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WHAT DRIVES STRUCTURAL TRANSFORMATION IN SUB-SAHARAN AFRICA?

by Justice Tei Mensah*
George Adu**
Anthony Amoah***
Kennedy Kwabena Abrokwa****
Joseph Adu*****

*Swedish University of Agricultural Sciences
** The Nordic Africa Institute
***School of Economics, University of East Anglia
**** Ghana Institute of Management and Public Administration
*****University of Professional Studies, Accra-Ghana

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This paper provides an empirical assessment of the driving forces behind structural transformation in Sub-Saharan Africa, and to further access the role of structural reforms in accounting for cross-country differences in transformation. Evidence from this paper reveals that country specific fundamentals, institutions and policy reforms as well as governance and fiscal reforms are the key drivers of transformation in the region. A set of policy strategies is proposed to engender sustained transformation and development in the region.

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School of Economics
University of East Anglia
Norwich Research Park
Norwich NR4 7TJ
United Kingdom
www.uea.ac.uk/economics

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Justice Tei Mensah[♣]
Department of Economics, Swedish University of Agricultural Sciences
Box 7013, S-750 07 Uppsala-Sweden
Email: justice.tei.mensah@slu.se / myjumens@gmail.com

George Adu
The Nordic Africa Institute, Uppsala-Sweden and
Kwame Nkrumah University of Science and Technology
Kumasi-Ghana
Email: george.adu@nai.uu.se / gadu.cass@knust.edu.gh

Anthony Amoah
School of Economics, University of East Anglia, Norwich, UK
Central University College, Accra-Ghana.
Email: Anthony.Amoah@uea.ac.uk/aamoah@central.edu.gh

Kennedy Kwabena Abrokwa
Ghana Institute of Management and Public Administration
Email: kennedyabrokwa@yahoo.com

Joseph Adu
University of Professional Studies, Accra-Ghana
Email: kwakuadu84@yahoo.com

[♣] Corresponding author

Abstract

This paper provides an empirical assessment of the driving forces behind structural transformation in Sub-Saharan Africa, and to further access the role of structural reforms in accounting for cross-country differences in transformation. Evidence from this paper reveals that country specific fundamentals, institutions and policy reforms as well as governance and fiscal reforms are the key drivers of transformation in the region. A set of policy strategies is proposed to engender sustained transformation and development in the region.

1. Introduction

Historically, sub-Saharan Africa (SSA) has lagged behind in growth performance and consequently, income per capita when compared with OECD member countries and even other developing regions. Even within the region, there are marked variations in income per capita across space and time. For instance, over the period 1970-2013, the average per capita income of the richest country in the region, Seychelles, of US$ 7,100 is more than a factor of 54 of the poorest country, Ethiopia, whose average per capita income over the same period is only US$160 (World Bank, 2013). While standard growth theory attributes observed income differences to differences in human capital, physical capital and technology across space and time, these factors alone cannot account for the observed differences in income across countries. Indeed, the recent empirical literature on growth has identified structural change, quality of macroeconomic policies, institutions, financial development, geography etc. as among the sources of cross-country differences in growth and income levels (see for instance: Acemoglu, 2009). In this paper, we conjecture that differences in the rate of structural transformation can explain part of the observed differences in income per capita across space and time. This then presupposes that convergence in economic structures has a potential of accelerating convergence in income per capita. Guided by this supposition, policy makers over the years have put up policies and programs aimed at accelerating the rate of transformation from agricultural driven growth, to industrial and services as engines of growth. A good prerequisite to successful policy aimed at transforming economies with the ultimate goal of sustained economic growth and development requires knowledge about the key drivers of structural transformation.

In line with the above, there has been an increased emphasis on structural change as a conduit for growth and development, as experts argue that it induces efficiency and productivity via the reallocation of resources across various sectors of the economy. Evidences of the effects of structural change have been felt all over the world. In the nineteenth and twentieth century, the now developed world escaped poverty to prosperity characterized by raising relative wealth and income levels of the poorer population, although the process was slow and gradual (Kuznets 1955; Chenery 1960; Chenery and Taylor, 1968). Over the last four decades, several developing economies including but not limited to China, Thailand, and India have moved from lower income status to middle income status owing to major structural and economic transformation policies. The evidence from these countries show that, countries that tend to go through structural and economic transformation are characterized by

conditions such as a declining share of agriculture in GDP and employment; a rural-to-urban migration underpinned by rural and urban development; the rise of a modern industrial and service economy; and a demographic transition from high rates of births and deaths to low rates of births and deaths (Breisinger, and Diao, 2008).

Interestingly, despite the common characteristic features among economies undergoing structural transformation, evidence suggest marked differences across regions and income in the terms of the process and pace of the transformation (Dablas-Norris et al., 2013). For instance, the process of transformation in most western economies (especially Europe), were characterized by transition from agrarian to industrial based economies as evidenced by the industrial revolution, and further transitioned towards service oriented economies. The transformation in Asia has also been bolstered by a burgeoning manufacturing sector. On the contrary, the transformation in most Sub-Saharan African (SSA) economies has been marked with not only a decline in the agriculture sector shares in output and employment, but also with an ailing manufacturing/industrial sector; thus leapfrogging the middle stage of the transformation ladder—industrialization—towards a service sector dominated economy (IMF, 2012). Also, even in each of these groups of countries/regions, the rate of transformation differs.

Like most economies in the world, countries in SSA have had its share of transformation albeit with marked differences in the performance of the economies. The chain of reforms implemented in SSA during the 1980s-90s is often credited to spurring the process of transformation of economies in the region. The reforms namely: Structural Adjustment Program (SAP) and the Economic Recovery Program (ERP), led to liberalization of the host economies towards market-oriented economies from the hitherto state dominated economies. The resulting paradigm shift among other things contributed to a gradual shift from agrarian based economies towards serviced based economies. Critics however, assert that these reforms contributed to the decline in the industrial base of most SSA economies as the existing firms at the time were not adequately prepared to match up with the competition from foreign firms that ensued as a result of the liberalization of the economies and the trade sector for example (Taylor, 1993; Stein 1992; Tarp,1993).

The objective of this paper therefore, is to seek answers to the following policy relevant questions: i). What are the key drivers of transformation in SSA? ii). what role has the myriad of structural reforms

implemented in the region played in spurring the process of transformation across economies in SSA? iii). What is the way forward for policy aimed at economic transformation?

Whereas, much has been said about the ongoing transformation in these economies, empirical estimates of the factors responsible for the transformation in SSA economies are not readily available. Therefore, an empirical assessment of the drivers of transformation in these economies is worthwhile as it will inform policy makers on the relevant policy instruments to use to engender economic transformation towards achieving the overarching goal of economic development. This paper fulfils this goal by providing an empirical assessment of the main driving forces behind economic/structural transformation in the SSA using a panel data on the 21 countries in the African Transformation Index (ATI) to inform growth and development policy design in the SSA.

The paper makes an important contribution to the literature on structural transformation in the sub-Saharan African region. First, to the best of our knowledge this is the first study that provides empirical estimates of the determinants of structural transformation in SSA, with particular reference to the 21 countries examined in the African Transformation Report (ATR) which has become the blueprint of transformation in the region. Second, as part of our search for the drivers of structural transformation in SSA, we examine the impact of policy reforms—that were specifically directed at restructuring the economies of SSA to promote sustainable economic growth—on economic transformation. The rate of success of different reforms programs in transforming the economies of SSA is important factor in the design of future reform policies. This evidence is lacking in the extant literature in the context of the SSA region.

The literature on structural transformation is relatively scanty but growing. Studies in this area mainly have their theoretical underpinnings on the works of Kuznets (1955), Chenery (1960) and Chenery and Taylor (1968) which describe structural transformation as often associated with the canonical shift in the economic structure as a country transition from developing to a developed economy. Also, the new growth theories spearheaded by Schumpeter (1934), Solow (1957), Grossman and Helpman (1991), Romer (1990), Aghion and Howitt (1992, 1998, 2009) offers good exposition on the drivers of transformation and growth. These studies unequivocally assert physical and human capital (see: Grossman and Helpman, 1991; Romer,1990), and technological change and innovation (Schumpeter,1934) as key drivers of transition from developing to a developed economy (i.e.

economic growth). For instance, Christiaensen et al. (2006) and Diao et al. (2007) assert that technology, rapid capital accumulation or investments such as in higher education and the labour force, linkages and the roles of market, institutions, and governments are key drivers of transformation. Thus policies aimed at enhancing the spread of adoption and use of technology and quality education of indigenes offers a potent approach towards transformation. From the empirical perspective, studies such as Bah (2011), Timmer et al. (2012), Duarte and Restuccia (2010), McMillan and Rodrik (2011), and Dabla-Norris et al. (2013) are notable. For instance, Dabla-Norris et al. (2013) using data on 168 countries over the period 1970-2010 with real value added of agriculture, manufacturing and services as indicators of structural transformation, provides estimates of the determinants of structural transformation. Their results reveal large differences in sector shares across and within regions and finds that large country variation in sector shares can be accounted for by country endowments/characteristics such as demographic structure, population size and real income per capita. Their results further indicate that policy and institutional variables such as trade openness, product market reforms, human capital etc. are key drivers of structural transformation across countries. Also, McMillan and Rodrik (2011) analyzing the link between labor productivity growth, structural change and globalization provides evidence of a shift of workers from low productivity sectors to high productivity sectors in some Asian economies, contrary to countries in Latin America and SSA where a reverse trend was observed[1]. The empirical approach used in this paper shares some semblance to the work of Dabla-Norris et al. (2013) but differs in terms of countries and econometric (estimation) procedures.

