THE UNIVERSITY OF HULL

Essays on Economic Growth in Africa

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List of Acronyms and Abbreviations

2SLS	Two-Stage Least Square
AUC	African Union Commission
CBN	Central Bank of Nigeria
CD	Cobb Douglas
CPI	Consumer Price Index
DTF	Distance to Technology Frontier
ERA	Economic Report for Africa
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HIPC	Heavily Indebted Poor Countries
HK	Human Capital
ICRG	International Country Risk Guide
IDCC	Industrial Coordination Committee
IFI	International Financial Institution
IMF	International Monetary Fund
INST	Institutions
ISI	Import Substitution Industrialisation
IV	Instrumental Variable
LOG	Logarithm
MDGs	Millennium Development Goals
MVA	Manufacturing Value Added
NEPD	Nigerian Enterprises Promotion Decree
ODA	Overseas Development Aids
OECD	Organisation for Economic Cooperation and Development
PIS	Primary Import Substitution
PRSPS	Poverty Reduction Strategy Papers
PWT	Penn World Table
R&D	Research and Development
SAP	Structural Adjustment Programmes
SIS	Secondary Import Substitution
SSA	Sub-Saharan Africa
Sys-GMM	System Generalized Method of Moments
TFP	Total Factor Productivity
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organisation
WDI	World Development Indicators
WPD	World Productivity Database

Abstract

This thesis investigates economic growth in Africa using three empirical papers from a number of different angles.

The thesis begins by investigating the effects of different natural resources on economic growth in Africa. Three exogenous natural resources proxies (for agriculture, fuels and minerals) have been constructed to account for endogeneity issues. Empirical results show that agriculture has a strong positive effect on economic growth, while fuels and minerals affect growth negatively in all specifications even after controlling for endogeneity, quality of institutions and economic policy. The results reject the notion for generalized natural resource curse and argue that the amalgamation of natural resources components into one measure may obscure differences in their respective growth impacts.

The thesis also investigates the effect of total and sectoral (primary, manufacturing and services sectors) FDI inflows on total factor productivity (TFP) at a macro level, using a new dataset for TFP developed by UNIDO-World Productivity Database and employing instrumental variables 2SLS estimation technique to control for endogeneity problem. Empirical findings show positive and statistically significant effects from total and sectoral FDI inflows on TFP growth. The findings also show that services sector has the highest potential to accelerate TFP growth (especially through communications, and trade and business sub-sectors).

Finally, the thesis considers the role of economic transformation in the form of increased manufacturing share in aggregate output in accelerating growth and reducing growth volatility in Africa. It examines the key determinants of growth in the share of manufacturing output (in GDP) and its relationship with real GDP growth and (growth) volatility. Empirical results indicate that real GDP growth and domestic investment are among the key drivers of growth in the share of manufacturing output and that growth in the latter has, in turn, the potential to raise GDP growth and reduce growth volatility.

Declaration

Part of the work presented in this thesis was a paper I co-authored and published in the following article:

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To my father and late mother

CHAPTER ONE

1.1 Introduction

After decades of growth collapse and stagnation in most African countries, economic growth in the continent has significantly improved. Since mid-1990's, there has been a rapid growth surge in the continent for more than a decade. For example the continent–wide GDP growth rate reached 6.1 per cent in 2007 from a low of about 0 per cent in 1992,[1] while its sub-regions; Sub-Saharan Africa and North Africa also recorded an impressive growth rate of 6.6 and 5.3 per cent respectively from a low rate of -1.1 and 2.2 per cent over the same period.[2] Thus, although there was a variation in the growth rates across the continent, the growth was widespread. Moreover, despite a sharp slowdown in the wake of the recent global financial crisis, political turmoil in North Africa and Ebola epidemic in West Africa, the continent-wide growth rate has since rebounded and is back on track.

The continent's recent growth surge has largely been attributed to commodity prices, increased FDI capital flows resulting from increased commodity prices, and other factors such as improved macroeconomic management, improved political and economic institutions within which to do business, debt relief and improved performance of non-oil sectors such as telecommunications and tourism (UNECA 2010). A major challenge however is the sustainability of this recent growth surge recorded in the continent, as it is widely argued that generating sustainable growth particularly in Sub-Saharan Africa remains the most pressing issue to global development (Block, 2001). This is because African countries are endowed with natural resources and as domestic resource mobilisation and non-resource exports are poor in the continent, natural resources therefore serve as the main source of income and foreign exchange earnings. This on the other hand, exposes Africa's economies to external shocks emanating from the volatility of international commodity prices and exchange rate fluctuations.

[1] United Nations Economic Commission for Africa & African Union Commission (2010) Economic Report on Africa.
[2] World Bank Development Indicators (2012).

In principle, achieving high sustainable growth and economic development will require African economies to achieve and maintain certain levels of economic fundamentals that are similar to well performing economies in East Asia and Latin America (Page, 2009). African economies have to industrialise and diversify their respective economies, improve productivity and invest in physical and human capital amongst others. Szirmai and Verspagen (2010) highlight that the very concept of strong and sustainable growth has come to be associated with growth in manufacturing sector, while Findlay (1978) observes that technological change has been a requisite of modern economic growth. In fact, more than half of the cross-country variation in both income per capita and its growth results from differences in productivity and its growth (Caselli 2005; Easterly and Levine 2001; Hall and Jones 1999). On the other hand, Schimidt-Hebbel et al. (1996) stress the crucial role of investment in physical and human capital in accelerating sustainable growth. For example, they point out that East Asian countries were able to achieve 7 to 8 per cent growth annually for about 30 years because investment was also growing about 30 per cent of GDP as of that time.

One of the key distinctive features of African countries is abundance of natural resources endowments, which has often been cited as a source of Africa's comparative advantage. Despite the assertion by many empirical studies such as Sachs and Warner (1995) Leite and Weidman (1999) and Gylfason (2001) on the negative effect from natural resources on economic growth, we view earnings from the sale of natural resources abroad as a potential source of investment funds, which if wisely invested, can enhance future growth and development (Deaton, 1999). However, the question that arises is that, are all types of natural resources good for economic growth or do different types of natural resources endowments generate different effects on economic growth?

Experience from the 1960's has shown that most African countries had attempted to invest their natural resources earnings to other viable economic sectors such as manufacturing in order to restructure and diversify their economies in the long run through state led Import Substitution Industrialisation (ISI). This is in line with the notion that the very concept of strong and sustainable growth has come to be associated with industrialisation (Szirmai and Verspagen, 2010) and in fact, almost all

experiences of modern economic development have been associated with growth in manufacturing output (Szirmai, 2009). Yet, despite the positive strong growth and structural transformation in the very early stage of ISI strategies, its sustainability was soon called into question in the late 1970's as Africa's external debt soared, income and productivity growth stagnated even below the population growth rate, the gap between imports and exports share in GDP widened, terms of trade deteriorated, and unsustainable twin deficits (fiscal and external) became almost permanent features of Africa's economies (Soludo, 2003). The disappointing result of ISI in Africa was seen most starkly in the poor productivity performance of the new domestic firms. FDI on the other hand is put forward as a catalyst for productivity diffusion in the recipient country through its technology transfer and spillovers effects to domestic firms as demonstrated by East Asia's fast economic transformation.

The thesis seeks to answer the following questions:

1. Do different natural resources affect economic growth differently?
2. Does foreign direct investment accelerate productivity growth?
3. Whether increased manufacturing output relative to aggregate output is associated with higher growth and stability?

The rest of the chapter is structured as follows: Section (1.2) reviews economic growth models and hypotheses. Section (1.3) gives an overview of Africa's economic performance from 1960-2010, while Section (1.4) presents conclusions with policy implications for the thesis.

1.2 Survey of Economic Growth Models and Hypotheses

In economic growth literature there are basically two categories of growth theories, those based on Solow (1956) growth model also known as neoclassical growth models or exogenous growth models and those based on the concept of endogenous growth model championed by Lucas (1988) and Romer (1986).

1.2.1 The Solow Growth Model

The Solow growth model explains long-run rate of growth through capital accumulation and exogenous rates of change in population and technological progress. It assumes that if countries are similar with respect to rate of technological progress and population growth, poor countries tend to grow faster than the rich countries and eventually catch up with or converge towards the income levels of rich countries due to diminishing returns on capital. Basic Solow growth model is usually presented by a Cobb-Douglas (CD) production function,

$$Y = AK^{\alpha} L^{1-\alpha} \qquad (1.1)$$

Where Y is the level of output, A the level of technology, L amount of labour input, K the input of capital and α is the share of capital in output. α is positive, below 1; i.e. $0 < \alpha < 1$. Output per worker can be obtained by dividing equation (1.1) by L. It is important to mention that Solow's Model adopted a constant saving. Ramsey (1928), Cass (1965) and Koopman (1965) amongst few are not happy with that, therefore they constructed a growth model popularly known as Ramsey-Cass-Koopmans model that improve the Solow's model by endogenising the saving rate (Bhattarai, 2004).

Mankiw Romer and Weil (1992) start their cross-country empirical investigation using the basic Solow model where aggregate output in country i (Y_i) is determined by the stock of physical capital (K_i) and technology-augmented labour (AL_i); i.e. $Y_i = K_i^{\alpha}(AL_i)^{1-\alpha}$. A and L are assumed to grow exogenously at rates g and n.

The model assumes that a constant fraction of output, s, is invested and the accumulation of physical capital for each country is governed by the motion equation $\frac{dK_i}{dt} = s_{ik}y_i - \delta k_i$, where s_{ik} is the saving rate and δ is the depreciation rate of capital. The motion equation implies that k_i converges to a steady-state value k^*. After solving for the k^*, substituting it into the production function and taking logs they obtain basic Solow CD equation

$$\ln\left(\frac{Y_i}{L_i}\right) = \ln A(0) + gt + \frac{\alpha}{1-\alpha}\ln(s_{ik}) - \frac{\alpha}{1-\alpha}\ln(n+g+\delta). \qquad (1.2)$$

The authors point out that ignoring human capital in the basic Solow model leads to incorrect conclusions. They observe that over half of the US capital stock in 1969 was human capital. Consequently, the authors extend the basic Solow model by introducing human capital as an additional factor of production:

$$Y_i = K_i^{\alpha} H_i^{\beta} (AL_i)^{1-\alpha-\beta}. \qquad (1.3)$$

Where (H) is the stock of human capital, α is the share of physical capital, β is the share of human capital. α and β are positive, below 1 respectively; i.e. $0 < \alpha < 1$ and $0 < \beta < 1$. Physical and human capital are governed by the motion equation $\frac{dK_i}{dt} = s_{ik}Y_i - \delta K_i$, and $\frac{dH_i}{dt} = s_{ih}Y_i - \delta K_i$ respectively, where s_{ik} is the fraction of income invested in physical capital, s_{ih} fraction of income invested in human capital and δ is the depreciation rate of capital. The motion equation implies that k_i and h_i converges to a steady-state value k^* and h^*.

After solving for the $k^*$and h^*, substituting it into the production function and taking logs, they obtain the extended Solow CD equation

$$\ln\left(\frac{Y_i}{L_i}\right) = \ln A(0) + gt + \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) + \frac{\alpha}{1-\alpha-\beta}\ln(s_{ik}) + \frac{\beta}{1-\alpha-\beta}\ln(s_{ih}). \qquad (1.4)$$

From the above equations it is evident that technological advancement is the driving force of the growth process in the Solow model in the steady state. However, the model did not deal with how technological advancement is created and how it

affects the long-term growth rate of output. This leads to the development of endogenous growth theory.

1.2.2 Endogenous Growth Model

Endogenous growth models purports that long-run growth is determined by endogenous factors i.e. investment in human capital and innovation (new technologies). The models focus mainly on two main issues: First, on the positive externalities and spill over effects of an educated work force in determining the rate of technological innovations and long-run growth. Second, on the technological advances resulting from purposive research and development (R&D) activity by some of ex-post monopoly power. The notion behind this is that if there is no tendency to run out of ideas, then the growth rates can remain positive in the long run (Barro, 1997).

Lucas (1988) explains the rise in productivity of workforce as a process where people decide on their time allocation between acquiring education and working in the production sector on the basis of standard (inter-temporal) utility maximisation. They spent (u) fraction of their time working and $(1-u)$ fraction of their time studying.

Bhattarai (2004) asserts that the rational behind the Lucas model is that human capital tends to grow faster when people spend more time in studying, because they will learn more and become more skilled. This raises the per capita human capital available in the economy and raises the skill and the productivity of workers at work. Thus, human capital has both internal and external effects. Such a rise in productivity compliments with physical capital accumulation is the major source of output growth. Lucas presents a growth model, in which output is generated by a production function,

$$Y = AK^{\alpha}\,(uhL)^{1-\alpha} \qquad (1.5)$$

Where h is human capital per worker, u the fraction of time spent on working, L the labour supply (assuming this as given) and $0 < \alpha < 1$. To take illustration of the model if $K = 100$, $L = 100$, $h = 30$, $u = 0.8$, $\alpha = 0.3$, $A = 1$; $Y = 100^{0.3}\ (0.8^{*}3^{*}100)^{0.7} = 100(2.4)^{0.7} = 185$ but without human capital $Y = K^{\alpha}\ L^{1-\alpha} = 100$.

One of the important features of Lucas' model unlike Solow's model is that long-run growth is a function of investment in both physical and human capital. Thus, there is an important role for education in the long run as well as the short run. Furthermore, Human capital is endogenously determined and does not have diminishing returns.

Romer (1990) endogenises technological progress by introducing R&D sector, which results from the work of researchers interested in profiting from their invention. Bhattarai (2004) highlights that, the model assumes that economy consist of three sectors; research, intermediate and final good sectors. Thus, research sector produce new ideas and they sell the exclusive right to produce a specific capital good to an intermediate sector. The intermediate sector manufactures the capital good and sells it to the final good sector, which produces output (Bhattarai, 2004). The production function in Romer model is similar to labour augmented technology in the Solow model as

$$Y_i = K_i^{\alpha}(AL_Y)^{1-\alpha} \qquad (1.6)$$

Where A is productivity or knowledge, total labour L can either be used to produce goods, L_Y, or to produce new ideas L_A: $L = L_Y + L_A$. Jones (1995) point out that the number of new ideas depends upon the number of people engages in research, L_A, average productivity in the research sector $\bar{\delta}$ and stock of existing knowledge A (Bhattarai, 2004).

Consequently, the general production function of new ideas is, $\dot{A} = \delta L_A^{\lambda} A^{\phi}$. Assuming that $0 < \phi < 1$, dividing by A, we now have $\frac{\dot{A}}{A} = \delta \frac{L_A^{\lambda}}{A^{1-\phi}}$. By log differentiation this equation the growth rate of technology is determined by the rate of

population growth in the steady state, $a = \delta \frac{\delta_n}{1-\phi}$, thus, the population growth is beneficial to growth as economy can afford to put more people in the research sector (Bhattarai, 2004).

Furthermore, the endogenous model asserts that in the long-run policy measures can have an impact on the economy while the Solow model argues that long-rate of growth is out of the reach of policymakers. It is however important to point out that although endogenous growth models are vital for providing explanations for long-term growth, the recent cross-country empirical studies on growth has received more inspiration from the old neoclassical/Solow model as it was extended to include government policy, human capital, and the diffusion of technology (Barro, 1997).

1.2.3 Dynamic Optimisation

Recent growth models use dynamic optimisation tool to analyse capital accumulation process and to identify a set of parameters that are critical to the balanced growth path (Ramsey (1928), Cass (1965), Koopmans (1965), Lucas (1988) Romer (1989) and etc.). Following Bhattarai (2014) such model involves maximising the utility of the infinitely lived household

$$\max_{C_t} U_o = \int_{t=0}^{\infty} e^{-\rho t} \frac{C_t^{1-\sigma}}{1-\sigma} dt \tag{1.7}$$

Subject to technology constraint $(0 < \alpha < 1)$

$$Y_t = A_t K_t^{\alpha} N_t^{1-\alpha} \tag{1.8}$$

Capital accumulation $\dot{K}_t = Y_t - N_t C_t - \delta K_t$ (1.9)

Market clearing $Y_t = C_t + S_t \quad I_t = S_t$ (1.10)

Initial (boundary) condition $K_0 = K_0$; Assume $(A_t = 1;\ N_t = 1)$

The optimisation problem is often formulated in the form of a current value Hamiltonian as

$$H(C,K,\theta) = \frac{C_t^{1-\sigma}}{1-\sigma} + \theta_t[K_t^{\alpha} - C_t - \delta K_t] \quad (1.11)$$

Where C is consumption, Kcapital stock and θ shadow price of capital stock in terms of utility. The optimal path of capital accumulation is found using four first order conditions as follows:

Control $$\frac{\partial H(C,K,\theta)}{\partial C_t} = 0 \rightarrow C_t^{-\sigma} = \theta_t \quad (1.12)$$

State and Co-State $$\dot{\theta}_t = \rho\theta_t - \frac{\partial H(C,K,\theta)}{\partial K_t} \rightarrow \dot{\theta}_t = \rho\theta_t - \theta_t[\alpha K_t^{\alpha-1} - \delta] \quad (1.13)$$

State $$\dot{K}_t = Y_t - N_t C_t - \delta K_t \quad (1.14)$$

Boundary $$\lim_{t-\infty} e^{-\rho t}\theta_t K_t = 0 \quad (1.15)$$

The four first order conditions above denote: shadow price of capital in terms of marginal utility of consumption; shadow price is sensitive to subjective discount factor and capital constraint; capital accumulation equation and the final terminal condition implies no need for capital at the end of the planning horizon. Now, capital stock $\frac{\dot{K}}{K} = g_K$, consumption $\frac{\dot{C}}{C} = g_c$, and shadow price of capital $\frac{\dot{\theta}}{\theta} = g_\theta$. These imply that they remain constant in the balanced growth path.

In the balanced growth path from second first order condition we can obtain

$$\alpha K_t^{\alpha-1} = \rho - \frac{\dot{\theta}_t}{\theta_t} + \delta \quad (1.16)$$

Equation (1.16) implies that marginal productivity of capital should equal the cost of capital. By assumption $\frac{\dot{K}}{K} = 0$, and from the production function and budget

constraint $\frac{\dot{Y}}{Y} = 0, \frac{\dot{C}}{C} = 0$ respectively. These imply that when capital stock is not growing output also is not growing likewise also when output and capital stock are not growing consumption also is not growing.

Shadow price in the steady state is also not growing as is clear by log differentiation of first four order condition

$$\frac{\dot{\theta}_t}{\theta_t} = -\sigma \frac{\dot{C}_t}{C_t} = 0 \tag{1.17}$$

Therefore, in steady state capital stock, output and consumption are:

$$\alpha K_t^{\alpha-1} = \rho - \frac{\dot{\theta}_t}{\theta_t} + \delta \rightarrow \alpha K_t^{\alpha-1} = K^* = \left(\frac{\rho+\delta}{\alpha}\right)^{\frac{1}{\alpha-1}} \tag{1.18}$$

$$Y^* = \left(\frac{\rho+\delta}{\alpha}\right)^{\frac{\alpha}{\alpha-1}} \tag{1.19}$$

$$C^* = Y^* - \delta K^* = \left(\frac{\rho+\delta}{\alpha}\right)^{\frac{1}{\alpha-1}} \left[\left(\frac{\rho+\delta}{\alpha}\right)^{\frac{1}{\alpha-1}} - \delta\right] \tag{1.20}$$

Savings rate in the steady state:

$$s = \frac{\delta K^*}{Y^*} = \frac{\delta\left(\frac{\rho+\delta}{\alpha}\right)^{\frac{1}{\alpha-1}}}{\left(\frac{\rho+\delta}{\alpha}\right)^{\frac{\alpha}{\alpha-1}}} = \delta\left(\frac{\alpha}{\rho+\delta}\right) \tag{1.21}$$

Equation (1.21) implies that saving rate is determined in terms of parameters of preferences and technology instead of being assumed as in the Solow model. Moreover, higher discount rate of capital reduces capital but raises the level of saving rate in the steady state, while higher discount for future consumption lower saving rate but more productive capital implies higher saving rate (Bhattarai, 2014). Consequently, the long run growth path of the economy is determined by a set of parameters in preferences and technology, which in turn are determined by economic policy and institutions (Bhattarai, 2014).

Growth theories identify two fundamental sources of growth namely: the rate of factor accumulation and total factor productivity (TFP) growth. The former refers to investment in human (education, experience, and health) and physical capital, as well as increases in labour force, while the later refers to production efficiency stems

from generation of new ideas and better ways of doing things (technological advance).[3] Scholars argue that despite the critical role these fundamental sources play in determining a country's growth in the long-term, they are driven by the quality of the country's institutions, geography and economic policy.

1.2.4 Geography/Endowment Hypothesis

According to this hypothesis geography helps to explain cross-country differences in income. The hypothesis underscores geography adverse impact on the quality and quantity of production factors such as labour and land especially in countries located in arid and semi-arid environments. It holds that geography is the key determinants of climate, endowment of natural resources, disease burden, transport costs, and diffusion of knowledge and technology from more advance areas (Rodrik et al. 2004). Hence, it exerts therefore a strong influence on agriculture productivity and the quality of human resources. Sachs and Warner (1997) observe that countries located in the tropics tend to grow slower than countries in temperate climates. This is because tropical countries face a wide variety of patristic disease that are much less prevalent in the temperate countries, and disease is one of the source of low labour productivity.

Artadi and Sala-i-Martin (2003) highlight that about 85 per cent of Africa's continent-wide territory lies within tropics, while in the Sub-Saharan African region the fraction goes up to 92 per cent. This is in contrast with 60 per cent of East Asia or 3 per cent of OECD territory located in the tropics. Moreover, 33 per cent of African countries are also landlocked (have no sea port). Bloom et al. (1998) emphasise that being located in the tropics is seen as a handicap to higher labour productivity because of the proliferation of human infectious diseases in this environment, while, being a landlocked country could constrain access to large domestic and foreign markets, limit economies of scale, increases domestic cost of living through imported inflation, and therefore limit production efficiency and impose extra costs on investment which reduces the rate of return on investment and growth in the long-run.

[3] United Nations Economic Commission for Africa (2010) Economic Report on Africa

Furthermore, Bloom and Sachs (1998) and Sachs (2001) point to Africa's tropical location as a large hindrance to Africa's growth and development. They argue that a tropical location leads to underdevelopment through eight mechanisms which are as follows: (1) the fragility and low fertility soil, (2) high prevalence of crop pests and parasites, (3) excessive plant respiration and lower rate of net photosynthesis, (4) high evaporation and unstable supply of water, (5) lack of a dry season, cold temperature, or long enough summer days for temperate grain crops, (6) ecological conditions favouring infectious diseases for humans, (7) lack of coal deposits and , (8) high transport costs.

Consequently, if this hypothesis holds, the geography attributes in African countries (such as tropical climate or being landlocked) should correlate negatively with economic growth. Artadi and Sala-i-Martin (2003) observe that Africa's annual growth rate was reduced by 1.21 percentage point due to the fact that it had an adverse tropical geography. However, Sachs and Warner (1995, 1997) point out that these redeeming features of Africa's geography have contributed substantially to Africa's poor growth, but in the same ways that are consistent with the effects of geography evident in other parts of the world.

On the other hand, Easterly and Levine (2002) observe that resources endowment for example minerals or ecological conditions favouring cash crops influence income. This is because the environment shapes economic development directly by influencing the inputs into the production function and the production function itself (i.e. certain endowments could make production technologically more difficult). One of the key distinctive features of Africa's geography is abundance of natural resources endowment, which has often been cited as a source of Africa's comparative advantage. However, it is worth mentioning that as a result of Africa's reliance on commodity prices exports over decades the terms of trade of the region has been fragile due to the volatility of international commodity prices, and thus many policy commentators consider growth episodic in Africa.

Despite this assertion we cannot conclude whether natural resources endowments is good or bad for economic growth in Africa. This is because; on one hand natural resources can have a positive impact to growth when earnings are

managed well and channelled to other viable economic sectors such as manufacturing, education, and infrastructure development that can diversify the economy in the long run. While on the other hand, natural resources especially those that are "easy to steal" turn out to have a very adverse impact to growth through triggering corruption chains that may end up destroying institutions such as rule of law (Sala-i-Martin and Subramanian, 2003).

Gallup et al. (1999) conclude that geography continues to matter importantly for economic growth and development, alongside the importance of political and economic institutions. However, some research findings for example Acemoglu Johnson and Robinson popularly known as AJR (2001) suggest that geography explains nothing after controlling for institutions.

1.2.5 Institutions Hypothesis

"Economies cannot function in an institutional vacuum, otherwise there is economic (and political) chaos. At a very minimum there has to be rule of law; the protection of property rights, and constraints on power and corruption if private individuals are to be entrepreneurial, to take risks and invest." (Thirwall, 2006, P.74)

The institutions hypothesis holds that the geography/endowment's main impact on economic growth and development runs through long-lasting institutions (Easterly and Levine, 2002). For example, in an environment where cash-crops are effectively produced using large plantations, the development of political and legal institutions became inevitable in order to protect the few landlords from the many peasants.

Acemoglu (2003) postulates that good institutions have three key characteristics: First, enforcement of property right for a broad cross section of society, so that a variety of individuals have incentives to invest and take part in economic life. Second, constraints on the actions of politicians, elites and power groups so that they cannot expropriate the income and investments of others to create a highly uneven playing field. Third, create some degree of equal opportunity for broad segments of societies, so that individuals can make investments in human capital and participate in productive economic activities. On the other hand, weak

institutions are associated with ineffective resource allocation systems, high income in equality, corruption and weak incentives for innovative long-term investment and private sector development (UNECA, 2012). Therefore, weak institutions hinder economic growth.

Two main similar but conflicting theories emerged from this hypothesis: the "Tropics" theory of institutions based on Hall and Jones (1999), and the "Germs" theory of institutions based on Acemoglu, Johnson and Robinson (2001) (AJR). The tropics theory holds that Western European countries have historically been associated with strong institutions. Therefore, countries with similar climate to Western Europe will attract Western European settlers and in turn develop better institutions. Hence, Africa's tropical climate will be less likely to attract Western European settlers and consequently will have low quality institutions (Hall and Jones, 1999).

On the other hand, the "Germs" theory of institutions argues that despite the fact that institutional quality depends on Western Europe colonisation, European Settlement was a function more of "Germs" rather than more of "Location". That is, Europeans settled and created institutions to support private property and checked power of the state where 'Germs' are favourable to them (e.g. in Australia, USA and New Zealand). While on the other hand, where germs are unfavourable to the Europeans settlers they created institutions that empowered the elite to extract gold, cash crops and etc. (e.g. in Burundi, Congo, Ghana and etc.). Therefore, in areas where 'germs' created high mortality amongst potential settlers, Europeans tended to create extractive state, while in areas where 'germs' favoured potential sellers, Europeans tended to form colonies.

The AJR further holds that the institutions created by European colonies endured after independence. That is, settler colonies tended to produce post-colonial governments that were more democratic and more devoted to defending property rights. In contrast, since extractive colonies have already constructed institutions for effective extracting resources, the post-colonial elite frequently assumed power and exploited the pre-existing extractive institutions, sometimes even making them more extractive (Easterly and Levine, 2002).

Murphy et al. (1993) point out that the persistence of these extractive institutions in post-colonial Africa has affected long-term economic growth by increasing the rate of return to rent-seeking behaviours and by raising the probability of corruption practices. Furthermore, Acemoglu (2003) argues that it is weak institutional structures that are fundamental causes of underdevelopment in developing countries including those in Africa. This is because the character of institutions matter most as the determinants of all the proximate causes of economic growth and development such as investment, education and trade. In fact, even countries with 'bad policies' tend to do well with good institutions (Thirlwall, 2006).

1.2.6 Economic Policy Hypothesis

The economic policy hypothesis attracted much attention as a determinant of economic performance since it sets the framework within which economic growth takes place (Petrakos, 2007). According to this hypothesis, adopting effective policy measures can quickly reverse any adverse legacy of geography/endowment and post-colonial institutions. It further asserts that while tropical environments, germs, and specific crops may have influenced production and institutions, understanding environmental factors is not crucial to understanding economic growth and development today (Easterly and Levine, 2002).

Therefore, the hypothesis de-emphasises the role if initial conditions in economic growth and emphasises the role of macroeconomic policy and the degree of integration in international trade (Masanjala and Papageorgious, 2008). Furthermore, the hypothesis holds that adoption of policies that foster low and predictable inflation, sustainable budget deficits, openness to international trade and absence of capital account controls will promote economic growth and development (Easterly and Levine, 2002). This is because sound economic policies can influence several aspects of an economy through reduction of uncertainty, investment in human capital and infrastructure, improvement of political and legal institutions and so on (Petrakos, 2007).

Sachs and Warner (1997) point out that although Africa's physical geography tends to diminish growth rates compared to other parts of the developing countries, it

does not pose insurmountable challenge to faster growth. The authors observe that economic policy deficiencies and weak institutions explain Africa's poor growth performance. Therefore, where strong economic reforms have actually been implemented in Africa, the result would have been rapid economic growth.

In the same vain, Easterly and Levine (1997) argue that Africa's growth particularly in Sub-Saharan African countries is associated with domestic policy deficiencies which gave birth to; low human capital, political instability, underdeveloped financial systems, distorted foreign markets, high government expenditure and insufficient infrastructure. Therefore, all of these characteristics mentioned by Easterly and Levine (1997) can be overcome by adopting effective policy measures. This attests to the fact that recent growth surge in Africa has been attributed partly to adoption of better domestic economic policies rather than the general phenomenon that it all comes from natural resources endowment. It was pointed out in UNECA, (2012) annual "Economic Report on Africa" (ERA) that natural resources and related government spending (they financed) generated only 32 per cent of Africa's GDP growth from 2000 through 2008. Furthermore, Page (2009) observes that Africa's recent growth momentum appears to have had more to do with adoption of good policy.

