	**0.32**
DRC	-1.81	-1.63	-1.51	-1.79	-1.54
Cameroon	-1.56	-0.81	-0.83	-1.12	-1.21
Congo	-1.81	-1.63	-1.51	-1.79	-1.54
Gabon	-0.18	-0.90	-0.96	-0.73	-0.94
NICs					
Hong Kong	-0.27	1.74	1.98	1.60	1.67
Malaysia	0.11	1.00	0.67	0.59	0.25
Singapore	1.53	2.22	2.16	1.88	2.16
South Korea	0.48	1.38	1.07	1.19	0.76
Taiwan	0.72	1.44	1.40	1.14	1.05

Source: Kaufmann, Kraay & Mastruzzi (2020) – WGI.

The data indicate that much has not changed for Africa institutionally, and that if current dismal trends persist, then SSA might remain in a quagmire for a long time. The challenge of dysfunctional institutions, mostly embedded in its political economy, has been widely documented. Collier (1997) for instance, has long identified institutional and governance

failures as the bane of industrialization in SSA, a reason why it persists in exporting natural resources versus manufactured products. The deployment of state power to service the interests of a few private individuals has been the dominant feature of the political economy of SSA. Beji and Belhadj (2016) investigated the determinants of industrialization in 35 SSA countries, where they regress the industrialization index of SSA on a set of predictors (specifically good governance and the size of labour market rigidities as institutional variables), finding that financial and institutional variables are important drivers of industrialization.

Our evaluation of four (i.e., human capital, cost of doing business, network of input supply and the quality of institutions) out of 12 key drivers of industrialization generally paint a dismal picture of their present condition, implying a cynical prognosis of the future trajectory of industrialization in SSA. With this qualitative analysis, a significant departure from previous studies is that, unlike the use of industrialization index, we deploy real output added in the manufacturing sector as well as more robust measures of institutions (namely political stability, government effectiveness, regulatory quality, rule of law and control of corruption) in our analytical estimations. This, to the best of our knowledge, is the first attempt at deploying these institutional data to investigate their effect on industrialization in SSA.

3.3 Theoretical underpinnings

The ensuing regression analysis and associated estimates are underpinned by neoclassical growth theory, which specifies an aggregate production function in terms of capital (K), labour (L), and total factor productivity in national income (TFP, also known as the Solow residual) (A):

$$Y = f(K^{\alpha}, L^{\beta}, A^{1-\alpha-\beta}) \tag{1}$$

Where α and β are the shares of capital and labour in aggregate output respectively.

This neoclassical specification clearly shows that the combined share of K and L is less than that of A. The Solow framework is, however, unable to explain what determines A. Yet this residual is a significant proportion which accounts for the huge differences in growth rates between developing and

developed nations. This drawback in the exogenous framework is corrected by endogenizing *A* in Mankiw's, Romer's and Weil's (1992) endogenous growth model. Thus, in modelling growth, equation (1) is often transformed into an augmented Cobb-Douglass aggregate production function, which basically incorporates other relevant variables peculiar to the economy under consideration into A. Thus, for our purposes, we hypothesise that the poor quality of institutions could account for low levels of industrialization in SSA. Our initial descriptive analysis above has already provided a cursory confirmation of this hypothesis. TFP can be disaggregated into different measures of institutional quality, namely: political stability (POLS), government effectiveness (GOVT), regulatory quality (REGQ), rule of law (RLW), and control of corruption (CNTC) (Kaufmann, Kraay & Mastruzzi, 2020):

$$A = (POLS, GOVT, REGQ, RLW, CNTC) \tag{2}$$

Substituting equation (2) into equation (1), and redefining aggregate output Y as manufacturing output, we have:

$$Y = f(K, L, POLS, GOVT, REGQ, RLW, CNTC) \tag{3}$$

The econometric specification of equation (3) is:

$$LnY_t = b_0 + b_1 LnGFCF_t + b_2 LnLABF_t + b_3 POLS_t + b_4 GOVT + b_5 REGQ + b_6 RLW + b_7 CNTC + \varepsilon_t \tag{4}$$

A priori, we expect the parameter estimates (b_1 to b_7) to be greater than zero, implying that all institutional variables, as well as capital and labour, exert a positive impact on industrialization in SSA.