Findings from this paper reveal that country specific fundamentals such as natural resource and human capital endowments are key factors behind the cross country differences in sectoral real value added output. It also emphasize the key role of institutions and policy reforms such as education, trade openness, financial development, real and financial sector reforms in driving economic transformation. Finally, the paper shows that governance and fiscal reforms are important determinants of transformation in SSA, thus efforts aimed at promoting good governance and building institutions are key instruments in promoting structural transformation in the region. Thus, the historically poor score of most of the countries in the region in terms of governance and institutional quality measures partly explains the region's slow pace in structural transformation and consequently, the slow pace of economic growth and development.

The remainder of this paper is structured as follows: Section 2 presents some stylized facts on economic/structural transformation in the SSA region. In Section 3 the theoretical background and empirical approach used in the paper are presented. A description of the data used in the study is presented in section 4. The analysis and discussions of results are undertaken in section 5. Section 6 concludes and highlights the policy implications stemming from the paper.

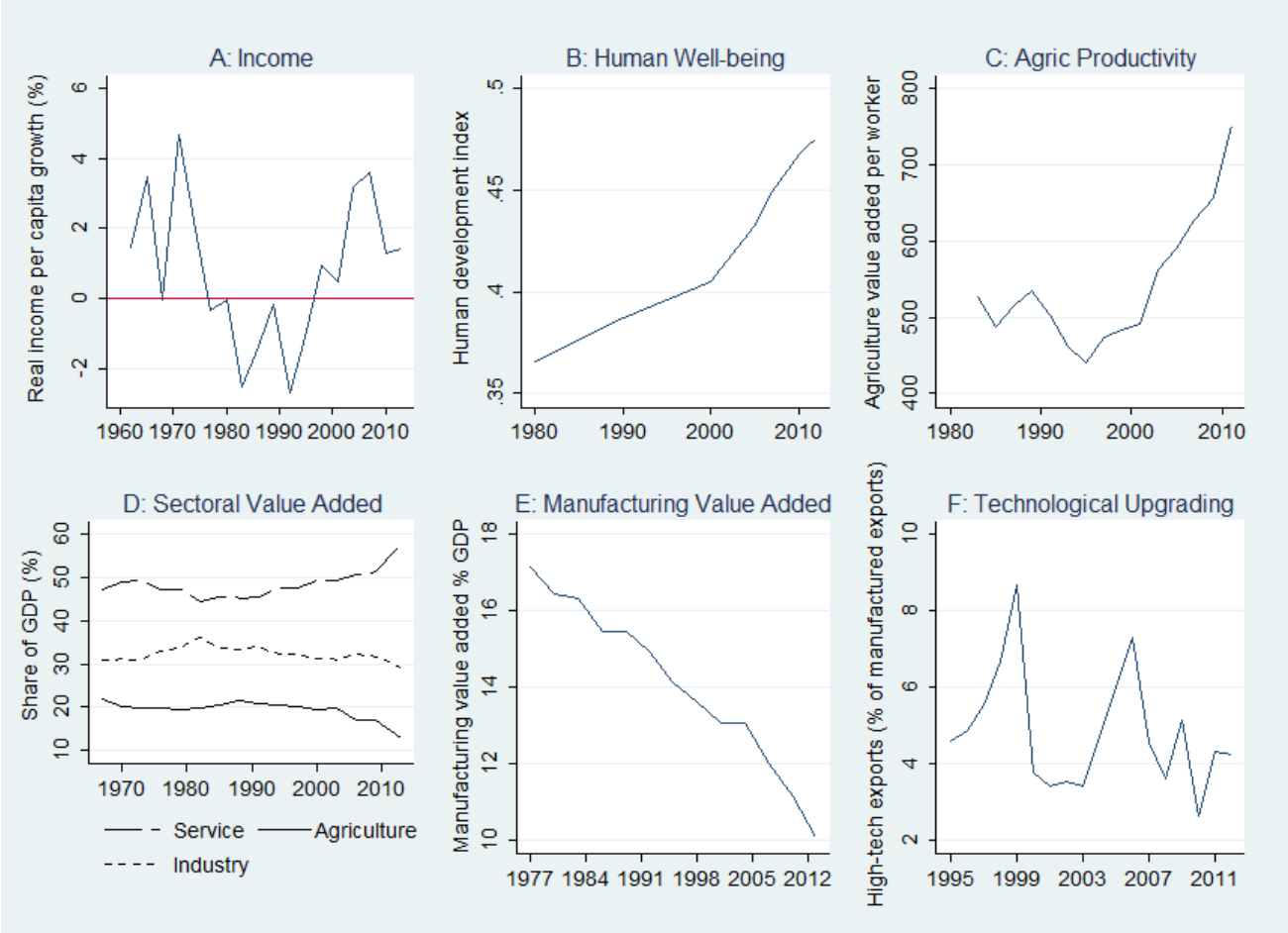
2. Stylized Facts on Structural Transformation in SSA

This section of the paper provides an overview of aggregate and sectoral performance of economies in the region and the implications of these trends on transformation.

Income and standard of living

The performance of the SSA region over the past 5 decades can be described as a mix of booms and busts, with marked era of booms in 1960s-70s and post 2000. Riding on the back of rising commodity prices, economies in SSA performed creditably well in the 1960s through the early 1970s with real income per capita growth averaging 2% and 1.3% between 1960s and 1970s respectively. Growth was however stunted during the 80's as a result of the myriad of economic downturns in many economies in the region which resulted in the adoption and implementation of the chain of reforms notably, the Structural Adjustment Programs. The average growth of real income per capita of the region during the 1980s was about -1.1%. Recovery was experienced in the 1990's albeit at a slow pace with real income per capita growth averaging 0.85%. The region regained full recovery with sustained growth in the post 2000 era with growth in real income per capita averaging 2.2% per annum. Experts contend that the strong performance of economies in the region during this period can be attributed to the HIPC program which led to debt forgiveness thereby boosting fiscal space of most economies and engendering pro-growth policies. See fig 1, panel A.

Fig.1. Performance of Structural Indications in SSA



Source: All data were sourced from World Bank's WDI except HDI which was obtained from UNDP Human Development Report, 2013.

Overall, as evidenced by the Human Development Index (HDI), welfare of the populace has increased considerably well since the 1980s by 30% from a score of 0.37 to 0.475 in 2012.

Sectoral Performance

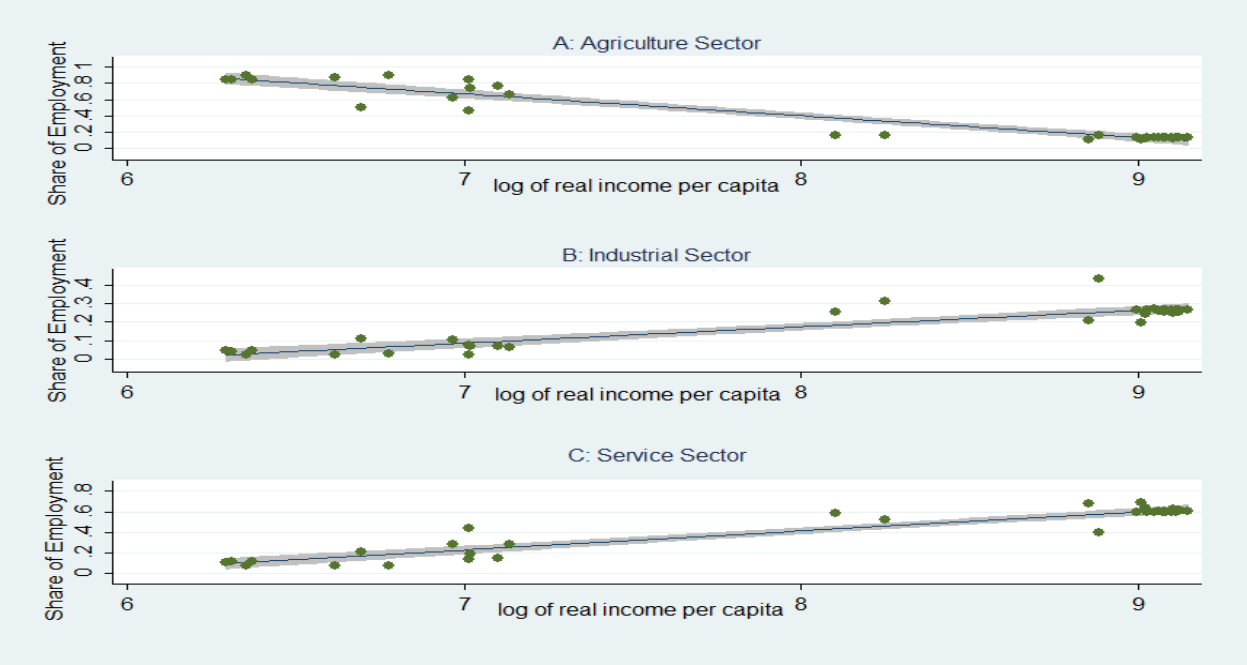
In terms of sectoral composition, data from the World Bank suggest that the service sector has been the dominant sector in SSA, followed by industry and agriculture respectively. A trend analysis on the contribution of each sector to GDP (panel D. fig. 1) shows evidence of some dynamics in the structure of economies in the region. For instance, whereas the share of agriculture and manufacturing to GDP has witnessed a declining trend, decreasing by -120% and -9.1% respectively from 21.7% to 9.8% of GDP and 31.4% and 28.8% of GDP respectively between 1965 and 2013; the contribution of the

service sector has seen an increasing trend, expanding by 23% from 46.8% to 60.4% of GDP respectively between 1965 and 2013.