1.3 Review of Africa's Economic Performance (1960-2010)

1.3.1 Imports Substitution Industrialisation Phase (1960-1985)

This phase began on the attainment of political independence in most African countries in the 1960s and continued to be at the heart of Africa's growth and development strategies up until the late 1970s. Theoretically, import substitution industrialisation (ISI) is based on Prebish-Singer hypothesis, which argued that terms of trade between primary products and manufacturing goods deteriorate over time. The authors observe that; as income rises, demand for manufacturing goods increases more rapidly than demand for primary products (mainly agriculture). Therefore, in the long-run terms of trade for primary commodity exporters did have a tendency to decline or even deteriorate. In line with this notion most African countries adopted import substitution industrialisation (ISI) strategies in order to; ignite a structural transformation agenda to become industrialized, enhance self-reliance and prevent balance of payment constraints. Thus, attain mature market economy in the long run.

As in other developing country regions, ISI in Africa started with the domestic production of consumer durable goods that were previously imported. The idea was that the domestic markets for these goods already existed and could form the basis for initiating an industrialisation programme. Hence, there were expectations that by replacing imports of consumer goods by domestic production, the economy will overtime begin to be more resilient, more independent, more diversified and more better able to generate increasing welfare as a matter of routine (Brutun, 1989).

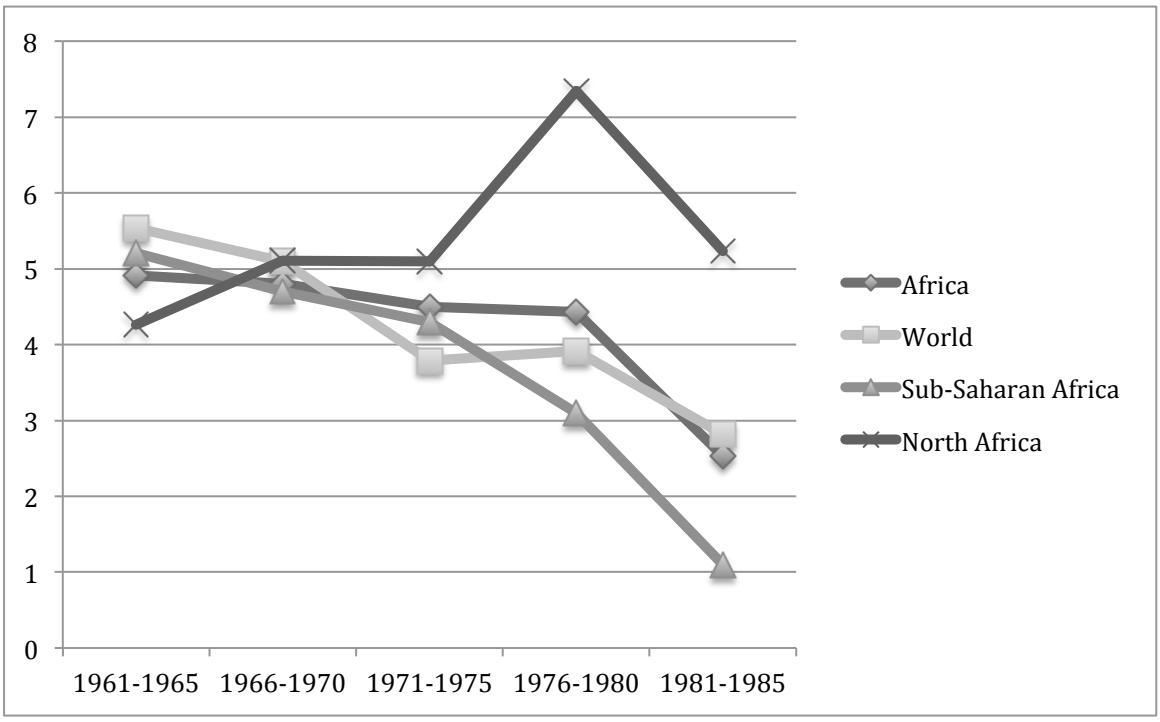
It's worth mentioning that while the initial focus of ISI implementation was on domestic production of consumer goods, there was expectation and hope that, as the industrialization process proceeds, there will also be domestic production of intermediate inputs and capital goods required by the domestic industries. This expectation is in line with the phenomenon that economies pass through some evolutionary phases as follows: they begin from an early or primary import substitution (PIS) sub-phase, then gradually evolve to secondary import substitution (SIS), and then mature into an outward looking or externally oriented sub-phase which may be of the export promotion and export substituting variety (Soludo, 2003).

The implementation of ISI in Africa generally involved the following strategies: (a) restriction of imports to intermediate inputs and capital goods needed by domestic industries (b) extensive use of tariff and non-tariff barriers to trade (c) currency overvaluation to facilitate the imports of inputs required by domestic industries (d) subsidised interest rate to make domestic investment attractive (e) direct state ownership or participation in industries; and (f) provision of direct loans to firms as well as access to foreign exchange for imported inputs especially capital goods (Mkandawire and Soludo, 2003; UNCTAD 2011). It is however paramount to note that the pattern of these policies implementation differed among the countries as dictated by their peculiarities of their respective political economies and institutional and marginal capabilities (Soludo, 2003).

The key features of the early stage of ISI implementation involved substantial government support as well as protection of domestic firms from foreign competitors. In particular, through this "protectionism", domestic infant industries were identified and nurtured. This is in line with the rationale that domestic firms have the potential to be competitive but require a temporary period of protection before they could withstand international competition (UNCTAD, 2011).

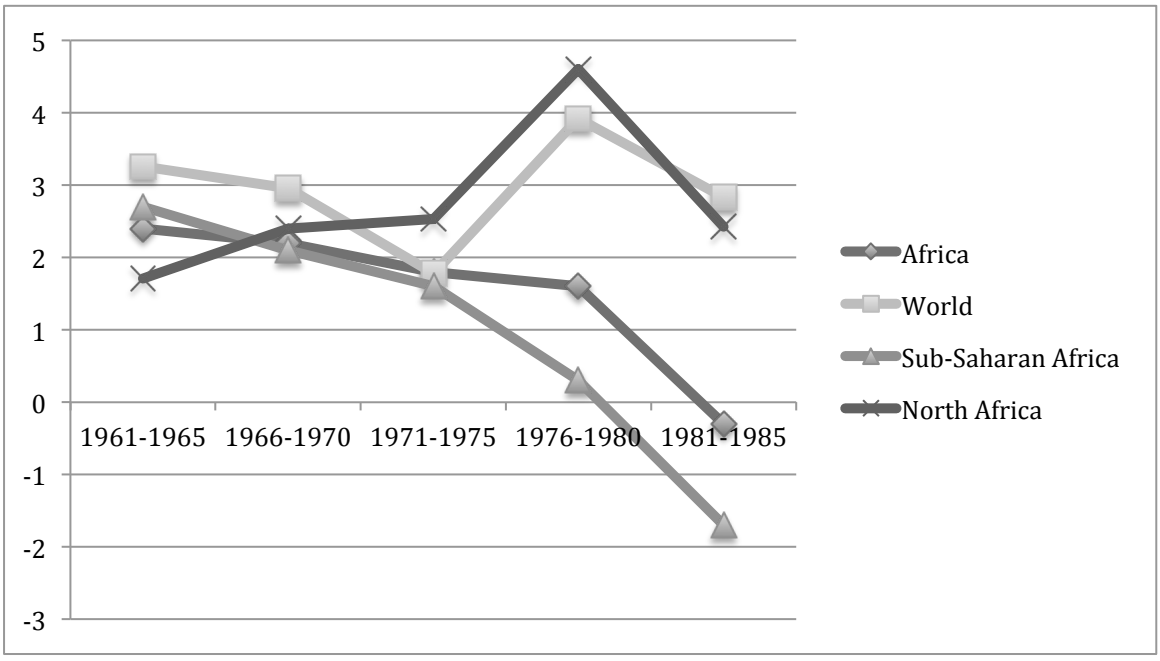
During this period, Africa's economy witnessed a positive and relatively stable growth in gross domestic product. GDP growth rate hovered around 4 per cent as shown in Figure 1.1 and this was comparable to figures for global growth. In fact Africa's growth rate was higher than the global growth rate in the 1971-1980 period. Moreover, when we divide Africa into sub-regions, North Africa's growth rate is consistently higher than that of Sub-Saharan Africa and also that of the continent as a whole in the 1966-1985 period. As purported by neoclassical growth theory due to the high population growth rate, per capita income was consistently low and fragile as shown in Figure 1.2. However, if we compare North Africa to Sub-Saharan Africa it is clear that its per capita income is consistently far higher and in line with the global rate because its population growth rate is not as high as that of the continent.

Figure 1.1: GDP growth (1961-1965)



Source: Author Computed From World Development Indicators

Figure 1.2: GDP per capita growth 1961-1985

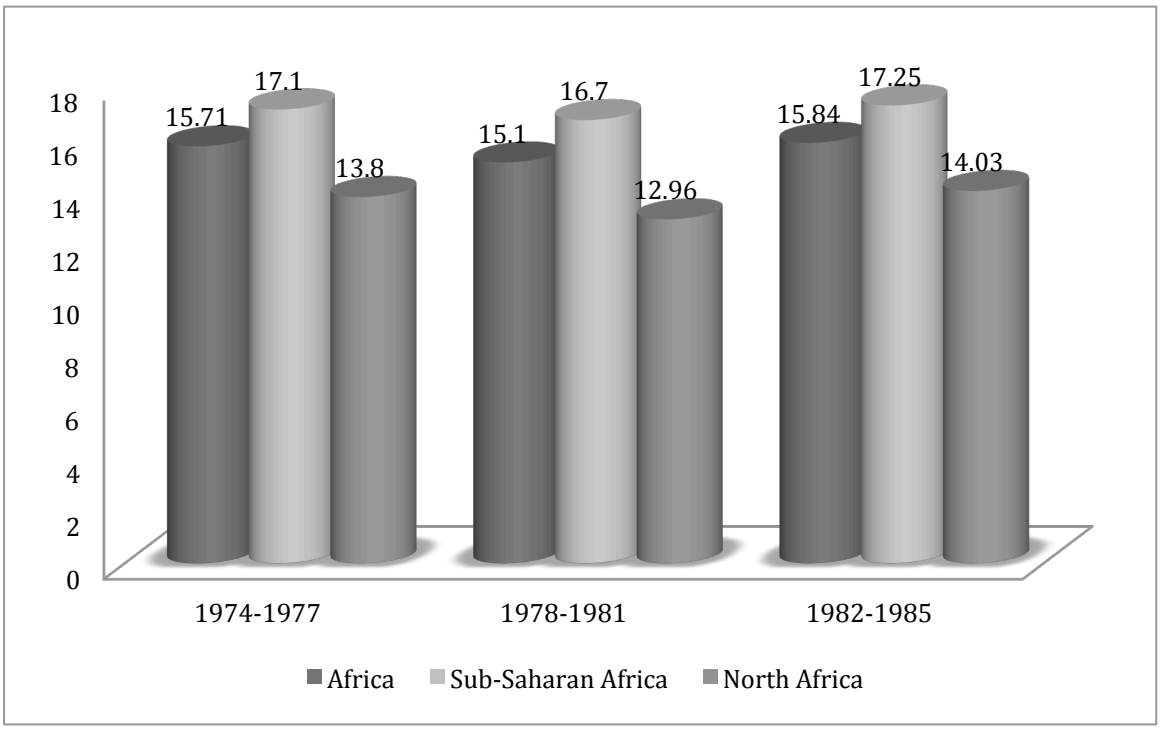


Source: Author Computed From World Development Indicators

The adoption of the ISI model was intended to increase the share of the manufacturing sector in the gross domestic product. The share of manufacturing value added in total GDP recorded a stable pace of 15 per cent in Africa in the 1974-1985

period, Sub-Saharan Africa and North Africa also recorded a stable pace of around 17 percent and 12 per cent respectively over the same period as shown in Figure 1.3.

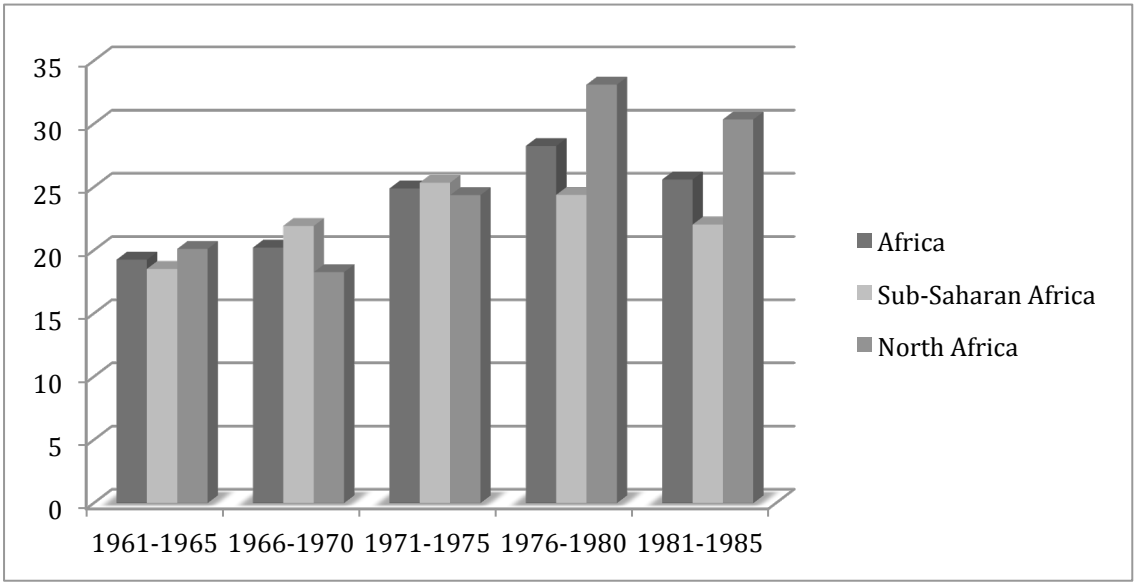
Figure 1.3: Manufacturing Value Added as a % of GDP (1974-1985)



Source: Author Computed From World Development Indicators

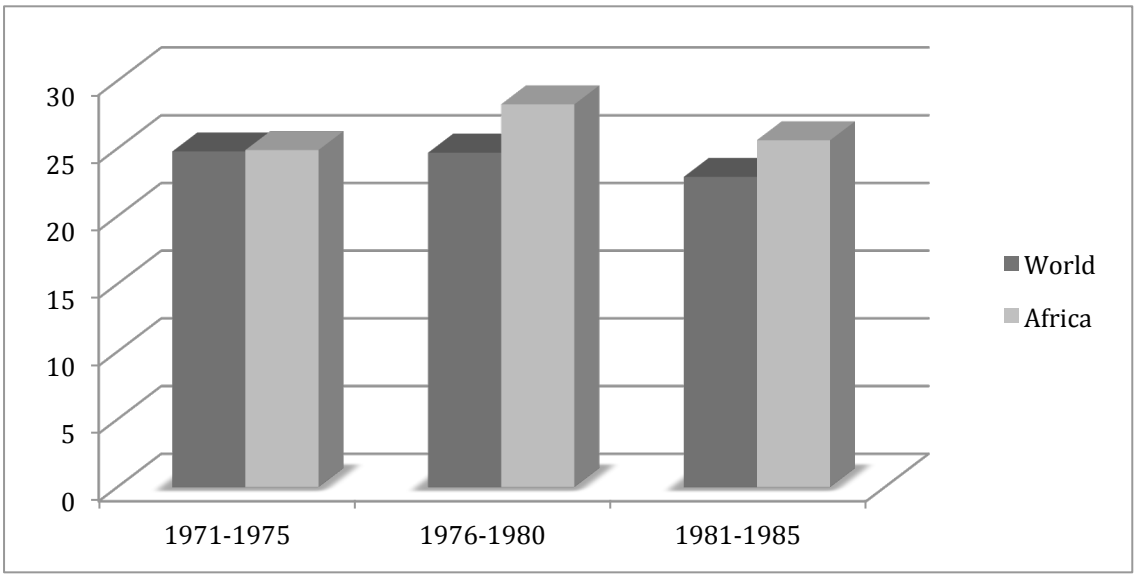
The share of domestic investment in the economy measured by the gross capital formation as a percentage of GDP witnessed a steady rise from 19.25 per cent in the 1961-65 period to 24.88 per cent in the 1971-75 period and peaked to 28.25 in the 1976-1980 period but later declined to 25.6 per cent in the 1981-85 period (as highlighted in Figure 1.4). On the other hand Sub-Saharan Africa recorded a stable rise from 18.52 per cent in the 1961-65 period to 25.34 in the 1971-75 period before declining to 22.03 per cent in the 1981-85 period, while North Africa witnessed a consistent rise from 20.1 per cent in the 1961-65 period to 33.1 per cent in the 1976-80 before declining to 30.35 per cent in the 1981-85 period. When we also compare the figures of Africa to that of the World, we can see a consistent stable trend between the two. In fact Africa's increase was even higher from the 1976-1985 period (See Figure 1.5).

Figure 1.4: Gross Capital Formation as a % of GDP (1961-1985)



Source: Author Computed From World Development Indicators

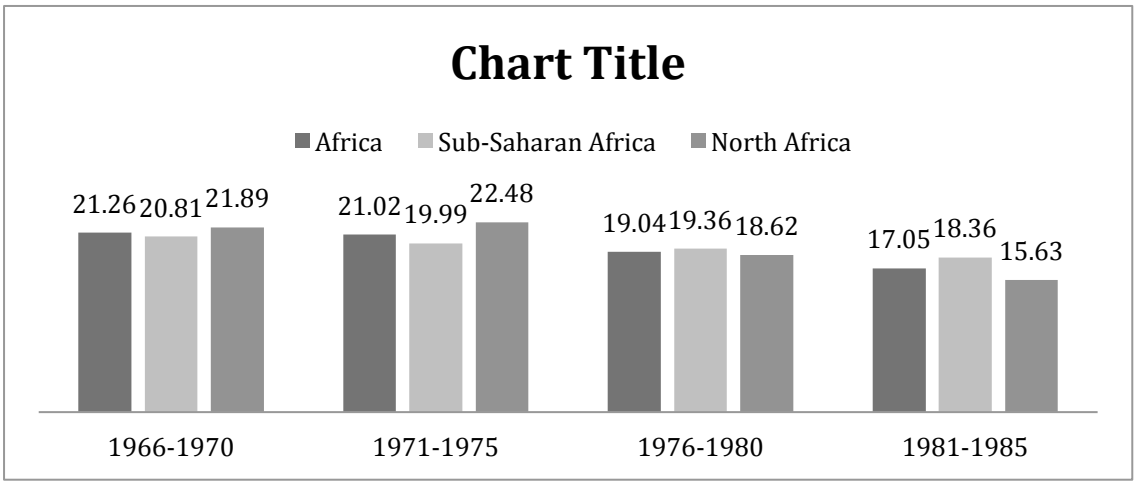
Figure 1.5: Gross Capital Formation as a % of GDP (1971-1985)



Source: Author Computed From World Development Indicators

During this period, agriculture was neglected as its contribution to total GDP also started a declining trend in the first part of the 1960s (see Figure 1.6). The average value of the agricultural sector to the GDP declined from 21.26 per cent in the 1966-1970 period to 17.05 per cent in the 1981-1985 period. On the other hand, it also declined in both Sub-Saharan Africa and North Africa from 20.81 per cent to 18.36 per cent in the former and from 21.89 per cent to 15.63 per cent in the latter over the same period respectively, thus, deepening the poverty of the rural and urban informal sector (Soludo, 2003).

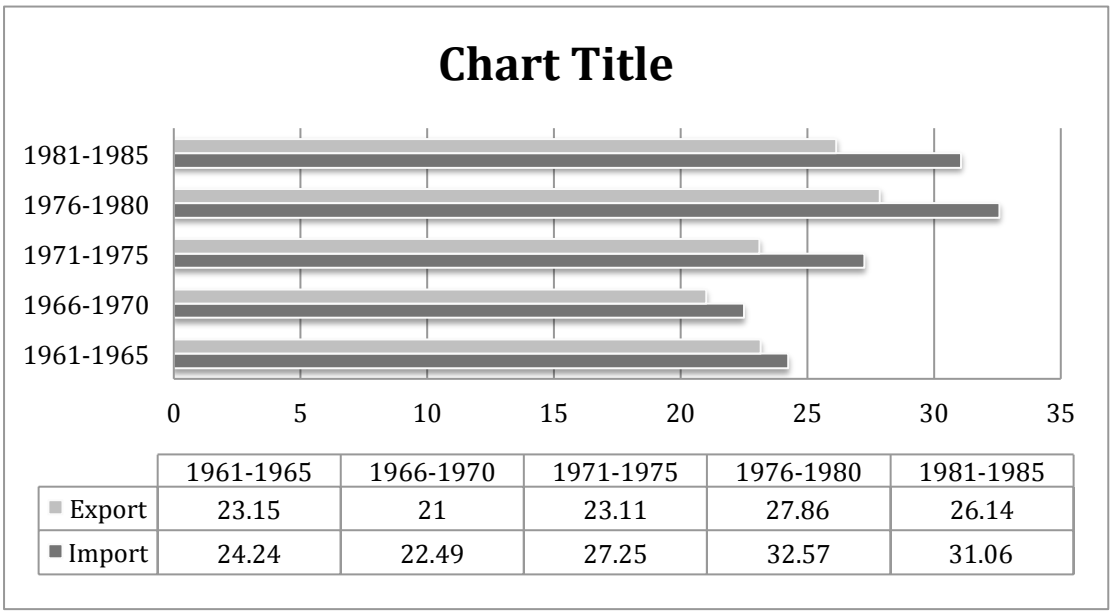
Figure 1.6: Agriculture Value Added as a % of GDP (1966-1985)



Source: Author Computed From World Development Indicators

Another noticeable feature of this phase is that imports of goods, as a percentage of GDP was consistently higher than the exports of goods as shown in Figure 1.7. This statistics supports the view that the implementation of ISI was un-sustainable because the gap between imports and exports share in GDP which was gradually closing up from the 1961-65 period up to 1966-1970 period started widening with import rising at a steady rate and export rising at a slower rate, clearing the way for terms of trade deterioration. It is paramount to note that primary commodity dominated most African countries' exports.

Figure 1.7: Exports and Imports of goods & services as a % of GDP (1961-1985)



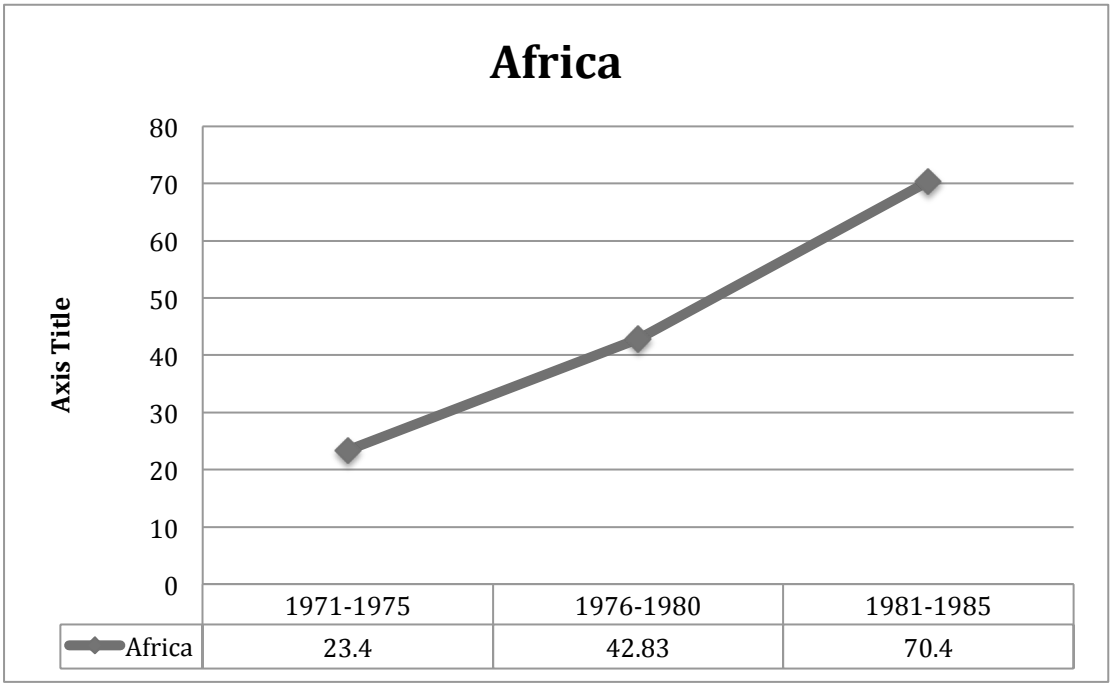
	1961-1965	1966-1970	1971-1975	1976-1980	1981-1985
Export	23.15	21	23.11	27.86	26.14
Import	24.24	22.49	27.25	32.57	31.06

Source: Author Computed From World Development Indicators

Furthermore, another key feature of this period was the gradual accumulation of debt by African economies. External debt as a percentage of GDP skyrocketed from 23.4 per cent in the 1971-75 period to 42.83 per cent in the 1976-1980 period and peaked at 70.4 per cent in 1981-85 period as shown in Figure 1.8. The reason for this is that in the 1960s and 1970s, African countries became indebted to international lenders as they accepted loans for political and economic stabilization in the post-independence era. Hence, the debt crisis on the continent began to unfold in the 1980's, due to oil shock, rising interest rate and falling global prices for primary commodities (UNECA, 2012).

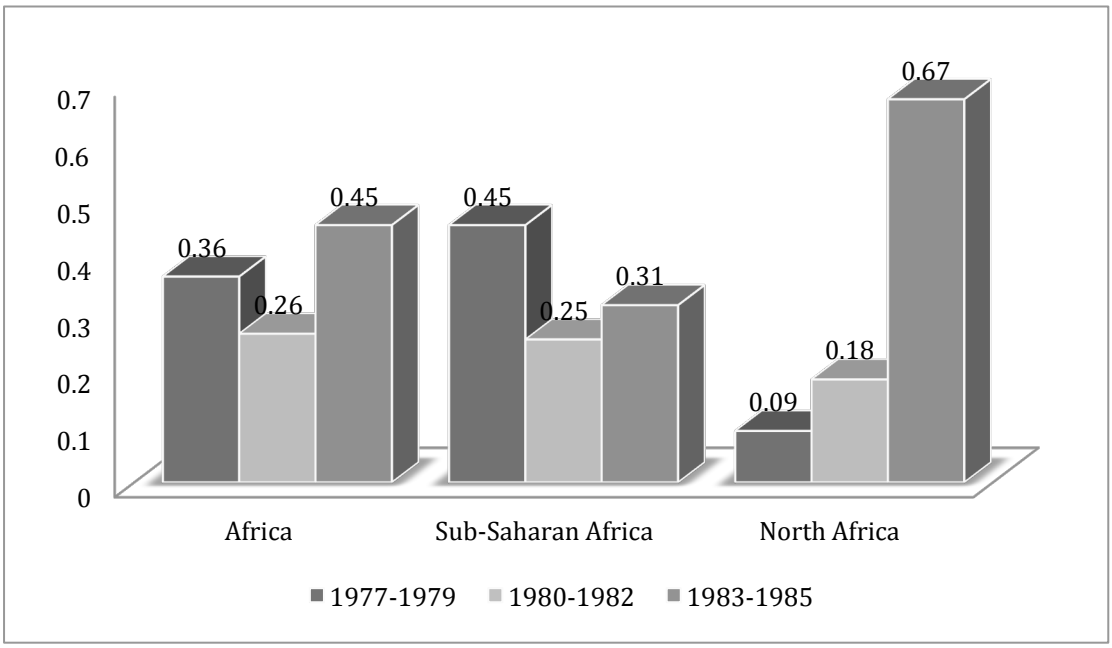
Foreign direct investment as a percentage of GDP was also very low and fragile although it increased from 0.36 per cent in the 1977-79 period to 0.45 per cent in the 1983-85 period (see Figure 1.9), it also decline from 0.45 per cent to 0.35 per cent in Sub-Saharan Africa, while it increase rapidly from 0.09 per cent to 0.67 per cent in North Africa over the same period respectively.

Figure 1.8: External Debt as a % of GDP (1971-1985)



Source: Author Computed From World Development Indicators

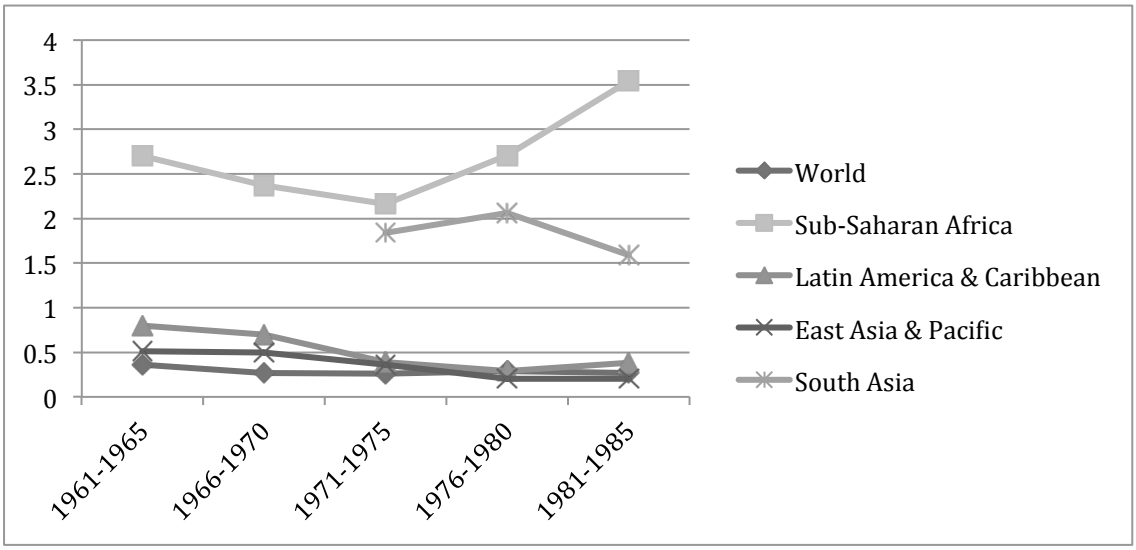
Figure 1.9: FDI as a % of GDP (1977-1985)



Source: Author Computed From World Development Indicators

Foreign aid as a percentage of gross national income consistently witnessed an increase above other developing regions during this era as shown in Figure 1.10. This clearly shows the dependence of the region (SSA) on overseas development assistance (ODA).