4. Data Descriptions and Estimation Techniques

4.1 Data description

To provide the necessary empirical account of the roles played by institutions on industrialization in SSA, this study adopts a balanced panel data estimation procedure consisting of about 390 observations, made up of an annual data series spanning 13 years (between 2007 and 2019) and 30 out

of 49 SSA countries, selected based on data availability and consistency. These are Angola, Benin Republic, Botswana, Burkina Faso, Cameroon, Chad, the DRC, Congo, Cote d'Ivoire, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Togo and Uganda. Accordingly, the cross-section (N) is 30, while the time-series (T) is 13, conventionally described as short panel data with N>T. The data sets were converted to natural logarithmic to allow for an elasticity-based analysis. More insights in terms of notations, measurements and sources are provided in Table 2, and their characteristics (in terms of expected value, standard deviation, skewness, minimum and maximum values, kurtosis, and distributive forms) are summarised in Table 3.

Table 2: Data Description and Sources

Series	Notation	Unit of Measurement	Source
Manufacturing Value Added	MVA	Current US$	Word Development Indicator https://databank.worldbank.org/source/world-development-indicators
Gross Fixed Capita Formation	GFCF	Current US$	Word Development Indicator https://databank.worldbank.org/source/world-development-indicators
Labour Force	LBF	Total (Annual growth rate)	Word Development Indicator https://databank.worldbank.org/source/world-development-indicators
Government Effectiveness	GOVT	Estimate	Word Governance Indicator https://databank.worldbank.org/source/worldwide-governance-indicators
Political Stability	POLS	Estimate	Word Governance Indicator https://databank.worldbank.org/source/worldwide-governance-indicators
Regulatory Quality	REGQ	Estimate	Word Governance Indicator https://databank.worldbank.org/source/worldwide-governance-indicators
Rule of Law	RLW	Estimate	Word Governance Indicator https://databank.worldbank.org/source/worldwide-governance-indicators
Control of Corruption	CNTC	Estimate	Word Governance Indicator https://databank.worldbank.org/source/worldwide-governance-indicators

Note: All the data sets are freely obtainable from public data repositories.

Table 3: Summary Statistics

Variable	Mean	Median	Maximum	Minimum	Standard Deviation	Skew	Kurtosis	Jarque-Bera
MVA	21.01	21.02	24.68	17.72	1.56	-0.05	3.16	0.63
GFCF	22.05	21.77	31.24	18.80	1.91	2.47	11.57	1593***
LBF	0.03	0.02	0.08	-0.02	0.01	-0.15	5.63	113***
GOVT	-0.67	-0.73	1.05	-1.74	0.61	0.68	3.07	30.15***
POLS	-0.45	-0.32	1.20	-2.40	0.81	-0.33	2.68	8.94**
REGQ	-0.52	-0.56	1.12	-1.58	0.54	0.57	3.26	22.96***
RLW	-0.60	-0.62	0.99	-1.78	0.59	0.50	2.94	16.43***
CNTC	-0.60	-0.69	1.04	-1.82	0.62	0.58	2.71	23.86***

Notes: The notation Max, Min and Std. Dev. denote maximum, minimum, and standard deviation, respectively. ***, ** and * indicate the rejection of the null hypothesis of normal distributions of the data set at the 1% and 5% levels of significance, respectively.

Available evidence from the summary statistics (Table 1) reveals that all data series, except MVA, are not normally distributed, judging by the probability values of the Jarque-Bera statistics. GFCF has the highest expected value, followed by MVA. Variables like MVA, LBF and POLS have large left tails, while others have positive tails. Furthermore, the Kurtosis value of all the series is approximately 3, except for GCFC and LBF. These suggest that all the series converge around the mean.

