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PRODUCTION TRANSFORMATION AND SECTORAL GROWTH DRIVE: A COMPARATIVE EXPLORATION ON SUB-SAHARAN AFRICA AND ASIAN ECONOMIES

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Abstract

The doctoral dissertation intends to explore the level and patterns of production transformation, centering the analysis on sample economies from East Asia, Southeast Asia, South Asia and SSA. It consists of seven parts. The general introduction gives outline of the research theme, claims (problem statement), objectives and research questions. It also introduces the motivation, content and contributions of each of the six parts to the dissertation.

Part two intends to give conceptual discussions on production transformation and to review relevant theoretical strands on structural transformation and structural change. The aim is to grasp useful insights on how the dynamic evolution of the production structure of an economy towards the increasing returns sector (chiefly manufacturing) pertains to employment creation, cumulative productivity increases and sustainable development. It discusses the tenets of the classical development theories (along with the Anglo-Saxon structuralism, ECLAC, and contemporary discourses of structuralism), the Kaldorian and Pasinettian approaches, the technological catching-up perspectives and the agent-based evolutionary theories on the importance of sectoral composition of the economy. It addresses whether sectoral composition and structural change matter for economic development and sustainability; whether shifts in sectoral activities and factors of production towards high-productivity manufacturing activities still contribute to capital accumulation and new productive and technological capabilities as it did in the past. Part two set the analytical foundation of the study that rest on the structuralist and Kaldorian analytical constructs and stylized facts, which recognize the existence of structural heterogeneity between economic sectors contrarily to the neoclassical economics presumption of sectoral homogeneity.

As a continuation of part two, part three seeks to discuss sectoral role of growth, framing the analytical framework in favor of the dynamic synergetic relationship between sectors (which is related to the multi-sectoral multiplier approach). Early development thinkers thought production transformation as synonymous to development and acknowledged that manufacturing has superior qualities which enable it to drive development, sustainability and wealth creation of nations. Nevertheless, such conventional thought has encountered heavy knockbacks mainly since the 1980s, with services-led development route received much focus and weight to replace manufacturing in becoming the new growth escalator. This is notwithstanding the new digital technologies and the consequent shift in globalization, hence growing outsourcing of certain services activities from manufacturing firms, might have intensified the blurring dividing line between manufacturing and services. With the aim at contributing to the debate on sector-led development route and wealth creation in today's low-income economies that failed to have their own industrialization imitating the advanced economies as well as to the debate on industrialization and service transformation, part three devotes to critically and thoroughly review the tenet of the different theoretical strands (past and present) on engine of growth hypothesis. It contributes to the industrialization or the production transformation and development literature by synthesizing the role of manufacturing and other sectors (agriculture and services) to economic development and poverty reduction in the developing economies context in SSA and Asia. Following the sector-specificity and activity-specificity approach (discussed in part two), the lengthy discussion of part three vindicated the existence of a synergetic relation between economic sectors and production activities [and the "stimulus complement" role of services to manufacturing] through addressing hosts of questions.

The remaining parts of the dissertation were intended to validate the proposed synergetic relationship between economic sectors as well as the "stimulus complement" role of services to manufacturing rather than substitute to it. The possibility for synergetic relationship [rather than antithetic nature] between manufacturing and services activities in the transformation and development process has been missing or received very little attention in the debate hitherto – advocates of each sector completely ignore or place little focus on the existence of a dynamic synergetic relationship between them. The dissertation calls for

synergy because everything is interconnected in the economic system. One cannot discuss about development without production and employment; without acknowledging structural heterogeneity of the economy. So, it is difficult to separately discuss or define anything clearly; hence, difficult to draw stylized fact with respect to sectoral role in economic transformation and development process that is clear and accepted by all. The arguments we read are not actually definitions, but simply formulations (claims) that explicate certain strengths and flaws of variety of perspectives, proposition and empirical observations. In fact, the discussion may at times seem contradictory. This is simply because synergy by its conception involves logging a middle course between polarized ideas (extremes). In short, synergy rejects extremes and often calls for the 'middle way,' neither too far to the right nor to the left. Often the truth in real world production is neither one alternative nor the other but both. Choosing synergy generally requires one to accept ambiguity, uncertainty, mystery and paradox. For instance, manufacturing has indispensable role in the economy; but, agriculture should not be marginalize and belittled, nor services be ignored. The economy needs both, despite manufacturing conventionally has special place to play pivotal role than others.

The discussion from part one through part three suggests that countries may undergo disproportional patterns and sequences of changes of production structure composition in the course of their development, in that structural transformation could be good (that is, growth-enhancing) in one part of the globe and bad (that is, growth-reducing) in another part. That is why some countries experience growth miracles accompanied by good quality job creation that change their poverty landscape, leapfrogging their comparative advantage while others stagnate or even lose headway. The development orientation and pathway of rising living standards in advanced countries and newly industrialized economies has centered on shifting the production structure in the direction of high-productivity, technology-intensive and tradable activities (most notably manufacturing and modern services), not simply moving from one economic sector to another. The converse meant that reproducing oneself or shifting resources, typically labor, from traditional agriculture to traditional services could not help capture the gains from structural transformation.

With this background, part four seeks out to detect, in comparative perspective, the transformation and development paths of sampled SSA and Asian economies through the lens of production transformation [employing descriptive and empirical analysis]. The findings give useful insights on understanding where the considered economies stood in production transformation in the past five decades. During the study period, economic growth and development in Asia has been associated with structural transformation in the direction of high productivity sectors/production activities. A corollary to this observation is that economic growth did drive structural change with the rise in affluence followed by change in production composition (demand side) while structural change did drive economic growth from the supply-side as labor shifted from low-productivity to high-productivity activities. Interestingly, countries differ with respect to their paths of structural transformation. On one hand, the evolution of the production composition and development journey in some of the sample economies [typically South Korea, Taiwan, China, Malaysia, etc. in Asia and perhaps Mauritius in SSA) took after the conspicuous historical regularities and stylized facts of structural transformation observed in today's advanced economies; moved from agriculture through manufacturing to services [exceptions were Hong Kong and Singapore, which are city states that had no large agriculture sector]. On other hand, the remaining countries in both regions did not conform to this path: some of them saw services dominancy in 2015 from agriculture dominancy at the beginning of the study period while in others the exit of labor from agriculture ended up in manufacturing, or industry outside of manufacturing (such as construction) or to both manufacturing and services. This suggests that the process of structural transformation can better be described as uneven and incomplete. The estimates of employment elasticity and productivity intensity of growth at economy-wide and sector level, and the results of the decomposition of labor productivity growth into constituent parts through the widely used shift-share analysis all suggest the existence of structural heterogeneity between economic sectors with respect to inclusiveness and sustainability, giving support to the synergetic or symbiotic relationship hypothesis. This way the dissertation contributes to the structural change and development literature, hence to the knowledge gap.

Several empirical studies evidenced the existence of an inverted U-shape (a hump-shape) relationship between per capita GDP and the relative share of manufacturing in GDP and in total employment while others question whether such hump-shape relationship exists in real world production. The growing concern of researchers now is centered on *premature deindustrialization* that developing countries encountered at lower levels of income per capita and lower shares of manufacturing in the economy than was the case in advanced economies. It is worrying, because such *deindustrialization* episode in low-income economies, if there be one in reality, could potentially make manufacturing-led development path harder to start and to sustain for these economies. Yet, the debate on *premature deindustrialization* and on the hump-shape curve is ongoing. This dissertation claims that such episode can better be characterized as *premature tertiarization than deindustrialization.* The findings suggest that developing Asian economies, on average, were immune from deindustrialization or premature tertiarization, despite the growing importance of services with the rise in affluence. However, the findings for SSA is inconclusive; but, send flash of light on the presence of more of industrial stagnation and under-industrialization with premature tertiarization, rather than premature deindustrialization, albeit variation exists across countries. The U test results suggest the existence of inverted U shape in one or two panels, but monotonic or increasing monotonic in others. The findings suggest the need to use appropriate methodology to identify varieties of deindustrialization or premature tertiarization in developing countries.

It then delve deep to empirically identify all plausible determinants of industrial development (measured in terms of relative share of manufacturing in GDP and employment) in a way to support the theoretical discussions made in parts two and three in relation to why and in what manner could it be beneficial for developing countries to industrialize and to invest in manufacturing development. It also sheds important insights on why countries in developing Asia achieved higher share of manufacturing (and become industrial powerhouses) than those in SSA (which experienced *stagnant industrialization or* under-industrialization *with prematuretertiarization*). In this way, the dissertation contributes to the debate and knowledge gap, detecting the main driving forces for manufacturing development across sample economies from Asia and SSA employing recent panel data econometric methods that corrects cross-sectional dependence, slope heterogeneity and dynamic common factors apart from investigating the patterns of *deindustrialization or teritiarization.* Basically, the main contribution of part five to the literature is empirical, identifying the relative strength of the effects of the different determinants of manufacturing and differences between the country panels in which manufacturing is relatively more, or less, subtle to the effects of these determinants to shed lights into what might help or hinder a country's industrialization. The driving forces for manufacturing development in the full sample and the two country groupings come out complex and heterogeneous in terms of both qualitative aspect (sign of the coefficients) and quantitative aspects (magnitude of the coefficients) as well as level of significance with respect to their impact on the change of manufacturing value added and employment shares. This implies that implications of the various explanatory variables would differ between SSA and Asia and across countries in each region. Interestingly, some variables come out similar (positive/negative and consistently significant across models) between SSA and Asia while certain other variables come out different (positive for one and negative for other). The sign and magnitude of the income effect (per capita GDP and its square) observed with the baseline regression differ with the extended model specification partly associated with inclusion and exclusion of some variables and the estimation approach employed. Given that general model (instead of specific models that retain merely statistically significant covariates in each case) is used for the full sample and the two country groups alike with the intent of respecting comparability between the two country groups suggests that the estimation outcome may not give precise predictions when insignificant variables are retained. The findings suggest the need to institute concerted efforts by governments of SSA economies to build foundational capabilities including well thought industrial policies to guide manufacturing firms compete in the fragmented GVCs and benefit from the opportunities created with the Fourth Industrial Revolution. It may give useful insights if future research extends the estimation to different manufacturing activities by level of development; regions (sub-regions); manufacturing export levels (manufacturing exporters and non-manufacturing exporters); population dynamics and size; and by sub-period. It may also sound interesting if future research includes additional variables (and exclude others) and use different estimation models to draw much wider insights on the determinants of industrial development and extend this to services and agriculture sectors.