Figure 1.10: Aid as a % of GNI (1961-1985)



Source: Author Computed From World Development Indicators

From these available statistics we can clearly see that the main drivers of economic growth during this phase were primary production exports and investment.

Despite the positive strong growth and structural transformation in the very early stage of ISI strategies the sustainability of ISI strategies in Africa was soon called into question in the late 1970's as Africa's external debt soared, income and productivity growth stagnated even below the population growth rate, the gap between import and export share in GDP widened, terms of trade deteriorated, and unsustainable twin deficits (fiscal and external) became almost permanent feature of Africa's economies (Soludo, 2003). The result of this socio-economic crisis raised an urgency for the search of an alternative model of growth and development in Africa.

Before we proceed to the next phase it is paramount to shed more light on what has caused this disappointing outcome of ISI strategies. The failure of ISI in Africa is a source of unending debate. Two main conflicting views emerged; the first view (shared mostly by IFI's) argues that the whole model is wrong and un-sustainable, for example, ISI requires high foreign exchange in the early stage since it involves imports of intermediate inputs and capital goods by domestic industries. However, the implementation of ISI in most African countries did not lay emphasis on the generation of foreign exchange. Moreover, most countries stagnated at the early or primary import substitution (PIS) sub-phase, and failed to gradually move to the secondary import substitution (SIS) phase as hoped for, in particular the focus was more on setting up factories rather than building the entrepreneurial capabilities that would foster industrial dynamism and the development of competitive export sectors (UNCTAD, 2011). Thus, the disappointing result of ISI in Africa was seen most starkly in the poor productivity performance of the new enterprises. On the other hand, the second view argues that the failure of ISI was due to external shocks, for example, oil price shocks in the 1970's and the decline of the commodity prices in the world markets.

1.3.2 Structural Adjustment Programme Phase (1985-1995)

The SAP phase in Africa commenced in the early 1980s and ended in the late 1990s. Its origin could be traced back to the early 1980s, when many African countries experienced severe balance of payment crisis resulting from the cumulative effects of the oil price shocks in the 1970's, decline of commodity prices in the world markets

and growing imports needs of domestic industries (UNCTAD, 2011). This crisis led many African countries to seek financial assistance from the International Monetary Fund (IMF) and the World Bank.

The Fund/Bank interpretation of the crisis was that it had to do with the domestic policy mistakes and adverse external volatility resulting from the second round of oil price shock in 1979-80, where most African countries were pushed to the wall. Thus, adjustment became inevitable. This interpretation was based on the findings of the Berg Report on *Accelerated Development in Sub-Saharan Africa: An Agenda for Action* published by the World Bank in 1981. The report pointed out that Africa's economic and industrial performance was poor due to the policy inadequacies in the form of; overvalued exchange rates, overemphasis on industry at the expense of agriculture, trade protectionism, interest rate controls and rapid increase in public sector expenditure without corresponding increase in public sector revenue.

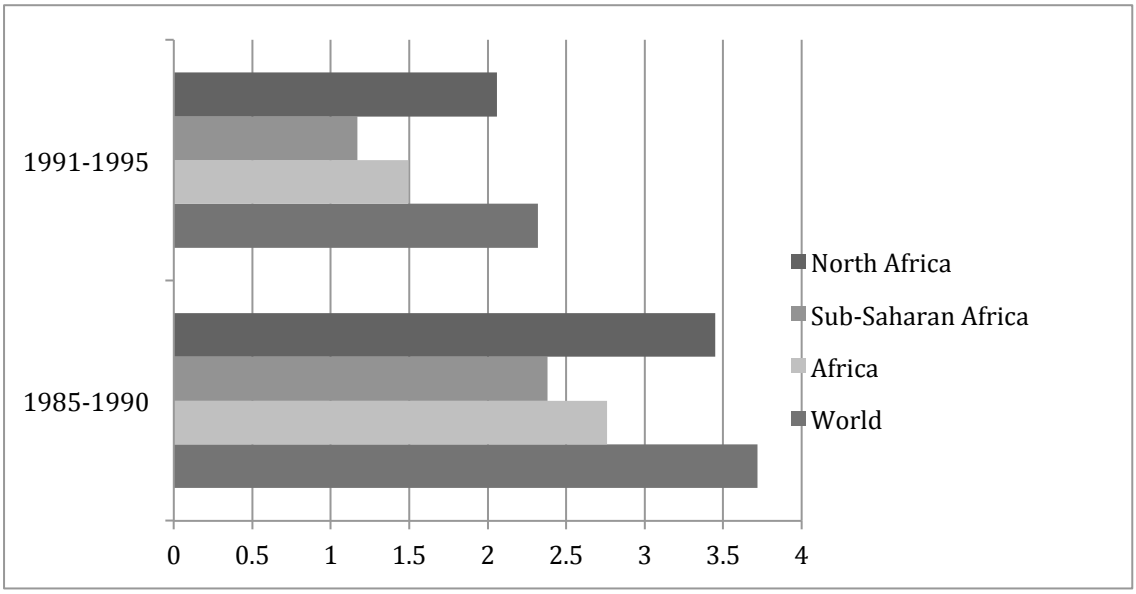
The key objective of the structural adjustment programme (SAPs) was to stabilise the macroeconomic environment and reduce the role of the state in the development process, thereby giving market forces more room in the allocation of resources. The assumption was that markets are more efficient than the State in resource allocation and that the appropriate role of the State should be to provide the enabling environment for the private sector to flourish (UNCTAD, 2011).

The African countries that adopted the structural adjustment programme (SAPs) were expected to implement certain policy reforms as a condition for receiving financial assistance from the IMF and the World Bank. The policy conditions included among other things: (a) devaluation of currency (b) reduction of the public sector expenditure (c) elimination of subsidies (e) liberalization of trade (f) deregulation of interest, and (g) privatization of State-owned enterprises.

Africa's economic growth witnessed a marginal trend of 2.76 per cent in the 1985-1990 period but later decline to 1.49 per cent in the 1991-95 period. Also Sub-Saharan Africa recorded a declined from 2.38 per cent in the 1985-1990 period to 1.17 per cent in the 1991-95 period, and North Africa recorded a decline from 3.45

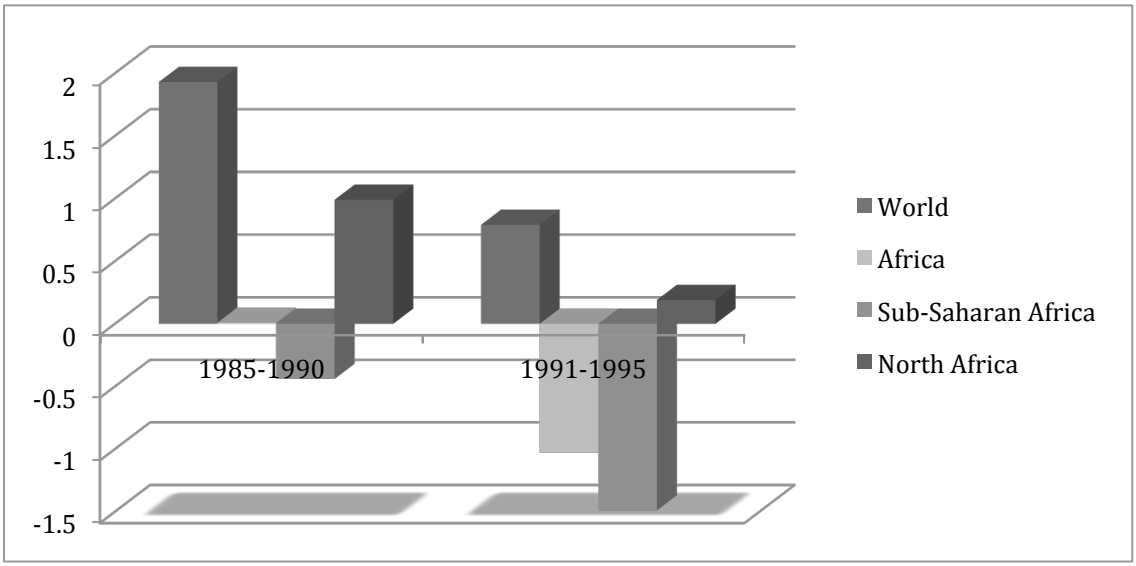
per cent in the 1985-1990 period to 2.06 per cent in the 1991-95 period (Figure 1.11). Furthermore, growth in per capita real GDP deteriorated for Africa as a whole as it recorded a decline from 0.009 per cent in the 1985-1990 period to -1.03 per cent in the 1992-95 period. Sub-Saharan Africa also recorded a negative value of -1.49 percent in the 1991-95 period while North Africa also reported a decline of 0.19 per cent in the same period (Figure 1.12).

Figure 1.11: GDP growth (1985-1995)



Source: Author Computed From World Development Indicators

Figure 1.12: GDP per capita growth (1985-1995)



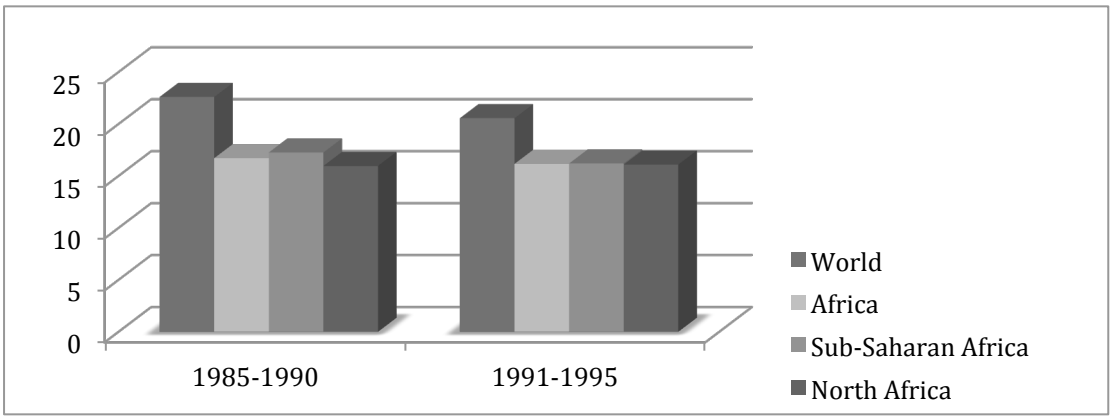
Source: Author Computed From World Development Indicator

Turning to sectoral performance, agriculture value added as a percentage of GDP improved marginally from the last period of ISI but later declined. Africa as a whole recorded 17.87 per cent in the 1985-1990 period and 17.18 per cent in the 1991-95 period. Sub-Saharan Africa reported 18.6 per cent in the 1985-1990 and 18.5 per cent in the 1991-95 period, while North Africa recorded 16.8 per cent in the 1985-1990 period to 15.26 per cent in the 1991-95 period (Figure 1.13). On the other hand, manufacturing value added as a percentage of GDP hovered around 16.5 per cent and this was comparable to figures for Sub-Saharan Africa and North Africa as shown in Figure 1.12 respectively. The emerging picture from this trend is that SAPs marginally improved economic indices albeit slightly in the first five-year period of its implementation which were quickly reversed in the succeeding five years.

Figure 1.13: Agriculture Value Added as a % of GDP (1985-1995)

Source: Author Computed From World Development Indicators

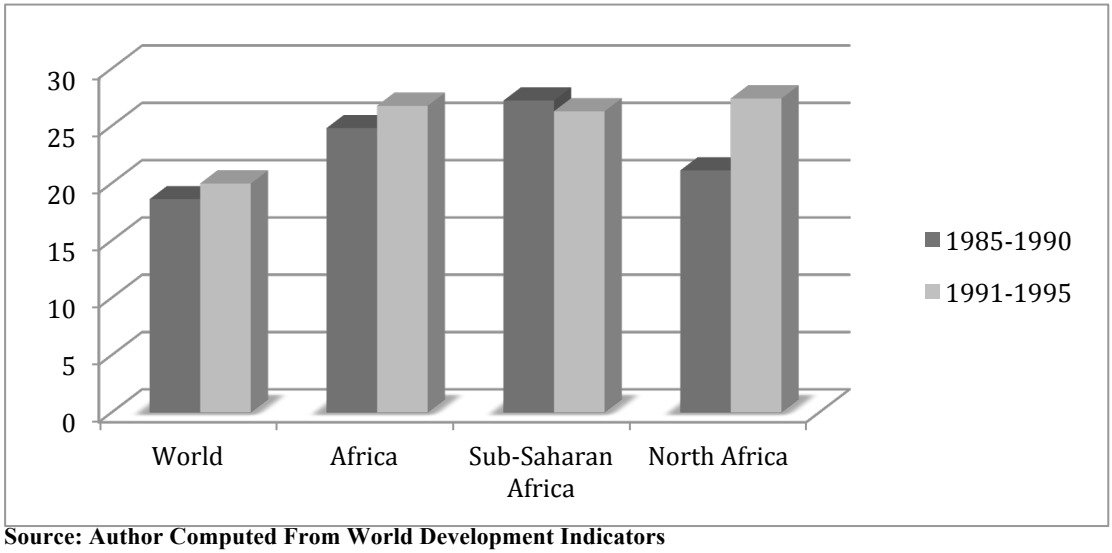
Figure 1.14: Manufacturing Value Added as a % of GDP (1985-1995)



Source: Author Computed From World Development Indicators

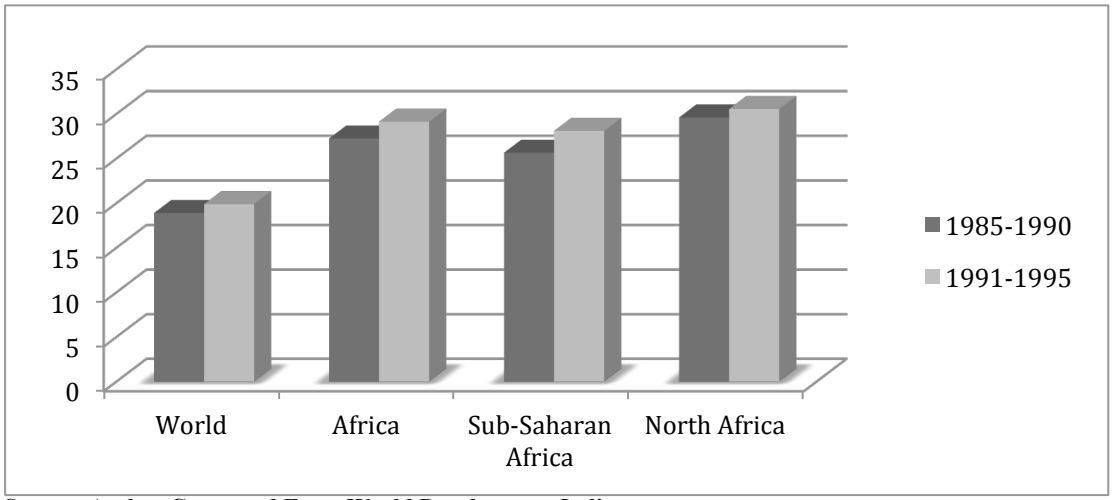
Exports and imports of goods and services as a percentage of GDP increased slightly in the adjustment period (Figures 1.15 and 1.16), and for the first time the increase in exports as a percentage of GDP (1.94%) was more than the increase recorded in the imports as a percentage of GDP (1.89%). It is however important to mention that despite this increase no significant diversification occurred in the exports. In fact, most African countries were still dependent on the exports of primary commodities.

Figure 1.15: Exports of goods and services as a % of GDP (1985-1995)



Source: Author Computed From World Development Indicators

Figure 1.16: Imports of goods and services as a % of GDP (1985-1995)

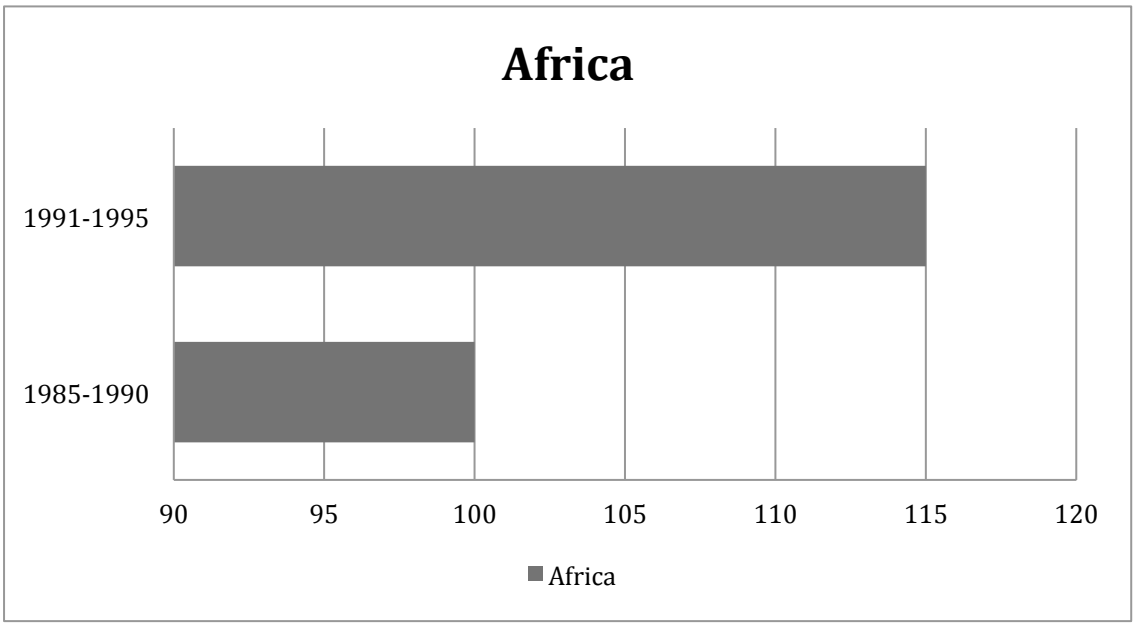


Source: Author Computed From World Development Indicators

Debt accumulation during the adjustment period assumed an alarming proportion in the African continent. External debt as a percentage of GDP increased

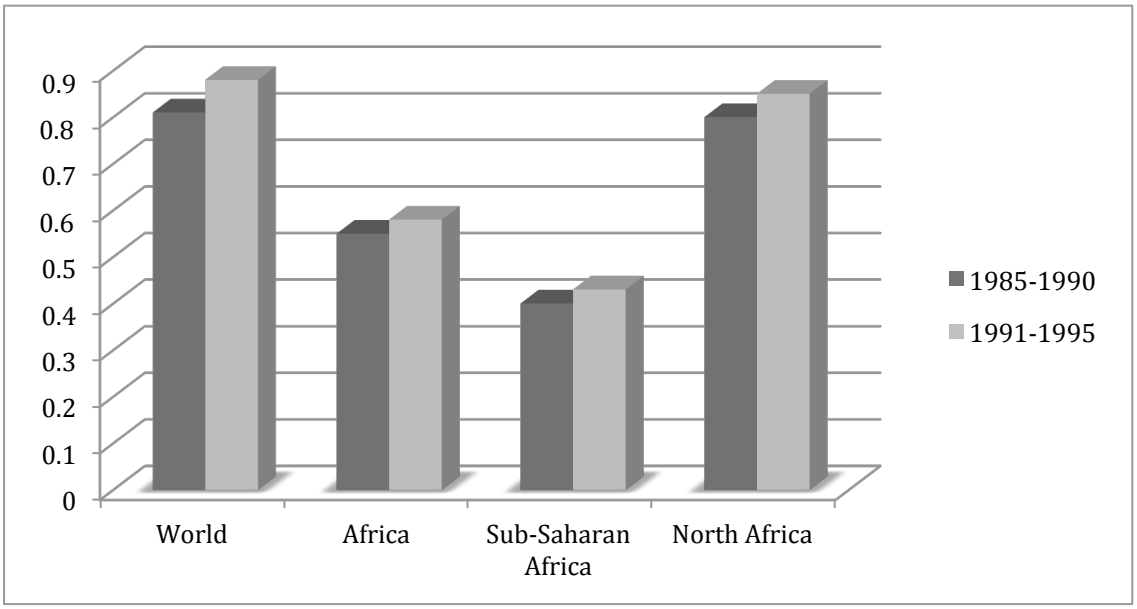
from 100 per cent in the 1985-1990 period to 115 per cent in the 1991-95 period (Figure 1.17). Foreign direct investment as a share of GDP improved only marginally during the adjustment era from 0.55 per cent in the 1985-1990 period to 0.58 per cent in the 1991-95 period as shown in Figure 1.18. Gross capital formation (Investment) as a percentage of GDP declined to 19.53 per cent in the 1991-95 period, which is much lower that the figures in the ISI phase (Figure 1.19).

Figure 1.17: External Debt as a % of GDP (1985-1995)



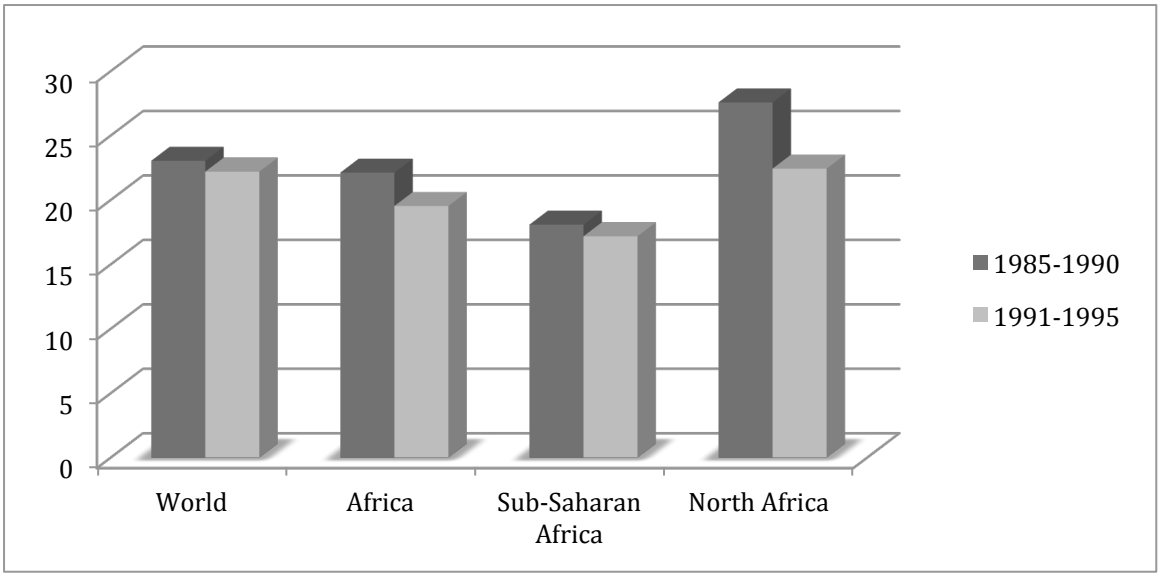
Source: Author Computed From World Development Indicators

Figure 1.18: FDI as a % of GDP (1985-1995)



Source: Author Computed From World Development Indicators

Figure 1.19: Gross Capital Formation as a % of GDP (1985-1995)



Source: Author Computed From World Development Indicators

The structural adjustment programmes (SAPs) came under heavy criticism following the first round of its implementation by many African countries. These criticisms stemmed from the fact that the economies of the implementing countries actually deteriorated rather than improved. Critics argue that the SAPs placed African countries on a low growth path and undermined economic diversification efforts, and led to an erosion of the industrial base in the region (Soludo, Ogbu and Chang, 2004; Stein, 1992). In addition, most UN agencies criticized SAPs for its neglect of human issues in its design and implementation.

The SAPs accentuated rather than ameliorated the social and economic crises faced by African countries, which included the collapse of internal production systems and the social fabric, as well as balance of payments and debt problems. Indeed, this process of one-size-fits-all economic policies which were poorly adapted to a country's specific needs failed to address growth and development challenges facing African countries. However, it is important to mention that some of the critics blame SAPs unjustifiably for Africa's poverty tragedy, this is because they neglect the fact that the main objective of SAPs was not to alleviate poverty, rather it was to address balance of payment crisis, improve the macroeconomic environment and reduce the role of the state in the development process.

Pitfalls of the SAPs have resulted in the adoption of Poverty Reduction Strategies (PRSPs), which set out a country's macroeconomic, structural and social policies to promote sustainable growth and thus reduce poverty in African countries (UNECA, 2011).

1.3.3 PRSPS and Economic Liberalisation Phase (1995-2010)

This phase began in the 1990s in response to the failure of the structural adjustment programmes (SAPs). It was documented that by the second half of the 1990s many African countries accumulated huge foreign debt and thus the burden of debt services became a bottleneck to growth and development in the region (UNCTAD, 2011). Eventually, in response to the crisis the IMF and World Bank launched the Heavily Indebted Poor Countries (HIPC) initiative to provide relief to the severely indebted countries. However, the initiative was marked with slow progress in addressing the problem and consequently led to adoption of the enhanced HIPC initiative in the late 1990s (Booth, 2003). Under this initiative, developing countries wishing to apply for debt relief or lending from either the IMF/World Bank are required to draw up PRSPs (Poverty Reduction Strategy Papers) detailing how the resources made available through debt relief / lending would be used to reduce poverty in the recipient countries. Most African countries considered eligible for participation in the HIPC programme and have prepared PRSPs giving priority to invest the resources made available on health and education (UNCTAD, 2011).

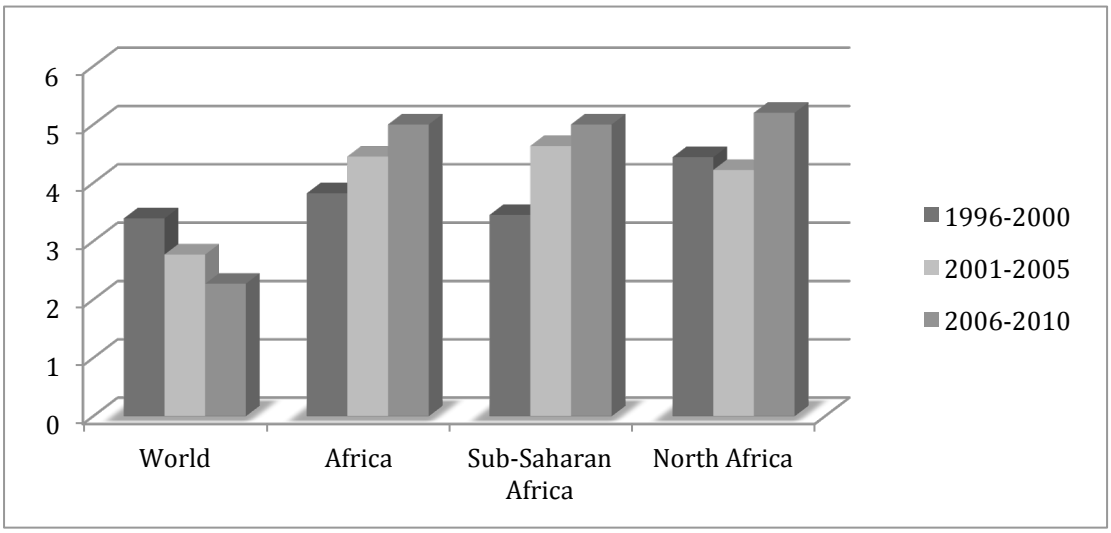
On the other hand, by the year 2000 the United Nations (UN) system in agreement with its 193 member states adopted the Millennium Declaration, which gave birth to the Millennium Development Goals (MDGs). They have agreed to achieve eight goals by the year 2015. These goals are: eradicating poverty and hunger; achieving universal primary education; promoting gender equality; reducing child mortality; improving maternal health; combating HIV&AIDS, malaria and other diseases; ensure environmental sustainability; and developing a global partnership for development. The adoption of both the MDGs and PRSPs marked the beginning of another phase of policy design and implementation that had implication for growth and development African. Furthermore, it has also marked the beginning of the policy shift by the Fund/Bank in Africa, as they recognise the importance of ownership as

well as the need for greater focus and deliberate intervention on poverty reduction rather than using market forces to address it. All of these shifts were missing in the structural adjustment programme (SAPs).

Economic growth witnessed a significant improvement during this phase. It increased from 3.82 per cent in the 1995-2000 period to 5.0 per cent in the 2006-2010 period. Sub-Saharan Africa and North Africa also reported a stable increase (See Figure 1.20). Similarly, per capita GDP growth recorded a positive growth in this phase this is in sharp contrast to the adjustment period when it was negative. It increased from 1.35 per cent in the 1995-2000 period to 2.58 per cent in the 2006-2010 period (Figure 1.21). Evidently, after almost two decades of stagnation and decline, growth performance improved significantly in Africa during this phase. In fact Africa is emerging as one of the world's fastest growing regions, with an average GDP growth of 5.6 per cent a year from 2001-08 (UNECA, 2010).

Furthermore, a recent analysis by the Economist finds that over the ten years to 2010, six of the world's ten fastest growing economies were in Sub-Saharan Africa, namely: Angola, Nigeria, Ethiopia, Chad, Mozambique and Rwanda.[4]

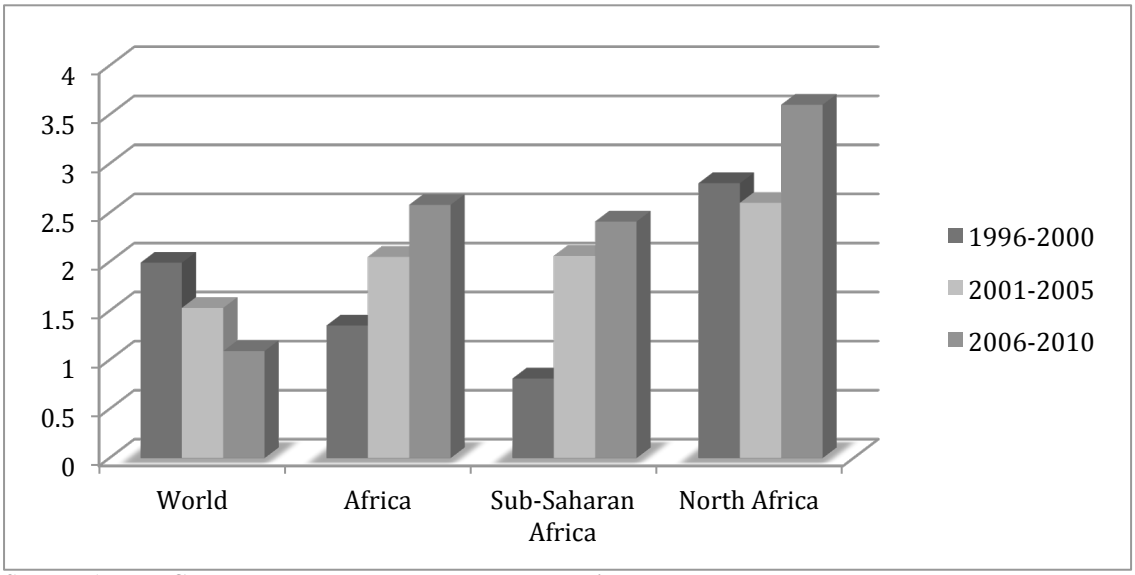
Figure 1.20: GDP growth (1996-2010)



Source: Author Computed From World Development Indicators

[4] See The Economist, January 8th 2011, P14.