4.2 Estimation techniques

The estimated results of the present study are based on several panel data estimation techniques, among which are: (1) panel cross-sectional dependency test for the effects of shocks, which considers the dependency level of the variables; (2) tests for stationarity, based on Im, Pesaran and Shin (2003); and (3) a cross-sectional augmented Im-Pesaran-Shin (IPS) technique. The test for long-run relationships is conducted based on the Pedroni (2004) and Westerlund (2007) panel cointegration procedures, which are efficient even in the face of cross-sectional dependency (following Gyamfi, Sarpond & Bein, 2020). Furthermore, the long run and short run parameter estimates were conducted using the Pool Mean Group Panel Autoregressive Distributed Lag (PMG-ARDL) model. The Augmented

Mean Group (AMG) model is also employed to check for robustness. Finally, the test for the direction of causality was conducted based on Dumitrescu's and Hurlin's (2012) panel causality test technique, on the account of insights gained from Sarpong et al. (2020) and Musah, Kong and Vo (2021). According to Sarpong et al. (2020), the Dumitrescu-Hurlin test is more efficient than the traditional Granger causality process. Notably, this enhanced method provides information on varying coefficients across cross-sections and is applicable irrespective of the nature of the panel series (i.e., regardless of whether T>N, T<N, or if it is a strongly balanced or heterogeneous panel).

4.3 The Pool Mean Group Panel Distributed Lag model (PMG-PARDL)

The study adopts the PMG-ARDL framework for its empirical analysis, taking into consideration that it is a dynamic model that simultaneously accounts for both long and short run effects of the regressor(s), and the lag effects of the dependent variable on predicted variables. More so, it is applicable irrespective of whether the series are mutually integrated between order-zero or order-one, or when all the data sets are all I(0) or I(1) series (Sarpong et al., 2020).

The underlying functional relationship of the standard PMG-PARDL framework is provided below:

$$\Delta(\dot{Y}i)_{i,t} = \sum_{j=1}^{p-1} þ_j^i \Delta(\dot{Y}i)_{i,t-1} + \sum_{i=1}^{q-1} \theta_j^i \Delta(Xi)_{i,t-1} + \partial^i[(\dot{Y}i)_{i,t-1} - \{\beta_0^i + \beta_0^i(Xi)_{t-1}\}] + \varepsilon_{i.i,t} \quad (5)$$

Where:

- $\dot{Y}$ represents the target variable (MVA);
- X represents a set of predictor variables which includes GFCF, LBF, GOVT, POLS, REGQ, RLW and CNTC;
- Þ: short term coefficient of the target variable;
- θ: short term coefficient of the predictors;
- β: long run coefficients;
- ∂: speed of adjustment to equilibrium after initial perturbations;

- i: individual country;
- t: time; and
- ε: time-varying error term.

Furthermore, the under listed terms within the square bracket represent the long run relationship existing between the dependent and independent variables.

The study aligns with specifications (4) and (5) for the estimated result of PMG-PARDL. A potential limitation of these methodologies is their inability to consider thresholds that could produce the most desirable effects of the explanatory variable on the explained variable.

5. Results and Discussions

The analysis began with the test of cross-sectional dependency (CD) conducted to ensure that the estimated results are based on variables that are not dependent across the cross-sections, and to determine the appropriate panel estimators and generation of panel unit techniques to be adopted. The results in Table 4 are based on four standard statistics: Breusch-Pagan LM; Pesaran scaled L-measure (LM); bias-corrected scale LM; and Pesaran CD. The overall evidence provides an overwhelming support that allows us to reject the null hypothesis (cross-sectional independence of the error term at 1% level of significance) across all relevant statistics except for Pesaran CD (with a 5% significance level, RLW) and a few insignificant cases recorded in LBF, GOVT, POLS, and CNTC. The overall implication is that the panel series is cross-sectionally dependent, hence, the second-generation panel unit processes are preferred: neglecting these will undermine the overall estimated model (Gyamfi et al., 2020; Musa et al., 2020).