The aim of part six is to empirically confirm or refute the conclusions drawn from the theoretical discussions and descriptive analysis made in the preceding parts. In particular, it intends to empirically test whether manufacturing maintains special qualities to play engine of growth role in the considered SSA and Asian economies, evidencing the existence of a dynamic causal relationship between growth rate in that sector and economic growth in line with Kaldorian and Structuralist traditions. To this effect, recent panel-data estimation approaches were employed that are proved to give robust estimates in the presence of cross-sectional dependence, slope heterogeneity, non-stationarity, endogeneity and reverse causality problems the original Kaldor's growth equations, in a way to address the following questions: (i) Does manufacturing still wear its premised cardinal potentials to exhibit engine of growth effects? Or to what extent does manufacturing exhibit growth engine effects in SSA and Asian sample economies? (ii) Can skill-intensive services present special properties that enable them replace or play the role of mere stimulus complement to manufacturing? (iii) Could agriculture have the capacity to be growth escalator in SSA economies? Addressing these questions is predicted to give useful insights as to whether Kaldorian predictions are relevant to the sample economies in SSA and Asia for relatively long period covering 1970-2015. So, the contribution of part six is mainly empirical, exploring whether manufacturing still maintains stronger positive effect on economic growth than services and agriculture sectors. To the best of the researcher's knowledge, this is a first attempt of treating these issues in empirical works pertinent to the sectoral engine of growth analysis. It contributes to certain debates in the literature (see parts three and four) such as those that suggest that services may ultimately complement, or take from, manufacturing as an engine of growth in developing countries. The findings from the close and open economy models give support for the engine of growth role for manufacturing as services and agriculture failed to pass the first spuriousness test. In many cases, the magnitude of the coefficients for the two segments of services and agriculture exceeds that of manufacturing. The inclusion of investment, government consumption and export in their real growth rates altered the size of the coefficients for manufacturing and other sectors, but their sign and level of significance remain unbroken; those aggregate demand elements bear positive sign, statistically significant effect on the growth of the respective country groupings. The results give supportive evidence to endorse the synergetic relationship between manufacturing and services and between manufacturing and agriculture. The same conclusion can be drawn from the findings of the second and third growth laws of Kaldor. When data availability is improved, future research should considered increasing the number of countries included in similar research works. This may inspire one to carry out further research using different dataset and empirical methods to make sure if the findings remain intact or change. In future research, re-estimation of Kaldor's second growth law is required perhaps through including with the regression other variables like investment or aggregate demand (or its autonomous components), structural change, etc. to come out with more sensible results, which at the same time address the critiques on the original model.Future research should evaluate the dynamic relationship between sectoral growth to poverty reduction and inequality. Most importantly, country-specific studies should be carried out to entangle the kind of policy intervention for growth enhancing structural change so as to stimulate good quality employment generation.

Key words: Production Transformation; Structural Change; Industrialization; Deindustrialization; Premature Tertiarization; Manufacturing; higher productivity and Baumol's diseases services; Agriculture; Structural Heterogeneity; Kaldor; Determinants of Manufacturing Development; Growth; Development; Static and Dynamic Panel data Estimation

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PART I: GENERAL INTRODUCTION

1.1. Background: The Big Picture

There has been, and still is, debate among development economists and economic historians, on the driving forces that brought the divergent development paths and poverty reduction among regions and countries worldwide – that is, the forces that made rich countries rich and poor countries poor, and continued that way. Predominantly, after the so-called golden age of prosperity (1950-1973), the growth divergence and the gap in per capita income and living standards widened among the center (rich, developed economies) and the periphery (poor, underdeveloped economies). Such disparities were said to be hinged, chiefly, on differences in productive and technological capabilities (Andreoni and Chang 2016; Chang, et al. 2014) on one side, and policy failure (Tregenna 2016b) and political settlement (Khan 2010), hence frail institutional quality (Chang 1994; Acemoglu, et al. 2014; Fadda 2018), on the other. In explaining the divergence paths in production transformation and development among countries globally, Arthur Lewis (1977 p. 4) aptly said: *"As the industrial revolution developed in the leading countries in the first half of the 19th century, it challenged the rest of the world in two ways. One challenge was to* ***imitate*** *it. The other challenge was to* ***trad****e. ... The challenge to* ***imitate*** *was immediate and have one's own industrial revolution. A number of countries reacted immediately in North America and Western Europe. But, most countries did not, even in Central Europe. This was the point at which the world began to divide into industrial and non-industrial countries."* (Emphasis is the author). Why did it happens that way remain a big and intriguing question.

In the Lewisian strong propositions, the ways of **imitation and trading** are key plausible explanations to the divide in the level of development or economic prosperity between rich and poor, technologically frontier and technologically backward countries. Hence, the metaphorical center and periphery precept[1] come to the surface. On one side, the technologically frontier and

[1] This goes back to the Argentine economists and statesman Raúl Prebesh (1950) and the Economic Commission for Latin American Countries (ECLAC). The dependency theory perspective argued that underdevelopment is resulted from the peripheral position of affected countries in the world economy rather than internal factors such as productivity, where the countries supply the world market with labor and raw materials at low cost. In this perspective, therefore, the historical prevalence of unequal relationships (dependency and exploitation) between advanced and undeveloped countries caused the latter to remain poor and continued that way. Development is explained by an economy's mode of integration into the world economy, which is influenced by market mechanisms that maintain this dependency. So, a European world system caused the persistence differentiation between wealthy, industrialized core countries and undeveloped, agrarian periphery countries. Typically, undeveloped countries sale raw materials to advanced countries at cheap price, which are transformed into finished goods at factories in the advanced countries and exported them to undeveloped economies at high prices, depleting the capital they might otherwise use to build their productive capacities. This was the reason for the perpetual division of the world economy into a rich core and a poor periphery (Kaya 2010; Kiely 2010; Chase-Dunn 2015).

economically advanced countries (the rich core, the Center) specialized in the production and supply of more complex and sophisticated products to the global market which are predicted to be concentrated on the center, dense part of the product space[2]. They achieved development and end poverty through industrialization (manufacturing development). On other side, the technologically lagging and poor ones (the Periphery) continued to reproduce themselves and supply more of the same products (mainly raw materials) that are located in the far corner, outer boarder part of the product space, which are prone to price volatility. These economies lack the capabilities, or in the dependency theory precepts, denied the opportunity to diversify their export baskets and improve the diversity and complexity of their production structure and economic systems.[3]

Lewis explicated that the catching-up countries that **imitated**[4] the frontier economies have made the transition from a traditional to a modern production economy (industrialization); hence, from an economically poor and technologically backward nations to an economically rich core and technologically advanced nations. This implies that productivity growth and long-term economic dynamism depends on how the composition of production structure changes and diversifies overtime, in turn driven by the availability and application of dynamic production technologies. Polanyi (2001/1944) referred this as the "Great Transformation" – that is, transformation from agrarian to industrial societies. Therefore, various eminent scholars both from the mainstream and heterodox wing (e.g. Dani Rodrik, Erik Reinert, Ha-Joon Chang) posit that those prospered ones seem to advise the lagging countries *"do what we do, and you will get prospered too."*

[2] The product space is defined as the relatedness of products or the network between products that are subject to world trade (Hausmann and Klinger 2006, 2007; Hidalgo et al. 2007), wherein products that require similar capabilities are grouped together. The product space is heterogeneous which may direct the speed at which a given economy can transform its productive structure and diversify its exports. In this perspective, countries with limited productive and technological capabilities find it difficult to diversify their products towards more complex and sophisticated product groups. The visualization of the product space demonstrates that products located in the center of the product space are complex products, with extensive network connections and high spillover effect while the outermost products are the non-sophisticated ones that do not require much knowledge and skills to produce (Hausman and Hidalgo 2009; Hidalgo 2011). The center of the product space is mostly occupied by machinery, chemical, and metal products whereas petroleum, raw materials, vegetable and animal products, and labor- and capital-intensive goods (except metal products) are located on the outer border. The closer the products a country manufactures to the center (core), the easier it is to manufacture new goods as existing capabilities can be redeployed to realize this production (Abedon et al. 2010; Felipe 2010).

[3] This seems the central precept for Rodrik (2006) to claim that the number of products a given economy sells is not significant anymore, but the quality and complexity of the products matter.

[4] Eric Reniert called it "emulation". He posits that "The presently wealthy nations have all been through a stage where they employed a strategy of emulation into the paradigm-carrying activities of the day. The Marshall Plan—the giant plan for reindustrializing Europe after World War II—was the last big emulation plan that opened up for successful free trade later. Presently the United States and European economies are emulating each other in creating gigantic rent-seeking machines based on very oligopolistic competition—like Boeing and Airbus. As a rapidly increasing part of world trade takes place in patented goods—i.e. legalized rent-seeking—it is almost indecent of First World economists to suggest that Third World countries should not be allowed to engage in industrial policies that produce rent-seeking. This is a blatant example of double standards: the strategy 'perfect competition for you and imperfect competition for us' was the core of an industrial policy called colonialism. The Third World will increasingly see the present stance as neo-colonialism" (Reinert 2009 pp 26).

The question is: *what had the prospered ones done and could today's undeveloped countries effectively follow that route and be able to do what the prospered economies did in the past?* Questions like this are complex, necessitating cautious review of economic history, theory and stylized facts on production transformation and development. Most importantly, economic history witnessed that industrialization has been a necessary condition for economic development and poverty reduction. Today's advanced economies had undergone continuous production transformation (industrialization and industrial upgrading) that helped them export more complex and innovative products. This is why Hausman, et al. (2007) strongly argued that the type of products countries export matter for their development. Overall, the successful **imitators** have managed to build their productive and technological capabilities, following the conventional development journey and production transformation, and in due course they not only caught-up the leading countries but also forged-ahead them. Joshua Child (1963, cited in Reinert 2009 pp 2), said that 'If we intend to have the Trade of the World, we must imitate the Dutch, who make the worst as well as the best of all manufactures, that we may be in a capacity of serving all Markets, and all Humors' in an attempt to clearly explain the emulative nature of English catching-up. This statement may make it clear that those prospered economies have successfully moved up the quality ladder, and hence, managed to supply the world market with complex manufacturing products, away from **trading** traditional products which are characterized by low price- and income-elasticity of demand. In such moves, governments of respective countries played active role – successfully implemented targeted industrial policies. To this effect, they had allocated huge investment funds on infrastructure, technological development and innovation. In short, the prospered countries followed the industrialization path of the frontier economies rather than insisting on free trade prematurely while countries in the global South (especially Africa) failed to optimize the advantage of their technological backwardness to **imitate** [that is, they **insisted on trading**].