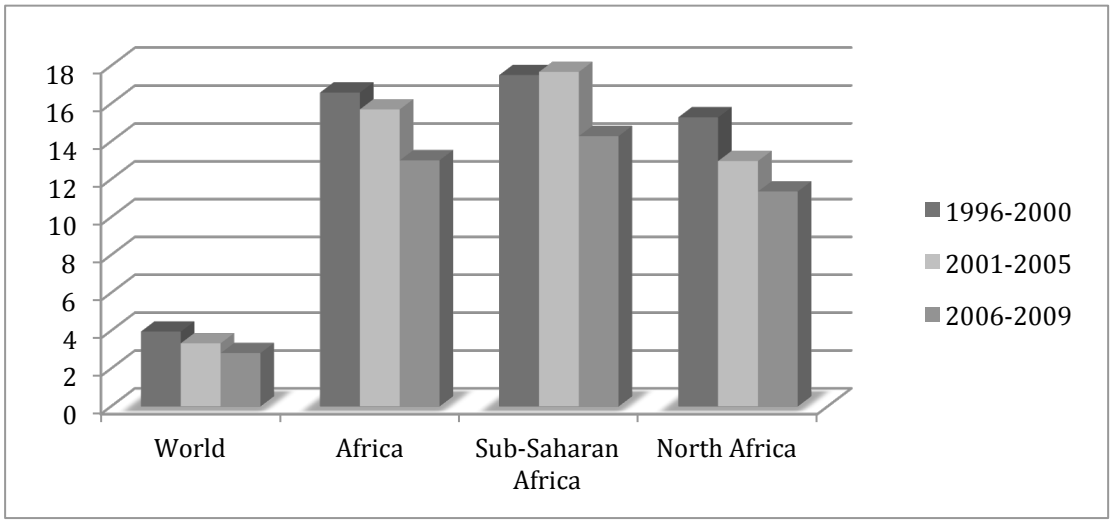
Figure 1.21: GDP per capita growth (1986-2010)



Source: Author Computed From World Development Indicator

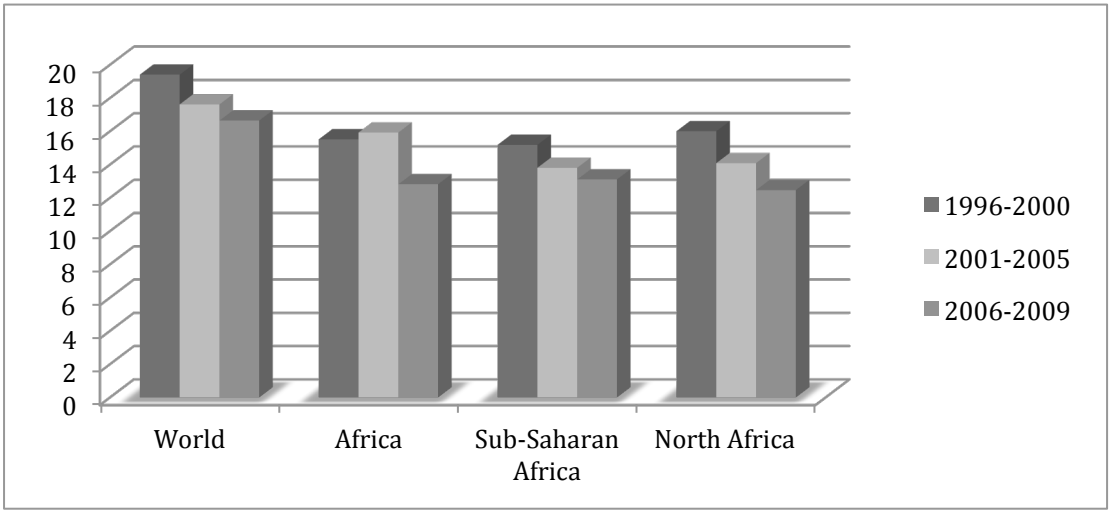
Turning to sectoral performance, agriculture value added and manufacturing share as a percentage of GDP were on the decline for the entire PRSPs period (Figure 1.22 and Figure 1.23). Foreign direct investment enjoyed a consistently upward trend during the period (Figure 1.24), however the FDI flowing into Africa has been argued to be resource seeking (e.g. crude oil and other natural resources) rather than market seeking. Gross capital formulation also followed an upward trend during this period although the value was below 25 per cent (Figure 1.25).

Figure 1.22: Agriculture Value Added as a % of GDP (1995-2009)



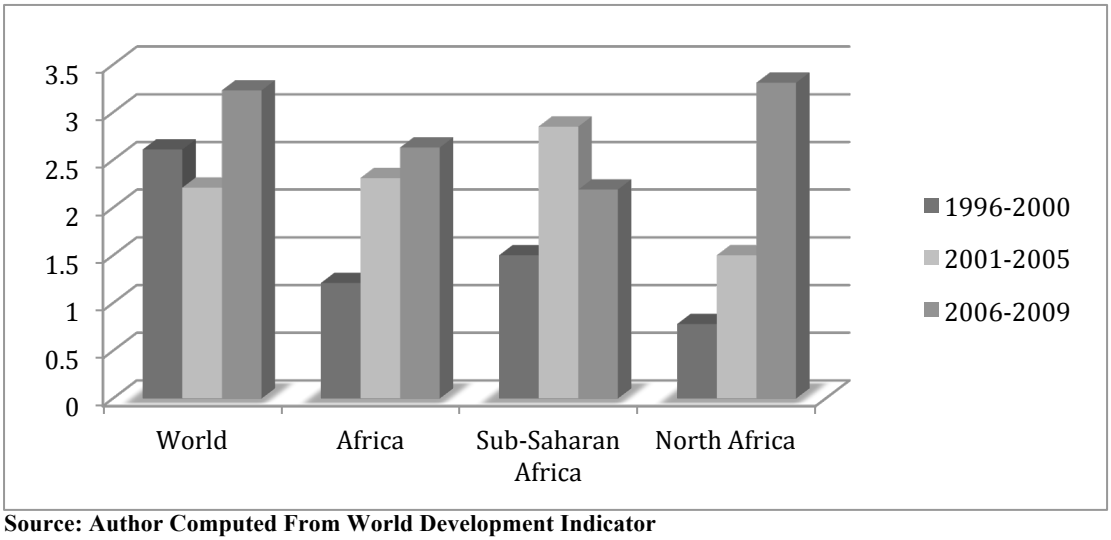
Source: Author Computed From World Development Indicator

Figure 1.23: Manufacturing Value Added as a % of GDP (1995-2009)



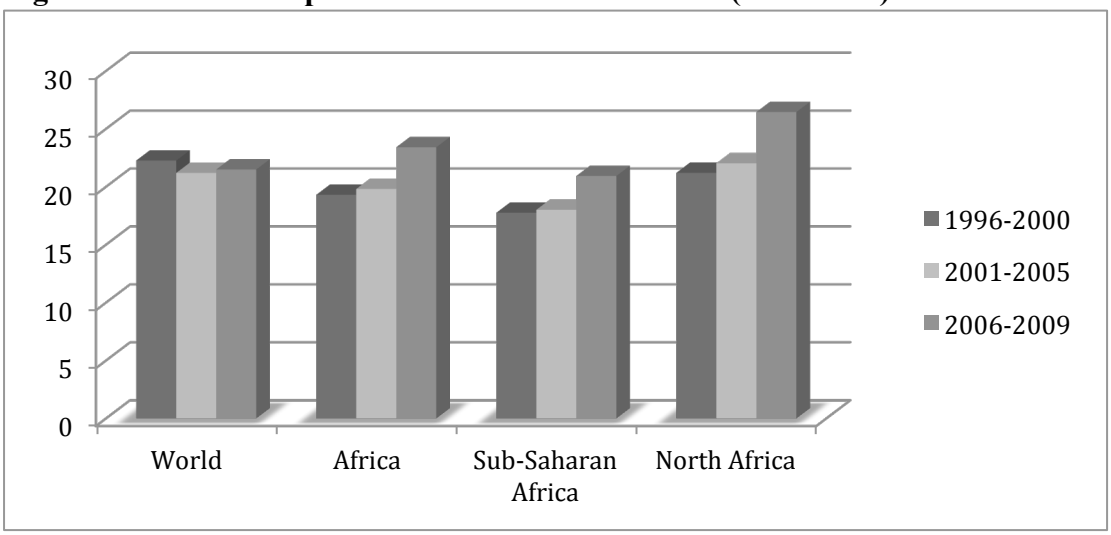
Source: Author Computed From World Development Indicator

Figure 1.24: FDI as a % of GDP (1995-2009)



Source: Author Computed From World Development Indicator

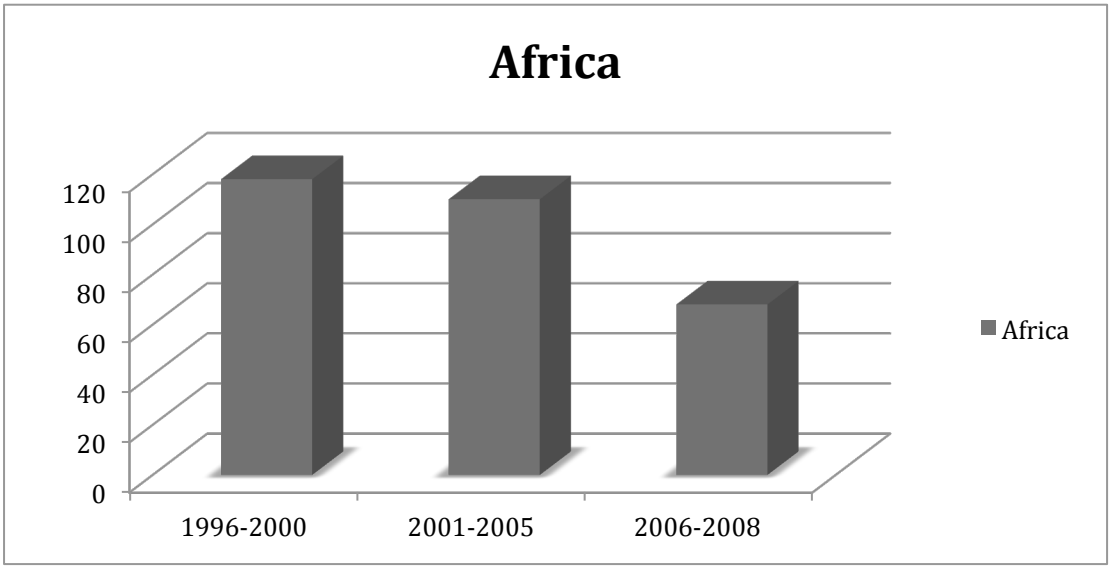
Figure 1.25: Gross Capita Formation as a % of GDP (1996-2009)



Source: Author Computed From World Development Indicator

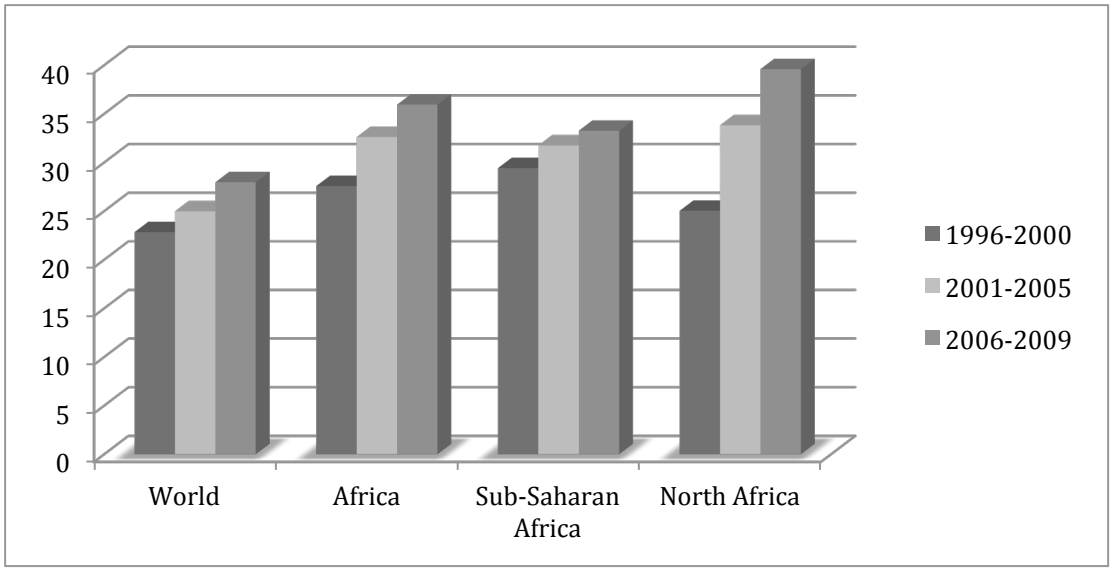
External Debt as a percentage of GDP started witnessing a downward trend during the PRSPs phase (Figure 1.26). The reason for this was the that most African countries benefited from the debt forgiveness at the outset of the 2000 decade from international creditors through the adoption of the Heavily Indebted Poor Countries (HIPC) initiative. Exports and imports as a percentage of GDP both increased significantly (Figure 1.27 and 1.28), but the most noticeable feature is that the increase of exports as a percentage of GDP (8.4%) was much more than the increase recorded in the imports as a percentage of GDP (7.02%).

Figure 1.26: External Debt as a % of GDP (1995-2008)



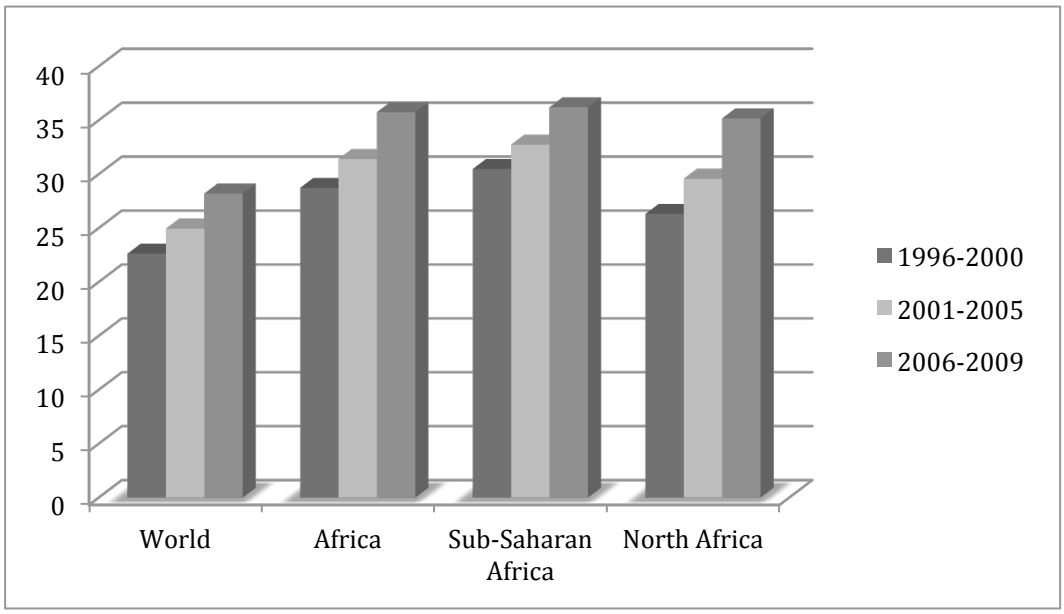
Source: Author Computed From World Development Indicator

Figure 1.27: Exports of goods and services as a % of GDP (1995-2009)



Source: Author Computed From World Development Indicator

Figure 1.28: Imports of goods and services as a % of GDP (1995-2010)



Source: Author Computed From World Development Indicator

After two decades of growth tragedy in Africa, available statistics suggest that PRSPs did produce by far a more positive and desired result for most African countries than the ISI and SAPs. The major issue however is the sustainability of the surge in growth recorded in recent times. Africa indeed shows strong resilience to the global crisis as it recorded a GDP growth rise of 3.2 per cent in 2009 and 4.5 per cent in 2010. Another good news for the African economy is that despite the fact that the recent growth momentum was attributed to global commodity boom and the increased global demand for these commodities, the boom explains only part of Africa' success. Other factors accounting for Africa's recent growth include, improved macroeconomic management, increased FDI capital flows, debt relief and improved performance of non-oil sectors such as telecommunications and tourism (UNECA, 2010).

We draw certain key lessons from the discussion above on Africa's economic performance review. First, the pattern of growth appears to be volatile. Second, Africa is overtly dependent on natural resources for exports and income earnings. Third, lower level of investment, poor productivity and dependence on natural resources appear to explain Africa's highly variable and volatile growth. Schimidt-Hebbel et al. (1996) find that East Asian countries were able to achieve a stable growth of 7-8 per

cent annually for about 30 years because investment was also growing about 30 per cent of GDP as of that time.

1.4 Summary and Conclusion of the Thesis

This section summarises the results obtained within the three empirical chapters in the thesis and offers some concluding remarks and policy recommendations.

The first empirical chapter (Chapter 2) investigates whether different natural resources (agriculture, fuels and minerals) affect economic growth differently. The second empirical chapter (Chapter 3) analyses the effect of foreign direct investment on total factor productivity at a macro level using both aggregate and sectoral composition of FDI flows (in primary, manufacturing and services sectors respectively) and employs new dataset for TFP developed by UNIDO-World Productivity Database (WPD). The third empirical chapter (Chapter 4) evaluates the engine of growth hypothesis for manufacturing by investigating the determinants of manufacturing output growth and analyses its effect on economic growth and stability.

This thesis employs time-series and panel data, and focuses exclusively on African countries in all the three empirical papers. However, different techniques have been used to address endogeneity problems in the thesis. In the first empirical chapter, I constructed natural resources proxies (for agriculture, fuels and minerals) that are exogenous and employed fixed effect (FE) to take care of unobservable country specific effects. In the second empirical chapter, I used instrumental variables (IVs) 2SLS estimation technique, while in the third empirical chapter we employed generalised method of moment (GMM) estimator. In summarising and concluding this thesis, I go back to the research questions presented in Section 1.1 and explain how the thesis addresses them.

(RQ 1) Do different natural resources affect economic growth differently?

The thesis investigates whether different natural resources affect economic growth differently in 52 African countries over the period of 1960-2010. I constructed three natural resources proxies (agriculture, fuels and minerals) that are exogenous in order to tackle endogeneity issues.

After controlling for endogeneity problems and impact of variables found to be important for growth, I find that agriculture is good for growth, while fuels and minerals affect growth negatively. Our findings assert that different natural resources (agriculture, fuels, minerals) affect economic growth differently. This rejects the notion for generalised natural resources curse and affirms that compounding natural resources components into one measure may obscure differences in their respective growth impact. Moreover, our results still hold even after adopting alternative natural resource measures (resources rents measures).

(RQ 2) Does Foreign Direct Investment accelerate productivity?

The thesis also empirically investigates the effect of FDI on productivity using time series data for Nigeria. I firstly applied basic OLS technique in order to compare results with previous studies. Furthermore, I employed instrumental variables (IVs) 2SLS estimator to address potential endogeneity problems. Our findings show a positive and statistically significant effect from aggregate FDI on productivity growth.

Since FDI flows to different sectors in the economy, I also investigated which sectoral FDI flow contributes more to productivity growth. I used three sectors namely primary, manufacturing and services sectors and three sub-sectors (oil. communications, trade and business). Our findings show that FDI flows in all the three sectors and three sub-sectors contribute positively to productivity growth even after controlling for endogeneity and other variables found to be important for productivity growth. However, FDI in services sector has the highest potential to grow productivity followed by FDI manufacturing and FDI in primary sector. On the sub-sectoral level, FDI in communications has the highest potential to accelerate productivity.

(RQ 3) Whether increased manufacturing output relative to aggregate output is associated with higher growth and stability?

We investigated the determinants of growth in the share of manufacturing output in GDP and answered the question whether increased manufacturing output growth accelerates economic growth and reduces volatility. Using both cross-section and time

series data from 50 African countries, our findings confirm the engine of growth hypothesis for manufacturing and also show that increase in manufacturing output relative to GDP not only accelerates economic growth, but it also helps to reduce growth volatility in Africa.

1.4.1 Policy Implications

The following policy implications are derived from our findings in the three empirical papers in this thesis:

1. Countries that are endowed with fuels and minerals natural resources need to improve their institutional capacity and governance together with effective revenue administration to make sure earnings are well managed and channeled to other economic viable sectors such as manufacturing and services.

2. Since our results confirm agriculture has a positive effect on growth and giving that agriculture employs 70-80% of Africa's total labour force, modernising and transforming agriculture will have the largest impact on inclusive growth in the continent. In this regard, there is a need for African countries in collaboration with their development partners to help their respective domestic farmers have better access to latest agricultural technologies, finance, markets and infrastructure in order to unlock their potentials. African countries can also tap opportunities to engage in value addition and commodity-based industralisation. However, this has to be done on a country-by-country diagnostic approach.

3. FDI should be welcomed and encouraged in all economic sectors. However, governments need to design effective policies to channel it to the economic sectors that will create employment and improve exports potentials.

4. Our findings also indicate that FDI in services sector has the highest potential to accelerate productivity growth in Nigeria. Therefore, the government needs to do more to attract and welcome FDI in the services sector through

providing incentives, improving business environment and security and investing in infrastructure and education.

5. Industrialisation and structural transformation are urgently required in Africa. African countries should exert more efforts to spur domestic and foreign investments in the manufacturing and services sectors, improve economy of scale through regional integration and trade openness, and address internal constraints such as availability and reliability of electricity, and poor institutions.

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CHAPTER TWO

Do Different Natural Resources Affect Economic Growth Differently?

2.1 Introduction

Natural resources are an important source of national income around the world, particularly in Africa, where primary commodity exports account for 71 per cent of total exports, domestic wealth mobilisation is poor, and access to private international capital markets is limited due to economic vulnerability of many countries in the continent.[5] Hence, exports earnings from the sale of natural resources abroad (or royalty) not only serve as the main source of income but also serve as the main source of foreign exchange earnings for African resource-rich countries. The revenue from these earnings provides a potential source of investment funds, which if wisely invested, can enhance future growth and development (Deaton, 1999). Thus, natural resources endowments would potentially enable countries to make a transition from underdevelopment to industrial "take-off" (Rostow, 1961).

Yet, since the seminal empirical work of Sachs and Warner (1995), there has been a wide phenomenon that natural resources are more of a "curse" than a "blessing". This stems from the fact that resource rich countries often grow more slowly than their non-resource rich counterparts. The authors highlight that between the period of 1970-92 only three resource rich developing countries, namely Botswana, Malaysia and Mauritius, had sustained per capita GDP growth of (greater or equals) 2 per cent per annum. Similarly, Gylfason (2001) also observes that of the 65 resource rich countries, only four managed to achieve long-term investment exceeding 25 per cent of GDP and per capita GDP growth of (or above) 4 per cent per annum.[6]

However, empirical evidence on the effect of natural resources on economic growth is ambiguous. For example, while Sachs and Warner (1995, 1999, 2001), Gylfason et al. (1999), and Sala-i-Martin and Subramanian (2003) among others find

[5] See World Bank, World Development Indicators 2010.
[6] These four countries are Botswana, Indonesia, Malaysia and Thailand.

natural resources are harmful to growth, recent studies such as Cavalcanti et al. (2011), Brunnschweiler and Bulte (2008), and Lederman and Maloney (2008) find that natural resources have a positive effect on growth. We argue that the reason for this mixed evidence could be a consequence of methodological problems, type of natural resource and quality of the country's policy.

According to Calvacanti et al. (2011), Brunnschweiler and Bulte (2008) and Manzano and Rigobon (2007), there are a number of grounds on which the econometric evidence on the effect of natural resources on growth may be questioned. Firstly, the literature relies primarily on a cross sectional approach and as such does not take into account the time dimension of the data and is also subject to endogeneity and omitted variable problems. Secondly, the proxy used by Sachs and Warner (1995) for resource dependence (the share of exports of primary products in GNP at the beginning of observation period), which has similarly been adopted by many studies that follow, is endogenous.

In addition to these critiques, Leite and Weidmann (1999) highlight that the amalgamation of the components of natural resources by previous studies into one measure may obscure differences in their growth impact giving the expected differences in behaviour for the different components of natural resources. For example, fuels and minerals natural resources are capital intense and tend to induce poor governance and corruption due to rent-seeking, while agricultural natural resources are more labour intense and tend to generates fewer rents.

In light of these critiques, the paper analyses the effects of different natural resources on economic growth. Although this approach is similarly employed in Leite and Weidemann (1999) and Sala-i-Martin and Subramanian (2003) this paper takes it further and contributes to the literature in three ways. First, it constructs proxies that are exogenous for the three natural resource components namely: agriculture, fuels, and minerals to take care of endogeneity. Second, extends the analysis to panel data for 51 countries over a period of 1960-2010. Third, employs a fixed effect estimator to control for unobserved country characteristics. In addition, following Van der ploeg (2011) suggestions that future research on natural resource and economic growth to

not only employ panel data regression but to also take into account for changing quality of institutions, this paper includes an institutional quality variable.

Furthermore, this paper focuses exclusively on African countries. This is because Africa only exists primarily as a dummy variable in a single reduced-form growth regression in most of the resource curse empirical studies. Collier and Gunning (1999) challenge this approach of using a near global sample of countries and impose the same specification for all regions except for the inclusion of regional dummies as level or interaction effects. Additional, this will also enables us to construct exogenous natural resources proxies using international commodity prices because the proportion of the world exports of each natural resources components (agriculture, fuels and minerals) are relatively low in our sample and unlikely to affect the world prices by the actions of individual countries. However, we relax this approach and adopt alternative natural resource measures (WDI resource rents measures) to check the robustness of our results.

The rest of the paper is organised as follows: Section (2.2) reviews the literature. Section (2.3) presents empirical model. Section (2.4) describes data and constructs natural resources proxies. Section (2.5) reports results. Finally Section (2.6) concludes.

2.2 Literature Review

Over the last decades, the notion that natural resources abundance is a curse rather than a blessing has attracted much attention building from the works of Gelb (1988), Auty (1993), Sachs and Warner (1995, 1999) and Leite and Weidamann (1999), where the authors observe that resource rich countries not only fail to benefit from a favourable endowment, they actually perform worse than less well-endowed countries. This conceptual puzzle is the basis of the resource curse paradox. Humphreys et al. (2007) explain that two key differences make natural resources wealth different from other types of wealth. First, natural resource wealth does not need to be produced rather it simply needs to be extracted. Hence, generation of natural resource wealth particularly fuels and minerals can take place without major linkages to other industrial sectors and without much participation of the domestic labour force.[7] Second, because many natural resources are non-renewable particularly oil and gas, from an economic point of view they are not considered as a source of income, instead they are seen as a wealth that will be consumed overtime and eventually run out.

The resource curse literature has identified several channels through which natural resources hurts economic growth, namely: Dutch disease, volatility of commodity prices and rent seeking. These different channels can be further categorised into period of booms and slumps in the international commodity prices. Deaton (1999) observes that the difficulties of handling commodity price fluctuations are so severe that price booms and price slumps are equally to be feared. The price booms channels help explain resource curse through surge in income earnings and discovery of new resources. Therefore, focuses on Dutch Disease, rent seeking and debt overhang channels of transmission. While price slumps channels explain resource curse through the volatility of income earnings and real exchange rate as a result of volatility in the international commodity prices.

[7] This point was earlier observe by Auty (1993), where he points out that mineral production is strongly capital Intensive and employs a very small of the total national workforce with large inputs of capital from foreign sources. Thus, mining sector displays marked enclave tendencies.

According to van Wijnberge (1984) natural resource curse occurs through the channel of "Dutch Disease". This is where a boom in natural resource sector leads to an appreciation of the real exchange rate, which raises the cost of exports of the products of other industries. Thus, lowers the competiveness of manufacturing and non-resource export sector. The idea behind the Dutch disease channel is that an increase in revenue from the sale of natural resource abroad makes a local currency stronger and ensuing contraction of the traded sector (Corden, 1984), by making imports cheaper and manufacturing exports expensive. The traded sector is assumed to be the engine of growth and benefit most from learning by doing and other positive externalities, therefore a re-allocation of resources from the sector to resource export sector which is consider low-tech and low-skill will stunt economic growth and lower employment in the traded sector (Cavalcanti et al., 2011; Sachs and Warner, 1995; and Gylfason et al., 1999).

Natural resources generate rents, which lead to rapacious rent seeking, whose adverse manifestation is felt through political economy effects and to increased corruption.[8] Torvik (2002) views resource curse from the rent-seeking theory, he stresses the negative effect on growth caused by rent-seeking activities associated with natural resource. The author asserts that a greater amount of natural resources increases entrepreneurs' engagement in rent seeking and reduces the number of entrepreneurs running productive firms. With a demand externality, he shows that the drop in income from the productive firms as a result of this is higher than the increase in income from the natural resource and consequently argues it leads to lower welfare. Leite and Weidamann (1999) add that natural resources abundance creates opportunity for rent seeking behaviour and is an important factor in determining a country's level of corruption, thereby distorting the allocation of resources and reducing both economic efficiency and social equity (Gylfason, 2000).