Of particular interest is the performance of the manufacturing sub-sector which has seen a sharp decline in its contribution to GDP from 17.6% in 1975 to only 10% in 2013 as shown in panel E in figure 1. The slump in the manufacturing sector has been attributed to among other things the effects, of the Structural Adjustment Programs (SAP) which liberalized the economies, via increasing trade openness, divestiture of state owned corporations etc. Interestingly, despite the sharp decline in the agricultural sector, evidence suggests a steady increase in productivity in the agriculture sector (see Figure 1, panel C) with value added per worker increasing by 34% between 1982 and 2012. This perhaps reflects the effects of increasing technology adoption in the sector despite the fact that the levels of technology use in the sector in SSA is lower compared to other regional averages. The assertion of low technological base of SSA economies is confirmed by data on the share of high technology exports in total manufacturing exports which reduced by 8.1% between 1995 and 2012. Experts argue that the erratic supply of energy particularly electricity is a key factor influencing the low level of technology adoption in the region. Poor intellectual property rights protection has also been identified as an important barrier to technology adoption in the SSA region, particularly in the agricultural sector.

Another evidence of structural change in SSA is shown in the sectoral shares of total employment. As depicted in figure 2, the share of employment in the agricultural sector declined sharply with rising income levels between 1990 and 2005. On the contrary, employment in the service and industrial sectors over the same period increased sharply with rising income levels. The implication of these trends is that, rising income level (economic growth) in the region has been associated with a change in employment, from the hitherto agrarian sector to the industrial and service sectors; hence an indication of structural shift.

Fig.2. Share of employment in various sectors in SSA



Note: -- represent fitted values. Shaded area refers to 95% confidence interval. Source: Authors' construct based on data (on 17 SSA countries between 1990-2005) from African Economic Outlook 2013 - © OECD 2013

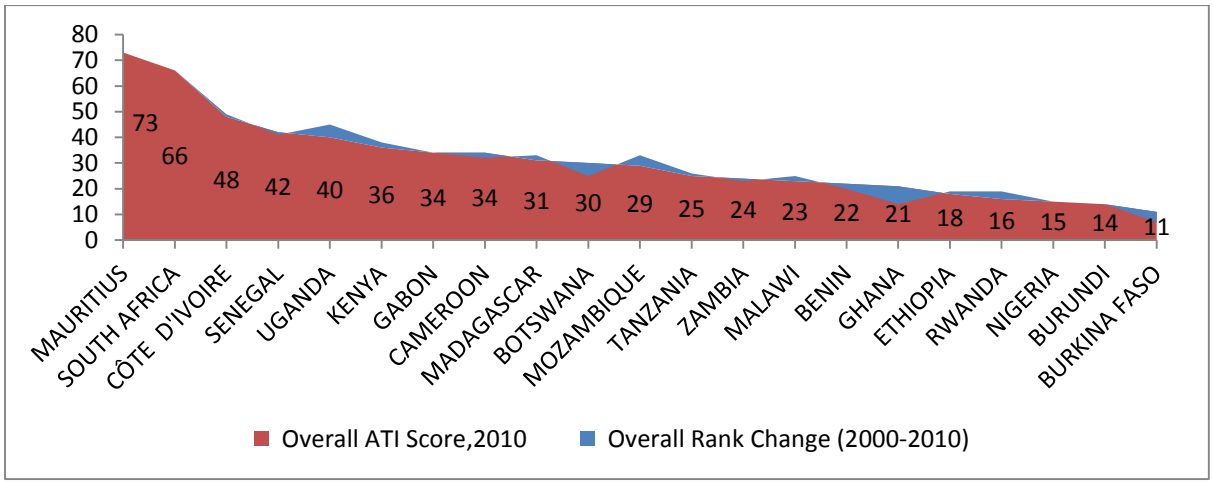
African Transformation Index

The above dynamics in the various indicators examined above is an indication of some level of structural transformation. In lieu of this, the African transformation index (ATI)[2] provides a rank of the best performing countries in the region in terms of changing the structure of their respective economies. The index is based on 21 countries selected on the basis of data availability for a period of 40 years (1970-2010) and at the same time experiencing economic transformation rather than economic reconstruction (in-conflict or recently emerging from conflict). The index shows Mauritius, South Africa, Cote D'Ivoire, Senegal and Uganda with respective scores of 70, 66, 48, 42, and 40. At the base of the rank are six countries with scores ranging from 11-21. They include Burkina Faso (11), Burundi (14), Nigeria (15), Rwanda (16), Ethiopia (18), and Ghana (21).The rest have scores ranging from 22-36 and these countries are Benin, Malawi, Zambia, Tanzania, Mozambique, Botswana, Madagascar, Cameroon, Gabon and Kenya (see Figure. 3).

Despite the overall rank of the 21 countries in the transformation index over the period 1970-2010, the ATI also assess the performance of the economies between 2000 and 2010. The results shows Uganda, Mozambique and Rwanda as the best performers over the period with positive improvements

in the respective index scores with an overall rank-change of 5, 4 and 3 respectively. At the same time, countries like Ghana, Bostwana and Burkina Faso, experienced decline in the index (score) with an overall rank-change of -7, -5 and -4 respectively. The remaining countries however maintained their status in the index.

Fig.3. ATI Score for 21 Countries in SSA



Source: ACET (2014)

3. The model and empirical strategy

Whereas there is no single theory explaining the process of transformation, the theoretical underpinnings behind structural transformation stems from traditional growth theories particularly of Lewis (1954) and Chenery (1960) which emphasize the canonical transition in aggregate output and labor from the low technology based agrarian economy to a service based economy via an era of manufacturing. In other words these models assert that the process of economic development is composed of three main stages: an agriculture based economy, manufacturing/industrial stage and finally a serviced dominated economy. Thus structural/economic transformation therefore describes the evolution of an economy across these stages.

Given this background, we set up our empirical model within the framework of the neoclassical growth model where output of each sector (Y_{it}^{j}) is expressed as a function of inputs and a set of policy reform variables as shown in equation 1.

$$Y_{it}^{j} = \alpha + \beta X_{it}^{j} + \phi Z_{it}^{j} + \mu_{it}^{j} \qquad (1)$$

where X_{it} is a vector growth fundamentals, Z_{it}^{j} a vector of policy reform indices, μ_{it} is the idiosyncratic error term, whiles *i* and *t* refers to country and time period respectively; and *j* indicates the sector.

Endogeniety

Estimating the parameters in the model in equation (1) is not without a challenge. In particular, the institutional and structural reforms indices are potentially endogenous, which could hinder efficient identification of the true causal impact of institutions and reforms on structural transformation in SSA. For example countries with fertile arable lands are more likely to be engaged in agricultural activities and hence increase output of agricultural sector, boost incomes and further provide raw materials to feed industrial sector. Moreover countries with higher industrial output shares could demand greater trade reforms to boost exports and consequently, income. This calls for the need to correct any potential endogeniety effect in the estimated models so as to ascertain the true effects of the various policy drivers of structural change.

To overcome the above challenge to identification, our study employs the system GMM estimator which allows the "true" causal effects to be estimated when some regressors are (potentially) endogenous. This technique, proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) is one of the efficient econometric techniques in accounting for endogeneity in panel data. The method uses the country fixed effect to account for idiosyncratic time invariant country effects and addresses endogeniety among the variables by instrumenting them with their own lagged values (in levels and first differences). Thus, the system GMM in principle imposes homogeneity on all slope coefficients in the estimated model. For the sake of brevity, theoretical representation of the system GMM estimators is however, not discussed in the present study. Interested readers may refer to Wooldridge (2010) and Baltagi (2013).

The empirical approach of this study is outlined as follows: First, to account for the individual country effects such as income, natural resource endowment, population (to account for scale effects), etc, we examine the role of country fundamentals on the sectoral output. Second, we examine the role of policy reforms and institutional factors on sectoral output. Here, we augment the baseline model with policy and institutional drivers to estimate the influence of the latter on the sectoral output shares. Four main policy instruments/indicators are used. These include indices of market-oriented structural

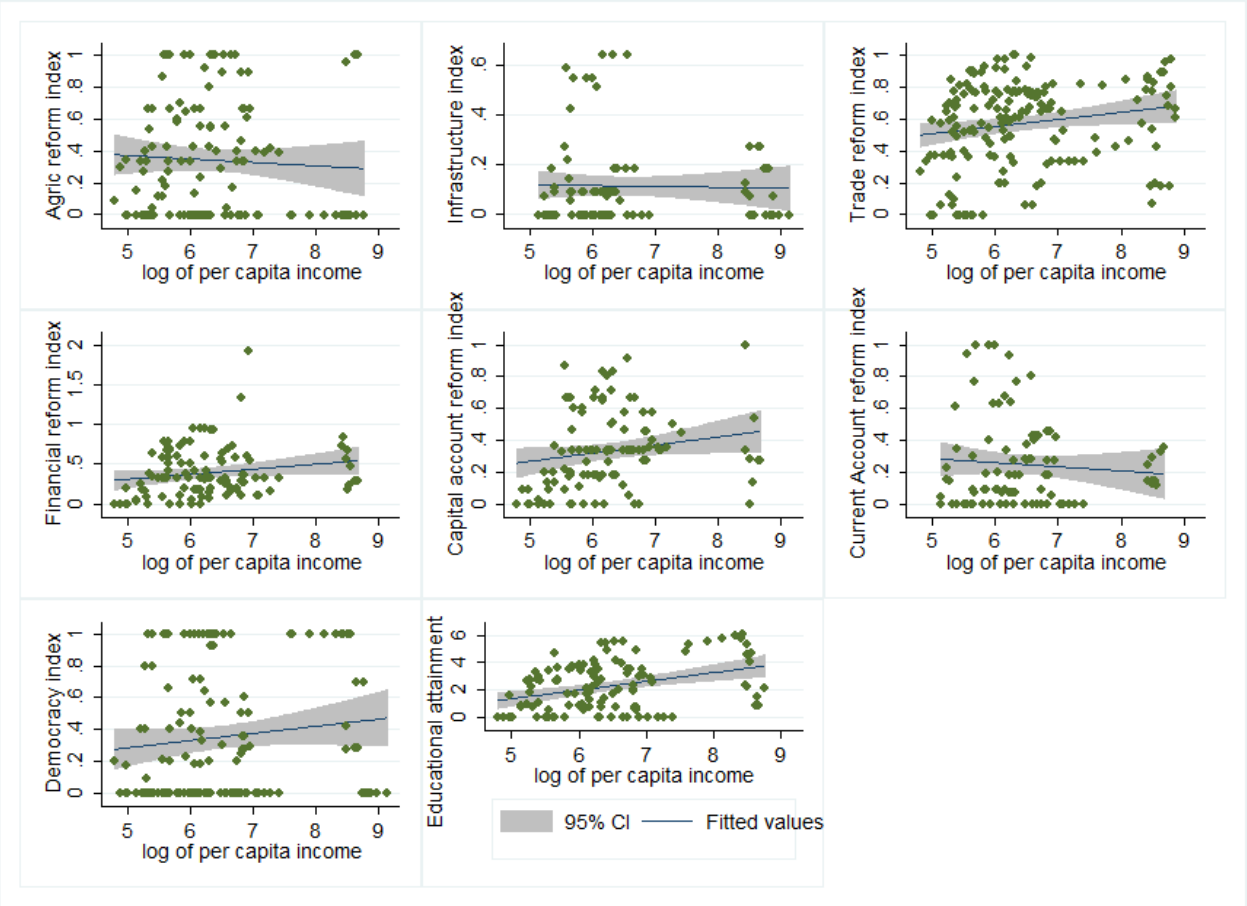
reforms in trade, agriculture, financial market and infrastructure (access to electricity and telecommunications). Thus we argue that these indices of policy and institutional reforms can influence structural transformation in the form of production, distribution and consumption, by enhancing or obstructing the resource allocation to the various sectors of the economy (Dabla-Norris, 2013). We also include indicators of trade openness, human capital (proxied by educational attainment), financial development (proxied by domestic credit to private sector as % of GDP) and foreign direct investment inflows. In the final stage, we examine the role of governance and fiscal reforms/regulations in driving economic transformation.