What the above suggests is that sectoral composition and structural change matter for countries development. This is in line with the sector- and activity-specificity prediction of the Strucutralist, Post-Keynesian and Schumpeterian thoughts. It matters because manufacturing was, and still is, playing engine of sustainable growth and sources of technological advancement and innovation, offering strong forward- and backward-linkages and multitude of spillover effects. It matters, as discussed above, as several countries climbed the ladder of development and sustainability through following manufacturing-led development journey, **imitating** the advanced, industrialized core countries. By contrast, the periphery continued to **trade** primary agricultural commodities, following the principle of comparative advantage, counting out the dynamics of technological development, innovation and competition. Therefore, they continued to be poor, undeveloped, because their comparative advantage following (CAF) strategy (and the world economic system) exposed them to highly volatile commodity prices in the world market and terms of trade deterioration. As a result, the development programs implemented could not help them experience learning-based industrialization and production diversification in the right direction. If there was structural change, it can be considered as bad – bad, because it was growth reducing. Contrary to those countries that made successful **imitation** or emulation up to defying their comparative advantage (e.g. South Korea), the countries that failed to **imitate** the advanced, industrialized core countries (such as those in SSA) lacked the productive capabilities[5] to produce complex and sophisticated goods, but ended up exporting raw materials and natural resources at relatively lower prices and import finished goods at higher prices. Hence, they found themselves caught in the club of undeveloped countries, wherein small-scale agriculture and traditional services (and informal activities) take dominancy in the economic system.

The economic history of today's advanced capitalist economies suggests that developing countries (especially low- and middle-income countries) can only attain inclusive growth and sustainable development, and therefore break the poverty trap through the process of production transformation (and state-led industrialization) that may ensure employment creation and job quality, productivity gains and the like (Amsden 2001, 2010; Rodrik 2013; Andreoni and Chang 2016). For, this route was proved to be viable route for today's mature industrialized economies in building a vibrant economy and developed sustainably. The structural change and growth literature documented that almost all economies in the world were relatively agrarian and poor before the Industrial Revolution than today; where, the gap between the richest and poorest cores of the world economy was roughly in the ratio of 2 to 1 (Maddison 2010). More specifically, take off, forging-ahead and sustainable development in several developed countries (Western Europe, USA, and other Western Offshoots as well as Japan that all emulate the UK) and the East and Southeast Asian tigers and emerging mega economies was state-led industrialization and export of manufactures rather than free trade based on the export of primary products and import of manufactures as undeveloped countries did. In particular, the industrial policies implemented by these economies were geared towards diversifying and increasing the production and exports of more complex and sophisticated manufactured goods.

[5] Andreoni and Chang (2016 pp 6) defined productive capabilities as "personal and collective knowledge that are needed for the execution of production tasks and for the improvements in technological and organizational and organizational functions of production units… these capabilities mainly developed through processes of learning in production within firms…. It is within the realm of production that human beings develop their identity as producers."

As indicated earlier, there was fairly widespread robust growth in the developing world during the so-called 'golden age of prosperity', whereby income level gap was not diverged big. This was especially reversed, according to Palma (2011), since the launching of the neo-liberal policies of Washington Consensus in the 1980s. What this means is that the divergence patterns of structural change and growth seem to have been the rule in the world economy over the era of globalization than before. National accounts data shows that widening gap in GDP growth and income per capita between the developed and developing economies, and across developing economies [6] was typically prevalent during the 1980s and 1990s. That is why the United Nations report (2006) strongly claims that *growth collapses and successes appear to have been clustered in time and space*. All said, *twin big divergences emerged since the 1980s: divergence between the developing and developed world (or divergence between the North and the South, the center and periphery), and regional disparities within the club of developing countries (divergence within the South*). What is worrying and surprising is the coexistence of high average growth with big divergence among developing countries block, a testimony of the ways of **imitation and trading.** The first-tier industrialized economies or the four Asian tigers (comprising Hong Kong, South Korea, Singapore and Taiwan) exhibited sustained growth trajectory through following the conventional development journey and production transformation (industrialization) that surpassed not only SSA but also other regions of the developing world and reached high-income status. These economies were followed by the ASEAN-4 (Indonesia, Malaysia, Philippines and Thailand) and now by the emerging giants (China, India and Vietnam). In contrast, other developing economies, especially those in Africa and Latin America and the Caribbean observed either growth collapse or stagnation with dire poverty, leaving out industrialization.

The home-take messages from the above are two-folds:

First, convergence of developing economies with developed countries was the exception rather than the rule globally for countries that insisted on **trading** rather than following manufacturing-led development route to their development (Rodrik 2013; 2016). This claim is in stark contrast with the contemporary (mainstream) growth theories which posit that technologically backward countries have the advantage of benefiting from advanced economies as their low capital-labor

[6] Data from the Conference Board total economy database shows that average annual growth of global output fell from 5.1 percent (1950-1975) to 1.2 percent (1975-1995), and then rose to 4.3 percent (1995-2011). In the same way, median growth rate declined from 4.8 percent in sub-period one to 2.4 percent in sub-period two and then slightly went up to 3.9 percent in sub-period three. For the 71 countries in the developing block, median output growth was 4.9 percent per year, which then fell to 3.4 percent per year and increased to 4.5 percent per year over the three sub-periods, respectively. The same reference periods witnessed the emergence of regional gaps in terms of annual average GDP growth.

ratios should raise the return to investment,[7] everything else being the same. For, the countries can import technologies from abroad and use global capital markets to finance investments in the production of tradable goods for which they have comparative advantages, supplementing domestically mobilized resources (so savings should not act as a constraint). Nonetheless, this was not what happened on the ground, for not all countries have developed the productive capabilities to produce tradable goods whose income-elasticity of demand in the global market is higher; lack of investment finance being one of the constraints.

Historically, with the exception of European periphery and handful of East and Southeast Asian forerunners, economically and technologically backward nations failed to see rapid and sustained growth through transforming their production structure in the right direction, thereby catching-up the advanced capitalist economies. However, notwithstanding a large number of economies opened up their trade, capital accounts and financial systems to the global market (UN/DESA 2006), "convergence has been the exception rather than the rule since the great divergence spawned by the Industrial Revolution and the division of the world into a rich core and a poor periphery" (Rodrik 2013). This all may give some clue to answer the question: Why such big divergence occur? What does the catching-up success story of Asia tell us? The dissertation claims that the divergence economic growth path so big between regions and across countries is a mere manifestation of the difference in their production structure; no predestination!

Second, continuous change in the production structure towards high-productivity economic sectors (production activities) such as manufacturing played the decisive driving force for wealth creation and sustainable development in today's affluent countries. This suggests that the way of **imitation and trading** is the main reason for the world economy to continue dividing into the industrialized, the core rich (developed) and poor periphery (undeveloped) blocks, notwithstanding the world saw fabulous technological advancement and supreme production transformation since the aftermath of the Second World War and the independence of many countries from their colonies.

In an attempt to explain about this, Justin Lin (2011 pp 3) argued that *"dramatic acceleration in growth rates came about with the rapid technological innovation after the Industrial Revolution and the transformation of agrarian economies into modern industrialized societies with*

[7] This, according to heterodox economists, is the usual neoclassical myth: that the marginal product of capital and hence the rate of return on capital depends on the capital-labor ratio. The return on investment depends on whether there is or not a tendency toward an international equalization of rates of return all over the world. The rate of return in a country will be high if, given the efficiency of production in that country, wages are lower than necessary to yield the world rate of return, and there are barriers to entry that discourage more investment in that country, that would increase the demand for labor until wages or land rents rose, or would decrease the world price of the country's exports. It is the low wages that should be an advantage (like for China) if not neutralized by lower efficiency.

agriculture's employment share declining from more than 80 percent down to 10 percent. This intriguing trend has led us to recognize that continuous structural change prompted by industrialization, technological innovation and industrial upgrading and diversification are essential features of rapid, sustained growth."

The author is very authentic in arguing that those economies that have experienced growth-inducing structural change (in line with the classical development theories) prospered and those that failed to do so stagnated and even regressed. In the former, he joined several other development economists who posit that climbing the development ladder was almost synonymous with industrialization. By this he disparages the dominant neoclassical view of development for its relegation of production and employment creation on account of its sector or activity neutral proposition (Lin and Chang 2009). Yet, he still posits that countries should pursue a comparative advantage following (CAF) strategy rather than comparative advantage defying (CAD) strategy. He articulates his new structural economics and endorses the existence of close and strong link between industrialization and development and sustainability. In some aspect, his view converges to the Lewisian and Kaldorian predictions, in that the shift of labor and other resources towards higher-productivity sectors (such as manufacturing) remains the key driving force for achieving economic development and sustainability. For, shifting towards that sector was conventionally taken as growth-enhancing or progressive in the sense of cumulative productivity increases. The absence of such transformation could be regressive in the sense of losing (missing) productivity gains and development, which in Lewis's prediction cane be labeled as perpetually walking the way of **trading**.

One may deduce from the second message that wealth creation and sustainable development in today's economically wealthy nations (typically in the North) was manufacturing-led. Seeing from this lens, therefore, inquiring as to whether those conventional cardinal elements that gave manufacturing strong potential of expansion in the past are still available today and may continue to hold in the future so that developing countries can **imitate** the way of the conventional development path (industrialization), is an interesting research theme. This line of argument conjectures that *difference in production transformation attributed to different driving forces explain the existence of different development paths between regions* (such as between SSA and Asia and Pacific).

1.2 Divergence growth paths and patterns in SSA and Asia: Overview

Three decades ago, levels of development of some of the authoritarian developmental states of Asia were not far from most SSA economies. The East and Southeast Asian economies had managed to build their capacity to move up the technological ladder and diversify their economies towards more tradable activities (mainly manufacturing) following the so-called "flying geese model" of industrial transformation (Lin and Monga 2011; Andreoni and Chang 2016). Their economic and productive complexity levels leapfrogged, **imitating** Japan as well as the industrialized economies of Western Europe, the USA and other Western Offshoots, defying their comparative advantage (Lin and Chang 2009).

In contrast, SSA saw dismal growth performance: Countries in the region observed either growth collapse or stagnation in the 1980s and 1990s [mainly during the SAP regime] where sustainability in growth momentum was the exception (UN/DESA 2006). The economy of majority of the countries in SSA was characterized by frail changes in the production structure [and inability to create good quality jobs], growth reducing structural change and very low economic complexity, leading to the prevalence of abysmal poverty. Not only had these economies recorded precarious economic performance, but they were also scourged with mounting debts. Most of the countries fell behind, experiencing prolonged growth stagnation and volatility over those periods. So, these periods were considered by many as lost decades for Africa; some scholars call the region a 'hopeless continent' (The Economist May 2000), predestined for backwardness, underdevelopment and poverty. Interestingly, several countries in SSA exhibited growth boom during the 2000s and thereby Africa has been hailed as a "hopeful continent" [The Economist April 2013], and some scholars have wrote off about the growth acceleration as Africa's Great Run.

With this background, this sections seeks to elucidate the divergence growth paths among and across sample SSA and well-off East, Southeast and South Asian economies and to evaluate the recent growth boom observed in countries of SSA in the context of production transformation and sustainability. The extent and pattern of production transformation will be thoroughly investigated in latter parts of the dissertation.