Table 4: Cross-Sectional Dependency Tests Results

Variables	Breusch-Pagan LM	Pesaran scaled LM	Bias-corrected scale LM	Pesaran CD
MVA	2110.48***	56.81***	55.55***	34.21***
GFCF	2059.46***	55.07***	53.82***	33.05***
LBF	1582.06***	38.89***	37.64***	0.28
GOVT	1013.12***	19.60***	18.35***	-1.07
POLS	1408.89***	33.01***	31.76***	1.08
REGQ	1502.07***	36.17***	34.92***	3.05***
RLW	1814.96***	46.78***	45.53***	2.11**
CNTC	1433.27***	33.84***	32.59***	-0.65

Note: *** and ** denote the rejection of the null hypothesis at the 1% and 5% levels of significance, respectively.

Following the confirmation of CD, the study proceeds with the test of stationarity by adopting two second generation panel unit-root procedures, including the IPS and cross-sectionally augmented Im-Pesaran-Shin (CIPS). The results (Table 4) indicate that the panel data sets are mutually integrated between order-zero (*I[0]*) and order-one (*I[1]*). Thus, the PMG-PARDL becomes the preferred estimation technique for the present study. However, the study first probed for cointegration among the variables by deploying the Pedroni and Westerlund panel cointegration techniques.

Table 5: Unit-Root Test Results

Variable	IPS	Remarks	CIPS	Remarks	CADF	Remarks
MVA	-2.81***	Level	-4.57***	Level	-2.85***	1st difference
GFCF	-5.18***	1st difference	- 4.88***	Level	-2.85***	Level
LBF	-5.43***	1st difference	-5.41***	Level	-3.17***	Level
GOVT	-2.55***	1st difference	-5.05***	Level	-2.32**	Level
POLS	-2.22***	Level	-5.85***	Level	-3.41***	Level
REGQ	-1.23***	1st difference	-4.16***	Level	-3.19***	Level
RLW	-1.83**	1st difference	-4.83***	Level	-4.27***	1st difference
CNTC	-2.06**	1st difference	-4.39***	Level	-2.71***	Level

Note: *** and ** indicate that the variables are stationary at the 1% and 5% levels of significance, respectively.

5.1 Cointegration test

The study further examined the likelihood of a long run relationship among the panel series by employing a panel cointegration procedure accounting for CD. Hence, the study employed the Pedroni and Westerlund processes, notable for its efficiency. Table 6 suggests that the panel series share a long-term relationship, leading to the rejection of the null hypothesis of no long-term relationship at relevant significance levels. Accordingly, both panel cointegration tests support the rejection of the null hypothesis. By implication, industrialization in SSA has a common long-term trend, with the selected determinants including labour, capital, and institutional factors.

Table 6: Cointegration Test Results

Pedroni Cointegration Test		
Parameter	Statistics	Probability
Modified Phillips-Perron t	-1.707**	0.04
Phillips-Perron t	-17.644***	0.00
Augmented Dickey-Fuller t	-17.986***	0.00
Westerlund Cointegration Result		
Parameter	Statistics	Probability
Variance ratio	4.463	0.00

Note: *** and ** indicate rejection of null hypothesis of no cointegration at the 1% and 5% levels of significance, respectively.

Having established that the panel series share a long run trend (cointegrated), the study proceeds with the estimations of PMG to probe for long- and short-term dynamic relationships between industrialization and its determinants, including its traditional variables (labour and capital) and relevant institutional factors (GOVT, POLS, REGQ, RLW and CNTC). The summarised results are depicted in Table 7.

Table 7: PMG-PARDL Estimated Results

Long-run effects		
Variables	Coefficient	Probability
LGFCF	0.63***	0.00
LBF	-0.65***	0.00
GOVT	0.32***	0.00
POLS	0.17***	0.00
REGQ	-0.34***	0.00
RLW	-0.61***	0.00
CNTC	-0.46***	0.00
Short-run effects		
ECT	-0..35***	0.00
D(LGFCF)	0.49***	0.00
D(LBF)	-1.57	0.33
D(GOVT)	1.56***	0.00
D(POLS)	0.02	0.26
D(REGQ)	-0.43***	0.00
D(RLW)	-0.92***	0.00
D(CNTC)	-0.18***	0.00