4. Data

Our analysis of the drivers of structural transformation is based on a combination of data on key macroeconomic indicators and structural reform/regulation indices on 21 countries in SSA over the period[3] 1970-2012. As indicated earlier, the choice of these economies for this study is motivated by the availability of relevant data on structural transformation as considered in the African Transformation Report. A survey through the literature revealed the dearth of a single measure of structural transformation with consistent data over the study period. Nonetheless, four main indicators are often used to access the degree of transformation in given economy (Dabla-Norris et al., 2013); and hence adopted in this study as well. These include: the real value added output share in agriculture, service, industry and manufacturing. Data on these indicators were sourced from the United Nations Statistics Division. Data on indices of structural reforms/regulations describing the degree of regulation and liberalization in key sectors of the economy were compiled by the Research Department of the IMF and used in studies such as Guiliano et al. (2013) and Dabla-Norris (2013). The indices cover six (6) main sectors of the economy ranging from the real sector to the financial/monetary sectors. The essence of these indices as used in this study is to delineate the role of the myriad of reforms on the ongoing structural transformation in the region. We complement our analysis with a set of variables including population, per capita income, dependency ratio, trade openness, mineral rents (% of GDP) as a proxy for natural (mineral) resource endowment and credit to private sector (% of GDP) as a proxy for financial development obtained from the World Bank's World Development indicators (WDI). Data on educational attainment were also used as a measure of human capital and is based on Barro and Lee (2010) international data on educational attainment. Stock of physical capital was however excluded due to limited availability over the sample period and countries considered in the study. Further, data on degree of democracy and governance indices from

Guiliano et al. (2013) were also included in the study. For a detailed description of the policy reform indices (agriculture, infrastructure, trade, financial, capital account, current account, democracy/governance, educational attainment) see Guiliano et al., (2013). Figure 4 presents a description of the relationship between the various policy variables and real income per capita as used in this study.

Fig. 4. Fit plot of Policy/reform indices and real income per capita



Source: Authors construction based on data from Guiliano et al., (2013) and WDI.

5. Results and Discussions

In this section, we present and analyze results from our regression analysis to determine the key drivers of economic transformation in SSA and their implications for economic development. To achieve this, the section is organized into 3 sub-sections. As a baseline regression, we examine the role of country fundamentals on structural transformation. Next, we assess the role of policy reforms and institutions. Finally, we investigate the role governance and fiscal reforms in structural transformation.

In each stage, we estimate four (4) separate models, using the log of real value added of agriculture, service, industry and manufacturing sectors as respective dependent variables. It must be emphasized that though real value added of the industrial sector entails the output of the manufacturing sector, we complement our analysis by investigating the factors driving output of the manufacturing sector. This is meant to delineate the real impact of the factors on the manufacturing sector which many experts argue to have myriads of inter-linkages to other sectors of the economy than the capital intensive extractive industry which despite being a key contributor to output of the industrial sector, offers little inter-linkages and employment[4] in SSA.

Baseline model: Role of country fundamentals

This baseline model examines the influence of a broad set of cross country fundamentals such as country size (proxied by population capturing scale effects); factor endowments such as arable land (% of total land area) and mineral rents(% of GDP); demographic effects (proxied by the age dependency ratio, young % of total); and income levels (proxied by real income per capita). The motivation behind the use of these factors stems from the fact that these factors can be viewed as initial conditions that cannot be influenced directly (at least in the short run) by policy makers but remains fundamental to the growth of every economy (Dabla-Norris, 2013).

Results from the system GMM estimates suggest varying effects of these country fundamentals on the sectoral performance. For instance, it shows that the stock of a country's mineral resource endowments (proxied by mineral rents % of GDP), arable land and age dependency account for the cross country differences in real output of the industrial sector. In the manufacturing sector, the results suggest that only income and arable land are the significant factors determining real value added of the sector. Similar results were derived for the service sector. These results suggest that income, demographic structure, size of arable lands and to some extent, mineral endowments, are significant factors accounting for cross-country variations in the real value added output of the manufacturing, industrial and service sectors. Surprisingly, none of these factors were shown to have significant impact on agriculture value added output.

Table 1: Role of country fundamentals: System GMM estimates

VARIABLES	(1) Agric	(2) industry	(3) manufacturing	(4) service
log of population	-0.00088	0.03435	0.11149	0.05119*
	(0.024)	(0.035)	(0.081)	(0.027)
log of per capita income	-0.01597	0.11498	0.26101**	0.15392**
	(0.062)	(0.084)	(0.114)	(0.068)
age dependency, young (% of total)	0.00041	0.00783*	0.00872	0.00847***
	(0.003)	(0.004)	(0.005)	(0.003)
Mineral rents (% of GDP)	0.00366	0.00754*	0.00196	0.00695
	(0.004)	(0.004)	(0.006)	(0.006)
Arable land (% of land area)	0.00010	0.00534**	0.00596*	0.00663***
	(0.002)	(0.002)	(0.003)	(0.002)
Lagged dependent variable	1.00938***	0.94928***	0.94020***	0.97053***
	(0.014)	(0.024)	(0.029)	(0.031)
Observation	162	162	162	162
Hansen test	17.5[0.89]	18.4[0.86]	18.2[0.82]	19.5[0.82]
AR(1)	-2.85[0.04]	-1.77[0.08]	-1.40[0.16]	-1.35[0.18]
AR(2)	0.45[0.65]	-1.03[0.3]	-0.89[0.4]	-1.936[0.05]

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; dependent variable in logs.

Role of Institutions and Policy Reforms

In this section we augment the baseline model with policy indicators such as education[5], financial development (credit to private sector % GDP), foreign direct investment, trade openness, and some measures of policy reforms mainly in real (agriculture, trade, infrastructure/network) and financial (financial reform index) sectors. The underlying idea herein is to assess the role of the myriad of structural policies implemented in the study countries in engendering structural transformation.

Agriculture

After accounting for the possible effects of these policy reforms on the real value added output of the sector, we observe that factors such as population, age dependency and arable lands achieve some level of significance. Notably, the result suggests that countries with larger share of youthful population (youth bulge) tend to have higher agricultural output relative to countries with an ageing population. This results in practice seems true in the sense that the agricultural sector in SSA still remains labor intensive with high proportion of youthful population particularly children used as farm labor. Notable examples of countries with this phenomena include Ghana and Ivory Coast where children and young adults form a significant share of labor used in cocoa and cash crop plantations (see: Bøås and Huser, 2006; World Vision, 2011).

In terms of the policy variables, the results indicate that whereas higher educational attainment exerts a negative relation with real output of the sector, reform indices such as agriculture, trade and infrastructure show positive effect on agricultural value-added. In other words, we observe that the quest for higher educational attainment in the region is associated with a decline in output shares of the agrarian sector. This result is in line with structural change ideology of Chenery (1960) and Lewis (1954) that a growing literate society will result in a gradual shift from low technology requirement economic activities such as agriculture towards the industrial and service sectors. Further, contrary to the findings of Dabla-Norris et al. (2013), our results indicate that policy reforms in the agricultural sector have yielded some positive impact on output of the sector.[6] Dabla-Norris et al. (2013) using data on 168 countries and the same measure of agriculture reform index finds a negative impact of the reforms on output of the sector. The implications of our results suggest that the chain of reforms implemented during the era of the Structural Adjustment Programs in SSA aimed at liberalizing various sectors of the economy including agriculture such as the removal of farm subsidies and price controls, divestiture of state owned farms/firms, towards a free market economy yielded some marginal impact towards enhancing output from the agricultural sector. The trade reform index captured among other things, efforts aimed at boosting trade openness through the harmonization of tariffs, removal of trade barrier etc. to enhance the flow of goods and services across countries. Since most of African economies are exporters of agro-products—albeit as raw materials— such as cocoa, coffee, rubber; trade liberalization is expected to generate greater benefits to the exporting economies and particularly the agricultural sector. This is confirmed by the results of trade reform index where a positive nexus is obtained.