A. Divergence in terms of Output Growth Patterns:

Table one reports annual average output growth patterns for sample economies in Asian and SSA during the period 1960-2015; splitting the whole period into three sub-periods: 1960-1979, 1980-1999 and 2000-2015. Four observations are notable from the Table:

First, huge gaps in real output growth between [and within] SSA and Asian economies were observed over the 1980s and 1990s, wherein most SSA economies experienced either growth deceleration or stagnation. Exceptions were Botswana, Cameroon and Mauritius, which not only exhibited remarkable real output growth over the first and second sub-periods, but also their growth rate was relatively higher or comparable to the East Asian boomers. Mauritius, a small country, was recognized as growth miracle [a success story], amidst the lost decade for SSA, recording sustainable growth trajectories through pro-growth industrial policies;

Table 1: SSA and Asia: Annual Average Growth rate of Real Output, 1960-2015 (percent)

Country	1960-1979	1980-1999	2000-2015	Country	1960-1979	1980-1999	2000-2015
BWA	15.6	8.1	4.2	CHN	5.9	9.6	9.7
CMR	8.7	5.0	3.5	HKG	9.0	5.7	4.3
ETH	2.6	2.4	9.2	IND	3.3	5.8	6.8
GHA	1.6	3.4	6.5	IDN	6.4	5.1	5.0
KEN	4.9	3.4	4.4	KOR	7.2	6.5	3.7
MWI	5.5	2.1	4.5	MYS	9.2	6.4	5.0
MUS	9.9	4.6	4.3	PHL	7.0	2.7	5.2
MOZ	-3.1	6.5	7.4	SGP	9.1	7.5	4.0
NAM	2.3	2.9	4.9	TWN	11.0	6.9	2.5
NGA	7.1	2.5	7.8	THA	7.6	6.2	3.7
RWA	7.9	1.9	7.8	BAN	0.9	3.9	6.1
SEN	2.2	2.5	3.9	SLK	4.3	4.7	5.6
ZAF	4.3	2.0	3.5	CAM	-7.1	5.1	7.6
TZA	4.5	2.9	7.9	MMR	4.3	3.6	6.3
UGA	2.3	6.0	5.9	VIE	4.6	6.2	6.5
ZMB	0.3	0.7	5.7				

Note: Abbreviations are: SSA countries: BWA – Botswana; CMR- Cameroon; ETH – Ethiopia; GHA – Ghana; KEN – Kenya; MWI – Malawi; MUS – Mauritius; MOZ – Mozambique; NAM – Namibia; NGA – Nigeria; RWA –Rwanda; SEN – Senegal; ZAF – South Africa; TZA –Tanzania; UGA – Uganda; and ZMB – Zambia. Asian economies: CHN – China; HKG – Hong Kong; IND – India; IDN – Indonesia; KOR – South Korea; MYS – Malaysia; PHL – Philippines; SGP – Singapore; TWN – Taiwan; THA – Taiwan; THA – Thailand; BAN – Bangladesh; SLK – Sri Lanka; CAM – Cambodia; MMR – Myanmar; and VIE – Vietnam.

Source: Own Computation, based on data from GGDC, APO and WDI

Second, within Asia, the emerging economies (such as Bangladesh, Cambodia, China, India, Myanmar and Vietnam, with respective solid annual average growth rate of 6.1 percent, 7.6 percent, 9.7 percent, 6.8 percent, 6.3 percent and 6.5 percent in 2000-2015, became new morning stars. The new morning stars of Asia saw increase in their manufacturing performance during the post-1990 period and therefore, SSA economies were exposed to stern competition from these countries with the exports of light-manufacturing products such as clothing, textiles and apparels;

Third, most of the considered SSA economies have experienced growth acceleration during 2000-2015, exhibiting an average real output growth rate ranging between 3.5 percent per year

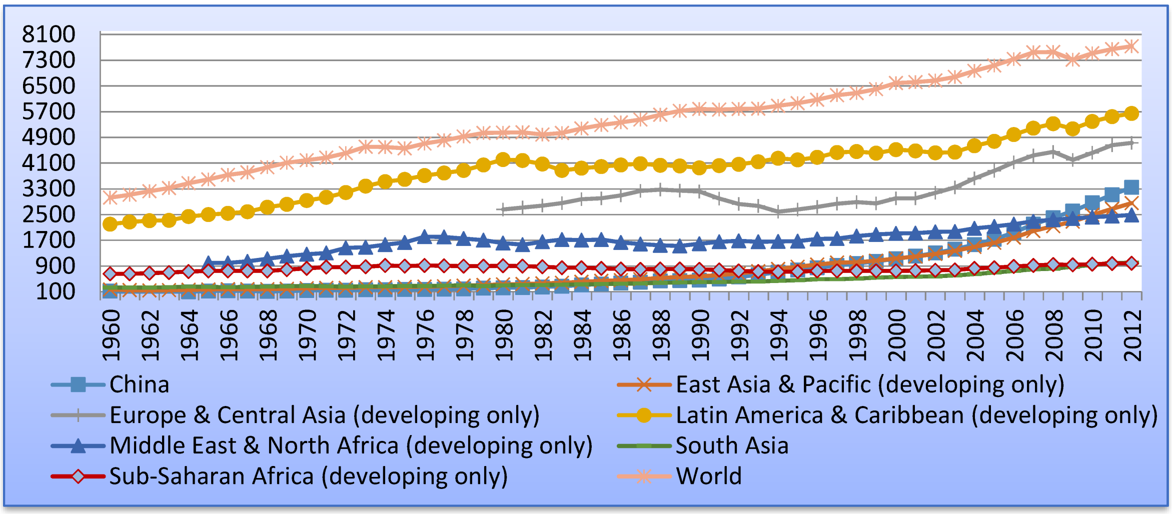
(Cameroon and South Africa) and 9.2 percent per year (Ethiopia). The growth trajectories observed in Ethiopia, Nigeria, Rwanda, Tanzania and Zambia over this sub-period were striking when compared particularly to own average growth rates observed in sub-period two, when they both saw an average growth rate of less than 3 percent per year;

Fourth, most of the economies in SSA [including landlocked and resource poor ones] exhibited growth acceleration during sub-period three, growing at the rate of some of the well-heeled South, Southeast and East Asian economies. For instance, Ethiopia, a land-looked and non-oil exporting country, has experienced growth acceleration through public investment mainly in infrastructure development and supported by conducive external environment (World Bank 2015). Such growth episode led many to stand on the side of optimism, speaking on the odds for the continuity of the positive growth prospects for the countries. Nonetheless, what is worrying and stirring doubts on the quality and continuity of the growth acceleration is that the growth was partly driven by primary commodities price boom attributed in part to the surge in global demand for natural resources, particularly from China. Rodrik (2016 pp 29) confirmed that the growth acceleration was not driven by the "traditional mechanism of industrialization." Instead, "Many of the growth booms appear to have been driven by capital inflows, external transfers, or commodity booms, raising question about their sustainability."

B. Divergence in terms of Per Capita GDP Growth Patterns:

Notwithstanding the existence of heterogeneity amongst countries within each region, per capita GDP level in several SSA economies was more or less upward trending in the 1960s and 1970s, where import substitution strategy received principal focus of policy makers and governments of several developing countries. It then become dilapidated and dipped below world average over the 1980s and 1990s. Overall, real per capita GDP for SSA went up slightly, in 2005 constant prices, from USD 658 in 1960 to USD 689 in 2012. During the same time span, real per capita GDP increased in developing East Asia and pacific, and South Asia, respectively, from USD 174 to USD 2,856 and from USD 229 to USD 1,009. What is more amazing was that real per capita GDP in China increased by 2,588 percent to reach USD 9,321 in 2012, higher than that of total developing SSA (Figure 1).

Figure 1: Trends in GDP Per Capita by Region, 1960-2012 (Constant 2005 USD)



Source: World Bank, WDI Database, 2013

Exploring the evolution of GDP per capita at country level may help draw some more interesting observations, surprises and insights on the credibility of the "Africa Rising" narratives. During the 1950s and 1960s, the economy of most SSA countries, measured in terms of per capita GDP, was pretty akin with that of today's well-off Southeast and East Asian countries. For instance, per capita income in 1990's USD (converted at Geary Kham's PPPs) for China (USD 347) was lower than those of Ethiopia (USD 390), Democratic Republic of Congo (USD 570), Niger (USD 617) and Tanzania (USD 424). By 2013, Democratic Republic Congo and Niger became fragile with weak institutions, failed to even retain the income per capita level they had in the 1950s and 1960s. Similarly, Ethiopia and Tanzania remained in the club of low-income economies, struggling to attain food self-sufficiency and to reduce poverty, despite exhibiting impressive growth accelerations in the 2000s. A comparison of South African and South Korea may also give important insights. Income per capita for South Africa and South Korea was USD 2,535 and USD 854 in 1950. However, by 2013, South Korea increased its per capita income level by 28 fold to reach USD 24,156 while South Africa's per capita income was USD 5,567, above 4 times lower than that of South Korea. The former moved up to high-income status while the latter jammed at middle-income level, caught in the so-called middle-income trap. Additionally, the former endured industrial transformation and upgrading while the latter felt *"premature de-industrialization"* (see Annex III, Figure 1).

A closer look into growth performance by sub-periods shows that SSA had performed more dismally over the second sub-period (1980-1999) than during sub-period one (1960-1979). During sub-period one, developing SSA achieved per capita GDP growth rate of 1.7 percent per year; per capita GDP growth was upward trending for most SSA economies. This indicates that *growth failure was the exception in SSA over that sub-period, wherein merely handful of countries experienced growth stagnation or collapse*. The second sub-period tells a different story though: On one hand, *SSA experienced dismal annual average growth rate of -0.94 percent per year*. Merely few SSA countries were successful in sustaining their growth record.[8] So, over this sub-period, *growth collapse became the rule rather than the exception for countries in SSA*. Several factors could have contributed to such dismal growth performance: the 1979 oil price shock, the sudden rise in world interest rate at the end of the 1970s, the collapse of non-oil commodity prices accompanied by the debt crisis in the 1980s and other domestic factors including political instability and civil war, inapt policies, drought, etc. (see Annex I). Per capita income growth rate in sub-period three (2.2 percent) was slightly above world average (1.5 percent), despite the absolute figure remains low. Again, this growth momentum begets optimism for SSA, replacing the decadal pessimism on its per capita income growth.

Quite the reverse, the representative Asian economies saw a persistent increase in their per capita GDP level, enabling them comfortably walk up to middle-income and high-income status. Indeed, most of these economies were among the poorest assemblage before the 1960s [only Taiwan, Singapore, the Philippines, Malaysia, and Japan had higher GDP per capita than half of the world average then]. However, the region[9] extraordinarily triumphed, with per capita GDP growth in the second sub-period was faster compared with that of the golden age of prosperity, and more than ten times as fast as in the old liberal order (1870-1913) (Maddison 2006). East Asia and Pacific region saw average annual per capita income growth of 3.3 percent during 1960-1979, which increased to 6.4 percent in 1980-1999 and 7.8 percent during 2000-2015. Likewise, average per capita GDP for South Asia increased from 1.2 percent (which was slightly lower than that of SSA) to 3.3 percent and 4.9 percent over the three sub-periods respectively. Typically, the glamorous performance of China and India[10] altered the region's growth pattern.