An alternative explanation is put forward by Mehlum et al. (2006), where they argue that resource rents only invite non-productive lobbying and rent seeking in countries with "grabber-friendly" institutions, but not in countries with "producer-

[8] Sala-i-Martin and Subramanian (2012) refer to this effect more broadly as the institutional impact of natural resources.

friendly" institutions. Thus, the extent to which resource curse through the channel of rent seeking may occur depends on the quality of institutions. Similarly, Robinson et al. (2006) argue that the manifestation of resource curse depends critically on institutions. Therefore, countries with poor institutions where accountability and state competence are lacking will suffer from resource curse.

On the other hand, Van der Ploeg and Poelhekke (2009) explain natural resource curse from the context of volatility of international commodity prices. The authors argue that the adverse effect of natural resource results mainly from volatility of commodity prices, especially for point-based resources (fuels and minerals).[9] The volatility of commodity prices induces fluctuation in national income and trigger exchange rate volatility. These pose problems for macroeconomic management and create uncertainty in the economy, which is harmful to exports and other trade, including foreign investment (Deaton and Miller, 1995; Gylfason, 2001). Furthermore, Aghion et al. (2009) suggest that real exchange rate volatility can seriously harm the long-term productivity growth, especially in countries with low levels of financial development.

Other resource curse channels of transmission explained in the literatures include debt overhang, civil conflict, and neglect of education. Manzano and Rigobon (2001) argue that natural resource curse is related to debt overhang problem. The authors explain that in the 70's when commodities' prices were high, resource rich countries used them as collateral for debt, when the commodity price boom came to an end in the 80's some of these countries found themselves unable to service their accumulated debt. Collier and Hoeffler (2002) point out that natural resources considerably increase the chances of civil conflict in a country because they provide sources of rebel finance. For example, income from natural resource predation such as diamond in Angola and Sierra Leone are quoted as important sources of finance for the rebel movements. Gylfason (2001) argues that natural resource abundance deters economic growth not only through the Dutch Disease, rent seeking and overconfidence that tend to reduce the quality of economic policy and structure, but

[9] This study differs with Van der Ploeg and Poelhekke (2009) in three ways, first, by constructing resource proxies that are exogenous, second, by focusing exclusively on African countries, and third, by extending data to cover 1960-2010.

also by weakening the incentive to accumulate human capital. Thus, resource rich countries that are confident that their resource wealth are their most important asset may inadvertently or perhaps even deliberately neglect the development of their human resources, by devoting inadequate attention and expenditure to education.

Most empirical evidence on resource curse hypothesis tends to follow the pioneering cross-sectional study of Sachs and Warner (1995). The study show that economies with high ratio of natural resource exports to GDP in 1971 (the base year) tended to have low growth rates during the subsequent period 1971-89. Their results postulate that a unit standard deviation increase in the share of primary exports is associated with a reduction in per capita growth of 0.93 per annum, even after controlling for variables found to be important for growth, such as initial per capita, trade policy, government efficiency and investment. Their study is seen as the corner stone of many discussion of the resource curse but can be criticised on econometric grounds. For example, the proxy they used for resource dependence (the share of resources in GNP) is endogenous, and if instrumented it does not significantly affect growth whereas subsoil resource wealth (abundance) does have a significant positive effect on growth (Brunnschweiler and Bulte, 2008).

Following Sachs and Warner (1995) cross-sectional technique, Leite and Weidmann (1999) and Gylfason et al. (1999) confirm a statistically significant inverse relation between natural resource abundance and economic growth, even after accounting for the endogeneity of corruption, effects of commodity prices variability and trade liberalisation. However, Leite and Weidmann (1999) criticises the amalgamation of the components of natural resources into one measure by the former study and thus, split the natural resource abundance into four components (fuels, ores, agriculture and food) adding each component as a separate variable and endogenise corruption within their growth-regression framework as a transmission mechanism from natural resource abundance to economic growth.

Several studies have applied cross-sectional technique to show that natural resources have a negative impact on growth via their effect on institutions and once institutions are controlled for they have no further impact on growth. Isham et al. (2003) divide natural resources into “point source” (fuels, minerals and plantation

crops) and "diffuse" (agriculture) to tests the proposition that natural resource affect economic growth through its adverse effect on economic institutions. They argue that different types of natural resource endowments matter for economic growth by generating a differential capacity to respond to economic shocks. Their results show that countries dependent on point source natural resources are predisposed to heightened social divisions and weakened institutional capacity, which in turn impede their ability to respond effectively to shocks and sustain rising levels of prosperity. Similarly, Sala-i-Martin and Subramanian (2003) enlarge Sachs and Warner's natural resource abundance measure to include (i) four types of natural resource exports (fuels, ores and metals, agriculture raw materials and food); (ii) the share of all natural resources in total exports; and (iii) a dummy for oil-exporting countries. Their results show that natural resources particularly fuels and minerals appear to have a strong, robust and negative effect on growth by impairing institutional quality, but once institutions are controlled for, there is either a very little effect of natural resources on growth or even a positive effect.

The empirical evidence presented so far relies primarily on a cross-sectional approach and as such does not take into account the time dimension of the data and suffer from potential omitted variable bias. In order to overcome this problem Van de Ploeg (2011) stresses the need to adopt panel data estimation. Manzano and Rigobon (2001) estimate the effect of natural resource abundance on growth using panel data and find that the inverse relationship is only present in cross-sectional data and not in panel data. Thus, the empirical finding in cross sectional approach is due to omitted variable biases and once fixed effects are introduced the impact disappears. However, in another panel study Carmingani and Chowdhury (2007) find that while there is no evidence of a generalised resource curse at a global level, natural resources do negatively affect economic growth in Sub-Saharan Africa.

Furthermore, Lederman and Maloney (2008) use natural logarithm of the absolute value of net exports of natural resources per worker to investigate the link between natural resources and economic growth covering a period 1980-2005. Their results for both static and dynamic growth models show natural resources are blessings for growth. In fact, for the dynamic model their result implies that a one per cent increase in natural resource export is associated with 1.1 to 1.9 percentage points

rise in the average growth rate of GDP per capita. Similarly, Cavalcanti et al. (2011) employ a heterogeneous panel data approach, which allows for different dynamics across countries. Using the real value of oil production, rent or reserve as a proxy for resource endowment their results imply that natural resource abundance has a positive effect on both income levels and economic growth.

While there are few studies that apply the panel data techniques many of the proxies used for natural resource dependence or abundance are likely to suffer from endogeneity problem, thus making it difficult to interpret the estimated effects as causal (Collier and Goderis, 2012).

To address the endogeneity problem, this paper constructs exogenous proxies for the three different natural resource measures (fuels, Minerals and agriculture) by taking their initial share, hold it constant overtime, but weights at each point in time with corresponding level of international prices. Unlike many of the natural resource proxies used in previous studies, we argue that our proxies are exogenous since any variation investigated is entirely triggered by changes in international prices. This methodology is similarly employed in Perez-Sebastian and Ravey (2016) when they construct their mineral rents proxy to investigate why resource endowments lead to divergent outcomes in resource rich countries.

Moreover, the paper focuses exclusively on African countries. This is because Africa only exists primarily as a dummy variable in a single reduced-form growth regression in most of the resource curse empirical studies. Collier and Gunning (1999) challenge this approach of using a near global sample of countries and impose the same specification for all regions except for the inclusion of regional dummies as level or interaction effects.

Block (2001) challenges the approach of assuming that the magnitude of the marginal impact of particular explanatory variable is the same in Africa as elsewhere. He argues that the approach is unsatisfactory because of two reasons: first, the forced inequality between Africa and non-African slope coefficient; second, because of the lack of consideration of the channels of transmission through which the reduced form variables affect growth. He further asserts that several critical slope terms are indeed

different for Africa. For example, if a variable is found to contribute positively to the growth in the non-African countries, the benefits are less in Africa, while if a variable is found to be costly to growth in the non-African countries, it is often more costly to growth in Africa.

2.3 Empirical Model

The effects of different natural resources on GDP per capita are analysed using a growth regression. In this framework, long-run growth path of the economy is determined by exogenous technical progress, while the growth rate during transition to the steady state level is a fraction of the determinants of the steady state level of output and initial level of output.

In order to exploit both the cross-section and time-series dimension of our data, instead of averaging over the entire period of 20 or 30 years as in the cross-country studies discussed in Section 2.2, the paper employs panel data estimation techniques to investigate our research question: do different natural resources affect economic growth differently. The use of panel data in empirical growth regressions has many advantages with respect to cross-sectional regressions. First, it allows accounting for permanent unobservable country specific effects. Second, the prospects for reliable generalisation in empirical growth studies are often constrained by the limited number of countries available, thus the natural response is the use of within-country variation to multiply the number of observations.

In a panel data setting the equation to be estimated is as follows:

$$\Delta y_{i,t} = \beta y_{i,t-1} + \psi x_{i,t-1} + \gamma R_{i,t-1} + \alpha_i + \mu_t + \varepsilon_{i,t} \qquad (2.1)$$

Where $i = 1, \dots, N \; and \; t = 1, \dots, T$, $y_{i,t}$ is the logarithm of real GDP per capita for country i in period t, $\Delta y_{i,t}$ denotes growth rate of real GDP per capita between t and $t-1$, $x_{i,t-1}$ is a $k \times 1$ vector of growth determinants that are expected to affect the long run steady state level of GDP per capita, $R_{i,t-1}$ denotes resource proxies, α_i is a country-specific fixed effect, μ_t time-constant and $\varepsilon_{i,t}$ is the error

terms. One of the methodological difficulties in estimating our model Eq. (2.1) is the choice of control variables as Moral-Benito (2009) observes that empirical studies have found more than 140 variables to be correlated with the growth rate. Consequently, the feasibility strategy is to select a number of controls on the basis of theoretical consideration.

Durlauf et al. (2005) point out that earlier empirical studies that estimate an empirical version of the neoclassical growth model typically include variables that proxy for those suggested by the augmented Solow model. However, while the augmented Solow variables appear as the baseline of growth analysis the choice concerning which additional variable to include vary greatly among researchers. This is because there is no unifying theory on which growth determinants should be included in a growth regression. Therefore, in addition to adopting variables identified in augmented Solow model, the paper experiments with inclusion of selected long-run control variables based on the ranking of proxies and data availability in Sala-i-Martin et al. (2004) and Moral-Benito (2009).

2.4 Data and Variables

The database constructed for this paper consists of annual data from the Summers and Heston dataset (made available by Penn World Tables, version 7.1), World Development Indicators (WDI) and Polity-IV project dataset (made available by Marshall and Jaggers, 2010). Our data include a total of 13 variables (including the dependent variable) and I employ panel data series for 51 African countries (see Table 2.7 in appendices) over a period of 1960-2010. I split our sample to five-year period $(t = 5)$, so each country has 10 observations, for a maximum sample of 114 observations.

The paper's dependent variable is the growth rate of real GDP per capita obtained from PWT (7.1), while the following variables are used as controls. (i) The lagged value of per capita GDP. (ii) The investment share of GDP. (iii) The enrolment rate in secondary school education. (iv) Life expectancy. (v) Population growth. (vi) Inflation rate. (vii) Government consumption relative to GDP. (viii) Trade openness measured by imports plus exports as a share of GDP, and (ix) Polity2 as a measure of

institutions and governance. Polity2 measures a country's political regime characteristics in terms of political stability and quality of institutions. It is computed by subtracting polity's institutionalised autocracy (autoc) from its institutionalised democracy score to generate aggregate variable. It ranges from -10 to 10, with higher values indicating better institutions and governance system. These variables have been used extensively in cross-country growth regression and have been found to be significant in at least one study (see Durlauf et al., 2005).

The paper categorises natural resources exports into three different components, namely: agriculture, fuels, and minerals. This approach has several advantages compared to earlier studies. This is because disaggregating resource exports into agriculture, fuels, and minerals would allow us to look at the differences in behaviour for the different components of natural resources on economic growth instead of amalgamating them into one measure.

The three natural resource proxies constructed in the paper are as follows: First, an initial share of the different natural resource exports in GDP is calculated and taken for agriculture, fuels and minerals.[10] Second, each share is held constant overtime, but weighs at each point in time with the corresponding level of international prices. This methodology is similarly employed in Perez-Sebastian and Ravey (2016) when they construct their mineral rents proxy to investigate why resource endowments lead to divergent outcomes in resource rich countries. The paper argues that these proxies are exogenous since the initial share of each natural resource components is held constant overtime and therefore any variation investigated is entirely triggered by changes in international prices. On the other hand international commodity prices are typically not affected by the actions of individual countries as highlighted in Deaton and Miller (1995).

However, one may argue the idea that international commodity prices are not affected by individual countries that potentially could be main suppliers of these commodities in the world market goes against the standard international trade theory. Figures 2.1-2.3 (see appendix) shows the proportion of world exports of each natural

[10] All in the earliest year available for each country.

resource components for each country in our sample and affirms the proportion to be relatively low; therefore, we can conclude that international commodity prices are unlikely to be affected by the actions of individual countries in our sample. We also relax this approach and adopt alternative natural resource measures to check the robustness of our results.

Moreover, to address the concern that by taking the initial share of a resource component and hold it constant overtime, countries with larger resource exports are at a disadvantage, Figures 2.4-2.7 (see appendix) show that majority of countries that were largely resource abundant at the beginning of the period for each components appear to hold their relative ranking at the end period. Hence, keeping the share of each natural resource components constants can still capture accurately the countries' relative position with respect to their natural resource abundance overtime (Perez-Sebastian and Ravey, 2016).

2.5 Empirical Results

Tables 2.1 to 2.4 report results of estimating Eq. (2.1), first column reports results for the specification with the augmented Solow determinants, while second column shows results when adding economic policy control variables identified in Sala-i-Martin et al. (2004), and third column reports results with the inclusion of institutional quality and governance measure.

Table 2.1, columns 1 to 3 show estimation results using proxies for natural resources exports without correcting for endogeneity. In all the specifications columns 1 to 3 the paper finds agriculture and fuels affect economic growth negatively, but only agriculture is significant at 1 and 5 per cent levels, while minerals is ambiguous. The coefficient for the agriculture range from -0.2 to -0.3 in columns 1 to 3, thus, indicating that a 1 percentage point increase in the share of agriculture natural resource exports in GDP is associated with a reduction of -0.2 to -0.3 percentage points on economic growth. This result affirms the resource curse hypothesis.

Moreover, Table 2.2 columns 1 to 3, also shows results without correcting for the endogeneity but with a compounded measure for all the three natural resource

exports such as agriculture, fuels and minerals. The results show in all the three specifications natural resource exports proxy is negative and significant, at 10, 1 and 5 per cent level respectively. The coefficients range from -0.12 to -0.19. This finding is inline with the previous findings of a negative effect from natural resource exports on economic growth such as Sachs and Warner (1995), Leite and Weidmann (1999), Gylfason et al. (1999) and Sala-i-Martin and Subramanian (2003) among others. These studies find that natural resource exports are harmful to growth.

The empirical results presented so far (Tables 2.1 and 2.2) rely on the proxies for natural resource exports that do not correct for endogeneity. As explained in the previous section, this paper constructs exogenous proxies for three natural resource exports (agriculture, fuels and minerals) that account for endogeneity problem. Table 2.3, columns 1 to 3 shows estimation results using these proxies for natural resources exports. In all the specification of Table 2.3, columns 1 to 3 the paper finds fuels and minerals affect growth negatively, while agriculture affects growth positively even after controlling for variables found to be important for growth and endogeneity. This is in contrast with our initial findings in two ways. First, agriculture changed signs from negative to positive. Second, fuels and minerals are now not only negative but also significant.

Our results in Table 2.3 column 1 shows that agriculture is positively significant at 1 per cent level with a coefficient of 0.01. This implies that an increase in agriculture exports by 20 percentage points is associated with 0.2 percentage points increase in real per capita GDP growth. This asserts that the agriculture exports for an average economy would have to increase from 0.01 per cent to 0.03 to achieve a 0.3 percentage points increase in growth rate of real per capita GDP. This finding is consistent with the idea that agricultural exports are labour intensive, tend to generate fewer rents and are associated with less corruption. Moreover, given that 70-80% of the labour force in Africa is engaged in agriculture, a boom in the agriculture natural resource exports will increase income for not just the state but also for rural farmers. Dube and Vargos (2012) find that a rise in agriculture commodity price increases wages, thereby raising the opportunity cost of fighting. Thus, a rise in agricultural commodities decreased conflict in the municipalities cultivating agriculture goods.

On the other hand, Table 2.3 column 3 shows fuels and minerals affects growth negatively at 5 and 10 per cent level respectively. The coefficient for fuels is -0.01 and for minerals is -0.02. Our results confirm the resource curse hypothesis for this type of natural resource exports. Our result is inline with the previous findings in the empirical literature for example in Isham et al. (2003) and Sala-i-Martin and Subramanian (2003). They show that point-source resources (fuels and minerals) affect growth negatively. Furthermore, Dube and Vargos (2012) show that these types of natural resources are positively related to conflict. An alternative explanation for these types of natural resource negative effect to growth may be because, as fuels and minerals' exporters earn more income from their exports their budgetary spending or government consumption tend to increase, and in many instances the increase on spending will be on current expenditure or over-price capital expenditure. This in turn will increase corruption and misuse of funds, which will harm economic growth as shown by many empirical studies on corruption and growth in resource rich countries (see Leite and Weidamann, 1999).

We put our exogenous natural resources proxies into one compounded measure of natural resource exports and report the results in Table 2.4 columns 1 to 3. Our results show that natural resources exports proxy is positive in all specifications of columns 1 to 3 but not significant. If we compare these results with those in Table 2.3, we can clearly see that the amalgamation of the components of natural resources into one measure has obscured differences in their growth impact giving the expected differences in behaviour for the different components of natural resources.

Finally, we take an alternative natural resource measures; GDP share of forest rents, GDP share of fuels (oil, natural gas and coal) rents and GDP share of mineral rents respectively to check the robustness of our results. Perez-Sebastian and Ravey (2016) stress that these measures are relatively exogenous to growth because rents are not dependant on economy's capacity to exports, thus making it less correlated with development and growth. Moreover, in the African economies' context, resource rents are usually extracted by multi-national firms that bring their own technology and production factors, thus making these rents relatively independent of unobservable development indicators.

Table 2.5 columns 1 to 3 reports the robustness results using the alternative natural resources measures. Our results are very similar to our initial findings using price-based natural resources proxies. Agriculture has a strong positive effect on growth, although due to data limitation we can only use GDP share of forest rents for the agriculture. Our coefficient for agriculture increased significantly from 0.01 (in the price-based resources proxies' results) to 0.19 even after controlling for economic policies and institutional quality. Turning to the fuels and minerals natural resources. Our results show they each affect growth negatively. However, only fuels are statistically significant at 1 per cent level. The coefficients for fuels also increased to -0.08 from the earlier -0.01.

Lastly, we put our resource rents measures into one compounded measure and report the results in Table 2.6. The compounded resources rents measure shows a strong positive effect on growth in all specifications, but its coefficient power decreases as we go further to control for economic policies and institutional quality. These results further show that compounding natural resources into one measure will obscure differences in their respective growth impact.

2.6 Conclusion

This paper answered the question do different natural resources affect economic growth differently by constructing exogenous proxies for three different natural resource component, such as: agriculture, fuels and minerals to account for endogeneity problem and the differences in behaviour for the different components of natural resources on economic growth in Africa. The paper employed fixed effects panel estimation to take account of the unobservable country specific effects and to correct for the omitted variable bias problems that may arise from pure cross-sectional regression. Our results show that amalgamation of the components of natural resources into one measure may obscure differences in their growth impact giving the expected differences in behaviour for the different components of natural resources.

Agriculture natural resource exports show strong positive effects on economic growth in all the specifications. Thus, rejecting the notion for generalized natural resource curse asserted in Sachs and Warne (1995). While on the other hand fuels and

minerals affect growth negatively in all specifications even after controlling for quality of institutions and economic policy variables.

It is important to highlight though, it is not the existence of fuels and minerals natural resources as per se that seems to be the problem, rather it is the failure of resource rich countries to undertake appropriate policies to avert or mitigate the dangers that accompany such natural resources (Gylfason, 2001). Similarly, Van Der Ploeg (2011) highlights that many resource rich countries may have performed badly not because they relied too much on fuels and minerals resource, but because they failed in developing their natural resource potential through appropriate policies. Hence, the manifestation of adverse effects of these types of natural resources may largely depend not only on the quality of the country's institutions as per put forward by Salai-i-Martin and Subramanian (2003), but it also depends on employing appropriate economic policy (World Bank, 2012).

The policy implication that we can derive from these results are: First, for African economies especially those that rely on Fuels and Minerals exports need to develop good policy framework alongside good institutions and governance to ensure better use of export earnings and linkage to other economic productive sectors. Second, given that 70-80% of the labour force in Africa is engaged in agriculture and are locked into poverty with limited access to technologies, finance, markets and infrastructure to unlock their potentials, transforming the agriculture sector will have the largest impact on inclusive growth in the continent. In this regards, African countries need to design and implement effective development plan and industrial strategies to address constraints and tap opportunities to engage in value addition and commodity-based industrialisation.

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Appendix I

Table 2.1: Panel (FE) Growth Regression (NR Proxies)

	(1)	(2)	(3)
GDP (Log)	0.20 (0.10)	1.44 (0.77)	1.07 (0.54)
Popgrw (Log)	0.90 (1.99)	0.74 (1.45)	0.51 (1.00)
Investment	0.16*** (3.14)	0.06 (1.12)	0.06 (1.12)
Life Exp	0.17 (1.38)	0.14 (1.32)	0.11 (0.97)
Educ	0.03 (0.46)	0.02 (0.50)	0.00 (0.06)
Agric	-0.27*** (-2.66)	-0.26*** (-2.91)	-0.30** (-2.42)
Fuels	-0.05 (-0.32)	-0.15 (-1.05)	-0.11 (-0.82)
Minerals	0.03 (0.26)	-0.11 (-0.96)	-0.10 (-0.89)
Open		0.05*** (2.82)	0.02 (0.71)
Govt		-0.00 (-0.04)	0.05 (0.47)
Inflation		-0.12** (-2.13)	-0.14** (-2.18)
Polity2			0.13 (1.08)
Constant	-13.76 (-0.90)	-20.07 (-1.39)	-12.42 (-0.84)
Observation	90	89	81

Notes: Dependent variable is the growth rate of real GDP per capita, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 2.2: Panel (FE) Growth Regression (compounded NR proxy)

	(1)	(2)	(3)
GDP (Log)	0.67	1.40	0.87
	(0.34)	(0.76)	(0.45)
Popgrw (Log)	0.77*	0.59	0.44
	(1.71)	(1.22)	(0.91)
Investment	0.13***	0.04	0.04
	(2.62)	(0.89)	(0.83)
Life Exp	0.14	0.13	0.10
	(1.15)	(1.23)	(0.87)
Educ	0.04	0.03	0.03
	(0.67)	(0.75)	(0.55)
NR (Total)	-0.12*	-0.19***	-0.17**
	(-1.65)	(-2.95)	(-2.33)
Open		0.05***	0.03
		(2.95)	(1.35)
Govt		0.01	0.05
		(0.11)	(0.43)
Inflation		-0.15***	-0.16**
		(-2.84)	(-2.52)
Polity2			0.08
			(0.77)
Constant	-15.66	-18.98	-11.84
	(-1.02)	(-1.35)	(-0.82)
Observation	90	89	81

Notes: Dependent variable is the growth rate of real GDP per capita, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 2.3: Panel (FE) Growth Regression (exogenous NR Proxies)

	(1)	(2)	(3)
GDP (Log)	-5.15***	-8.37***	-8.93***
	(-2.71)	(-4.19)	(-4.36)
Popgrw (Log)	0.41	0.27	0.23
	(0.73)	(0.45)	(0.37)
Investment	0.30***	0.31***	0.32***
	(4.22)	(4.45)	(4.27)
Life Exp	0.33*	0.17	0.18
	(2.17)	(1.08)	(1.09)
Educ	0.10*	0.18***	0.19***
	(1.67)	(2.88)	(2.93)
Agric	0.01***	0.01***	0.01**
	(3.11)	(2.64)	(2.45)
Fuels	-0.01*	-0.01*	-0.01*
	(-1.71)	(-1.88)	(-1.84)
Minerals	-0.02***	-0.02**	-0.02**
	(-2.61)	(-2.54)	(-2.46)
Open		0.01	0.01
		(0.41)	(0.23)
Govt		0.10	0.11
		(0.71)	(0.75)
Inflation		-0.13*	-0.14*
		(-1.79)	(-1.82)
Polity2			-0.04
			(-0.32)
Constant	5.97	44.75**	49.65**
	(0.39)	(2.46)	(2.57)
Observation	114	111	103

Notes: Dependent variable is the growth rate of real GDP per capita, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 2.4: Panel (FE) Growth Regression (compounded NR exogenous proxy)

	(1)	(2)	(3)
Log GDP	-4.74**	-8.04***	-8.56***
	(-2.29)	(-3.70)	(-3.83)
Popgrw (Log)	0.71	0.46	0.44
	(1.20)	(0.72)	(0.65)
Investment	0.21***	0.25***	0.25***
	(2.94)	(3.33)	(3.17)
Life Exp	0.24	0.07	0.08
	(1.48)	(0.42)	(0.47)
Educ	0.07	0.15**	0.16**
	(1.07)	(2.27)	(2.29)
NR (Total)	0.00	0.00	0.00
	(1.18)	(0.91)	(0.75)
Open		-0.01	-0.01
		(-0.39)	(-0.18)
Govt		0.06	0.07
		(0.43)	(0.44)
Inflation		-0.15**	-0.16*
		(-1.95)	(-1.88)
Polity2			-0.04
			(-0.24)
Constant	12.59	55.11***	58.81***
	(0.77)	(2.82)	(2.85)
Observation	114	111	103

Notes: Dependent variable is the growth rate of real GDP per capita, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 2.5: Panel (FE) Growth Regression (Natural Resource Rent Measures)

	(1)	(2)	(3)
GDP (Log)	-6.56***	-6.46***	-6.61***
	(-7.37)	(-7.42)	(-7.38)
Popgrw	-0.22	-0.26	-0.28
	(-1.17)	(-1.38)	(-1.48)
Investment	0.12***	0.12***	0.12***
	(5.47)	(5.30)	(5.23)
Life Exp	0.04	0.02	-0.01
	(0.95)	(0.40)	(-0.16)
Educ	0.07***	0.06***	0.06***
	(3.55)	(3.40)	(3.19)
Agric_rents	0.21***	0.22***	0.19***
	(4.05)	(4.30)	(3.39)
Fuels_rents	-0.07**	-0.08***	-0.08***
	(-2.25)	(-2.71)	(-2.65)
Minerals_rents	-0.04	-0.02	-0.03
	(-0.48)	(-0.29)	(-0.38)
Open		-0.01	-0.02
		(-0.70)	(-1.63)
Govt		-0.12**	-0.10**
		(-2.44)	(-2.09)
Inflation		-0.00***	-0.00**
		(-2.68)	(-2.60)
Polity2			0.08
			(1.60)
Constant	41.73***	44.67***	47.91***
	(6.41)	(6.92)	(7.12)
Observation	307	302	293

Notes: Dependent variable is the growth rate of real GDP per capita, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 2.6: Panel (FE) Growth Regression (compounded NR rents)

	(1)	(2)	(3)
Log GDP	-7.85***	-7.87***	-7.64***
	(-8.26)	(-8.92)	(-8.40)
Popgrw (Log)	-0.21	-0.14	-0.18
	(-0.93)	(-0.56)	(-0.74)
Investment	0.20***	0.15***	0.16***
	(6.73)	(5.19)	(5.30)
Life Exp	0.04	0.01	-0.01
	(0.64)	(0.22)	(-0.15)
Educ	0.08***	0.08***	0.07***
	(3.69)	(3.71)	(3.14)
Resource_rents	0.15***	0.07**	0.06**
	(4.76)	(2.41)	(2.08)
Open		0.01	0.01
		(1.25)	(0.88)
Govt		-0.28***	-0.28***
		(-5.09)	(-5.08)
Inflation		-0.00*	-0.00
		(-1.72)	(-1.63)
Polity2			0.08
			(1.31)
Constant	48.00***	54.27***	54.34***
	(6.71)	(7.97)	(7.86)
Observation	318	311	302

Notes: Dependent variable is the growth rate of real GDP per capita, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 2.7: List of Countries

Algeria	Egypt	Mali	Sudan
Angola	Equatorial Guinea	Mauritania	Swaziland
Benin	Eritrea	Mauritius	Tanzania
Botswana	Ethiopia	Morocco	Togo
Burkina Faso	Gabon	Mozambique	Tunisia
Burundi	Gambia, The	Namibia	Uganda
Cameroun	Ghana	Niger	Zambia
Cape Verde	Guinea	Nigeria	Zimbabwe
Central African Rep.	Guinea Bissau	Rwanda	
Chad	Kenya	Sao Tome and Prin.	
Comoros	Lesotho	Senegal	
Congo, Dem Rep	Liberia	Seychelles	
Congo Rep	Libya	Sierra Leone	
Cote D'Ivoire	Madagascar	Somalia	
Djibouti	Malawi	South Africa	

Figure 2.1: Share of Agriculture Exports in Total World Exports by Country

Source: Author's calculation based on WDI data

Figure 2.2: Share of Fuels Exports in Total World Exports by Country

Source: Author's calculation based on WDI data

Figure 2.3: Share of Minerals Exports in Total World Exports by Country

Source: Author's calculation based on WDI data

Figure 2.4: Relative rank of resource dependence Initial VS. Last period: Agriculture

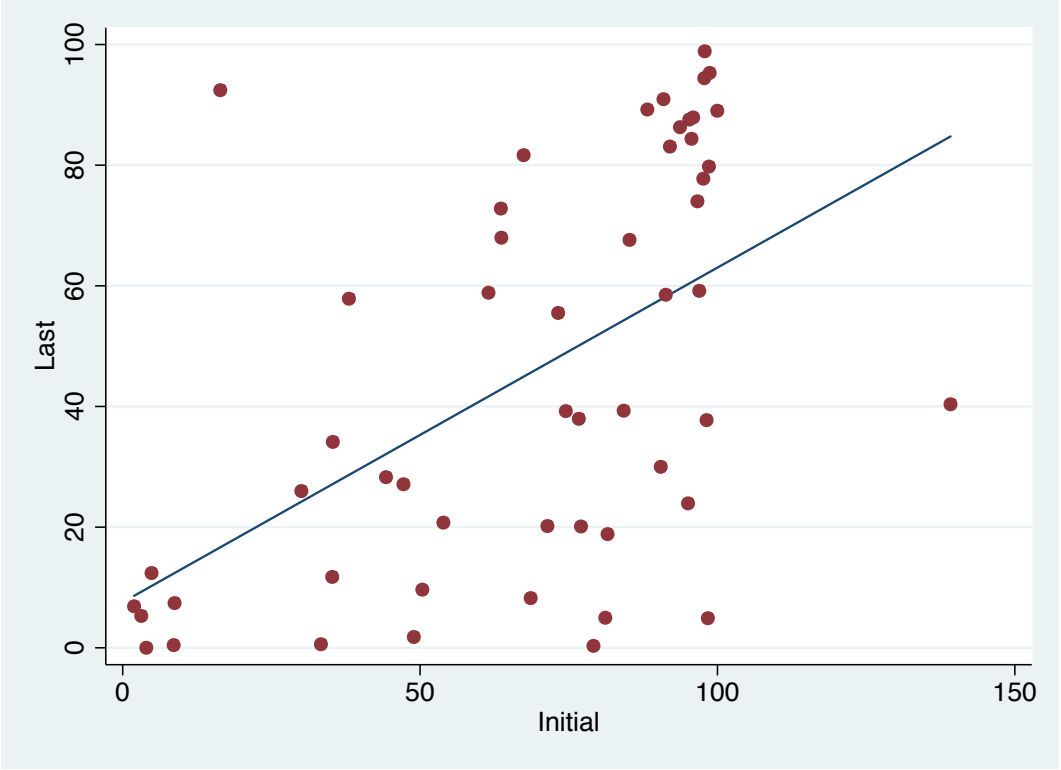


Figure presents the Spearman Correlation between the merchandise share of Agriculture exports (oil, natural gas and coal) in the initial and last period. ($\rho = 0.58$) (Source: WDI).