Another noticeable result is the impact infrastructural/network index in boosting productivity of the agricultural sector. The implication of this result is that improvement in social amenities offers great potential to the agricultural sector as access to electricity can help in the transition towards a more mechanized and technology based agriculture in the sub region. Likewise access to reliable and efficient telecommunication services can boost output of the sector by enhancing market accessibility via reducing the informational asymmetries in the market for agricultural produce.

Table 2. Role of Policy reforms: System GMM estimates

VARIABLES	(1) agric	(2) agric	(3) agric	(4) agric	(5) agric	(6) agric	(7) agric	(8) agric	(9) agric
Lagged dept. variable	1.01850***	0.98553***	0.98658***	1.01698***	1.00327***	0.99075***	1.00503***	0.99455***	0.99370***
	(0.017)	(0.010)	(0.007)	(0.017)	(0.011)	(0.011)	(0.009)	(0.007)	(0.007)
log of population	-0.00887	-0.02952*	-0.02078	-0.06704	-0.01952	-0.01871	-0.01423	-0.01063	-0.00882
	(0.026)	(0.014)	(0.023)	(0.166)	(0.041)	(0.017)	(0.035)	(0.016)	(0.014)
log of per capita income	-0.12874	0.02722	0.01315	0.02668	0.03472	0.01455	0.02304	-0.01817	0.00427
	(0.084)	(0.031)	(0.017)	(0.034)	(0.045)	(0.030)	(0.036)	(0.036)	(0.028)
age dependency, young (% of total)	-0.00282	0.00558***	0.00467***	0.00238	0.00136	0.00340	0.00042	0.00206	0.00268
	(0.005)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Mineral rents (% of GDP)	0.00344	-0.00092	-0.00255	-0.01030	-0.00421	0.00002	-0.00299	0.00081	0.00155
	(0.003)	(0.004)	(0.006)	(0.014)	(0.007)	(0.003)	(0.006)	(0.003)	(0.002)
Arable land (% of land area)	0.00220	0.00210	0.00179	-0.00723*	-0.00212	0.00164	-0.00224	0.00168	0.00160
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
educational attainment	0.00311	-0.02531**	-0.02549*	-0.01179	-0.01712*	-0.02096**	-0.01595*	-0.01199	-0.01648**
	(0.009)	(0.010)	(0.012)	(0.016)	(0.008)	(0.008)	(0.008)	(0.008)	(0.006)
agric reform index		0.07448	0.05339	-0.04334	0.00006	0.08270	-0.00690	0.11273*	0.07765
		(0.053)	(0.060)	(0.076)	(0.044)	(0.053)	(0.044)	(0.059)	(0.050)
trade reform index		0.25430***	0.15106*	0.14965	0.09669	0.14795***			
		(0.053)	(0.082)	(0.101)	(0.116)	(0.049)			
financial reform index			0.09121	0.04385					
			(0.055)	(0.134)					
infrastructure index				0.31364*	0.11213		0.12695		
				(0.124)	(0.107)		(0.093)		
Domestic credit to private sector (% of GDP)					-0.00109	-0.00052	-0.00103	-0.00014	-0.00027
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
openness								0.00011	-0.00014
								(0.001)	(0.001)
FDI % of GDP									0.00323
									(0.003)
Observations	111	111	82	45	64	108	64	108	108
Hansen test	12.9[0.91]	7.5 [1]	0 [1]	0[1]	0 [1]	5.9[1]	0[1]	11.98[1]	7.9[1]
AR(1)	-2.5[0.01]	-2.2[0.02]	-2.01[0.05]	-1.49[0.14]	-0.16[0.11]	-2.2[0.03]	-1.61[0.1]	-2.28[0.02]	-2.3[0.02]
AR(2)	-1.39[0.05]	-1.12[0.14]	-0.94[0.35]	1.24[0.22]	1.48 [0.14]	1.48[0.14]	1.62[0.1]	-1.57[0.12]	1.5[0.13]

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 . figures in brackets [..] are p-values for diagnostic tests

Service sector

In terms of the service sector (see table 3), results on the impact of country fundamentals (i.e. population, income, size arable land, and mineral endowments) in driving real output of the service sector are significantly positive. This suggest, for instance, the possibility of significant backward linkages from the extractive sector to the service sector in terms service contracts such as catering , telecommunications, cleaning, etc.

On the policy front, our results show significantly positive relationship between the various reform indices and service sector productivity. The result of the financial reform index suggests that the liberalization of the financial sector in the respective economies has contributed positively to the expansion of the service sector in SSA. This impact can be analyzed from the point of view of facilitating the process of financial intermediation among economic agents and further reducing the barriers to accessing financial services thereby boosting investment and output of the service sector. Interestingly, contrary to the impact of the financial reform on service output, the results suggest a negative effect of domestic credit on output of the sector. This can be attributed to the myriad of challenges facing the private sector in securing credit from the financial sector, as issues exorbitant interest rates, high inflation, currency depreciation and a general macroeconomic instability in most SSA countries, makes the cost of credit too high for the average African firm to afford.

Consistent with Dabla-Norris et al. (2013), we find positive and significant effect of agricultural reforms on service sector output and thus, suggest that the liberalization of the agriculture sector contributed to freeing up of resources for other sectors of the economy. In other words, there are some spillover effects of reforms in the agricultural sector on other sectors including services. This spillover effects from agricultural sector reforms on the services sector could partly be attributed to increase in the demand for financial services due to the income effect of increase in agricultural value-added. Critics of the structural adjustment however hold the view that the booming service sector in most African economies is as a result of the declining agricultural sector—largely attributed to failure of the reforms in the sector in enhancing productivity

The effect of the trade reforms likewise that of openness confirm the assertion that the liberalization of the external trade sector has led to a booming service sector. This comes on the back of the fact that the declining manufacturing sector in SSA largely attributed to the increasing competition as a result of increasing degree of trade openness, has created a window of opportunity for trading in goods and services thereby boosting output of the service sector.

Table 3. Role of Policy reforms: System GMM estimates

VARIABLES	(1) service	(2) service	(3) service	(4) service	(5) service	(6) service	(7) service	(8) service	(9) service
Lagged dept. variable	0.97969***	0.97211***	0.96711***	0.97400***	0.98493***	0.98343***	0.98810***	0.98148***	0.98289***
	(0.013)	(0.012)	(0.011)	(0.020)	(0.005)	(0.009)	(0.005)	(0.007)	(0.007)
log of population	0.03435***	0.01385	-0.00036	0.08433	0.03140	0.02776*	0.04813**	0.03790**	0.03390*
	(0.011)	(0.014)	(0.027)	(0.200)	(0.018)	(0.014)	(0.019)	(0.014)	(0.016)
log of per capita income	0.05427	0.05781	0.04166	0.02347	0.07997**	0.00099	0.03944	-0.00087	-0.00081
	(0.053)	(0.039)	(0.034)	(0.039)	(0.027)	(0.036)	(0.032)	(0.035)	(0.028)
age dependency, young (% of total)	0.00531	0.00588**	0.00599	0.00597**	0.00678***	0.00196	0.00396**	0.00402**	0.00377**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Mineral rents (% of GDP)	0.00591*	0.00517	0.00432	-0.00104	-0.00215	0.00660**	0.00196	0.00479*	0.00400*
	(0.003)	(0.003)	(0.004)	(0.016)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
Arable land (% of land area)	0.00739***	0.00702***	0.00716**	0.00378	0.00170	0.00631***	0.00165	0.00631***	0.00636***
	(0.001)	(0.001)	(0.002)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
educational attainment	0.00254	-0.00179	-0.01605	-0.00701	-0.01302	0.00136	-0.00733	0.00119	0.00162
	(0.007)	(0.007)	(0.009)	(0.020)	(0.010)	(0.007)	(0.010)	(0.007)	(0.007)
agric reform index		0.11090**	0.03557	0.05884	0.07461*	0.06862	0.05797	0.05422	0.04761
		(0.049)	(0.079)	(0.109)	(0.033)	(0.047)	(0.045)	(0.045)	(0.043)
trade reform index		0.03065	0.05563	0.19918	0.26455**	-0.02321			
		(0.089)	(0.058)	(0.115)	(0.081)	(0.089)			
financial reform index			0.21585***	0.06934					
			(0.041)	(0.052)					
infrastructure index				0.03234	0.11086		0.13440*		
				(0.131)	(0.062)		(0.067)		
Domestic credit to private sector (% of GDP)					-0.00097*	0.00014	-0.00084	0.00058	0.00060
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
openness								0.00172*	0.00137
								(0.001)	(0.001)
FDI % of GDP									0.00434
									(0.004)
Observations	111	111	82	45	64	108	64	108	108
Number of code	15	15	11	6	9	15	9	15	15
Hansen test	11.7[1]	7.7 [1]	0 [1]	0[1]	0 [1]	3.84[1]	0[1]	0.93[1]	0.35[1]
AR(1)	-1.2[0.2]	-1.3[0.2]	-1.1[0.25]	0.51[0.6]	-0.17[0.86]	-1.06[0.3]	-0.7[0.5]	-0.97[0.3]	-0.98[0.3]
AR(2)	-1.4[0.2]	-1.1[0.3]	-0.9[0.33]	-2.2[0.6]	-2.61[0.09]	-1.10[0.3]	-1.5[0.13]	-1.28[0.2]	-1.3[0.19]

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Values in brackets [.] are p-values for diagnostic test. Dependent variable in logs

This trend is evident across most economies in SSA as the influx of cheap imports from Asia (particularly China) has led to an increasing trend in businesses related to buying and selling of final product and services especially within the informal sector. The effects of foreign direct investment is however insignificant.