[8] A spectacular success over this period was experienced by Mauritius, witnessing a three-fold increase in per capita income growth: in 1970, it had half the income of South Africa and by the end of the 1990s it had twice its income. Mauritius has diversified its economy initially in the direction of manufactures largely through protectionist policies. In contrast, South Africa was stagnated for the entire sub-period. Botswana and Zambia are natural resources bonanzas, in which extractive industries contributed significantly to overall output. Botswana, we are told, has achieved growth miracles as a result both of its richness in natural resources (mainly diamonds) and its good institutions. Zambia, which at the beginning of the period had identical income level to that of Botswana, had seen a steady decline in per capita income until it recovered modestly in the third sub-period attributed mainly to bad institutions with undesirable implications on the contribution of the mining industry, whose growth performance was falling continually.

[9] Lin (2011) pointed out that the so-called flying geese model has emerged in those resurgent Asian economies, where the leading goose – Japan - emulated US, which then was emulated by the first-tier newly industrialized economies – Hong Kong, South Korea, Taiwan and Singapore- followed by the second-tier newly industrialized economies – Malaysia, Thailand, Indonesia and Philippines, and then China and Vietnam.

[10] China leaped forward at steady annual average per capita GDP growth of 9.4 percent per year in sub-period three from 8.5 percent in sub-period two, and 3.2 percent in sub-period one. Likewise, India has managed to experience average per capita GDP growth of 1.6 percent, 3.4 percent and 5.3 percent, respectively in the three sub-periods.

In sum, the economic growth acceleration observed in SSA, in terms of per capita GDP, is not as spectacular as the emerging Asian stars. So, it sounds natural to question the sustainability of the growth acceleration in SSA and the plausibility of the "Time for Africa" applauds.

C. Inquiring the Growth Boom of SSA in the Context of Sustainability

Whether the recent growth stride (especially in the non-resource and land-looked economies such as Ethiopia) could enable low-income SSA economies climbing to middle-income and high-income status (competing with the emerging giants in Asia such as Vietnam, Bangladesh, etc. in global manufacturing) remains debatable. For the optimists the growth acceleration could sustain, as it is time for Africa. For the skeptics, the growth acceleration, being jobless, would not be sustainable. The Economist (March 2, 2013), in their survey of SSA, articulated the debate clearly. *On one side, the 'boosters' proclaim the dawn of an African century, and on the other side, the 'skeptics' riposte that Africa has seen false dawns before and see foreign investors as not lifting but looting the continent and exploiting locals. The skeptics allege that "many officials are corrupt" while "those who are straight often lack expertise, putting them at a disadvantage in negotiations with investors."*

The Optimist claims the dawn of an African century: In its 2010 report on Africa, the McKinsey Global Institute bluntly said that the progress and potential pathway to prosperity of growing economies in the continent become *"lions on the move."* The Economist Magazine in its March and April 2013 editions[11] clearly stated that Africa is *"A hopeful continent," "the world's fastest growing continent just now," and the "hottest frontier"* in terms of FDI destination. The Time Magazine (in its December 2, 2012 issue) confirmed that Africa is rising and is *"the world's next great growth engine,"* yet *"hundreds of millions are at risk of being left behind."* Others speak of *"the China of tomorrow."* The World Bank report (2015) called the growth acceleration as "The Great Run." The forecast by IMF in 2011shows that seven of the ten fastest growing economies between 2011 and 2015 were in SSA, growing in the range of 6.8 percent per year for Nigeria to 8.1 percent per year for Ethiopia (The Economist Online, January 6th 2011). These are just few quotes evidencing the impressive growth surges observed in SSA. For these observers, the growth momentum would sustain, enabling low-income countries in SSA to move-up to middle-income level and those trapped at middle-income level to graduate to high-income level. Some of the justifications shielding the optimistic views on the sustainability of the growth chapter

[11] In its May 2000 special issue, the Economist labelled the continent as hopeless. Of course, the African growth tragedy narrative was not surprising given the fact that growth stagnation and dire poverty persisted in majority of the countries in the continent over the post-independence era (mainly in the 1980s and 1990s).

include: (i) improved policy environment (and improved economic governance) and growing inflows of FDI; (ii) increased political stability explained by reduced conflicts; (iii) increased use of technologies that create new opportunities for business; (iv) improved human development in the region; (v) demographic dynamics; and (vi) human geography (urbanization) (see Annex II for detail).

The Skeptics cast doubt on the sustainability of the growth boom given that the continent has seen false dawns before: In the skeptics standpoint, a mere growth acceleration is not enough to ensure sustainability and development, partly because the growth boom was in some sense pertained to the fall in the reduction in the frequency of growth declines and to the rise in growth accelerations of resource dependent economies (Arbache and Page, 2009) rather than accompanied by rapid industrialization and creation of good quality jobs. For the skeptics, the growth acceleration could not ensure inclusiveness and sustainability on the following grounds:

First, the growth acceleration was driven in most cases by primary commodity windfalls and new-resources discoveries, combined with external resource inflows (capital inflows, aid, and debt relief) rather than by the "traditional mechanism of industrialization" (Rodrik 2016);

Second, the growth rate was generally considered as lower than that observed in developing East Asia and Pacific region, albeit some SSA economies achieved exceptionally higher and faster growth - the average per capita growth rates in the fastest growing economies in SSA (e.g. Ethiopia, Mozambique, Nigeria and Rwanda) exceeds the average growth rate of the region. However, the average growth rate of these fast-growing economies is still low when compared to the success stories in East Asia and Pacific;

Third, the "Africa rising" growth chronicles pay little emphasis on the relationship between growth and welfare gains comprising employment opportunities, inequality, poverty reduction, and the like. The growth acceleration in the continent seems to have left the largest portion of Africans behind, wherein extreme poverty still persists affecting many rural people who are engaged in small-scale farming and low-productivity informal economies, making the quality of growth dubious. The evidence in the last decade witnessed that economic growth and these factors have not at all times gone in unison, instead they appeared to be distant partners in some resource-rich economies (Africa Progress Report 2013). The fastest growing economies could sustain their growth momentum, exit from the vicious trap of poverty, and vibrantly walk up to the ladder of prosperity and join the level of middle-income and high-income countries only if they manage to build the required capabilities and diversify the compositions of their production structures on the road to more dynamic economic activities that have high potential for cumulative productivity increases and creation of good jobs;

Fourth, sustainability of the growth trajectory in most countries [notably, growth spurts due to commodity prices boom in resource dependent countries] over the long-term is not guaranteed given the low level of transformation in the production structure towards higher-productivity activities, predominantly manufacturing. The lack of production transformation and creation of good quality jobs itself makes sustainability of the "Africa rising" chronicle mythical; and

Fifth, the fall in the prices for primary commodities, such as oil, may make the prospect and sustainability of the unprecedented growth of those heavily resource-dependent economies (e.g. Nigeria) dim. This does not mean that all countries in the continent follow similar route. It is equally anticipated that some non-resource dependent economies will have bright prospect if the political stability continues and the industrial policy pursued helps building internationally competitive manufacturing industries.

This dissertation joins the skeptics to contend sustainability of the growth trajectory is dubbed questionable: With a view of validating such claim, the rest of this sub-section seeks to cautiously and critically scrutinize the quality of economic growth registered over the "Africa rising" decade relative to the previous stagnant and lost decades [where Africa received the title of a "hopeless continent"] in comparative perspective with the growth and transformation paths of the Asian forerunners. This could be done through exploring the extent of the shift and transformation in the production composition and employment creation since the early 2000s following Amsden[12] (2012), who argued that the "cause of extreme poverty is unemployment", in turn attributed to "scarcity of jobs that pay above bare subsistence". To be more specific, economic diversification, productivity increase in agriculture, expansion of manufacturing, creation of good quality jobs and improvement in working conditions, and other attributes of quality growth continued to be as high as the sky in some countries in SSA. This situation, if not changed, could put development and sustainability in great jeopardy.

Production Structure: The production structure composition for SSA economies has hardly showed any perceptible and sustainable shifts during the growth acceleration regime compared with those in developing East and Southeast Asian economies. Most importantly, the drop in the

[12] In Amsden's view, poverty alleviation policies have generally been oriented towards consumption, ignoring production jobs. She noted that the "grass roots poverty alleviation measures exclusively designed to make job-seekers more capable" are self-defeating, essentially because employment creation was faltering, owing to the lack of capabilities to expand and transform the productive sectors.

share of agriculture in the economy was not accompanied by significant rise in the share of manufacturing. The manufacturing base remains low and its share in GDP and in total employment remains far lower than those of the Asian success stories (see Szirmai and Verspagen 2011; Page 2012; De Vries et al. 2013), with its relative value added share in GDP fluctuating between 12 and 15 percent until the 2000s and stagnated at about 10 percent since 2008, the lowest of all developing regions in the world (ECA 2015). Employment creation, improvement in job quality and working conditions through industrial transformation remain skimpy to attract large pools of surplus labor. This is a manifestation of the failure to translate the growth acceleration into good structural change. Thus, the World Bank report (2014) posits that Africa bypassed industrialization as a major driver of growth and jobs.

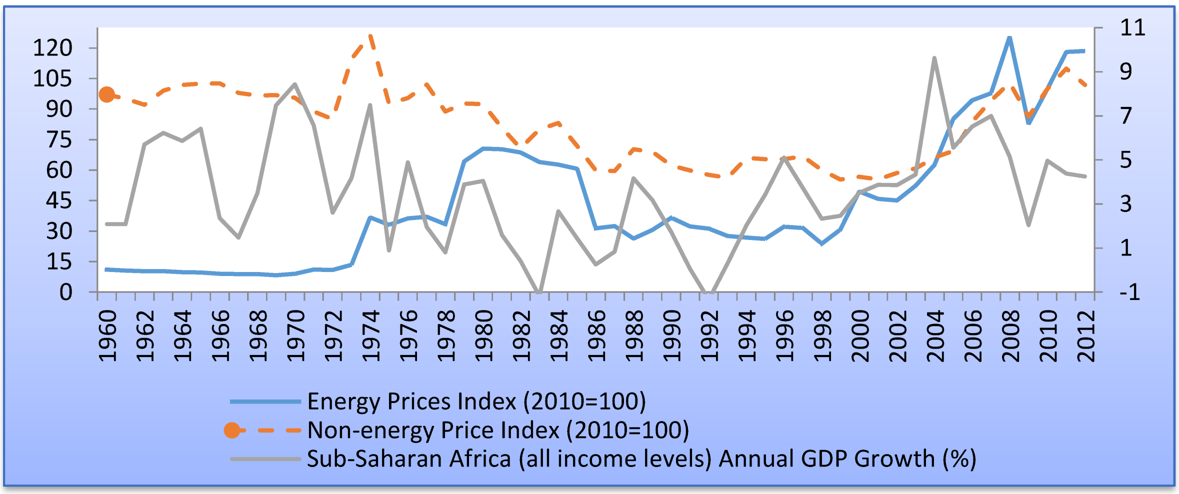
The above does not, however, mean that the prospect of manufacturing expansion in SSA is indistinct, despite automation of manufacturing [on account of new technological advancement] may pose labor to move into the services sector, with implications on swelling employment in the services sector. On the basis of manufacturing output and export growth in SSA, Te Velde (2016) predicts that a bright outlook awaits SSA. The author confirmed that value added of manufacturing increased by 3.5 percent per year over the period 2005 to 2014, which was faster than the global average. But, this is in stark contrast with the lower share of the sector's value added in GDP.