Figure 2.5: Relative rank of resource dependence Initial VS. Last: Minerals

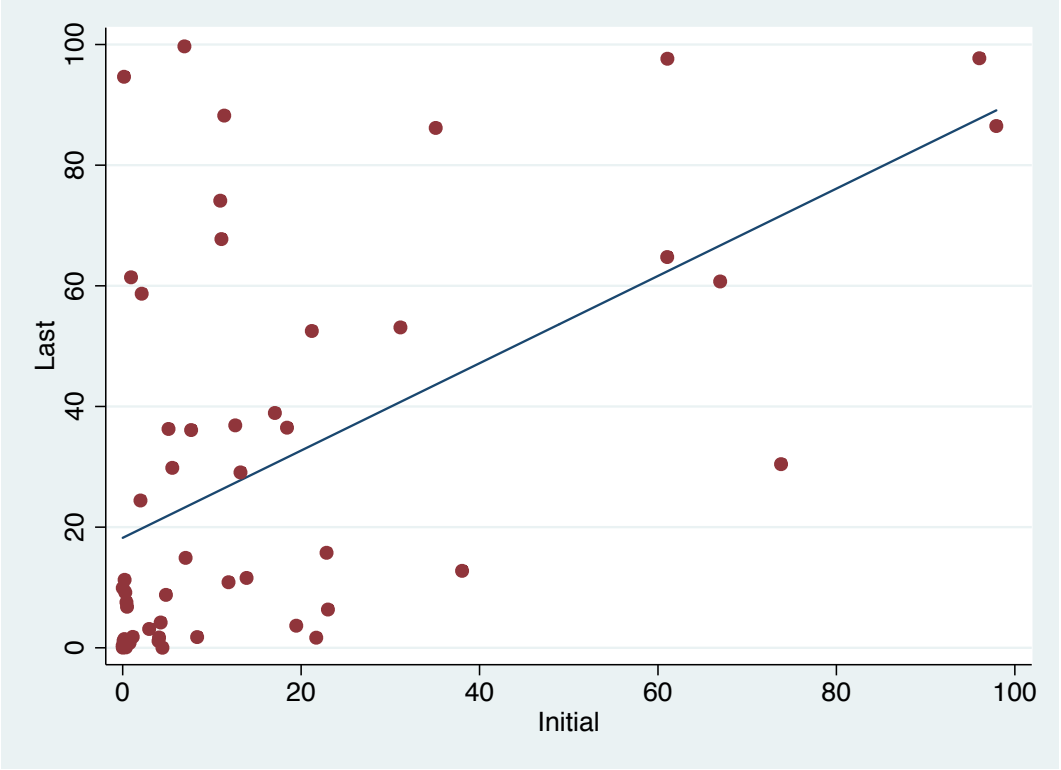


Figure presents the Spearman Correlation between the merchandise share of Minerals (Fuels, Ores and Metals) exports in the initial and last period. ($\rho = 0.57$) (Source: WDI).

Figure 2.6: Relative rank of resource dependence Initial VS. Last period: Fuels

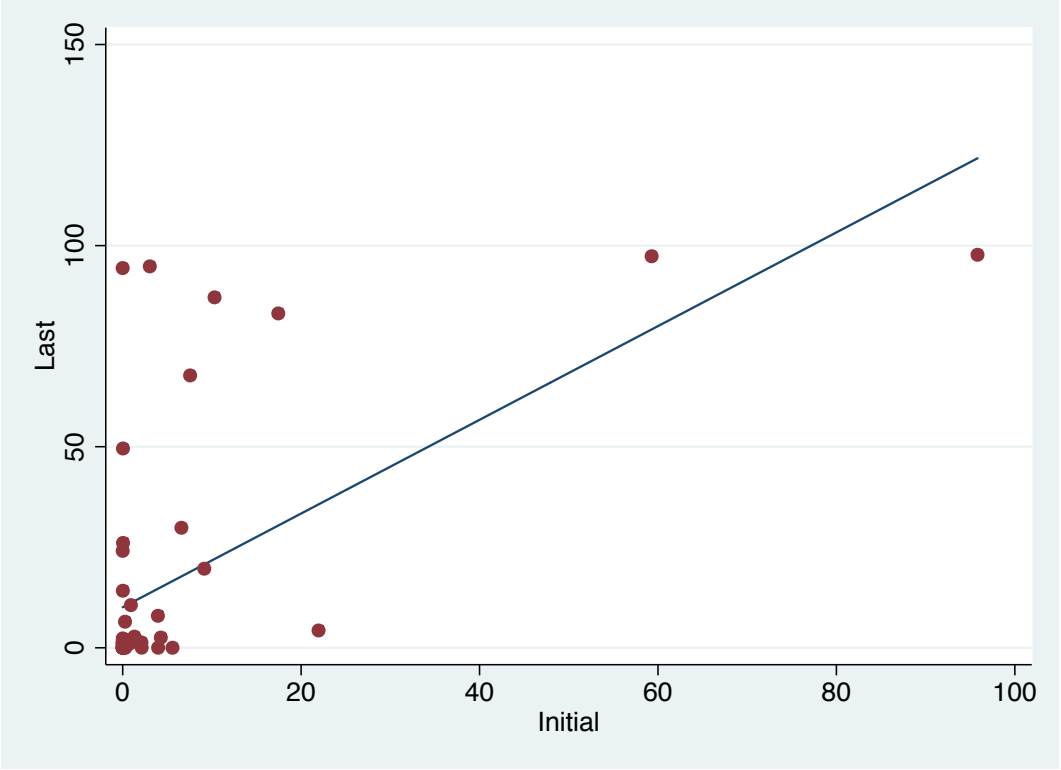


Figure presents the Spearman Correlation between the merchandise share of fuels exports (oil, natural gas and coal) in the initial and last period ($\rho = 0.45$) (Source: WDI).

Figure 2.7: Relative rank of resource dependence Initial VS. Last: Metals

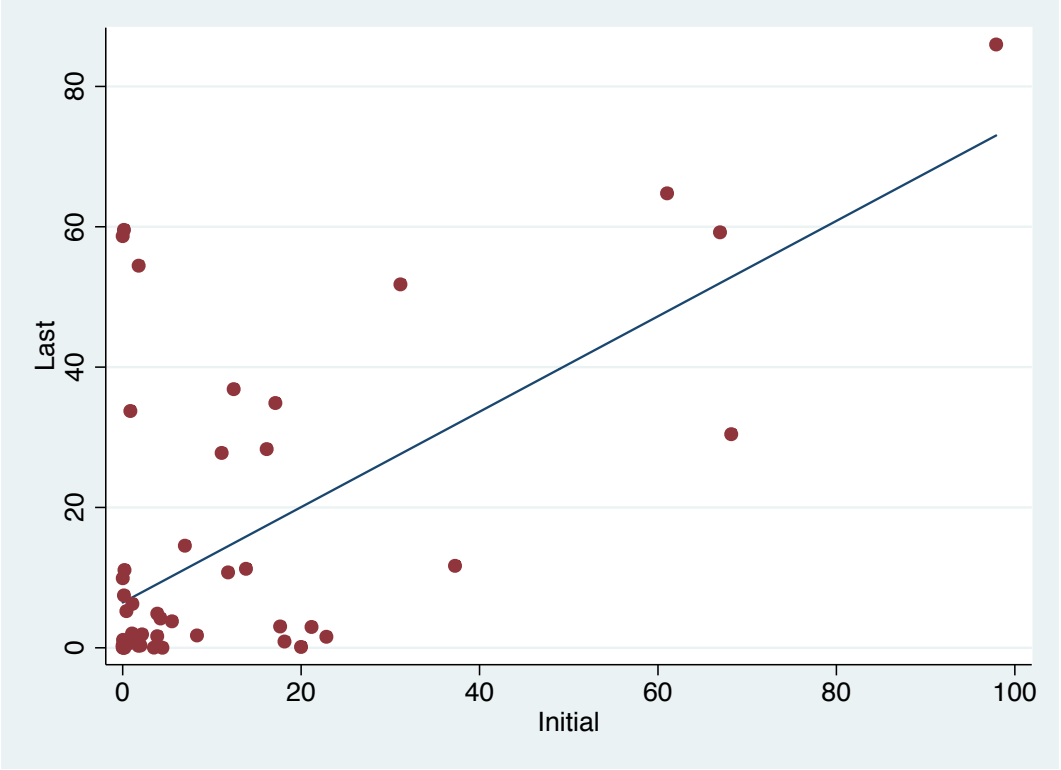


Figure presents the Spearman Correlation between the merchandise share of Ores and Metals exports in the initial and last period. ($\rho = 0.44$) (Source: WDI).

CHAPTER THREE

Does Foreign Direct Investment Accelerate Productivity?

3.1 Introduction

It has been widely argued that generating high sustained economic growth on which poverty alleviation and shared prosperity depend particularly in Sub Saharan Africa remains the most pressing issue to global development. Industrialisation and economic diversification on the other hand has been put forward to champion the route to high sustained economic growth and development since the industrial revolution of Great Britain and the recent fast economic transformation of East Asian countries. This route to the high sustained growth and development is further strengthened by the recent example of current economic chaos and policy dilemma in the wake of international commodity prices collapse in many African countries due to their overtly dependence on natural resources for exports and income earnings.

Yet, experience from the previous attempt in the 1960's by many developing countries including Nigeria to transform and diversify their respective economies through imports substitution industrialization (ISI) agenda had been futile due to what was seen starkly to weak productivity. It is almost a stylized fact since the seminal work of Solow (1957) that technological progress is the driving force of sustained economic growth. Findlay (1978) observes that technological change has been a requisite of modern economic growth. In fact, more than half of the cross-country variation in both income per capita and its growth results from differences in productivity and its growth (Caselli 2005; Easterly and Levine 2001; Hall and Jones 1999).

In principle, FDI is seen as a catalyst for productivity diffusion in the host country through its technology transfer and spillovers effect to the rest of the economy. Hymer (1960) asserts that FDI represents not simply a pure transfer of capital; rather, it represents a transfer of package in which capital, management, and new technology are all combined. Therefore, FDI is expected to help developing countries breach the technology gap and bring much-needed capital, exports

opportunities and management skills. It is however important to assert that these benefits cannot just happen automatically, rather the characteristics of the host country's industry and policy environment are important determinants that will enable it to reap these net benefits of FDI (Bloomstrom and Koko, 1997).

Despite the highlighted theoretical benefits of FDI to the recipient country in the literature, empirical evidence on the effect of FDI on economic growth is ambiguous. Some studies find that FDI affect growth positively (Bitzer and Gorg 2009; Woo 2009; Baltabaev 2014), while others find that the relationship is negative (Haddad and Harrison 1993; Aitken and Harrison 1999) or at best the impact is conditional on absorptive capacities of domestic country. Among those factors are the level of income (Bloomstrom et al., 1994), the level of trade openness (Balasubramanyam et al., 1996), the level of human capital (Borensztein et al., 1998) and the level of financial development (Alfaro et al., 2004). Other scholars for example, Aykut and Sayek (2007) argue that the impact is conditional on sectoral composition of FDI.

Moreover, it may also matter whether the dependent variable employed in the empirical studies is GDP or TFP growth. Because technological change is an important determinant of TFP, and most of the theories of spillovers from FDI relate to the improvement of domestic firms' technological progress and thus higher productivity growth to the host country, concentrating on TFP growth rather than GDP growth should be central to the analysis (Wang and Bloomstrom, 1992; Baltabaev, 2014). However, the majority of the empirical literature especially macro-studies concentrate on investigating the spillover effects from FDI to growth via GDP growth rather than TFP growth. Thus, there are limited studies that concentrate on TFP growth especially for developing countries and in most cases even those studies that did they mainly concentrated on firm level or industry level.

In addition, since this paper is interested in the high sustained economic growth puzzle in Africa and given that Solow (1957) postulates that technological progress is the driving force of sustained growth in GDP per capita, it would seem natural to concentrate on TFP growth rather than income. Alfaro (2009) concludes that the effect of FDI on growth operates through improvements in TFP rather than

factor accumulation and argues that this is consistent with the recent findings in the growth literature that show the important role of TFP over factor accumulation in explaining cross-country income differences.

According to Borensztein et al. (1998), Carkovic and Levine (2005) and Aykut and Sayek (2007), there are a number of grounds on which the empirical evidence on the FDI-growth nexus can be questioned. Firstly, the literature often fails to control for endogeneity problems. Secondly, the dependent variable used by many studies i.e. income growth is inadequate because the beneficial effects on growth of FDI come through higher efficiency rather than simply from higher capital accumulation. Lastly, the amalgamation of the sectoral composition of FDI into one measure may obscure differences in their respective growth impact since the benefits of FDI vary greatly across sectors.

Consequently, this paper contributes to the literature by investigating the effects of aggregate FDI as well as its sectoral composition (i.e. FDI in primary, manufacturing and services sectors respectively) on TFP growth using time series data and employing instrumental variable analysis to address the endogeneity problem. Due to lack of data on sectoral composition of FDI inflows, this paper focuses on Nigeria. However, to our knowledge, this study is the first to investigate the effect of aggregate and sectoral composition of FDI on TFP growth at a macro level. Although, it is worth to mention that Ayanwale (2007) employs sectoral FDI data for Nigeria, his study employed per capita income growth as a dependent variable rather than TFP growth and covers only 32 years (1970-2002). This paper covers a length of 47 years (1962-2009) and not only employs TFP growth as a dependent variable but it also uses a new productivity dataset developed by UNIDO-World Productivity Database.

The dataset enables us to have a richer and superior TFP estimate than was previously possible. The database is developed in a way that overcomes or at least minimizes the problems associated with the simple growth accounting methodology such as problems in measuring labour and capital inputs and assumption employed with respect to their prices (Barro and Sala-i-Martin, 2004).

The rest of the paper is structured as follows: Section (3.2) reviews the

literature. Section (3.3) discusses empirical model. Section (3.4) describes data and variables. Section (3.5) reports results and Section (3.6) concludes with policy implications.

3.2 Literature

Technological progress is the driving force of sustainable growth in the neoclassical growth model pioneered by Solow (1956). However, it is exogenously determined in the model. In this model FDI promotes growth only in the short run due to diminishing returns on capital in the long run. On the other hand, Modern growth theory endogenised the technological progress in the Solow model and put forward the view that FDI promotes growth through technological diffusion from the technological leaders to followers. Under this setting, unlike the neoclassical model, FDI promotes growth not only in the short run but also in the long run due to increasing returns in production via externalities and productivity spillovers (De Mello, 1997).

A number of studies highlight the channels through which technology spillovers from FDI can be transmitted to the host country such as: copying technology used by multinationals by the local firms (Wang and Bloomstrom 1992); skills acquisition by movement of trained labour from foreign owned firms to local firms that can bring new knowledge and advanced managerial skills (Dasgupta, 2012); and competition from multinationals entry, which will force the local firms to use their existing technology and resources more efficiently (Bloomstrom and Koko 1997). However, Bloomstrom and Koko (1997) caution that the realization of these benefits depends largely on the host country's industry and policy environment.

The seminal work of Findlay (1978) is seen as the corner stone of the FDI spillovers theory. His dynamic model asserts that the greater the technological gap between the backward and advanced regions the faster the rate at which the backward region can catch up. Though, the gap must not be too wide in order for the hypothesis to hold. He further argues that the presence of foreign firms in the backward region will enable the local firms not only to learn from advanced multinational's technology by imitation but also by imposing competitive pressure on them to improve their efficiency. All these would lead to higher productivity of domestic firms and spur economic growth. Blalock and Gertler (2009), Shen et al. (2010), and Baltabaev (2014) test the importance of technological gap in Findlay's model and find the interaction effect of FDI with technology gap to be robustly positive on economic

growth. However, Li and Liu (2005) argue that the positive effect only hold for developed countries with high technology-absorptive ability. Thus, implying a negative interaction effect of FDI with technology gap on economic growth in developing countries with low technology-absorptive ability.

Empirical literature on the effect of FDI on economic growth can be broadly classified into micro and macro studies. The former deals with the productivity effects of FDI spillovers on firms or plant using micro level data, while the latter deals with using aggregate FDI flows data for a broad cross-section of countries.

Using micro level data for Morocco, Haddad and Harrison (1993) reject the notion that foreign presence accelerates productivity growth in domestic firms. Similarly, Aitken and Harrison (1999) find no positive technology spillover from foreign firms to domestic firms in Venezuela between 1976 and 1989. In contrast, Liu and Wang (2003) find foreign presence as one of the most important factor enhancing productivity in Chinese industries. Javorcik (2004) and Bwalya (2005) also find similar results of positive technology spillover from foreign firms to domestic owned ones, but argue that the spillover only takes place through contact between foreign affiliates and their local suppliers in the upstream sectors i.e. backward linkages. Liu (2008) adds that, although FDI has a positive spillover through forward and backward linkages, the former seems to be statistically the most important channel through which spillovers occurs. An alternative explanation is put forward by Blalock and Gertler (2009), who argue that FDI technology spillovers are conditional on domestic firms' absorptive capacity and technology gap. Their results show that domestic firms with greater absorptive capacity, higher levels of human capital, but lower prior technical competency, are the prime beneficiaries of positive technology spillovers from FDI. Furthermore, they attribute the mixed evidence in micro studies due to heterogeneity in the capabilities of domestic firms.

On the other hand, macro studies test the effect of FDI on economic growth especially via interaction of FDI with certain domestic conditions in the host country. Blomstrom et al. (1994) show that FDI is a source of more rapid growth only in high-income developing countries. While Balasubramanyam et al. (1996) stress the importance of trade openness for obtaining growth-enhancing effects of FDI.

Similarly, Zhang (2001) using data for 11 economies in East Asia and Latin America find that the extent to which FDI is growth enhancing appears to depend on trade openness. In a cross-country analysis of 69 developing countries, Borensztein et al. (1998) find no evidence that trade openness and high income are critical. They argue that FDI has a positive growth-effect only when the recipient country has a minimum threshold stock of human capital. Bengoa and Sanches-Robles (2003) and Li and Liu (2005) findings also lend strong support to the critical role of human capital in accelerating positive effect of FDI on growth. In their excellently cited study, Alfaro et al. (2004) assert that countries with well-developed financial markets seem to gain significantly more from FDI. Their empirical results show that FDI affects growth positively in countries with well-developed financial markets. In the same vein, Durham and Benson (2004) also find that FDI has no direct positive effect on growth. Rather, the effect of FDI depends on the absorptive capacity of the host country via financial and institutional development.

Carkovic and Levine (2005) conclude that macro findings must be viewed skeptically because they often fail to control for simultaneity bias, country specific effects and the routine use of lagged dependent variables in growth regressions. He argues that these weaknesses can bias the coefficient estimates as well as the coefficients standard errors. The authors employ GMM panel estimator to address this problem and their results confirm that FDI does not indeed exert a reliable and robust positive impact on growth. However, unlike earlier macro studies they argue that the lack of an impact of FDI on growth does not depend on domestic conditions such as income level, trade openness, level of human capital or financial development.

Moving to the sectoral FDI studies, Alfaro (2003) examines the effect of total and sectoral FDI on growth and her results show that total FDI exerts an ambiguous effect on growth. As for the sectoral composition of FDI, her results show that FDI in the primary sector tends to have a negative effect on growth, while FDI in manufacturing has a positive effect on growth and evidence from service sector is ambiguous. Chakraborty and Nunnekamp (2008), and Aykut and Sayek (2007) also find similar results. However, Ayanwale (2007) findings show that FDI in manufacturing affects growth negatively, while FDI in primary and service sectors affects growth positively. These results point to the fact that the effect of FDI on

economic growth varies across sectors.

Most of the recent macro studies on FDI and economic growth shift concentration to investigating the effect of FDI on economic growth via total factor productivity, instead of per capita income growth. However, it is paramount to mention that these studies are limited especially for developing countries. Hee Ng (2007) employs panel data for 14 Sub Saharan African countries and finds limited evidence that FDI contributes to TFP, while Sisay (2008) finds a positive effect of FDI on TFP in the long run. Alfaro et al. (2009) show that the positive effect of FDI on TFP is subject to having a well-developed financial market, but Woo (2009) fails to find any significant evidence that the positive effect of FDI on TFP growth is conditional on the recipient country's capacity to absorb foreign technology. Thus, his results show that FDI has a positive and direct effect on TFP growth. Baltabaev (2014) using sys-GMM and new external instruments for FDI also finds that FDI significantly contributes to TFP growth directly, and also via its interaction with technology gap in the host country.

The review of the literature highlights the need for a macro study that would concentrate on FDI-growth nexus via TFP growth as put forward by Borensztein et al. (1998) who suggest that future research should concentrate on testing the effect of FDI on the rate of TFP growth in the recipient country since the beneficial effects of FDI on growth come through higher efficiency rather than simply from higher capital accumulation. Moreover, Aykut and Sayek (2007) highlight the need for future studies to consider not only on the effect of aggregate FDI but also on the sectoral composition of the FDI flows. This is because the benefits of FDI vary greatly across sectors (Alfaro, 2003).

Consequently, this paper investigates the effects of aggregate as well as sectoral FDI on TFP growth using time series data, and also employs instrumental variable analysis (2-SLS) to address potential endogeneity problem. Carkovic and Levine (2005) stress the need to reassess the empirical findings on growth and FDI especially macro studies with econometric procedure that will take care of endogeneity. They argue that previous studies must be viewed skeptically because majority of them ignore endogeneity issues.

3.3 Empirical Model

Following earlier studies (Findlay, 1978; Sisay 2008; Woo 2009; Baltabaev 2014), we hypothesize that FDI increases the efficiency of domestic firms in the recipient country. The growth factor of the increased efficiency or technological spillovers is captured by the growth of TFP since we are dealing with macro-analysis. Thus, a country's TFP growth is a function of FDI (Share of FDI flows in GDP) and other control variables (X). Our general model can be written as:

$$TFP = f(FDI, X) \tag{3.1}$$

Where X represents a vector of explanatory variables affecting growth of TFP. A review of the literature in section (3.2) shows that there are many variables that are possible candidates of vector (X). Recent studies (such as Findlay, 1978; Blomstrom et al., 1994; Balasubramanyam et al., 1996; Borensztein et al., 1998; Alfaro et al., 2004; Woo, 2009; and Baltabaev, 2014) have identified distance to technology frontier, trade openness, human capital, institutional quality, credit to the private sector, population growth and inflation as crucial determinants of TFP growth. With the consideration of our possible candidates of vector X, our equation (3.1) can be written as:

$$TFP = f(FDI, DTF, OPEN, HK, INST, PRIVCRE, POPGRW, INFL) \tag{3.2}$$

Where DTF is distance to technology frontier, OPEN is a measure of trade openness, HK is human capital, INST is institutional quality, PRIVCRE is credit to the private sector, POPGRW is population growth, and INFL measures inflation. With these considerations, as a benchmark, we investigate the effect of aggregate FDI on TFP growth based on the following equation:

$$TFPgrowth_t = \beta_0 + \beta_1 X_t + \beta_2 FDI_t + \varepsilon_t \tag{3.3}$$

Where $t = 1, \dots, T$, X_t is control variables and ε_t is the error term. Since we are also interested in investigating the effect of sectoral composition of FDI on TFP

growth, following Alfaro (2003) equation (3.3) can be written:

$$TFPgrowth_t = \beta_0 + \beta_1 X_t + \beta_2 FDI_t^j + \varepsilon_t \quad (3.4)$$

Where j corresponds to the primary (oil and agriculture), manufacturing or services sectors, respectively.

3.4 Data and Variables

To analyze the effect of aggregate and sectoral FDI on TFP growth, I use annual data for Nigeria covering the period of 1962-2009. The data for this study is collected from various sources: Summer and Heston dataset (made available by Penn World Tables, version 7.1), World Development Indicators (WDI), Central Bank of Nigeria (CBN) statistical bulletin, Polity-IV project dataset (made available by Marshall and Jaggers, 2010) and UNIDO-World Productivity Database.

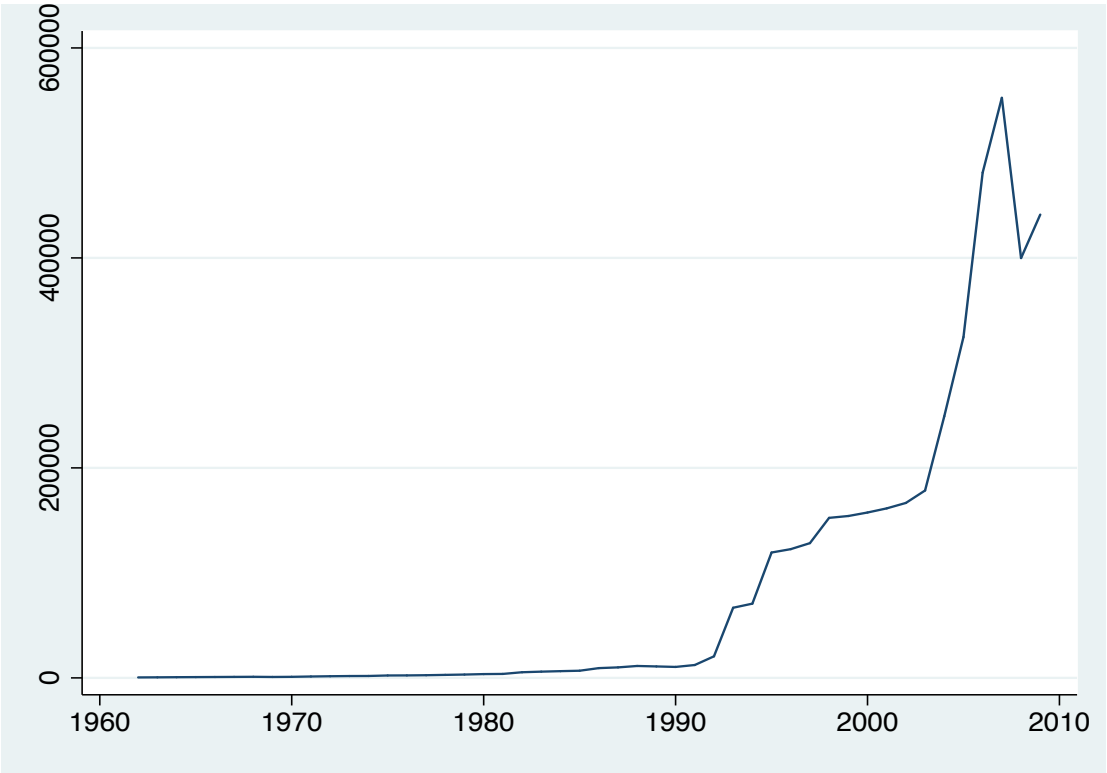
We obtained our dependent variable TFP growth from the new dataset developed by UNIDO-Word Productivity Database (WPD). The new dataset records TFP based on more than ten different measurement methods, several approaches to measuring capital and labour inputs, measures of technical progress and change in technical efficiency, and various specifications of the aggregate production function, including accounting for schooling and health (Isaksson, 2009). This dataset enables us to have a richer and superior TFP estimate than was previously possible. This is because it allow us to overcome or at least minimizes the problems associated with the simple growth accounting methodology such as problems in measuring labour and capital inputs and assumption employed with respect to their prices (Barro and Sala-i-Martin, 2004).

Our variables of interest aggregate FDI and sector components of FDI flows (primary, manufacturing and services sectors respectively) are obtained from the CBN statistical bulleting (various issues). Following earlier studies (Findlay 1978; Blomstrom et al., 1994; Balasubramanyam et al., 1996; Borensztein et al., 1998; Alfaro et al., 2004; Baltabaev 2014) the following variables are used as controls. (i)

Distance to technology frontier, measured as the ratio of the US technology level to Nigeria's technology level. (ii) Trade openness, measured by imports plus exports as a share of GDP. (iii) The enrolment rate in secondary school education. (iv) Institutions quality, measured by executive constraint. (v) Private credit by deposit money banks. (vi) Population growth, and (vii) Inflation. These variables have been used by the previous studies and are found to be important determinants of TFP growth. Table 3.1 shows the summary statistics (see appendix).