Industry

The results for the industrial value added equation (Table 4), once again confirm the positive impact of income, population, and mineral resource endowments on the sectors output. The positive effect of mineral rents (used as a proxy for mineral resource endowments) is not surprising given the fact that the industrial sector of many African economies (eg. South Africa, Ghana, Nigeria, Botswana, etc.) is dominated by the extractive sector with gold, crude oil, diamond, copper, manganese and bauxite as notable examples.

Surprisingly, we find the effect of infrastructure/network index to be (negative) insignificant. This, signals the inherent inefficiencies that still pertains in the utilities subsector of most African economies. Despite the appreciable gains in SSA in improving accessibility to electricity (energy) and telecommunications, the sector is marred with huge inefficiencies in their service delivery as frequent power outages has increased cost of production and in some cases resulted in the shutting down of some industrial plants due to inadequate supply of energy. For instance, the World Bank Enterprise survey revealed that firms in most African countries surveyed including Benin, Burkina Faso, Tanzania, Kenya and Cameroun indicated electric power outages as the main constraint to their businesses with respective percentage of 69.25%, 68.97%, 60.24%, 48.15% and 64.94% (see: World Bank Enterprise Survey Online Database, 2012). The telecoms sector is also fraught with challenges as call drops, low internet speed, and limited coverage are highly associated with service delivery in the region.

Another interesting outcome is the insignificance of educational attainment. This evidence provide credence to calls for reforms in the educational sector to improve science, mathematics and technology based education so as to train manpower equipped with relevant skills to resuscitate the ailing industrial sector of most African economies. On the influence of trade reforms and openness, we find a positive impact on industrial output.

Table 4. Role of Policy reforms: System GMM estimates

VARIABLES	(1) industry	(2) industry	(3) industry	(4) industry	(5) industry	(6) industry	(7) industry	(8) industry	(9) industry
Lagged dept. variable	0.96456***	0.94999***	0.98324***	1.01705***	0.97615***	0.94684***	0.98095***	0.96529***	0.96956***
	(0.025)	(0.021)	(0.011)	(0.027)	(0.019)	(0.023)	(0.019)	(0.018)	(0.017)
log of population	0.01933	-0.03131	-0.03085	-0.23575	0.07767	-0.03312	0.09896**	0.00206	-0.00550
	(0.028)	(0.024)	(0.036)	(0.282)	(0.053)	(0.030)	(0.039)	(0.024)	(0.025)
log of per capita income	-0.01720	0.06082*	0.00313	-0.01201	0.06179	0.11444**	0.00830	0.03194	0.03468
	(0.059)	(0.033)	(0.035)	(0.081)	(0.041)	(0.042)	(0.044)	(0.048)	(0.055)
age dependency, young (% of total)	0.00218	0.00660***	0.00510**	0.00399	0.00934**	0.00811**	0.00571	0.00803**	0.00795**
	(0.003)	(0.002)	(0.002)	(0.006)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Mineral rents (% of GDP)	0.01282**	0.00420	0.00991	0.02402	0.00475	0.00381	0.00975	0.00217	0.00142
	(0.004)	(0.005)	(0.007)	(0.028)	(0.009)	(0.004)	(0.006)	(0.003)	(0.002)
Arable land (% of land area)	0.00595**	0.00519**	-0.00017	-0.00588	0.00603	0.00522*	0.00597	0.00474	0.00492*
	(0.002)	(0.002)	(0.003)	(0.011)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
educational attainment	0.00222	-0.01113	-0.00915	0.00776	-0.02431	-0.01889	-0.01762	-0.00108	-0.00252
	(0.022)	(0.017)	(0.019)	(0.054)	(0.027)	(0.013)	(0.027)	(0.015)	(0.014)
agric reform index		0.21538***	0.12679	0.16509	0.12476**	0.22390***	0.10173	0.17953**	0.15985**
		(0.068)	(0.086)	(0.168)	(0.052)	(0.064)	(0.073)	(0.064)	(0.059)
trade reform index		0.24698**	0.19000**	0.25850	0.33023*	0.26404***			
		(0.083)	(0.064)	(0.187)	(0.144)	(0.062)			
financial reform index			0.13351	0.29615					
			(0.095)	(0.271)					
infrastructure index				0.26303	0.03590		0.06763		
				(0.345)	(0.173)		(0.148)		
Domestic credit to private sector (% of GDP)					-0.00036	-0.00096	-0.00018	0.00083	0.00096
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
openness								0.00283*	0.00234
								(0.001)	(0.002)
FDI % of GDP									0.00684
									(0.006)
Observations	111	111	82	45	64	108	64	108	108
Hansen test	8.9[1]	0.8 [1]	0 [1]	0[1]	0 [1]	5.9[1]	0[1]	5.9[1]	0 [1]
AR(1)	-1.9[0.06]	-1.81[0.07]	-1.42[1.6]	-0.9[0.3]	-1.23[0.2]	-2.2[0.03]	-1.61[0.1]	-1.87[0.06]	-1.15[0.25]
AR(2)	-0.3[0.77]	-0.69[0.49]	-0.50[0.6]	-1.4[0.2]	-1.16[0.2]	1.48[0.14]	1.62[0.1]	-0.54[0.59]	-0.81[0.42]

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.; Dependent variable in logs

This result on trade openness contradict assertions that trade liberalization is the key factor responsible for the declining industrial sector in the region. The agriculture reform index also shows a positive impact. Again, signaling the presence of a positive spillover effect of agricultural reforms on the industrial sector.

Manufacturing

As indicated earlier, owing to the important role of manufacturing sector on economic transformation via value addition and employment generation, we consider in this subsection the main drivers of manufacturing sector value added. Results are shown in table 5. The result for the manufacturing value added is quite similar to the overall industrial sector value added with few notable exceptions. Here, mineral rents are shown to have negative effects on the manufacturing sector, thus suggesting some level of competition between the extractive and the manufacturing. This perhaps suggests the dominance of the industrial sector by the extractive industries (mining and oil) thus, freeing up little resources and policy actions towards the main stream manufacturing subsector. Further, the results suggest a positive impact of agricultural reforms on manufacturing sector output. This attest to the contributions of the agro-processing firms which process agricultural produce like fruits and vegetables mainly for exports.

Again, we see an insignificant effect of education on manufacturing sector value added, thus indicating that exogenous variations in educational attainment has not yielded any significant impact on manufacturing sector output in SSA. This can be attributed to the slump in vocational, science and technology education in the region largely due to the lack of adequate financing and teaching aid to the sector thereby resulting in a growing lack of interest among students to go into science and technology education. For instance, according to the AEO (2008) "while enrolment in technical and vocational programs is quite high in North Africa (averaging 22.95 per cent of total secondary school enrolment between 2001 and 2005), the vocational education sector generally occupies a much smaller - if not marginal - position in school systems in countries in sub-Saharan Africa (5.2 per cent between 2001 to 2005 with a falling trend since 2003) compared to the OECD countries in the same period (18.6 per cent) and other developing regions, such as Latin America (11.6 per cent) and South East Asia (9.5 per cent)"[7]. Again, consistent with the results of the industrial sector, trade reforms and degree of openness, shows a positive impact on manufacturing output while the effect of infrastructure index remains insignificant.

Table 5. Role of Policy reforms: System GMM estimates

VARIABLES	(1) manufacturing	(2) manufacturing	(3) manufacturing	(4) manufacturing	(5) manufacturing	(6) manufacturing	(7) manufacturing	(8) manufacturing	(9) manufacturing
Lagged dependent. variable	1.00989***	1.01039***	1.01720***	1.00500***	0.98136***	0.98013***	0.98857***	0.98243***	0.98302***
	(0.035)	(0.036)	(0.036)	(0.042)	(0.019)	(0.021)	(0.020)	(0.019)	(0.018)
log of population	0.04898*	0.05502	0.07746*	-0.11931	0.04377	-0.01054	0.07683**	0.01688	0.01327
	(0.026)	(0.039)	(0.039)	(0.319)	(0.042)	(0.023)	(0.028)	(0.020)	(0.021)
log of per capita income	-0.12853	-0.10660	-0.10109	0.04799	0.16488**	0.09628*	0.08334	0.07209	0.07437
	(0.158)	(0.144)	(0.148)	(0.111)	(0.066)	(0.051)	(0.060)	(0.051)	(0.048)
age dependency, young	-0.00888	-0.00777	-0.00766	0.01040	0.01417***	0.00737*	0.00865*	0.00972**	0.00953**
(% of total)	(0.011)	(0.011)	(0.014)	(0.007)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Mineral rents (% of GDP)	-0.00154	-0.00093	-0.00188	0.02577	-0.00971	-0.00439	-0.00166	-0.00670*	-0.00720**
	(0.004)	(0.006)	(0.008)	(0.034)	(0.007)	(0.005)	(0.004)	(0.003)	(0.003)
Arable land	0.00156	0.00188	-0.00093	-0.01031	0.00244	0.00477*	0.00241	0.00464**	0.00470**
	(0.003)	(0.002)	(0.003)	(0.012)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
educational attainment	0.03079	0.02132	0.00776	0.02685	-0.01862	0.00450	-0.00798	0.00767	0.00799
	(0.026)	(0.020)	(0.031)	(0.068)	(0.031)	(0.013)	(0.030)	(0.013)	(0.013)
agric reform index		-0.00736	-0.04569	0.29117	0.18750**	0.12625	0.15329	0.09246	0.08837
		(0.133)	(0.166)	(0.204)	(0.080)	(0.076)	(0.106)	(0.068)	(0.069)
trade reform index		-0.10348	-0.13704	0.25006	0.51893**	0.05370			
		(0.137)	(0.155)	(0.298)	(0.181)	(0.138)			
financial reform index			0.10431	0.17396					
			(0.100)	(0.243)					
infrastructure index				0.09951	-0.10876		-0.05759		
				(0.516)	(0.221)		(0.196)		
Domestic credit to private sector (% of GDP)					-0.00093	-0.00011	-0.00065	0.00071	0.00068
					(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
openness								0.00311**	0.00277*
								(0.001)	(0.001)
FDI % of GDP									0.00390
									(0.005)
Observations	111	111	82	45	64	108	64	108	108
Hansen test	10.9[1]	0 [1]	0 [1]	0[1]	0 [1]	3.03[1]	0[1]	0[1]	1.86 [1]
AR(1)	-0.8[0.4]	-0.8 [0.4]	-0.73[0.46]	-0.9[0.36]	-0.93[0.35]	-1.2[0.24]	-1.61[0.1]	-0.8[0.4]	-1.2[0.2]

AR(2)	-0.06[0.95]	-0.02[0.98]	-0.07[0.95]	-1.46[0.14]	-1.6[0.1]	-0.3[0.76]	1.62[0.1]	-0.8[0.4]	-0.4[0.68]

Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1. dependent variable in logs.