Data from UNIDO (2016) evidenced that all developing regions saw increased share of manufacturing value added during 1990-2011 (increased from 2.71 percent to 5.2 percent for Southeast Asia, and from 0.13 percent to 0.24 percent for Central America) while SSA enjoyed the smallest gain, marginally increased from 0.67 percent to 0.69 percent. By contrast, the share of the services sector in several countries remained stable at nearly half of the GDP. On the other hand, most Asian economies have managed to close the gap in the value added share in GDP of their manufacturing industry with developed economies (even outpaced), albeit this began at different points in time (ibid). The share of manufacturing in GDP has continued to grow through to the 2000s and 2010s in Southeast Asia and East Asia, and are currently the highest in the world. The share of manufacturing in South Asia averaged at about 17 percent of the GDP (both in current and constant prices), much lower than East and Southeast Asia. *Therefore, the big divergence between SSA and Asian front runners pertains to the level of production transformation, reflected in sustainable structural change and rapid industrialization, wherein developing Asia exhibited higher rates of output and employment growth in industry sector*.

The growth boom was not accompanied by exports of complex and sophisticated products: Figure 2 shows that economic growth in the region was mostly following commodity price volatility at international market during the Great Run period. Thus, expecting sustainability of the impressive growth accelerations remains simple wishful thinking without structural change in the direction of higher-productivity sectors/activities. The economy of many SSA countries was unable to produce and export sophisticated and complex products and improve their economic complexity. Their export baskets depend on agricultural commodities and natural resources extracts, which are located in the far corner (periphery) of the product space. The foreign exchange earnings of almost all primary products (including oil) exporting SSA countries are heavily dependent on price and demand patterns in the global market. This may be taken as a testimony for the movement of the economy in the wrong direction [the lack of capability to see shifts in the production structure in the direction of higher productivity sectors/activities].

Can we say that booming commodity prices hampered diversification away from exports of mineral resources and agricultural commodities, contributing to the fitful trend in the share of SSA in global trade? There is no good base to make such sweeping statement given the existence of heterogeneity among countries within SSA, wherein commodity price surges might not have been responsible for the growth trajectories thereof. For instance, some landlocked countries [Ethiopia, Rwanda and Uganda] have seen notable progress in growth records without benefiting much from extractive resources such as oil and minerals. What is worrying, however, is that the progress in these fast growing economies was slow in terms of expansion in internationally competitive manufacturing production or tradable goods unlike the Asian morning stars such as China, Vietnam, Bangladesh, etc. This further reflects the need for these economies to imitate the East and Southeast Asian forerunners, if there be any blueprint to evaluate and apply in the rather fierce competition of more countries over a place in the fragmented GVCs.

Figure 2: Annual GDP Growth Rate (right axis) and Annual Commodity Price indices



Source: World Bank, World development Indicators (for GDP growth) and World Bank Commodity Price Data (the Pink Sheet)

Creation of employment and improvement in job quality: Corresponding with the difference in production structure, output growth patterns and productivity dynamics, there emerged divergence paths between the two regions since the 1980s in terms of employment generation and job quality. The growth acceleration in SSA has not been translated into the creation of quality jobs in sufficient number, partly because the growth was not induced by industrialization. The estimates by McKinsey (2012) show that Africa needs to create 122 million jobs by 2020, with high dynamic demographics whereby the size of its labor force is estimated to top that of China and India by 2035. A comparison of the magnitude and gaps of the employment growth with the growth of the working-age cohorts (15-64 years) and the labor force for selected SSA and Asian economies shows that SSA has relatively experienced jobless growth than Asia. This suggests that in several SSA economies, small-scale subsistence agriculture persists, absorbing the largest share of the labor force, while labor migrated from agriculture continued to move into the traditional and informal services activities. The Economist Magazine (2014) reported that with a given firm operating in the continent typically has 24 percent fewer people on its books than equivalent firms elsewhere as so many are informally employed in African firms.

Pieper (1999 pp. 36) pointed out that "in the absence of unemployment compensation, people are forced to enter into any economic activity no matter how low the pay or non-productive that may be." This, in ILO's technical jargon, is referred to as *vulnerable employment* comprising self-employment and unpaid family workers [informal jobs and undeclared work] as a percentage of gross employment. In its estimates, the ILO (2011) indicated that "two out of three jobs" in SSA were "*vulnerable*." Regrettably, the change in level of vulnerable employment in SSA over the "Africa rising" narrative period was diminutive. Vulnerable employment rate in SSA was estimated at about 77.6 percent of all jobs in 2011 [which stood at 77.4 percent in 2013]. Such rate was not only the highest of all developing regions, but also fell slightly against the rate observed in 2001 by merely 2.3 percentage points. This is in stark contrast with East Asia, Southeast Asia, and South Asia that have experienced a substantial decline in their vulnerable employment rate, respectively, by percentage points of 9.9, 5.4 and 3.6, from 2000 to 2011 (Annex III, Table 1).

The ILO (2012; 2008) estimate revealed that informal employment as a share of non-agricultural employment constituted 72 percent in SSA, higher than those in developing Asia (65 percent) and Latin America (51 percent). In turn, self-employment made up the larger proportion of informal employment (outside of agriculture) than wage employment, amounting to 70 percent (including South Africa). This figure constituted 59 percent of the informal employment in Asia. Self-employment comprised 53 percent of non-agricultural employment in SSA and 32 percent for Asia

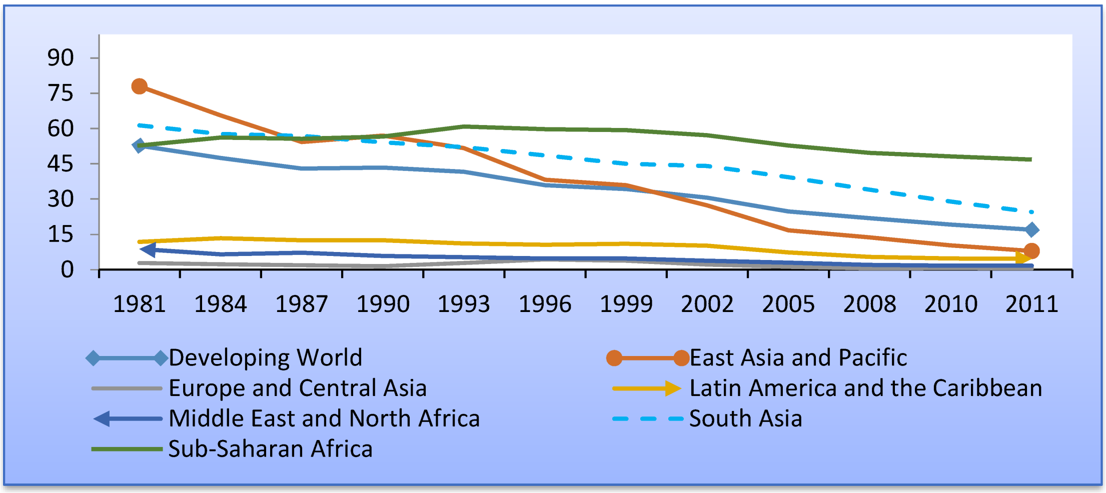
(ILO 2009); though recent data may show different magnitude. The informal economy is serving as 'employer of last resort' (UN/DESA 2006), absorbing over 70 percent of young labor force in SSA (AfDB 2012).

Additionally, SSA is *unique in terms of having the highest share of working poor* (UNCTAD 2010) – classified in terms of remuneration, benefits, job security, skill building and working conditions. The shares of SSA workers classified to extremely poor (42 percent) and moderately poor (65 percent) in 2011 were disproportionately high (Annex III, Table 2).

Extreme poverty and high inequality: As an offshoot of the diverging patterns of GDP and per capita GDP growth, there has been a clear disparity between the two regions in terms of poverty reduction and income distribution. Dire poverty still persists in SSA more than any other regions worldwide, despite the development discourse of the day lay its foundation on "poverty alleviation" (Amsden 2012); poverty-reduction measures pursued at grassroots level were not accompanied by changes in the production structure of the economy. This could be considered as the decisive missing link between the impressive growth record, hence the "Africa rising" applaud, and the continued prevalence of abject poverty. The period of growth acceleration in SSA has left many people in poverty (especially those living in rural areas) with higher wealth inequality as no quality jobs are available for job-seekers in sufficient numbers. Neither was the growth inclusive nor the economy move in the right direction. As such, rural poverty outpaces urban poverty (though in some cases, levels of urban poverty may surpass rural poverty), implying that smallholder farming was not part of the growth rise in most cases. So, the impressive growth record was not enough to push more people out of abject poverty and vulnerability, a testimony of the inadequacy of growth acceleration in sustainable development without transformation of the production structure. All in all, SSA remains the poorest of all developing regions *(*Figure 3*).*

In contrast, countries in Southeast and East Asia, having had the highest proportion of extreme poverty rate in the 1980s, exhibited remarkable agrarian reform and rapid industrial transformation, created more decent jobs, and thereby, demonstrated a dramatic drop in the level of extreme poverty over the last two to three decades. In particular, high per capita growth in East Asia pushed the percentage of population at $ 1.25 per day (PPP adjusted) down to 8 percent in 2011 from 78 percent in 1981 while poverty level in South Asia substantially dropped from 61.4 percent to 24.5 percent during the same reference periods. During the same time span, poverty levels in developing SSA showed a very slight decline to 48.5 percent from 51.5 percent. As can be evident from the figure, poverty headcounts increased substantially since 1980, reaching its all-time high level of 60.8 percent in 1993.