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Expectedly, the estimated results threw up some notable policy issues and options. First, the error correction term is significant and negative, which implies that all short run perturbations are duly corrected in the long run. However, we note that the speed of error correction is quite slow (35%). Second, GFCF has a positive and significant impact on industrialization in SSA in both the long and short term. Accordingly, a 1% change in capital leads to approximately 0.63% and 0.49% upward adjustment in MVA in the long- and short-run, respectively. This aptly suggests that, as per theory, capital is a strong determinant of industrialization in SSA. On the contrary and against theoretical expectations, the impact of labour force on industrialization in SSA is negative and significant in the long run, and it is positive but insignificant in the short run. This corroborates Karambakuwa, Ncwadi and Phiri (2018) and the AfDB (2014), where total misalignment of the labour force in SSA vis-a-vis industrialization was documented. The outcome may not be entirely unexpected, because a greater percentage of

the work force is engaged in menial and subsistence activities, which hardly support industrialization. More so, the labour force is mainly unskilled, agrarian, and lacking in technical capacity, unable to contribute significantly to productivity on a huge, industrial scale. This being the case, a streamlined policy roadmap targeted at upscaling the capacities of the large labour force are needed to make it more responsive to industrialization aspirations.

Considering the effects of institutional factors, evidence indicates that only GOVT and POLS contributed positively and significantly to industrialization process in SSA in the short term (see Table 6). However, all other institutional variables, including REGQ, RLW, and CNTC, influenced industrialization negatively. The long-term effects are consistent with the short-term results: hence, only GOVT and POLS exert a positive and significant impact. Accordingly, other institutional variables (REGQ, RLW and CNTC) have negative and significant influence. Specifically, a 1% improvement in GOVT and POLS improves MVA significantly, by approximately 32% and 17%, respectively. On the other hand, changes in RLW, REGQ and CNTC have significant and negative impacts on industrialization in SSA. Thus, productivity shrinks significantly, by approximately 0.61%, 0.34% and 0.46% due to changes in RLW, REGQ and CNTC, respectively. The above outcomes suggest that some of these institutional factors are rather inimical to industrialization in SSA. This confirms North's (2003) findings, as well as Collier's and Gunning's (1999), the below average performances of the industrial sector in the region and justifies the stated hypothesis. Finally, the study proceeds with test of robustness on the long run relationship existing between industrialization and the selected regressors established by the PMG-PARDL results to ensure that the results are consistent and reliable for policy inferences. The robustness check is based on the AMG panel estimator, following Salahuddin et al. (2020), and the results are summarised in Table 8.

Table 8: AMG Result

Variable	Coefficient	Probability
LGFCF	0.12***	0.00
LBF	-0.97**	0.03
GOVT	0.03**	0.04
POLS	-0.02	0.21
REGQ	-0.02	0.21
RLW	-0.07***	0.00
CNTC	-0.06***	0.00
Constant	8.33***	0.00

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

These robustness and sensitivity checks are largely consistent with the result obtained from the long run relationship of the PMG-PARDL estimations. However, the AMG model reveals that POLS exerts negative but insignificant impact, thereby suggesting some level of inconsistency. This also suggests that POLS is largely inadequate in ensuring an efficient drive for industrialization. Indeed, the main results which saw a positive influence of political stability apparently masks individual realities of social and political tensions (e.g., Nigeria, Cameroon, the DRC, Liberia, Cote d'Ivoire, Mali). This calls for the strengthening of political institutions in SSA to drive the industrialization process. Except for the above observation, the result of the PMG-PARDL is robust and reliable for policy inferences.

5.2 Panel causality links

Notably, the PMG-PARDL estimation could not provide information about the causal links between the regressors and the predicted variable. The study, therefore made further efforts by tracing the dynamic causal link between industrialization and the selected predictors in SSA. We relied on the Dumitrescu and Hurlin (2012) dynamic panel causality process, which is noted for its efficiency and flexibility (Sarpong et al., 2020; Musah, Kong & Vo, 2021) (see Table 9).