Role of Governance and fiscal reforms

The focus of this section is to highlight the role of governance and political stability, as well as fiscal reforms in spurring economic transformation in the sampled economies. Thus we use an index of democracy ranging between zero and one with one being the most democratic country and zero the least democratic country. In terms of fiscal reforms two indices are used: current account index- which measures the extent to which a country's government is compliant to IMFs Article VIII that enjoins member countries to avoid restrictions regarding proceeds from international trade in goods and services (i.e. current payments); capital account index-which measures the extent of government "controls on external borrowing between residents and nonresidents, as well as the approval requirements for FDI" (Giuliano et al., 2013). Results are shown in table 6.

The results reveal that these fiscal reform and governance indices have varying effects on output of the sectors. Specifically, we see a positive impact of capital account liberalization index on value added output of service and industrial sectors. Implying that countries with less governmental restrictions on foreign financial transactions attract a more foreign inflows and boost economic activities in the service and industrial sectors, especially the banking and finance institutions.

On the other hand, we derive a negative effect of current account reform index on real value of the agricultural sector. This may be due to the fact that current account liberalization encourages exports raw (primary) agricultural products while at the same time encouraging importation of food products (like rice) from Asia, Europe and North America. This development hinders value addition to agriculture value added in the region. Interestingly, the governance index (democracy) becomes negatively related to output of the agricultural sector. This suggest that the declining share of agriculture output can be attributed to the thriving democracies in the region which provides incentives for people to engage in highly productive economic activities other than being stuck to subsistence agriculture.

Table 6. Role of Governance fiscal reforms: System GMM estimates

VARIABLES	(1) Agric	(2) Service	(3) Industry	(4) Manufacturing
log of population	-0.01135	0.03490	-0.02622	0.07035**
	(0.020)	(0.032)	(0.022)	(0.024)
log of per capita income	0.01915	-0.00312	0.00367	0.06216
	(0.025)	(0.039)	(0.038)	(0.035)
age dependency, young (% of total)	0.00482*	0.00311	0.00613**	0.00939***
	(0.002)	(0.003)	(0.003)	(0.003)
Mineral rents (% of GDP)	0.00364	0.00022	0.01675**	-0.00026
	(0.005)	(0.006)	(0.006)	(0.006)
Arable land (% of land area)	0.00318*	0.00629**	0.00017	-0.00154
	(0.002)	(0.002)	(0.003)	(0.003)
capital account index	0.07542	0.11824**	0.21293*	0.17512
	(0.096)	(0.050)	(0.113)	(0.147)
current account index	-0.17802**	-0.04102	0.00167	-0.00666
	(0.070)	(0.066)	(0.128)	(0.128)
democracy index	-0.05895*	-0.03159	0.05329	-0.03804
	(0.027)	(0.053)	(0.084)	(0.109)
Lagged dependent variable	0.98772***	0.98002***	0.99419***	0.99255***
	(0.009)	(0.010)	(0.018)	(0.016)
Observations	77	77	77	77
Hansen test	0[1]	0 [1]	0 [1]	0[1]
AR(1)	-1.9[0.06]	-0.99[0.32]	-1.940.05]	-1.17 [0.2]
AR(2)	-0.5[0.64]	-1.91[0.06]	-1.17[0.24]	-1.18[0.24]

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.
Time dummies included. Values in brackets [.] are p-values for diagnostic tests. Dependent variables in logs.

6. Conclusions and Implications for policy

The main purpose of this study is to highlight the main drivers of economic transformation in the SSA region and to further analyze the implications for policy towards engendering sustainable economic growth in the region. To achieve this we investigate the determinants of real value added of the main sectors of the economy: agriculture, service, industry and manufacturing. The choice of these variables as indicators of structural change is informed by the lack of a general measure of structural transformation with consistent data over the study period, and also due to its application in the empirical literature on structural transformation. This study estimated the drivers of structural transformation using the system GMM estimator. The ensuing results from the model are summarized as follows:

First we find the stock of a country's human and natural resource endowments are key determinants of sectoral output shares. For example, whereas income levels have consistently shown significant positive effects on real sectoral output, the impact of share of land suitable for agriculture, mineral resource endowment, size of labor force (population), and the age distribution of the population varies across the various sectors.

On the policy front, we observe that institutions and policy reforms are significant drivers of economic transformation in SSA. Notably, the study reveals that higher educational attainment is associated with the declining share of agricultural sector in total output (GDP). These findings fall directly in line with the postulates of the structural transformation literature that as an economy ascends the ladder of transformation, with a large skilled human capital base, the overall contribution of the agrarian and rural economy falls. Surprisingly, we find the effect of educational attainment on manufacturing and industrial sector value added to be insignificant, thus suggesting that the impact of increasing educational attainment in adding value to the output of these sectors is yet to be realized. This presents an important implication for the design and implementation of policies in the region. It calls for careful and more pragmatic approach towards removing the myriad of constraints (accessibility, cost, quality, etc) in the educational sector in SSA countries with a view of using education as a tool for spurring structural transformation and development. It must be noted that whereas calls for increased education in the region is worthwhile, the emphasis should not be on increasing enrollment per se, but more importantly (in addition) enhancing the quality of the education (teaching and learning) offered in educational institutions in the region. This call comes in the wake of concerns especially from educational experts that the attention of education policy in most SSA has been focused mainly on boosting school enrolment with little or no recourse to school retention and educational quality. However, the overall impact of increased educational attainment on structural transformation can only be realized when the human resource of a country is endowed with the requisite skills (science, technology and mathematics education) to contribute effectively in the other sectors of the economy (such as manufacturing and service).

Our results also reveal that structural/economic reforms have varied implications on structural transformation. Specifically, we find that reforms in the agricultural sector exert some positive impact on not only the sector but also spill-over effects on other sectors (i.e. industry, service and manufacturing). However, it must be emphasized that even though economic transformation implies

a shift towards industrial/manufacturing sector from an agrarian based economy, it at the same time implies boosting productivity of the agricultural sector so as to engender food security. Thus given the food security problems and the (relative) comparative advantage of the region in terms of agriculture, reforms in the agricultural sector must focus on ways to encourage technology-driven-agriculture so as to maximize the potential gains from the sector with relevant linkages to other sectors of the economy.

Next, in terms of the regions exposure to the external community via international trade, our study confirms that SSA economies have generally benefited from reforms/liberalization in the trade sector and the ensuing increase in trade openness. However, there are concerns on the impact of over-liberalization on the competitiveness of the manufacturing sectors (eg. the textile industry in Ghana). There is therefore the need for concrete national policies aimed at boosting the competitiveness of domestic manufacturing firms via the provision of basic infrastructure such as reliable energy/electricity supply, transportation, enforcement of patent rights etc. These measures will contribute towards reducing the prevailing high cost of doing business in the region.

With regards to financial reforms and development, we find significant results only in the case of the service sector. The results show that whereas the indicator for financial reforms exerts a positive impact on real value added of the service sector, the effect of credit to private sector (proxy for financial development) is shown to be negative. This implies that on the one hand, financial liberalization has enhanced the growth of the financial sector to provide services to agents in the various sectors; on the other hand, the ensuing financial deepening has not really been beneficial to the various sectors. This can be attributed to the high cost of credit and collateral requirement often attached to loans from the financial sector to players in the real sector. Thus, the elimination of these constraints to credit can reverse the trend and fuel growth of output in the real sector. We argue that the problem of high cost of credit extant in the financial sector of most African economies can largely be attributed to structural inefficiencies in the respective economies. These include among other things, macroeconomic instability, political instability, lack of efficient and reliable national identification system for easy tracking of loan defaulters etc. Hence, tackling these issues can reduce to a large extent the inherent high risk in the financial sector thereby reducing the cost of credit to the real sectors of the economy.

Further, our results confirm the increasing importance of infrastructural provision on structural transformation. The results show a positive effect on output of agricultural and service sectors. However, in terms of manufacturing and industrial value added, our results suggest that impact of reforms in the electricity and telecommunications on the real output of these sectors is (statistically) insignificant. This in a way highlights the effects of the gross inefficiencies in the provision of utilities on industrial/manufacturing sector(s). For instance, firms in the region are constantly inundated with power outages often resulting shutdown of production plants and/or depending on relatively expensive alternate sources of energy such as the use of thermal plants/generators. Thus, finding a permanent solution to the various infrastructural challenges especially in energy, telecommunication, transportation is crucial towards achieving the overarching goal of structural transformation.

On the role of governance and fiscal reforms, we find that a higher degree of democracy, i.e. good governance, is highly associated with declining agricultural value added shares and an increasing industrial value added shares. The impact on the other sectors were however insignificant. In other words the results suggest good and stable governance to be an important factor driving the canonical shift of economic activity to the non-agricultural sectors from the agrarian based economies. Thus, efforts aimed at deepening democracy in the region must be bolstered to influence the process of transformation. Further we show that fiscal reforms such as compliance to IMF article VIII on reducing/relaxing restrictions on international trade receipts (capital account reform) as well as international financial transactions of residents (capital account reforms) are important factors for economic transformation. The results therefore lend support to calls for fiscal reforms aimed at liberalization of SSA economies whilst maintaining international standards.