Figure 3: Headcount extreme poverty rates by region ($1.25 day) (%)



Source: World Development Indicators, World Bank

Data shows that extreme poverty headcount in SSA went up by close to 9 percentage points between 1981 and 1993 and then fell by 12.9 percentage points between 1996 and 2011, explained by the growth rebound observed in the period. While various countries in SSA and in emerging Asia saw a steady decline in extreme poverty headcounts in line with the global trend, few other economies were unable to change their poverty landscape. The Africa Progress Panel (2012) disclosed that Africa accounted for 29 percent of the World's poverty, increased by 8 percentage points from 1999 (which was 21 percent); yet it accounted for 15 percent of the world population by the same year. In fact, inequality in SSA is still higher than that of East Asia and Pacific (Annex IV, Table 3a and 3b), a testimony of weak structural transformation (industrialization) in the former with implications on wealth distribution and poverty reduction.

Summary of findings: The following observations may come out from the foregoing statements:

First, the growth acceleration has not been moving in unison with employment creation and improvement in job quality for SSA during the so-called "Africa rising" period;

Second, labor has been moving in the wrong direction in SSA - that is, labor moved to low-productivity traditional services instead of high-productivity sectors/production activities such as manufacturing;

Third, the fastest-growing population of young people (and growing workforce) in SSA coexists with ubiquitous youth unemployment (due to unavailability of decent jobs), making the creation of more and better jobs a prior policy agenda. *Thus, the demographic dividend that awaits the continent might turn out to be a demographic disaster if governments fail to create sufficient jobs* *for the growing young people, which would force them to end up in the informal sector or laboring for their families;*

Fourth, observations (first) to (third) are in stark contrast with the successful Asian economies, wherein output growth, industrialization, employment and productivity growth moved relatively in unison. This may suggest that the majority of the considered Asian economies have managed to walk on the right paths of structural change compared with those in SSA. Given the predominance of the informal economy in most SSA economies, it is imperative to transform the production structure [and hence, quality jobs creation] for the region to ensure economic sustainability;

Fifth, the informal activities in urban areas have served as a buffer for absorbing an overwhelming share of low-skilled and unemployed workforce. In fact, the movement of workers out of the countryside to urban areas swell up the latter, a situation labeled by Gollin, Jedwab and Vollrath (2013) as "urbanization without structural transformation"; and

Finally, *the impressive growth performance of SSA in the last decade has only resulted in a slow decline in the rate of extreme poverty headcounts, making it the poorest region in the world. That is where the paradox lies. The growth acceleration could not halt the level of poverty to the desired level. This may imply that poverty level is less responsive to the growth acceleration in SSA relative to Asia and Pacific (though there could be both good news and bad news in this respect at country level). This may further indicate, though it requires empirical works, that the contribution of structural change in the direction of high-productivity sector/production activities to sustainable and quality growth, hence poverty reduction, has been petite in SSA.*

Therefore, for SSA countries to attain sustainable development, their governments should design development programs and industrial policies that are geared towards transforming the production structure in the direction of high-productivity sectors/activities that will, directly and indirectly, generate more good quality jobs. However, the causation may appear bidirectional: improvement in job quality is driven by production transformation of the economy while the former facilitates the latter. Caution is in order here, as "countries at different stages of development face different challenges while having different capabilities to address them… and therefore that each country has to identify its own pathway to sustainable development" [13] (Andreoni and Chang 2016 p. 11).

[13] The quality of jobs is determined by three dimensions: *material rewards* (e.g. wages plus other material benefits such as pension schemes, health insurance and education subsidies for children); *physical efforts of work* (determined by such factors as the type tasks workers perform, the way in which tasks are organized, etc.); *the intellectual efforts that work demands of the worker* (e.g. skills development and on/off-the-job trainings, work place motivation, social dialogues); and *the intellectual-emotional rewards* (e.g. tasks offering greater opportunities for continuous individual and collective learning, jobs security); all of which being affected by the process of development (ibid).

Be it so. One may still argue that the divergence trend of the production composition of the economy and good employment generation between the two regions and among countries within each region is itself a symptom caused by other factors. One such critical factor to have phenomenal impact on the development and transformation process of most SSA economies is politics (see Annex I for detail explanation of some of the possible factors).

1.3 Setting the Research Claims (Problem Statements) and Objectives

The debate in brief:

A. Fundamentals vs structural transformation

Palma (2005; 2008) distinguished three schools of thought based on the importance they attached on sectors (agriculture, manufacturing and services) and production activities. The first is the neo-classical growth theory, represented by Solow-type models of convergence [traditional and augmented, where growth is presumed to be driven by fundamentals such as the incentives to save, population growth, physical and human capital accumulation] as well as endogenous growth theory predicting increasing returns. In this perspective, structural transformation (inter-sectoral reallocation) and its relation with economic growth and development is unheeded as "growth is always considered equi-proportional in the sense that all sectors are assumed to grow at the same rate" (Fadda 2018 pp 4), albeit the recently attempt on utility based view assuming aggregate production function with elasticity of substitution.

The neo-classical growth theory (Solow 1956, 1957), which has its root in macroeconomics, posits that economic growth is explained by capital accumulation, population growth and technological progress, though "endogenous growth models have more recently admitted for the role of learning-by-doing or other endogenous factors with regard to output growth" (Deleidi et al. 2018, pp 10), with sectoral composition of production (structural change) is merely unimportant byproduct of growth (Echevarria 1997). In this perspective, therefore, the causation goes from productivity gains (attributed to technical progress, human capital, etc.) to economic growth as the model is neutral to sector-specificity (the shift of labor across economic sectors and production activities). Andreoni and Chang (2016, pp 3 &5) point out that the neo-classical economics "underestimates the heterogeneity of production activities within and across production sectors" and hence "supported the view that what countries produce does not matter", which "has, in turn, made a lot of developing countries on primary commodities, cheap assembly or low-grade services." They further noted that "different economic activities give different scope for growth and technological development, so even from a purely growth-oriented point of view, the assumption of production homogeneity has negative policy implications." Deleidi et al. (2018) introduced a different theoretical framework, according to which long-term growth of an economy is determined by aggregate demand – most notably, on the growth of its autonomous components (such as public spending and export). In this theoretical perspective, productivity growth plays pivotal role in explaining export growth and the propensity to import; hence, demand and employment growth and trade balance sustainability (Cesaratto et al., 2003 cited in Deleidi et al., 2018).

The second is the neo-Schumpeterian school, which places focus on activity-specificity in the economy, but is indifferent to sectors. The neo-Schumpeterian school models increasing returns through research and development (R&D) activities, leaving out the special qualities of manufacturing explaining the traditional importance it has on development.

The third school comprise Kaldorian, post-Keynesian, Schumpeterian and structuralism – or the Classical school - that conceptualize growth as sector-specific/activity-specific (e.g. Lewis 1954; Kuznets 1971; Chenery and Syrquin 1975; Tregenna 2008, 2009, 2015; etc.). This school acknowledges the intricate relationship between production transformation and economic development. They held strong view that development and sustainability rely to a large extent on changes in the composition of the production structure. They put the process of production transformation at the center of their discourse of economic development. In this perspective, the path way for sustained growth and prosperity entails transformation and diversification of the production structure away from lower-productivity sectors/activities (such as agriculture and traditional services) to sectors/activities with higher potential for cumulative productivity increases and creation of good quality jobs. Therefore, manufacturing was considered as the prime route for development and sustainability as it maintains special qualities to drive technology, externalities, balance of payment sustainability, and therefore catching-up and convergence to advanced economies.

Rodrik (2013) and Rodrik et al. (2017) distinguished between fundamentals and structural transformation: the first eschews distinction of the traditional and modern sectors of the economy, presuming that different types of economic activity are structurally similar enough to be aggregated into a single representative sector while the second is based on the dual-economy approach – distinguishing between the traditional and modern sectors. The former focuses on the growth process within the modern sector while the latter focuses on the relationship and flows among sectors. The former placed focus on developing and accumulating broad capabilities [physical and human capital levels in developing countries are low; hence, returns on accumulation should be high] while the latter posits that economic growth is a matter of shifting labor into modern industries in urban areas where productivity is high. This challenges policy makers in developing economies in two ways. The first challenge is the fundamental challenge, which can be tackled through crafting policies pertinent to capital accumulation, technological development, institutional development, and human capital development as key initiatives. The second challenge is structural transformation, which is complex as it involves diversification of production capabilities as well as facilitating the shift of resources, typically labor, rapidly to the modern sector that operate at higher levels of economic productivity. In their view, the two aspects can be combined in one framework as both help explain the overall economic growth performance of the economy. They further highlighted the possibility for achieving structural transformation without significant advances in fundamentals and also fundamentals may improve without reaping much reward in terms of structural transformation. This hypothesis may put governments and policy makers of developing countries in a policy dilemma: what portion of their policy priority is accorded to structural transformation and to improvement of fundamentals.

Perspective of the third school of thought clearly predicts the existence of strong relation between manufacturing and economic development. The analytical construct of the dissertation rests on this perspective, not only because production transformation is a re-emerging line of research, but also the analytical foundation could enable to focus on the research theme and to explore the powerful driving force for the dividing line on the transformation and development path between SSA and Asia, how to sustain the recent growth acceleration in SSA and as to whether developing countries (especially those in SSA) can follow a manufacturing-led development path in the current global context where industrial production is dominated by fragmented chains of production across countries along with identifying the key drivers of manufacturing development as the debate now is hinged on "manufacturing-led development route" vs à vis "services-led development route".

B. Manufacturing-led vs service-led development route

The conventional manufacturing-led development proposition has encountered strong blow beginning the 1970s, favoring the services sector to take over the place of manufacturing in development and production transformation. This was more pronounced with the shifts in policy towards neoliberalism over the 1980s and then with intensification of globalization in the 1990s. However, the debate on whether the conventional role of manufacturing in economic development and sustainability could be overtaken by the services sector [through the export not only of modern services such finance, IT, profession and business services, etc. as a product, but also the export of labor itself instead of shifting surplus labor to manufacturing industries to make goods and export them] is live. In fact, all sides agree that sustained growth of an economy is greatly entwined with the shifting of resources to sectors or production activities that carry higher potential for cumulative productivity increases

Proponents of the service-led development route explicate that manufacturing-led development route is outdated, as the world has entered to the era of "Services Transformation" that tumbledown the heyday of industrialization. In this view, therefore, today's developing economies could directly shift resources from agriculture to services without factories. Given the services sector growing importance in the economy of many countries [both in the developed and developing world blocks] measured essentially by its growing share in total value added along with the expansion of information and communication technology (ICT) and proliferation of the new digital technology dynamics, some scholars strongly claim that the time has come for services sector to substitute manufacturing, becoming pace setter in the economy (e.g. Ghani and O'Connor 2014; Baldwin 2014, 2016; Baldwin and Venables 2013; Lanz and Maurer 2015; Di Meglio 2017; Di Meglio et al. 2018). In their view the future of manufacturing in the age of digitalization and robotics is dim as it will continue losing its underlying characteristics that enabled it play engine of growth and development in the past. They further allude to the drop in the share of manufacturing in total employment due to increasing outsourcing of certain services activities out of manufacturing firms (such as business services) and the growing expansion of industries without smokestacks such as tourism (Newfarmer et al. 2018) along with growing scalability and increasing tradability of services to justify service-led development is a new pathway for developing countries to follow, rather than **imitating** earlier developers, to achieve sustainable development. Furthermore, the new dynamic digital technology (increasing automation of manufacturing) makes it harder for low-income and middle-income economies to capture gains from industrialization. The policy prescription they implicitly suggest for lagging countries to catching-up, if not forging-ahead, is to increase investment outlay on expansion of services activities, without the need to expand factories.