FDI inflows to Nigeria have been strongly influenced by the development of the oil sector, its world price and the government's policies (UNCTAD, 2009). As shown in Figure 3.1, FDI inflows increased significantly in Nigeria shortly after the indigenization policy (Nigerian Enterprises Promotion Decree (NEPD)) was relaxed and amended through the establishment of the Industrial Coordination Committee (IDCC). In addition, the flows also witnessed a sharp increase since the early 2000s, which is attributed to strong rise in the world oil prices.

Figure 3.1:
FDI inflows in Nigeria, 1962-2009
(Millions of Naira)



Source: Author's computed from CBN Statistical Bulletin

On the other hand, the sectoral composition of FDI flows in Table 3.2 shows a diminishing attention to primary sector from about 42.4% in 1962-1971 to 28.0% in 2002-2009, while manufacturing sector records a sharp increase from 20.5% to 36.8% over the same period. Services sector witness the sharpest decrease from about 30.6% in 1962-1971 to 12.1% in 2002-2009. We can therefore conclude from these figures that the establishment of private sector friendly policies such as IDCC in 1988 in Nigeria has undoubtedly paved the way for the positive increase of manufacturing sector FDI. This is a welcome development considering that manufacturing FDI has largely been argued to be the engine of technology spillovers to the rest of the economy in the host country. I also include Table 3.3 (see appendix), which shows percentage of sub-sectoral composition of FDI flows in Nigeria.

Table 3.2: Sectoral composition of FDI in Nigeria, 1962-2009 percentage

Year	*Primary FDI*	*Manufacturing FDI*	*Service FDI*
1962-1971	46.4	20.5	30.6
1972-1981	35.2	32.4	26.1
1982-1991	15.3	41.3	38.0
1992-2001	41.1	25.2	8.0
2002-2009	28.0	36.8	12.1

Source: Author's computation from CBN Statistical Bulletin

3.5 Empirical Results

Table 3.4 presents results for estimating equations 3.3 and 3.4 respectively. Column 1 tests the effect of aggregate FDI on TFP growth after controlling for other important determinants of TFP, while columns 2 to 4 estimate the effect of sectoral composition of FDI flows (i.e. primary, manufacturing and services sectors) on TFP growth respectively.

Our result in Table 3.4 column 1 shows that aggregate FDI has a positive and significant effect on TFP at 1 per cent level even after controlling for other TFP determinants. The coefficient for FDI is 0.22. This finding is similar to Woo (2009), who finds that a 1 percentage point increase in the annual share of FDI flows in GDP is associated with an additional 0.2 per cent growth of annual TFP. Our positive result for a direct effect of aggregate FDI on TFP supports the empirical findings of Li and Liu (2005) and Baltabaev (2014). On the other hand, our finding is in contrast with the findings of Alfaro et al. (2009) who do not find a direct positive effect from FDI on TFP.

Turning to the sectoral composition of FDI, our results in Table 3.4 columns 2 to 4 show FDI in primary, manufacturing and services sectors have strong positive and significant effects on TFP growth at 1 and 10 per cent significant levels respectively. The coefficients are 0.36 for FDI in primary sector, 0.81 for FDI in manufacturing sector and 1.76 for FDI in services sector. From these results we observe that FDI in services sector has the highest potential to increase TFP growth, followed by FDI in manufacturing and FDI in primary sectors. The coefficient for FDI in services sector implies that a 1 percentage point increase in annual share of services FDI flows in GDP would lead to an additional 1.7 per cent growth of annual TFP. Ayanwale (2007) asserts that FDI in services sector has the highest potential to grow the economy in Nigeria.

Our positive finding on the effect of manufacturing FDI are in line with the empirical findings of Alfaro (2003), Aykut and Sayek (2007) and Chakraborty and Nunnekamp (2008). However, while we also find a positive and significant effect of primary sector FDI, these studies find that FDI in primary sector has a negative and

significant effect on TFP, which is in sharp contrast with our positive findings. This can be attributed to the difference in our sample of countries as well as measurement of our dependent variable. For example, in contrast to these studies, our paper focuses only on Nigeria, which is a resource rich country and used TFP as our dependent variable instead of per capita income growth.

We recognize endogeneity issues could bias the results in Table 3.4. To address the endogeneity problem this paper employs instrumental variables (IV) estimation procedure 2SLS. The choice of appropriate instruments is derived by UNCTAD (2009) investment policy review for Nigeria, which emphasized the importance of domestic policies in attracting and retaining FDI. Following previous studies we also employ lagged FDI and exchange rate.[11] Thus, we used policy change (shock) dummy, exchange rate and lagged FDI as instruments. We report first stage F-test, and over identification tests (Sargan and Basmann) in Tables 3.5, 3.6 and 3.7 as well as first-stage results of 2SLS regressions in Table 3.8, 3.9, and 3.10 to show that our instruments are valid.

After controlling for endogeneity problem our result in Table 3.5 column 1 shows aggregate FDI still maintains a direct positive and significant effect on TFP at 5 per cent level with a coefficient of 0.14. On the sectoral composition of FDI, Table 3.5 columns 2 to 4 show all the three sectors (primary, manufacturing and services) maintain their respective strong positive and significant effect on TFP growth. In fact, the coefficients for primary and services sectors increase to 0.39 and 2.46 respectively. Thus, even after controlling for the potential endogeneity problems we still find a statistical positive effect from FDI on TFP in all specifications. This clearly implies that FDI is indeed an important factor of technological transfer in the host country as put forward by the theoretical literature on spillovers from FDI.

Moreover, given the fact that most of the available empirical literature investigates the effect of FDI on economic growth via income per capita growth channel instead of TFP growth, we replace our dependent variable (TFP growth) with per capita income growth and report the results in Table 3.6 columns 1 to 4. Our

[11] See Wheeler and Mody (1992), Aykut ans Sayek (2007), Ayanwale (2007) and Alfaro et al. (2009).

result is still positively significant even after replacing our dependent variable with per capita income growth. For the direct effect of aggregate FDI, the coefficient is 0.13, which is in fact similar with the earlier IV-2SLS coefficient of 0.14 in Table 3.5 column 1 using TFP growth. However, the significance level dropped to 10 per cent. The sectoral components of FDI are also positively significant as shown in columns 2 to 4. The size of the coefficients however varies. For example, while the services FDI coefficient decreased to 1.58 from 2.46, manufacturing and primary FDI coefficients increased significantly respectively (i.e. from 0.48 to 0.59, and from 0.48 to 0.60) in the earlier IV-2SLS estimation with TFP growth in Table 3.5 columns 2 to 4.

Furthermore, considering that Nigeria is one of the world's top oil exporters and Africa's largest economy with an impressive growth in the telecommunications sector, we divide our sectoral composition of FDI into three sub-sectors, such as oil, communications, and trade and business in order to test how each sub-sector affect TFP growth. Our results in Table 3.7 columns 1 to 3 show FDI in oil, communications, and trade and business affect TFP growth positively. The coefficients are 0.39 for Oil FDI, 13.77 for communications FDI, and 3.06 for trade and business FDI. These results further assert the importance of FDI as well as all the three sub-sectors in accelerating TFP growth in Nigeria. However, communications FDI shows to have the highest positive effect on TFP growth. The coefficient for communications FDI asserts that a 1 percentage point increase in annual share of communications FDI flows in GDP is associated with an additional 16.4 per cent growth of annual TFP.

3.6 Conclusion

This paper answered the question: does FDI accelerate productivity growth, by investigating the effect of aggregate FDI as well as its sectoral composition (i.e. primary, manufacturing and services sectors) on TFP growth in Nigeria using a new productivity dataset developed by UNIDO-World Productivity Database. This dataset enables us to have a richer and superior TFP estimate than was previously possible by recording TFP based on more than ten different measurement methods, several approaches to measuring capital and labour inputs, measures of technical progress and change in technical efficiency, and various specifications of the aggregate production

function, including accounting for schooling and health (Isaksson, 2009). The paper used instrumental variables (IV) estimation procedure 2SLS to address endogeneity problem that plagued the previous empirical literature. Our results show that FDI (both aggregate and sectoral composition) has a statistically significant and direct positive effect on TFP growth in all specifications. This is consistent with the notion that FDI is a vital source of technological transfer in the host economy. These findings are inline with the recent empirical findings of Li and Liu (2005), Woo (2009) and Baltabaev (2014).

The policy implication of our analysis is that FDI should be welcomed and encouraged into all the economic sectors, especially in manufacturing and services sectors since they generate more positive effects on productivity. This will aid Nigeria to address the weak productivity problem and help with the structural transformation and industrialization agenda. Furthermore, our results also assert the importance of access to finance and trade openness in accelerating productivity growth. Therefore, the government needs to create and implement specific policies and programs that would allow the private sector and entrepreneurs to gain access to finance and also pursue policies that will encourage trade openness.

Although this paper finds a positive effect from aggregate and sectoral composition of FDI on TFP growth, further research may be necessary to advance FDI growth literature i.e. by including more African countries once data for sectoral composition of FDI becomes available. Our results show that it would be worthwhile to take a closer look at the sectoral composition of FDI at the macro level. Therefore, as a caveat our findings have to be taking with caution, because we focused on Nigeria and thus end up with only 39 time-series data points in our regression results. This is due to the following limitations: firstly, there is lack of access to data on sectoral composition of FDI for other countries, and secondly the data on education (school enrollments) is very limited for Nigeria.

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Appendix II

Table 3.1: Summary Statistics

Variable	*Observations*	*Mean*	*SD*	*Minimum*	*Maximum*
TFP growth	48	0.768	7.536	-25.97	18.938
Foreign Direct Investment	48	26.805	21.527	1.831	87.110
Distance to TFR (DTF)	48	0.154	0.061	0.04	0.265
Trade Openness (OPEN)	48	50.993	10.737	28.798	81.583
Human Capital (HK)	39	17.203	14.763	0	45.104
Executive Constraint	48	-0.667	18.571	-88.0	7
Credit to Private Sector	48	11.512	6.012	3.293	36.010
Populations Growth	48	2.638	0.361	1.923	3.112
Inflation (INFL)	48	17.931	22.364	-5.666	113.076
Primary FDI	48	9.779	7.467	-0.161	21.035
Manufacturing FDI	48	8.234	8.595	0.861	37.095
Services FDI	48	4.065	2.778	0.533	10.653

Notes: All the FDI and Credit to Private Sector variables are measures as a % of GDP

Table 3.3: Sub-sectoral composition of FDI in Nigeria, 1962-2009 percentage

Year	*Mining & quarrying*	*Manufacturing*	*Agriculture*	*Building & construction*	*Transport & communication*	*Trade & business*
1962-1971	45.3	20.5	1.2	2.9	1.19	26.5
1972-1981	33.9	32.4	1.3	5.8	1.27	19.1
1982-1991	13.8	41.3	1.5	6.7	1.51	29.8
1992-2001	40.5	25.2	0.7	2.4	0.66	5.0
2002-2009	26.2	36.8	1.8	2.3	1.83	8.1

Source: Author's computation from CBN Statistical Bulletin

Table 3.4: Total Factor Productivity Regression

	(1)	(2)	(3)	(4)
DTF	145.35***	120.81***	156.44***	113.45***
	(3.95)	(2.97)	(5.26)	(3.21)
Openk	0.36***	0.45***	0.23**	0.36**
	(2.65)	(2.85)	(2.04)	(2.55)
Education	0.09	0.16	0.02	-0.03
	(0.83)	(1.08)	(0.18)	(-0.26)
Institution	-0.00	-0.01	-0.01	0.00
	(-0.05)	(-0.08)	(-0.21)	(0.03)
Private credit	0.54**	0.42	0.61***	0.59**
	(2.11)	(1.44)	(2.92)	(2.20)
Pop growth	-4.99	-7.95	-2.81	-7.96
	(-0.87)	(-1.24)	(-0.59)	(-1.38)
Inflation	0.07	0.10	0.07*	0.08
	(1.34)	(1.15)	(1.75)	(1.51)
FDI	0.22***			
	(3.41)			
FDIPRIM		0.36*		
		(1.77)		
FDIMANUF			0.81***	
			(5.62)	
FDISERV				1.76***
				(2.96)
Constant	-41.51***	-33.06*	-42.74***	-28.19**
	(-2.77)	(-1.79)	(-3.73)	(-2.04)
Observations	39	39	39	39
R-squared	0.52	0.39	0.68	0.48

Notes: Dependent variable is total factor productivity growth, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 3.5: Total Factor Productivity Regression (IV 2SLS)

	(1)	(2)	(3)	(4)
DTF	126.47***	123.20***	130.56***	126.47***
	(3.70)	(3.36)	(4.42)	(3.77)
Open	0.37***	0.45***	0.30***	0.33**
	(3.05)	(3.26)	(2.70)	(2.53)
Education	0.07	0.17	0.02	-0.00
	(0.71)	(1.27)	(0.27)	(-0.03)
Institution	-0.00	-0.01	-0.01	0.00
	(-0.08)	(-0.10)	(-0.18)	(0.02)
Private credit	0.48**	0.43*	0.52**	0.61**
	(2.07)	(1.66)	(2.53)	(2.45)
Pop growth	-7.04	-7.68	-6.02	-7.07
	(-1.34)	(-1.35)	(-1.30)	(-1.32)
Inflation	0.06	0.11	0.06	0.08
	(1.25)	(1.35)	(1.48)	(1.49)
FDI	0.14**			
	(2.06)			
FDIPRIM		0.39*		
		(1.86)		
FDIMANUF			0.48***	
			(2.72)	
FDISERV				2.46***
				(3.48)
Constant	-30.86**	-35.03**	-30.21**	-33.68**
	(-2.16)	(-2.01)	(-2.59)	(-2.49)
Observations	39	39	39	39
F-test	38.78	36.50	22.69	20.48
	(0.000)	(0.000)	(0.000)	(0.000)
Sargan (p-v)	0.171	0.124	0.406	0.128
Basmann (p-v)	0.226	0.171	0.470	0.176

Notes: Dependent variable is total factor productivity growth, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 3.6: Per Capita GDP (IV 2SLS)

	(1)	(2)	(3)	(4)
DTF	-2.52	5.03	12.00	-16.53
	(-0.07)	(0.14)	(0.34)	(-0.54)
Open	-0.02	0.09	-0.12	-0.03
	(-0.18)	(0.69)	(-0.88)	(-0.27)
Education	-0.01	0.08	-0.06	-0.10
	(-0.15)	(0.74)	(-0.62)	(-1.09)
Institution	0.08*	0.07	0.08	0.09*
	(1.69)	(1.23)	(1.54)	(1.82)
Private credit	-0.84***	-0.68**	-0.76***	-0.74***
	(-3.60)	(-2.56)	(-3.14)	(-3.13)
Pop growth	-4.21	-2.51	-1.91	-5.29
	(-0.80)	(-0.43)	(-0.34)	(-1.06)
Inflation	-0.08*	-0.00	-0.08	-0.06
	(-1.84)	(-0.04)	(-1.63)	(-1.38)
FDI	0.13*			
	(1.94)			
FDIPRIM		0.59***		
		(2.69)		
FDIMANUF			0.60***	
			(2.85)	
FDISERV				1.58**
				(2.36)
Constant	22.09	3.25	17.60	25.80**
	(1.53)	(0.19)	(1.26)	(2.08)
Observations	39	39	39	39
F-test	33.63	20.54	22.69	19.59
	(0.000)	(0.000)	(0.000)	(0.000)
Sargan (p-v)	0.296	0.103	0.309	0.740
Basmann (p-v)	0.361	0.145	0.374	0.774

Notes: Dependent variable is total factor productivity growth, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 3.7: Total Factor Productivity Regression (IV 2SLS Sub-Sectors)

	(1)	(2)	(3)
DTF	123.16***	142.14***	111.49***
	(3.37)	(5.16)	(3.50)
Open	0.45***	0.29***	0.37***
	(3.27)	(2.77)	(2.89)
Education	0.17	0.03	-0.07
	(1.27)	(0.38)	(-0.73)
Institution	-0.01	-0.02	-0.00
	(-0.11)	(-0.57)	(-0.04)
Private credit	0.43*	0.23	0.70***
	(1.67)	(1.17)	(2.78)
Pop growth	-7.67	-7.30*	-6.91
	(-1.35)	(-1.70)	(-1.31)
Inflation	0.11	0.08**	0.10**
	(1.36)	(1.95)	(2.05)
FDI_OIL	0.39*		
	(1.87)		
FDI_TCOM		13.77***	
		(5.07)	
FDI_TBUS			3.06***
			(3.72)
Constant	-35.13**	-25.77***	-34.22***
	(-2.01)	(-2.62)	(-2.64)
Observations	39	39	39
F-test	36.32	117.70	20.50
	(0.000)	(0.000)	(0.000)
Sargan (p-v)	0.124	0.903	0.168
Basmann (p-v)	0.172	0.917	0.223

Notes: Dependent variable is TFP growth, *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 3.8: Total Factor Productivity Regression (First-Stage IV 2SLS)

	(1) FDI	(2) FDIPRIM	(3) FDIMANUF	(4) FDISERV
Policy dummy	30.68***	16.12***	5.31**	1.72**
	(4.80)	(6.65)	(1.90)	(2.02)
Exchange rate	0.42***	0.09***	0.20***	0.05***
	(4.66)	(2.91)	(5.05)	(5.05)
Observations	39	39	39	39
F-test	33.63	20.54	22.69	19.59
	(0.000)	(0.000)	(0.000)	(0.000)
Sargan (p-v)	0.296	0.103	0.309	0.740
Basmann (p-v)	0.361	0.145	0.374	0.774

Notes: *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 3.9: Per Capita GDP (First-Stage IV 2SLS)

	(1) FDI	(2) FDIPRIM	(3) FDIMANUF	(4) FDISERV
Policy dummy	25.87***	16.70***	5.31**	1.71**
	(3.48)	(4.82)	(1.90)	(1.99)
Exchange rate	0.40***	0.08**	0.11***	0.05***
	(4.10)	(2.04)	(5.05)	(4.94)
Observations	39	39	39	39
F-test	33.63	20.54	22.69	19.59
	(0.000)	(0.000)	(0.000)	(0.000)
Sargan (p-v)	0.296	0.103	0.309	0.740
Basmann (p-v)	0.361	0.145	0.374	0.774

Notes: *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 3.10: TFP Regression (First-stage IV 2SLS Sub-Sectors)

	(1) **FDI_OIL**	**(2)** **FDI_TCOM**	**(3)** **FDI_TRBUS**
Policy dummy	15.90*** (6.62)		1.23* (1.70)
Exchange rate	0.09*** (2.92)	0.01*** (2.71)	0.04*** (5.27)
LagFDI_TCOM		0.71*** (4.54)	
Observations	39	39	39
F-test	36.32 (0.000)	117.70 (0.000)	20.50 (0.000)
Sargan (p-v)	0.124	0.903	0.168
Basmann (p-v)	0.172	0.917	0.223

Notes: *t*-statistics in parentheses.
*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

CHAPTER FOUR

Promoting Manufacturing to Accelerate Economic Growth and Reduce Growth Volatility in Africa[12] [13]

4.1 Introduction

Africa's economic performance during the last two decades of the 20th century was characterized by low growth rates, averaging less than 3 percent during 1980-1999, and high volatility compared to other developing regions. Low and volatile growth in Africa was attributed to various institutional, policy and geographic factors (Ndulu *et al.* 2007). In most African countries growth instability was associated with high commodity dependence (World Bank *et al.* 2000).

Since the turn of the 21st century, strong global commodity demand and prices underpinned Africa's relatively high growth performance, averaging 5.5 percent during 2000-2008. Other factors behind Africa's recent growth recovery include improved macroeconomic management, increased foreign capital flows, debt relief and improved performance in non-oil sectors such as agriculture, services and tourism (UNECA and AUC, 2010). However, Africa's growth remains highly volatile, jobless and below the level needed to achieve the Millennium Development (MDGs) and other social goals, while industry and particularly manufacturing continues to have the least share in aggregate output and contribution to GDP growth in most African countries (UNECA and AUC, 2010). The share of manufacturing in Africa's GDP fell over time.

Commodity dependence exposes African economies to shocks emanating from volatility of external commodity markets, exchange rate fluctuations, high global interest rates, climate change and political strife associated with poor natural resource management. Indeed, terms of trade and other exogenous factors such as weather and general political instability and uncertainty are often found to have a dominant impact on growth in Africa (Ndulu *et al.* 2007). Civil conflicts have a

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strong external influence on economic performance in Africa because they have the tendency to spill over political borders, disrupting trade links and diverting government attention and resources as well as donor aid away from investment in infrastructure and long-term development to humanitarian assistance (Mkandawire and Soludo, 1999).

Economic governance and management in many African countries has been weak owing to lack of relevant institutions and inadequate capacity that result in poor policy design and implementation as well as poor accountability and frequent policy shifts or discontinuity (UNECA and AUC, 2011). Also, economic management often focused on short-term crisis management instead of long term planning and suffered from external debt burden and interventions by international financial institutions and donors. This has often adversely affected policy flexibility or space and development effectiveness while weak institutions and poor infrastructure contribute to high investment costs and low productivity in Africa, discouraging private investments.

It is now evident that market-oriented policy reforms would not succeed in Africa if they are not adequately supported by a conducive overall governance framework and an enabling business environment characterized by adequate infrastructure, human capital and quality bureaucracy. In the long-term, the benefits from high commodity prices will only be maximized and sustained to the extent that commodity revenues are effectively utilized to ensure diversification of the sources of growth and export base. In this regard, the African Union Commission (AUC) adopted "industrialization" as the thematic focus of its January 2008 Head of States and Governments Summit and called for acceleration of Africa's industrial development for both resource-poor and resource-rich countries to promote broad-based and sustainable growth (AUC, 2008).

In this paper, we attempt to assess the key determinants of growth in the share of manufacturing output in GDP and investigate the question of whether increased manufacturing output relative to aggregate output is associated with higher growth and stability**.** By focusing on manufacturing the paper explores one dimension of economic diversification that has not been adequately analysed in recent research on

the topic (see e.g. UNECA, 2007). However, this focus does not imply that the domain of industrial policy should be limited to manufacturing.

Section 2 of the paper provides a review of theoretical and empirical literature, while Section 3 presents the analytical framework of the paper along with a preliminary analysis of the data. Section 4 quantitatively analyses the relationship between manufacturing value added and GDP growth and volatility in Africa and discusses our estimation results. Section 5 concludes with policy implications.

4.2 Literature Review

There are numerous factors that influence growth. These factors can be summarized in the framework of the standard production function in which output and growth depend on capital, labour and total factor productivity (TFP). In this framework, modern growth theory identify two fundamental sources of economic growth in terms of factor accumulation - including, but not limited to, investment in physical and human capital as well as increases in the labour force - and growth in TFP (Aghion and Howitt, 2009; Ghura, 1995). "Increases in the quantities of inputs, assuming no increase in TFP, will increase output at the rate of factor accumulation while increases in TFP without increases in factor accumulation, will result in the economy growing at the rate of growth of TFP" (UNECA and AUC, 2010:120).

The factors that underpin growth in TFP include the generation of new ideas, new technologies, as well as policies, institutions and markets that influence incentives and the allocation of resources (e.g. Fosu and O'Connell, 2006). Good economic institutions are defined as institutions that secure properly functioning bureaucracies and the provision of law and order (Johnson *et al*. 2010). Because these institutions protect property rights and enable contract enforcement, they reduce potential losses, particularly in innovative and vibrant manufacturing industries characterized by high-fixed costs and significant transaction costs. As a result, these institutions encourage investment both in human and physical capital. Good institutions also reduce the costs of entry and costs of trading, therefore encouraging economic activity in all sectors, including those with significant positive externalities.

Even where good institutions exist, they have to be well coordinated in order for them to produce the desired outcome.

In contrast, weak economic and political institutions are associated with ineffective resource allocation systems, high income inequality, corruption and weak incentives for innovative long-term investment and private sector development. Also, weak economic and political institutions cannot deliver sustained economic growth and transformation, although they might sometimes create conducive conditions for notable growth episodes (Satyanath and Subramanian, 2007). Unequal societies, often symptomatic of such institutions, are less likely to effectively manage distributional effects associated with exogenous shocks. They are, therefore, prone to policy mistakes, inconsistency and instability (Fosu and O'Connell, 2006).

Accelerating growth requires effective policy frameworks that facilitate the reallocation of factors of production from less productive sectors to more productive ones and diversification of the economy away from primary commodity sectors into high value added industry and services. Sound microeconomic and macroeconomic policies constitute powerful enablers in this process (Fischer 2003). Good microeconomic policies, including trade reforms and liberalization, can help remove price distortions and allow an efficient allocation of goods and factors of production to deliver substantial productivity gains that are essential for economic growth.

Good macroeconomic policies are often defined in terms of economic policy outcomes such as low inflation rates, positive real interest rates, competitive real exchange rates, and low fiscal and current account deficits or surpluses (Calamitsis *et al.* 1999). Although disagreements abound in the literature over which of these macroeconomic policies are conducive to economic growth, the consensus seems to be that maintaining a relatively stable and competitive exchange rate is an essential ingredient for a successful diversification of production and export bases and to high and sustainable growth (Johnson *et al.* 2010). Good policies, including industrial and trade policies, infrastructure and institutions are particularly important for countries to attract foreign capital and exploit natural resources (Asiedu, 2006). They are also important for countries to respond to challenges of environment and climate change that influence the quality and quantity of production factors such as labour and land

and therefore contribute to determining the pace of growth as an economy branches out into new dynamic sectors.

Growth theory implicitly assumes that the state has the capacity to design and implement sound policies and hence they do not pay sufficient attention to the factors that constrain state capacity. Yet the issue of state capacity has emerged as an important factor affecting economic and social development in developing countries especially in Africa (UNECA and AUC, 2011). Recent literature draws several lessons on the role of the State vis-à-vis the market in the process of economic transformation and development. For example, after reviewing the factors that underpinned recent economic development in East Asia, Aryeetey and Moyo (2012:79) concluded that "a healthy combination of market policies and State intervention" is important for developing countries to diversify and achieve fast and sustainable growth. Governments need to pursue country-specific development strategies with clear industrial objectives and measures to achieve those objectives. These measures normally include policies to address market failures, support private sector development, improve bureaucratic capacity, and promote new technology as well as finance especially for new and innovative industries.

Extensive empirical evidence underscores the importance of various economic, institutional policies and other factors in promoting economic growth, industrialization and economic transformation and greater economic stability. Economic factors include such variables as investment, government spending, inflation, and population growth. In a sample of developing countries, Tang *et al.* (2008) found domestic investment and foreign direct investment (FDI) as significant drivers of long-term economic growth. According to, Schmidt-Hebbel *et al.* (1996), East Asian countries were able to achieve high sustainable growth for about 30 years because investment was also growing at about 30 percent of GDP during that time.

Institutional and policy factors can be expressed in terms of various institutional and governance indicators, property rights, and judicial independence. Horst (2007) pointed out that growth can be retarded by the absence of property rights that encourage informal market activities and reduce investors' confidence. On the other hand, judicial independence is crucial in enhancing political stability and peace,

thus creating an enabling environment for the private sector to prosper by protecting rights and contract enforcement.

Of special interest to the analysis in this paper, extensive evidence suggests that there is a positive relationship between growth of manufacturing output and the growth of GDP as well as a robust positive effect of export diversification through manufacturing on per capita income growth and poverty reduction in developing countries (see Lederman and Maloney, 2007; Lin, 2011). This provides a strong argument for industrial strategies.

Sustained economic growth cannot happen without structural changes (Kuznet, 1966). In fact all countries that remained poor have failed to achieve structural transformation, that is, they have been unable to diversify away from agriculture and the production of traditional goods into manufacturing (Lin 2011), as postulated by the structural change literature. The literature asserts that as the economy grows and develops, the production shifts from the primary (agriculture, food, mining) to the secondary (manufacturing) and to the tertiary (services) sector (Kuznets, 1966; Chenery and Syrquin, 1975). In the same vein Rostow (1961) stresses that economy passes through various stages of development from the traditional stage to the "take-off" and to the mass consumption stage.

In Africa for example, traditional agriculture continues to play a dominant role, accounting for 63 per cent of the labour force (Lin, 2001). Wells and Thirlwall (2003) note that one of the striking features about Africa over the last decades is that there has been virtually no structural change. They conclude that this is undoubtedly one of the explanations for Africa's poor and volatile growth performance. This is because, structural transformation, in particular, through raising share of manufacturing in GDP is regarded as *a sine qua non* for countries that wish to experience accelerated economic growth, increasing labour productivity and socio-economic welfare improvements. McMillan and Rodrik (2011) point out that the bulk of the differences in growth between Asia, Latin America and Africa can be explained by the contribution of structural change to overall labour productivity.

In his seminal work Kaldor (1966) developed three growth laws that showed the existence of increasing returns within manufacturing and the reasons why manufacturing was the engine of economic growth. These laws can be summarised as follows (McCombie, 1983; Thirlwal, 1983): first, the faster the rate of manufacturing output, the faster the rate of economic growth of the overall system; secondly, the faster the growth rate of manufacturing output, the faster the growth rate of manufacturing labour productivity (due to increasing returns); and thirdly, the faster the growth rate of manufacturing output, the faster the growth rate of non-manufacturing labour productivity (due to reallocation of labour).

One of the early attempts to econometrically test the first law for the advanced economies can be found in Cornwall (1977, 1976) and Cripps and Tarling (1973). The first law, in particular, has been typically associated in the literature with the "engine of growth hypothesis" according to which the main engine of economic growth would be the manufacturing sector (Lavopa, 2015).