In conclusion, results stemming from this paper offer empirical evidence on the driving forces of behind the structural transformation witnessed in the SSA region over the past four (4) decades. Overall, evidence from the paper reveals that economic reforms are key determinants of structural change and hence, should be encouraged. However, attention must not only be given to the direct (intended) effects of the reforms but also the potential spillover effects on other sectors as well.

Reference

Acemoglu, D. (2009). *Introduction to modern economic growth*. Princeton University Press.

African Centre for Economic Transformation (ACET, 2014) "2014 African Transformation Report: Growth with Depth, Ghana.

African Economic Outlook (AEO, 2008). Access to Technical and Vocational Education in Africa. http://www.africaneconomicoutlook.org/theme/developing-technical-vocational-skills-in-africa/the-rationale-for-technical-and-vocational-skills-development/taking-stock-of-technical-and-vocational-skills-development/access-to-technical-and-vocational-education-in-africa/ [Accessed, 20th July 2014].

Aghion P., and Howitt P. (1992). A Model of Growth through Creative Destruction. Econometrica 60(2): 323-351

Aghion, P., and Howitt P. (1998). Endogenous Growth Theory, MIT Press, Cambridge, MA.

Aghion, P., and Howitt P. (2009). The Economics of Growth, MIT Press, Cambridge, MA.

Arellano M., and Bond S., (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies 58:277–297.

Arellano M., and Bover O., (1995). Another Look at the Instrumental Variable Estimation of Error-Components Models. Journal of Econometrics 68:29–51.

Bah, El-hadj (2011). Structural Transformation Paths across Countries. Emerging Markets Finance & Trade 47(3):5-19.

Barro, R., and J. Lee (2010). A New Dataset of Educational Attainment in the World, 1950–2010" NBER Working Paper 15902, Cambridge, MA: National Bureau of Economic Research.

Baltagi, B.H., (2013). Econometric Analysis of Panel Data. 5th Edition. John Wiley and Sons, West Sussex, United Kingdom

Blundell, R., and S. Bond (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," Journal of Econometrics 87:115–143.

Bøås M., and Huser A. (2006). Child labour and cocoa production in West Africa. http://www.fafo.no/pub/rapp/522/522.pdf [Accessed, 20th July 2014]

Breisinger, C. and Diao, X. (2008). Economic Transformation in Theory and Practice: What are the Messages for Africa? ReSAKSS Working Paper 21. International Food policy Research Institute (IFPRI).

Chenery, H.B. and L. Taylor (1968). Development patterns among countries and over time. Review of Economics and Statistics 50:391-416.

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

Christiaensen, L, L. Demery, J. Kuhl (2006).The role of agriculture in poverty reduction – an empirical perspective, World Bank Policy Research Working Paper No. 4013. Washington D.C.

Diao, X., P. Hazell, D. Resnick, J. Thurlow (2007). The role of agriculture in development: Implications for Sub-Saharan Africa. IFPRI Research Report No. 153. Washington, D.C.

Dabla-Norris E., Thomas A.H, Garcia-Verdu R., and Chen Y., (2013). Benchmarking Structural Transformation across the World. International Monetary Fund. Washington DC. Dec. 2013. https://www.imf.org/external/pubs/cat/longres.aspx?sk=40847 [Accessed, 20th July 2014]

Duarte, Margarida, and Diego Restuccia (2010). The Role of the Structural Transformation in Aggregate Productivity. Quarterly Journal of Economics 125(1):129-173.

FAO (2006). FAO Briefs on Import Surges Commodities No. 1. Import Surges in Developing Countries: the Case of Poultry. ftp://ftp.fao.org/docrep/fao/009/j8672e/j8672e00.pdf [Accessed, 20th July 2014]

Giuliano, P., Mishra, P., and Spilimbergo, A. (2013). Democracy and Reforms: Evidence from a New Dataset. American Economic Journal: Macroeconomics, American Economic Association. 5(4):179-204.

Global Poultry Trends (2013). Chicken Imports Rise to Africa, Stable in Oceania. http://www.thepoultrysite.com/articles/2972/global-poultry-trends-2013-chicken-imports-rise-to-africa-stable-in-oceania [Accessed, 20th July 2014]

Grossman, G. M., and E. Helpman (1991). Innovation & Growth in the Global Economy. Cambridge, MA, MIT Press.

Howitt, P., & Aghion, P. (1998). Capital accumulation and innovation as complementary factors in long-run growth. *Journal of Economic Growth*, *3*(2), 111-130.

International Monetary Fund (2012). Regional Economic Outlook: Sub-Saharan Africa-Maintaining Growth in an Uncertain World. http://www.imf.org/external/pubs/ft/reo/2012/afr/eng/sreo1012.htm [Accessed, 16th December 2015]

Jacques B. (2006). Feed subsidies to EU and US exported poultry and pig meats. http://www.iatp.org/files/451_2_78363.pdf [Accessed, 20th July 2014]

Kuznets, S. (1955). Economic growth and income inequality. American Economic Review 45:1-28.

Lewis, W. A. (1954). Economic Development with Unlimited Supplies of Labor. Manchester School of Economic and Social Studies 22:139-91.

McMillan, M. and D. Rodrik (2011), "Globalization, structural change and productivity growth," Chapter 2 in Making Globalization Socially Sustainable, Marc Bacchetta and Marion Jansen, eds. Geneva, Switzerland: International Labour Organization and World Trade Organization

Mensah, J.T. (2014). Carbon emissions, energy consumption and output: A threshold analysis on the causal dynamics in emerging African economies. Energy Policy 70:172-182.

Ogunleye, E. K. (2011). Structural transformation in sub-Saharan Africa: The regional growth poles strategy. In *African Economic Conference, Kigali*. http://www.uneca.org/sites/default/files/page_attachments/ogunleye-ssa_economic_transformation_through_growth_poles_1.pdf [Accessed, 20th July 2014]

Quartey, P. (2006). The Textile and Clothing Industry in Ghana, in Herbert Jauch and Rudolf Traub-Merz (eds), The Future of the Textile and Clothing Industry in Sub-saharan Africa, Bub Bonner Universitats-Buckdruckerei, Germany, pp. 135-146. ISBN 3-89892-497-1

Romer, P. M. (1990). Endogenous Technological Change, Journal of Political Economy, 98: 71–102.

Schumpeter, J.A. (1934). The Theory of Economic Development. Harvard University Press, Cambridge, Massachusetts.

Solow, R.M. (1957). Technical change and the aggregate production function. Review of Economics and Statistics 39 (3), 312–320.

Swiston, A. and Barrot L.D. (2011). The Role of Structural Reforms in Raising Economic Growth in Central America. IMF Working Paper No. 11/248. http://www.imf.org/external/pubs/cat/longres.aspx?sk=25313 [Accessed, 20th July 2014]

Stein, H. (1992), Deindustrialization, Adjustment, the World Bank and the IMF in Africa. World Development,20:83-95

Tarp, F. (1993). Stabilization and Structural Adjustment: Macroeconomic Frameworks for Analyzing the Crisis in Sub-Saharan Africa, London: Routledge

Taylor, L. (1993). "The rocky road to reform." *The Rocky Road to reform: Adjustment, Income Distribution and Growth in the Developing World MIT Press Cambridge, Massachusetts* (1993).

Timmer, P., McMillan M., Badiane O., Rodrik D., Binswanger-Mkhize H., and Wouterse F., (2012). Patterns of Growth and Structural Transformation in Africa: Trends and Lessons for Future Development Strategies. IFPRI Thematic Research Note 02. April 2012. http://www.ifpri.org/sites/default/files/publications/wcaotn02.pdf [Accessed, 20th July 2014]

World Bank (2013). World development Indicators Database, http://data.worldbank.org/[Accessed, 20th July 2014].

World Bank Enterprise Database (2012). Enterprise Surveys, http://www.enterprisesurveys.org/data/exploreeconomies/2012/[Accessed, 20th July 2014].

World Vision Australia (2012). Our Guilty Pleasure: Exploitative Child Labour in the Chocolate Industry. http://campaign.worldvision.com.au/wp-content/uploads/2013/04/Our-Guilty-Pleasure-Exploitative-Child-Labour-in-the-Chocolate-Industry-Report-Summary.pdf [Accessed, 20th July 2014]

Williams M. D. J., Mayer, R. and Minges M. (2011). Africa's ICT Infrastructure Building on the Mobile Revolution, http://siteresources.worldbank.org/INFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/AfricasICTInfrastructure_Building_on_MobileRevolution_2011.pdf [Accessed, 20th July 2014]

Wooldridge J.M. (2010). Econometric Analysis of Cross Section and Panel Data. The MIT Press Cambridge, Massachusetts, USA.

[1] This is often referred to as "*productivity-reducing structural change*"

[2] The African transformation index has five components: economic diversification (with the following sub components: production sector diversification, exports commodity diversification, and export sector diversification), export competitiveness, productivity growth (manufacturing value added per worker, cereal yield per hectare), technology upgrading and human wellbeing (level of GDP per capita, ratio of formal sector employment to the labour force).

[3] To reduce the role dynamics in the results, the regressions were run using data based on 5-year averages as its typical in the empirical literature on panel data (eg. see: Swiston and Barrot, 2011)

[4] This is due to the fact that there is little value addition in the extractive sector in African economies, as most of the produce is exported raw for refinement in the advanced economies, mostly Europe, North America and recently, China.

[5] As a proxy for human capital

[6]However this result is not robust across the various specification as shown in Table 2

[7]http://www.africaneconomicoutlook.org/theme/developing-technical-vocational-skills-in-africa/the-rationale-for-technical-and-vocational-skills-development/taking-stock-of-technical-and-vocational-skills-development/access-to-technical-and-vocational-education-in-africa/