Table 9: Dumitrescu-Hurlin Panel Causality Test Results

Null Hypothesis	W-statistics	Z-bar-statistics	Probability	Remarks
LGFCF does not homogeneously cause LMVA	2.08*	1.90*	0.05	Bidirectional
LMVA does not homogeneously cause LGFCF	2.23**	2.27**	0.02	GFCF↔MVA
LBF does not homogeneously cause LMVA	1.83	1.31	0.18	No causality
LMVA does not homogeneously cause LBF	1.87	1.39	0.16	
GOVT does not homogeneously cause LMVA	1.96	1.62	0.10	Unidirectional
LMVA does not homogeneously cause GOVT	2.52***	2.95***	0.00	MVA→GOVT
POLS does not homogeneously cause LMVA	2.13**	2.01**	0.04	Bidirectional
LMVA does not homogeneously cause POLS	2.15**	2.06**	0.03	POLS↔MVA
REGQ does not homogeneously cause LMVA	1.07	-0.51	0.60	Unidirectional
LMVA does not homogeneously cause REGQ	2.47***	2.83***	0.00	MVA→REGQ
RLW does not homogeneously cause LMVA	1.34	0.13	0.89	Unidirectional
LMVA does not homogeneously cause RLW	2.06*	1.84*	0.06	MVA→RLW
CNTC does not homogeneously cause LMVA	0.81	-1.12	0.26	No causality
LMVA does not homogeneously cause CNTC	1.48	0.46	0.64	

Note: ***, ** and * indicate the rejection of null hypothesis: no homogeneous causality at the 1%, 5% and 10% levels of significance, respectively.

The Dumitrescu-Hurlin panel causality test shows that a bidirectional causality link exists between GFCF and industrialization, implying that capital and industrialization reinforce each other. This is in total agreement with the PMG-PARDL result, which demonstrates that GFCF influenced productivity in SSA positively and significantly. Likewise, a

bidirectional link exists between POLS and industrialization in SSA, while a unidirectional causality runs from MVA to GOVT, REGQ and RLW. On the contrary (and in alignment with the result of the PMG-ARDL), no causal link exists between labour force and industrialization, thus demonstrating an overwhelming misalignment between labour and productivity, which demands an urgent policy framework to reposition the workforce so that it can contribute significantly to productivity. Additionally, no causal effects exist between control of corruption and industrialization, reflecting the significant negative impact of CNTC on MVA, as recorded in the PMG-PARDL and AMG. This implies that the benefits of the fighting against corruption in SSA are yet to materialise. By implication, policies aimed at mitigating corruption in SSA needs to be intensified, consequently reducing its negative effects on industrialization.

6. Conclusion and Policy Implications

A blissful economic future for SSA significantly resides in its ability to industrialise. With economic growth rates rising on the continent in recent times, one would assume that this evidential growth is accompanied by radical and systemic changes in the structure of production, principally seen in the MVA subsector. But even with surging flows of capital imported by way of FDI, ODA and even portfolio investments, significant improvements are absent in the industrialization frontier of SSA, except for South Africa and a few North African countries. This alone obviates the hackneyed argument about the paucity of capital as a critical input for growth. While several studies have noted the key role of the institutional environment in fostering and catalysing industrialization-induced growth, this study undertook both a descriptive and analytical approach in investigating the role of institutions in industrial development in SSA. By deploying current data of a broad range of institutional variables across 30 countries, we find further evidence to support the view that institutions are significant predictors of industrial sector performance, that in the long run, regulatory quality, rule of law and control of corruption all negatively and significantly impact the manufacturing subsector.

The results also indicate that political stability and government effectiveness are positively associated with industrialization. Overall, industrialization was found to be a decreasing function of most institutional

variables. Our investigation further confirms that SSA's labour force is yet to significantly impact the continent's industrialization sector. Its technical and scientific competence leaves much to be desired. All these imply that if SSA must industrialize, policy must concurrently be deployed not only to strengthen the mobilization and inflow of capital, but the political economy, embodied in both the political processes and the institutional environment, must be made conducive to facilitate the growth of industry. This calls for more forceful intervention by NGOs, civil society organisations (CSOs), community-based organisations (CBOs) and even faith-based groups. Governments alone cannot be entrusted with this task.

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