In fact, manufacturing has acted as the engine of high and sustainable growth since the great industrial revolution of Great Britain that started in the mid seventeenth century and the very concept of strong and sustainable growth has come to be associated with industrialization and growth in manufacturing output relative to total output (Szirmai and Verspagen, 2010). Manufacturing is a critical vehicle for dynamic and sustainable economic growth and development not just in the early stages of development but also in matured or advanced economies (Noland and Pack, 2003). The manufacturing sector is characterized by opportunities for high value addition and strong forward and backward linkages with other sectors that spur economic diversification and faster growth as shown by several diagnostic studies (Rodrik, 2007). In addition to the linkage and spillover effects, the main arguments supporting the case for manufacturing as an engine of development as summarized by Szirmai (2011) include observed strong positive empirical correlation between the degree of industrialization and levels of per capita income, higher productivity in manufacturing compared with other sectors, and greater opportunities for capital accumulation, economies of scale and technological progress.

Using panel data for a sample of 68 developing countries and 21 advanced countries for the period 1950-2005, Szirmai and Verspagen (2010) demonstrated that manufacturing had a positive, though moderate, impact on growth. Econometric findings by Fagerberg and Verspagen (1999) also confirm that manufacturing was typically an engine of growth in developing countries in East Asia and Latin America, but that there was no significant effect of manufacturing in the advanced economies.

In a more elaborate study, Fagerberg and Verspagen (2002) investigated the impact of shares of manufacturing and services on economic growth for a sample of 76 countries in three sub periods - 1966-72, 1973-83, and 1984-95. They demonstrated that that manufacturing had a greater positive contribution to growth before 1973 than afterwards. They concluded that the period 1950-1973 offered special opportunities for catch up through the absorption of mass production techniques in manufacturing and that information and communication technologies started to become more important as a source of productivity growth since then.

Using panel data for 50 countries over the period 1967-1992, Martin and Mitra (2001) found evidence of a high rate of technical progress both in agriculture and manufacturing at all levels of development. Szirmai (2008)'s extensive analyses of sectoral productivity levels in 19 Latin America and Asian countries between 1950 and 2005 shows that value added in manufacturing was consistently much higher than in agriculture.

Overall, by allowing higher productivity gains, investment in manufacturing generates greater returns on capital and manufacturing firms have been the key drivers of innovation and technological advances in the world economy (Shen*et al.* 2007). Many of the emerging economies in East Asia and Latin America escaped volatile growth traps through economic diversification and export-oriented strategies that focused on stimulating manufacturing sectors and exports (Noland and Pack, 2003). These countries transformed their economies from being primary commodity exporters to high manufactured value added goods, thus overcoming the negative impact of terms of trade in primary products, leading to sustainable growth and industrial development.

Industrial and trade policy can stimulate economic growth and restructuring by assisting new industries to emerge, improving the competitiveness of local industry and attracting foreign investment in manufacturing through fiscal, exchange rate and credit policies that reduce costs and enhance productivity and profitability (Rodrik, 2000). Effective industrial and trade policy must be underpinned by an improved institutional and policy environment that reduces costs, creates comparative advantages for new industries, and lead to reallocation of resources in favour of more competitive industries (UNECA 2006).

Institutions, human capital, international integration or trade openness and geography are considered to be the key determinants of a successful industrialisation process (Isaksson, 2009). Soludo and Ogbu (2004) also emphasized the importance of these factors along with state capacity to design and implement effective policies. Lall (2004) identified infrastructure, human capital, domestic markets, and entrepreneurship as four structural factors that have to be addressed in order to enhance the likelihood of industrialisation through manufacturing. Indeed, institutions can play a vital role in creating incentives for increased long-term investment that can lead to innovation and diffusion of new technology, which is the backbone of every industrialisation success (Rodrik*et al.* 2004; North, 1990). Isakson (2009) provides evidence that the quality of institutions have a strong impact on promoting industrialization through infrastructure development, which will help local industries to reduce costs and enhance competitiveness.

Human capital enables countries to industrialize through investment in high-skill products and improvements in productivity and by generating significant externalities including attracting FDI and transfer of technology (Isakson, 2009). To benefit from these positive externalities domestic firms must have sufficient high human capital levels that increase their absorptive capacity. Basu and Bhattarai (2012) used a 2006 data on cognitive skills, measured by international test scores in mathematics and science, as a proxy for human capital development to explain cross country differences in growth and effectiveness of liberalization policies in 75 developed, emerging and developing countries over 1971-2006. Their panel regression results showed that cognitive skills have positive and significant effects on

trade openness and growth and strongly explain cross-country differences in trade and growth performance.

Trade openness through regional and international integration is essential in determining the success of industrialization by creating export opportunities for domestic firms and helping them reap economies of scale and become more efficient as they compete with foreign producers (Isaksson, 2009). It can also create opportunities for domestic firms to earn foreign exchange, increasing their ability to import capital goods at international prices that may be lower than those offered at home.

Regarding geography, the literature underscores its adverse impact on the quality and quantity of production factors such as labour and land especially in countries located in arid and semi-arid environments. Being located in the tropics is seen as a handicap to higher labour productivity because of the proliferation of human infectious diseases in this environment (Bloom *et al.* 1998). Sachs (2001) attributed the poorness of Africa's soil to ecological factors inherent to the location in the tropics, whereas Doppelhofer and Weeks (2011) find geography and natural conditions such as the fraction of tropical area and Malaria prevalence as some of the robust factors constraining growth in a sample of 88 countries. Other particular geographical circumstances, such as those confronting landlocked countries, could constrain access to large domestic and foreign markets, limit economies of scale, and therefore limit production efficiency.

Summing up, the literature provides a wide range of variables that determine growth across countries and over time and suggests that growth would be faster and more sustainable when it is based on manufacturing. This partly explains the re-emergence of the debate on industrial policy and the need to restart industrial development, especially in the context of developing countries, given the potential of industry as a driver of structural change, the need for a more proactive public policy and the need for better institutions (see e.g. Ajakaiye and Page, 2012). This debate has now moved away from the question of whether industrial policy can be justified to focus on the more practical question of what kind of institutions and policies are more effective in promoting industrial development (see Lin and Monga, 2011).

4.3 Econometric Model

Based on the literature review in the previous section, data availability and the nature of African economies, the econometric methodology of the paper specifies three equations for the key determinants of growth in the share of manufacturing output in total output, the determinants of real GDP growth and the determinants of growth volatility. The identification of the determinants of growth in the share of manufacturing output in total output is based on a modified form of the Chenery-Syrquin (1975) model of economic transformation that attempts to characterize the pattern of manufacturing transformation. The simple form of the model is:

$$MFGGDPgrw_{it} = \beta_0 + \beta_1 GDPgrw_{it} + \beta_2 Popgrw_{it} + \beta Z_{it} + \varepsilon_{it} \qquad (4.1)$$

Where $MFGGDPgrw$ is the growth of the share of manufacturing value added in GDP (annual % change), $GDPgrw$ is the annual growth of real GDP, $Popgrw$ is the population growth rate, Z is a set of control variables including quality of institutions, overseas development assistance (ODA), foreign direct investment (FDI), trade openness and human capital, t stands for time and ε is the error term.

GDP growth and population growth are envisaged to have positive relationships with growth in the share of manufacturing output in aggregate output, mainly by stimulating investment in manufactured goods through increased demand. The quality of institutions is measured by Polity2 and International Country Risk Guide's (ICRG) political risk index (Polrisk). Polrisk is a composite country risk score based on indices of financial, economic and political risks faced by investors, corporations and government. Polity2, the most popular measure of a country's political regime characteristics in terms of political stability and quality of institutions, is computed by subtracting polity's institutionalised autocracy (autoc) from its institutionalised democracy score (democ) to generate an aggregate democracy variable. These scores are based on expert judgment on aspects of institutionalised democracy and autocracy within a country derived (see Marshall and Jaggers, 2002). Polity2 ranges from -10 to 10, with higher values indicating better institutions and governance systems.[i] As highlighted in the literature review,

improvements in institutions, governance and the political environment are likely to enhance the success of industrial strategies and incentives for economic diversification through manufacturing. Therefore, both Polity2 and Polrisk are expected to have positive coefficients on the dependent variable.

FDI flows are envisaged to stimulate growth in manufacturing to the extent that they are diversified and not concentrated in enclave natural resource sectors, whereas ODA would enhance growth in manufacturing if it is directed to build infrastructure and provide critical services as it has been the case in many African countries such as Ethiopia, Ghana, Uganda and Tanzania. Also ODA flows are often tied to policies to improve economic management and the business climate and are therefore expected to enhance opportunities for economic diversification and manufacturing. But, the impact of FDI flows on growth in the share of manufacturing output in total output could be positive or negative depending on their sectoral concentration.

Generally, the effect of trade openness, measured by the sum of exports and imports as a ratio of GDP, on manufacturing growth is expected to be positive. However, in the context of many African countries where exports are dominated by primary commodities and productive capacities are limited, trade openness might have no significant impact on manufacturing growth and economic diversification. Finally, human capital measured by primary school completion rate – due to lack of data on other possible proxies – is expected to stimulate economic diversification and growth in manufacturing by enhancing human skills and productivity and encouraging investment in the sector.

As discussed earlier, the literature identifies several underlying factors that can affect the rate of total output growth (Ndulu *et al.* 2007). Key among these are the rate of investment, human capital, institutions and changes in economic policies including fiscal policy, exchange rate policy, interest rate and credit policies, inflation as well as debt and trade openness. Furthermore, external capital flows, economic performance in major trading partners and exogenous shocks can have strong effects on growth. Over the long-term, various institutional and economic reforms, including human capital and private sector development can have profound impacts on growth. For

example, foreign trade policies can promote competition, encourage learning-by-doing, improve access to trade opportunities, and raise the efficiency of resource allocation (Collier *et al.* 2003).

We specify a rather simple model to study the relationship between the growth of the share of manufacturing value added in GDP and GDP growth ($MFGGDP$).[ii] In addition to $MFGGDPgrw$, the model includes a few factors assumed to be major determinants of growth in Africa. These include the growth rate of population ($Popgrw$), domestic investment measured by gross fixed capital formation a percentage of GDP ($GFCFGDP$) and a set of other variables (Z). To capture possible non-linearity effects of the manufacturing value added on GDP growth, the squared value of the former variable ($MFGGDP^2$) has also been included. The lagged value of the dependent variable is also included on the right hand side because growth performance may be characterized by persistence over time. Accordingly, the growth equation is specified as follows:

$$GDPgrw_{it} = \beta_0 + \beta_1 GDPgrw_{it-1} + \beta_2 MFGGDP_{it} + \beta_3 MFGGDP_{it}^2 + \beta_4 Popgrw_{it} + \beta_5 GFCFGDP_{it} + \beta Z_{it} + \varepsilon_{it} \quad (4.2)$$

GDP growth rate is expected to rise with increases in the share of manufacturing output in total output and increases in gross fixed capital formation. An increasing share of manufacturing value added in GDP would lead to increased productivity and higher growth given the strong forward and backward linkages between manufacturing and other economic sectors. However, the coefficient of the population growth variable can take either sign depending on the level of unemployment and excess capacity. Z includes the quality of institutions measured by Polity2 ($Polity2$) and political risk index (Polrisk), human capital, measured by primary school completion rate, trade openness and imports relative to GDP and the inflation rate measured by changes in the Consumer Price Index (CPI). All the explanatory variables included in Z are expected to impact positively on GDP growth except the inflation rate, which can take either sign depending on its level and underlying causes.

In essence, changes in the factors that affect growth can also lead to growth volatility. Thus, besides volatility in the share of manufacturing output in total output, the key factors determining growth volatility in Africa are specified in the dynamic equation below to include previous growth volatility, volatility of official development assistance ($ODAstd$), and other (Z) variables including Polity2 (as a proxy for quality of institutions), trade openness, and inflation (CPI).

$$gstd_{it} = \beta_0 + \beta_1 gstd_{it-1} + \beta_2 MFGGDPstd_{it} + \beta_3 ODAstd_{it} + \beta_4 FDIGDPstd_{it} + \beta Z_{it} + \varepsilon_{it} \quad (4.3)$$

Volatility is measured by a five–year moving standard deviation. All the independent factors may be positively correlated with growth volatility in Africa. The only exception is that over the long-run increases in the share of manufacturing value added in GDP should boost the ability of African countries to sustain growth and reduce growth variability.

4.4 Preliminary Analysis of the Data

We use cross-section time series data from 50 African countries to analyse the determinants of manufacturing share in aggregate output and its relationship with GDP growth and growth volatility during 1980-2009.[iii] Over the period considered, real GDP growth was fastest in the 2000s and lowest in the 1980s (table 4.1). On average manufacturing value added accounted for about 10% of GDP and grew at about 4% annually.[iv] The stagnation of the share of this sub-sector in total GDP is partly due to faster expansion in other sectors especially services and indicates its huge potential for expansion if the challenges it faces are effectively addressed.

Table 4.1: Descriptive Statistics, 1980-2009

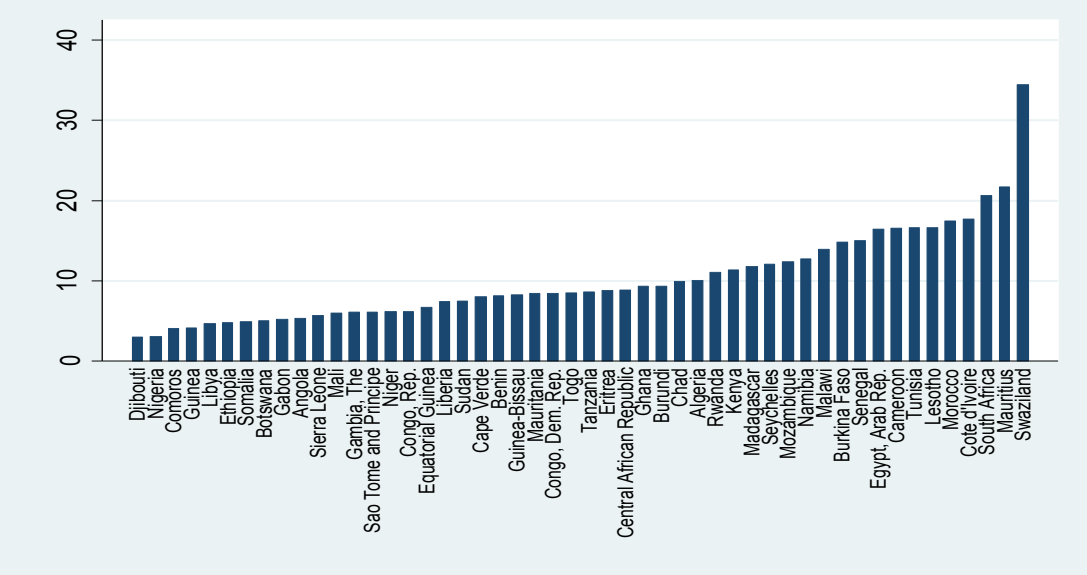
Variables	Period	Mean	Standard deviation	Minimum	Maximum	Number of observations
Real GDP growth (%)	1980-89	2.88	5.89	-26.71	23.68	415
	1990-99	3.00	9.00	-51.63	106.28	466
	2000-09	5.54	5.35	-31.33	61.90	480
	1980-2009	3.60	7.40	-51.43	106.28	1361
Manufacturing value added (% of GDP)	1980-89	10.93	5.26	0.36	35.84	377
	1990-99	11.24	6.62	1.60	39.79	444
	2000-09	10.54	7.32	1.42	44.35	432
	1980-2009	10.91	6.51	0.36	44.35	1253
Manufacturing value added growth (%)	1980-89	5.16	10.82	-25.37	65.58	316
	1990-99	2.54	10.75	-54.01	49.41	396
	2000-09	6.85	33.61	-30.09	575.26	347
	1980-2009	4.74	21.23	-54.01	575.26	1059

Source: World Bank, World Development Indicators, 2011.

Simple correlation analyses show that generally economic performance and volatility are positively associated at higher growth levels but inversely related at lower levels.[v] In 31 out of the 50 African countries covered by the data, high growth volatility - measured by a 5-year moving standard deviation of the growth rate - appears to be associated with lower growth rates.

As the share of manufacturing value added in GDP or manufacturing growth rate increases, GDP growth also rises, while growth volatility declines. Four African countries (Egypt, Tunisia, Mauritius and Zambia) are among the top 10 countries in terms of manufacturing share in GDP, the top 10 performing countries (figure 4.1) and the 10 most stable economies in 1980-2009.

Figure 4.1:
Man Manufacturing Value Added in GDP, 1980-2009 (%)



Source: World Bank, World Development Indicators, 2011.

These correlation results are in line with existing evidence. For example, Sahay and Goyal (2006) find robust negative relationship between growth and business cycle volatility in developing regions; the relationship was highest in Africa and the Middle East followed by Latin America. Evidence indicates that volatility of macroeconomic outcomes, including inflation, exchange rate changes and fiscal imbalances, terms of trade fluctuations and natural disasters depress growth in Africa compared with other developing regions (Lin, 2011).

4.5 Model Estimation and Discussion of Results

Selected estimation results for the three equations are presented in Tables 4.2-4.4 for the determinants of the share of the manufacturing sector in aggregate output, and how changes in manufacturing value added, among other factors, affect the real GDP growth rate and growth volatility. To avoid endogenuity problems which may arise owing to simultaneous causality between GDP growth and manufacturing value added, the equations were estimated using system Arellano and Bover (1995) generalized method of moments (GMM) estimator. The Arellano and Bover's estimator is used for its increased efficiency over the classic difference estimator due to Arellano and Bond.

The estimation results for equations, 4.1, 4.2 and 4.3 are discussed below, focusing on GMM findings. In all selected GMM results, instruments are valid according to the Hansen test, because we cannot reject the null hypothesis that they are exogenous while Arellano Bond AR tests confirm that there is no autocorrelation.

4.5.1 Determinants Of Growth In The Share Of Manufacturing Value Added In GDP

In line with our theoretical expectation, the estimation results show that GDP growth (**gdpgrw)** has a positive and significant impact on growth in the share of manufacturing value added in GDP over the period considered. This highlights the importance of the output variable in stimulating manufacturing and indirectly supports the argument that the failure of the import substitution strategies and consequent de-industrialization in many African countries in the 1980s and 1990s had more to do with policy mistakes than production and market opportunities (Aryeetey *et al*. 2003; Dasgupta and Singh 2006). In other words, increases in real GDP are likely to induce growth in the share of manufacturing value added in total output in Africa.

Population growth (**popgrw**) appears to have a strong but adverse impact on growth in the share of manufacturing output in total output, indicating that countries with larger populations in Africa have been less successful in promoting manufacturing compared to others. Indeed, in the absence of effective policies, population size alone may not be sufficient for industrialization through manufacturing as the example of Nigeria, the most populous African country, clearly suggests. Some African countries with smaller population and much limited resources, e.g. Mauritius and Tunisia, have been more successful than Nigeria in diversifying economic activity and promoting accelerated and sustained growth. The inability of Nigeria to stimulate greater investment in manufacturing despite its huge human and natural resource endowment was mainly the result of lack of coherent and sustained strategies for economic transformation (UNECA 2006).

The findings suggest that political stability and political risk (measured by polity2 and (**Polrisk)**, FDI flows (**fdigdp**) and ODA flows (**odagdp**) have positive

and significant effects on the share of manufacturing in total output in the continent. This underscores the importance of capital inflows in supporting Africa's industrialization efforts; in many African countries aid flows contribute significantly to infrastructure financing while foreign direct inflows are key to private investment and private sector development even when the bulk of these investments is concentrated in the natural resource sector.

Both trade openness and human capital development turned out to have no robust impact on growth in the share of manufacturing output in aggregate GDP. This is perhaps a reflection of Africa's inability to diversify through trade because of weak productive capacity and the fact that formal sector employment remains extremely limited compared to total employment. In most African countries, the informal sector contributes more than 70 of total employment and has no notable direct contribution to the production of tradable goods and services (see UNECA and AUC, 2010). However, as a caveat this may also be due to an efficiency problem considering we use GMM in a panel of 224 observations in column 1.6 with 40 instruments.

Table 4.2: Determinants of the Share of Manufacturing Value Added in GDP

	Dependent variable is Growth in the share of manufacturing value added in GDP)					
		OLS			GMM	
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)	(1.6)
Gdpgrw	1.62***	0.60***	0.75***	1.848	0.59**	0.67
	(0.10)	(0.12)	(0.14)	(1.15)	(0.24)	(0.42)
Popgrw	0.16	-0.67	0.07	-3.79	-5.21***	-2.45
	(0.619)	(0.76)	(0.73)	(4.64)	(1.83)	(1.74)
Polity2		0.03	0.08		0.40*	0.20
		(0.11)	(0.12)		(0.02)	(0.59)
Polrisk		0.05	-0.00		0.69**	0.50
		(0.06)	(0.06)		(0.32)	(0.32)
Fdigdp		0.25	0.76**		0.83**	1.13
		(0.18)	(0.37)		(0.36)	(0.69)
Odagdp			0.015			0.47***
			(0.05)			(0.16)
Trade openness			0.005			-0.06
			(0.017)			(0.09)
Human capital			0.023			0.19
			(0.029)			(0.13)
Constant	-1.29	0.70	0.45	7.25	-29.76*	-15.41
	(1.61)	(3.84)	(4.62)	(8.633)	(17.33)	(20.68)
Observations	1,044	446	224	1,044	446	224
Number of codec	43	26	21	43	26	21
Number of instruments				34	34	40
Hansen Test (p–value)				0.577	0.979	1.00
AR (1) (p–value)				0.005	0.072	0.015
AR (2) (p–value)				0.649	0.040	0.226

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Time dummies included in GMM estimations.

4.5.2 Manufacturing and GDP Growth

The findings on the key relationships in the GDP growth equation are both interesting and meaningful. Although the insignificant coefficient of the share of manufacturing in aggregate output (mfggdp) suggests that it has no strong linear relationship with real GDP growth, the coefficient of its square ($mfggdp^2$) indicates that it has a strong non-linear positive impact on GDP growth (table 4.3). Also growth in manufacturing output has a significant positive impact on total real GDP growth. Therefore, it appears that manufacturing is a major driver of growth on the continent, even when its share in total value added has remained small in most African countries over the period considered.

The GMM estimation also shows that gross fixed capital formation (gfcfgdp) has positive and significant effects on GDP growth. This result does not change even after correcting for potential simultaneity bias and remain strong when other determinants of growth are added to the equation, suggesting that in countries where fixed investment rates are higher and the manufacturing sector grows faster growth performance is stronger. This finding strongly supports the argument that growth drivers in Africa had to do with increased accumulation, mainly physical capital (Tahari *et al*. 2004). As discussed earlier, increased accumulation and growth was made possible by such factors as increased commodity prices, FDI resulting from increased commodity prices, increased aid, increased access to international finance, and stable and better management of the macroeconomic environment among other factors.

Table 4.3: Manufacturing Value Added and GDP Growth

	Dependent variable is Real GDP growth (annual % change)			
	OLS		GMM	
	2.1	2.2	2.3	2.4
Gdpgrw-1	0.07	0.02	-0.02	-0.04
	(0.05)	(0.05)	(0.09)	(0.10)
Mfggdp	-0.09		-0.54	
	(0.14)		(0.70)	
$Mfggdp^2$	0.01		0.02*	
	(0.004)		(0.01)	
Mfggrw		0.21***		0.18***
		(0.02)		(0.06)
Popgrw	0.76**	0.26	0.22	1.15
	(0.35)	(0.27)	(3.15)	(1.74)
Gfcfgdp	0.14***	0.11***	0.13	0.31**
	(0.04)	(0.04)	(0.20)	(0.15)
Polity2	0.17***	0.14***	0.29	-0.02
	(0.05)	(0.04)	(0.53)	(0.27)
CPI	-0.03**	-0.02*	-0.02	-0.01
	(0.013)	(0.01)	(0.03)	(0.02)
Trade openness	0.01	-0.001	0.03	-0.01
	(0.007)	(0.01)	(0.04)	(0.04)
Human capital	0.008	0.01	-0.15	-0.10
	(0.012)	(0.01)	(0.73)	(0.5)
Constant	-0.90	0.43	10.27	7.51
	(1.98)	(1.22)	(11.84)	(5.05)
Observations	384	333	384	333
Number of codec	34	29	34	29
Number of instruments			41	39
Hansen Test (p–value)			0.703	1.00
AR (1) (p–value)			0.001	0.001
AR (2) (p–value)			0.878	0.531

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1;
Time dummies included in GMM estimations.

Therefore, African countries should exert more efforts to spur domestic investment especially in the manufacturing sector, which could become their engine of growth as it has been the case in developed and emerging countries. The manufacturing sector, the main driver of growth in East Asia, contributes more than 50% of GDP and exports compared to less than 15% in Africa.

Political stability strongly enhances real GDP growth in Africa, while population growth and inflation seem to have no significant effect. This calls on African counties to improve political and economic governance and reduce political tensions in order to accelerate and sustain growth. In fact promoting political stability and reducing political tensions are desirable in their own right given the high cost of conflicts in Africa.

As in the case of equation 4.1, GMM estimates of equation 4.2 find no strong role for trade openness and human capital development in promoting real GDP growth. Again this seems to reflect weak productive capacity and lack of productive employment for the continent to capitalize on trade opportunities and utilize its huge human resource base. But it could also be attributed to the fact that primary school completion rate does not adequately capture development in human skills. Therefore, in the absence of other measures that could adequately capture skill contents such as tertiary education's indicators, it would be rather inaccurate to conclude that human capital development does not affect growth in Africa. The GMM results also show no significant impact for inflation on growth, possibly indicating the fact that while many African countries suffered from high inflation in the 1980s, inflation rates have since the mid-1990s declined and remained below 5 per cent in most of them.

4.5.3 Manufacturing Value Added and Growth Volatility in Africa

The GMM results suggest that volatility in the growth rate of manufacturing output (mfggrewstd) and FDI flows (Fdistd) is positively and strongly related to volatility in aggregate GDP growth over the period 1980-2009 (table 4.4). This highlights the need for African countries to adopt policies that enhance growth and stability in the manufacturing sector, which is frequently, disrupted by changes in domestic trade, credit and exchange rate policies. Also weak infrastructure, especially intermittent

power supply and frequent changes in taxes are partly to blame for observed instability in manufacturing output in some African countries. Growth instability in one year strongly influences growth volatility in the following year. Whereas political stability (polity2) seems to significantly dampen overall growth volatility, volatility in total trade has no strong effect.

The above findings support the argument for orthodox economic policies, including promoting investment in manufacturing and other sectors in order to accelerate growth and reduce growth volatility. The findings lend support to existing evidence, which indicates that competitive and increasingly diverse and sophisticated industrial production and exports are essential for low-income countries to promote high-level sustainable growth in the long-term (e.g. Cimoli, Dosi and Stiglitz, 2009). This partly explains the re-emergence of interest in industrial policy and industrialization as a central element of structural transformation in Africa.

Table 4.4: Manufacturing Value Added and Growth Volatility in Africa

	Dependent variable is Standard deviation of real GDP growth (growstd)			
	OLS		GMM	
	3.1	3.2	3.3	3.4
Growstd-1	0.88***	0.81***	1.02***	1.28***
	(0.03)	(0.03)	(0.10)	(0.18)
Mfgvagdp	-0.004		-0.05	
	(0.01)		(0.08)	
Mfggrewstd		0.02**		0.09**
		(0.01)		(0.01)
Polity2	0.01	0.01	0.04	0.36***
	(0.01)	(0.01)	(0.14)	(0.13)
CPI	-0.001	0.002	-0.01	0.01
	(0.004)	(0.004)	(0.01)	(0.01)
Odastd	0.05*		-0.08	
	(0.03)		(0.13)	
Fdistd	0.08**		0.09**	
	(0.01)		(0.02)	
Trade openness	-0.002	-0.000	0.02	0.001
	(0.002)	(0.002)	(0.11)	(0.04)
Constant	0.31	0.42*	-1.92	-8.62
	(0.29)	(0.24)	(1.58)	(6.48)
Observations	304	297	304	297
Number of cross sections	32	28	32	28
Number of instruments			35	27
Hansen Test (p–value)			0.861	0.660
AR (1) (p–value)			0.026	0.008
AR (2) (p–value)			0.501	0.632

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; Volatility is measured by a 5-year moving standard deviation; Time dummies included in GMM estimations.

4.6 Conclusion and Policy Implications

This paper demonstrates that improved governance, institutions and policies and increased domestic investment are, among other factors, conducive to growth in the share of manufacturing output in total output. It also shows that economic transformation through manufacturing has the potential to accelerate growth and reduce growth volatility. Given the strong backward and forward linkages between manufacturing and other sectors, promoting manufacturing can foster economic transformation, employment as well as wealth creation for poverty reduction. These findings lend support to the emerging consensus on the relevance and necessity of industrial policies. However, the problem African policymakers, who have historically been in favour of such policies, face is how to design and implement policies that are cost effective and sustainable over the long-term.

The fact that both state-led models of the post-independence era and the market-led approach adopted since the 1980s have failed to promote manufacturing and structural transformation in the continent points to the need for African countries to move to a more balanced position regarding the role of markets and government in economic transformation. While market forces and private enterprises would play a leading role, governments have to perform strategic and coordinating roles to address market failures to boost economic growth and transformation (Rodrik, 2004; Lin, 2011). The policies should be designed in such a way as to minimize the risks of waste and rent seeking at the same time they spur productive restructuring.

Instead of subsidizing specific industries to achieve some desired outcomes, governments should focus on getting the industrial policy process right (Rodrik 2004; Stiglitz, 2005; Haque, 2007). This requires close collaboration between government, the private sector and other stakeholders to identify institutional, technological and other constraints that impede economic transformation and devise measures to address them. The correct policy interventions should be based on a diagnostic approach that identifies key constraints and remedies that can vary across countries as well as within countries over time. They should also include measures to build entrepreneurship, address market failures due to information and coordination

externalities, and promote regionally integrated value chains and markets to stimulate investment in manufacturing and other sectors

Endnotes

[i] See http://www.systemicpeace.org/polity/polity4.htm for elaborate description.
[ii] For more elaborate growth models see Ndulu et al. (2007) and Nugent and Pesaran (2007).
[iii] The sample includes all 53 African (in 2009) excluding Somalia, Zambia and Zimbabwe due to data limitations.
[iv] The share of industry remained around 30 percent throughout Africa's postcolonial history. Manufacturing contributes around 10 percent of GDP and 30 percent of total industrial output, which is dominated by primary commodity production and exports especially oil and minerals.
[v] These correlations results are not reported for space limitation.

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