Other commentators observe that the global economic set up and technological dynamism has brought both opportunities and challenges for developing countries as several countries have already experienced deindustrialization prematurely, at lower per capita income level than the historical norm. Some of them strongly argue that the conventional manufacturing-led development route is becoming much harder for low-income countries to follow than historically been the case for their development (Szirmai and Verspagen 2015). This is essentially because industrial production is increasingly becoming dominated by fragmented chains of production across countries, wherein various countries compete to secure a place in the fragmented global value chains (GVCs) with implications on weakening the low-income countries low-cost competitive advantage with traditional manufacturing activities including textiles, apparel, etc. (Gereffi and Fernandez-Stark 2011; Felip et al. 2014; Phillips 2017). In fact, these scholars did not conclude that developing countries cannot undergo the conventional pathway of structural transformation. Whereas, some researchers maintain quibbles with the service-biased hypothesis, contending that it is very early to jump to conclusion and advice developing countries (principally those in SSA) to place little focus on manufacturing (Heraguchi et al. 2017; Diao et al. 2017).

By contrast, proponents of the manufacturing-led development route (such as Alice Amsden 2010) debunked proponents of the services-led development path being biased. She acclaimed learning-based industrialization as the only pathway to inclusive and sustainable development – a reflection of the greater importance and role of production in the sustainable development process. Advising low-income economies to place less on manufacturing as pace setter in the economy might be deceptive as there still is high probability for achieving development, improving living standards and poverty reduction through industrialization. Most importantly, the UN development agencies (such as UNIDO, UNCTAD) confirm the pivotal role manufacturing can still play in sustainable development. In view of that, Goal 9 of the 2030 Agenda for Sustainable Development (2015) urges for inclusive and sustainable industrialization; that is, increasing the share of industry sector (mainly manufacturing) in GDP and in employment without relegating agriculture and services sectors all together. Other recent studies carried out for UNIDO (2016, 2018) evidenced the continued importance of manufacturing in development and sustainability, albeit *deindustrialization and premature-deindustrialization* became a growing concern. *Deindustrialization* in mature industrialized economies is predicted to occur, apart from affluence, owing to increasing relocation of manufacturing activities from the West and North America to the emerging and developing economies; shifts in manufacturing production from low-tech to medium-tech and high-tech manufacturing production; a growing outsourcing of business services out of manufacturing firms to services; expansion of industries without smokestacks; and lower price of manufactures owing to productivity increases in manufacturing.

Rodrik (2013) investigated the link between manufacturing and growth, and confirmed the existence of "unconditional convergence" in labor productivity within manufacturing activities[14]across countries, irrespective of domestic policy and institutional quality, and special country traits such as geography, culture, etc. Recent empirical studies have also evidenced for the

[14] However, recent studies confirm that labor productivity in certain services too exhibits "unconditional convergence", where countries starting from lower labor productivity in these services saw faster growth than those with high initial labor productivity in that sector (Kinfe Michael and Morshed 2016; IMF 2018).

existence of strong correlation between manufacturing and per-capita income growth, sustainable structural change and poverty reduction. Notwithstanding the dynamic and modern services activities can serve as alternative growth escalator in the economy, they could so often merely at higher levels of development.

Not only had the development process of the industrialized capitalist economies in the North, but also the success stories in the South, particularly those of the newly industrialized East and Southeast Asian economies, all suggest that growth/development is a sector- and activity-specific phenomenon (Tregenna 2009, 2015; Rienert 2007). Therefore: (i) a closer look into the linkages between production dynamics at sector level and economic growth in the context of changes in the composition of production structure sounds interesting; (ii) centering the theme of the present dissertation on industrialization vs services transformation makes sense; and (iii) typically, it is exciting to explore the question: Could industrialization be more viable for developing countries (especially those in SSA) to generate quality jobs in sufficient number, to achieve inclusive growth and development and poverty reduction than services-led development pathway? If so, could the services sector serve as *"stimulus complement to manufacturing"* for these economies achieve development and end poverty?

The research claims:

Inspired by (i) the long-standing debate on the driving forces for the divide between the world economy into the North, center, rich economies and the South, periphery, poor economies; (ii) the debate on the thriving debate between proponents of the pro-manufacturing-led development journey and pro-services-led development journey; and (iii) by the debate on *deindustrialization and tertiarization* (conceptualized as the drop in the share of manufacturing in GDP and in total employment in consort with the rise in the share of services sector in GDP and in total employment), the core theme of the present dissertation rests on delving deep into exploring the extent of production and sector structure, comparatively examining the diverging growth and industrialization paths in SSA and Asian sample economies over the last five decades.

There is knowledge gap with respect to the hot debate on *(de)industrialization* and inverted U shape (hump shape) of manufacturing value added and employment share against per capita GDP as well as on the likely powerful driving forces of *(de)industrialization*, which requires a typology of *(de)industrialization* based on empirical analysis of developing economies. The dissertation attempts to fill this gap through empirically evaluating the extent of *(de)industrialization and/or premature tertiarization* as well as identifying the likely driving force of manufacturing development employing up-to-date panel data models.

Research on production structure, in the context of wealth creation and sustainability, is interesting as development success stories (past and present) are all strongly linked to shifts in the production structure of an economy towards high-productivity sectors or production activities. [15] Such research is ample for developed economies; but, little is known in today's developing economies. In other words, there is knowledge gap as to whether developing countries has followed or are following similar production transformation and development path of the frontier economies or are following different path [if different, what driving forces gave rise to this]. Therefore, the dissertation attempts to fill this gap through examining the production transformation and development paths in SSA and Asia sample economies to see which economic sector promotes job rich, sustainable and inclusive economic growth.

Additionally, there exists knowledge gap with respect to the debate on manufacturing-led development path versus services-led development journey in the context of developing economies, typically in SSA. Proponents of the services-led development route conjecture that the Great Transformation (industrialization) gave way to Services Transformation and implicitly advise governments of developing economies to directly invest in services sector expansion without passing through manufacturing as developed countries did in the past. In a recent paper Baldwin (2020) boldly opine to disable the traditional manufacturing-led development path of the type China is taking and enable the services-led development path India is following. In this kind of extreme (polarize) discourse, the possibility for synergetic relationship [rather than antithetic nature] between manufacturing and services activities in the transformation and development process is missed or receive little attention. Advocates of each sector completely ignore or place little focus on the possibility for the dynamic synergetic relationship between economic sectors. There is knowledge gap in this respect too. The dissertation, therefore, claims the possibility for dynamic synergetic relationship between sectors with services sector stand as stimulus complement to manufacturing than perfect substitute to it. The dissertation tests Kaldor's growth laws as they stand for a different datset and time series, and extending to two broad segments of services and agriculture sectors employing appropriate econometric approaches to validate the theoretical discussion on the synergetic relationship between these sectors.

Cognizant of the importance of production transformation in development and sustainability, Hirschman (1958) and other scholars in the early structuralist tradition discoursed the existence of

[15] Production transformation in this respect is beheld as economic and social changes that are associated with changes in the production structure and good employment creation. This may involve shifts in employment (and thereby improvement in job quality) in the direction of manufacturing and skill-intensive services sector; diversification and technological upgrading; new organization of production; urbanization; etc. Part two presents the various perspectives.

structural heterogeneity of production activities[16] *within* and *across* economic sectors/production activities and the corresponding qualitative differences between different patterns of economic growth. Structural heterogeneity of real world production activities suggests the existence of productivity gaps [typically in developing economies] between economic sectors [such as between the traditional rural and modern urban sectors], and within sectors (especially within services sector). Hence, the capacity of a country to shift resources from the less-productive to the more-productive sectors/activities would have phenomenal repercussions on cumulative productivity increases, capital accumulation, technological advancement and innovation, and sustainability.

However, changes in the production composition of a country's economy cannot happen in a vacuum and mechanically, or by simple wishful thinking of governments and policy makers. Neither is it costless. This implies that inclusive and sustainable development could hardly be gathered as manna in the wilderness, essentially because lack of sufficient productive capabilities coupled with shifts in public policy and political factors would constrict developing countries to speed up the process of production transformation and diversification of their production structure and step up the development ladder. So, an active and well-thought industrial policy matters; it matters under the logic of fostering transition towards high-productivity economic sectors/activities or complex and sophisticated export products.[17]

Taking the foregoing facts and presumptions, the dissertation can set a strong claim that low-levels of productive capabilities, bad policy associated with ill-fettered political settlements (non-inclusive political and economic power distribution within a society and weak formal institutions), lack of required capability to transfer technology and adapt to local needs and use contributed to the failure of the majority of SSA economies to **imitate** advanced, industrialized economies and follow the conventional development journey and production transformation (industrialization). Most importantly, the failure to transform the production structure from a subsistence agrarian economy into an industrialized one was responsible for the growth reversals and deterioration of

[16] Based on the works of Amsden (1991), Andreoni and Chang (2016) assert that different production activities exhibit different internal dynamics and external impacts [heterogeneity across products and sectors] along with different ways of producing the same product [i.e. process heterogeneity even for the same product]. The existence of process heterogeneity for the same product, according to these authors, could be attributed to different dimensions: each production units might use technologies that employ different combinations of factors, and that different production units might be organized in such a way that they obtain different product features to meet different needs and so on.

[17] Governments may thus play active role in facilitating targeted industrial transformation through eliminating binding constraints to innovative activities (including investment in new products) and allocating resources towards economic transformation, diversification, and accumulation of productive capabilities (Lin and Chang 2009). Thus, targeted industrial policy needs to be combined with public investment in infrastructure development and other enabling environments that would make the transformation and industrialization process possible, in line to Keynesian school of thought (Occampo et al. 2009). Capability building also requires political commitment and inclusive economic and political power distribution in society (Khan 2010).

living standards in SSA. It, thus, seems coherent to empirically investigate the link or delink between structural change and productivity gains as well as between sectoral output growth to total output and economy-wide productivity growth as baseline regression with the ultimate intent of validating the synergetic relationship between economic sectors/activities and thereby, contributing to the debate discussed earlier.

It hypothesizes that production transformation and the creation of decent jobs differentiate the leapfrogging Asian tigers and morning stars from the creeping SSA ducks. It intends to test the various countries in SSA have encountered tertiarization prematurely, at lower level of affluence and against the stylized facts and historical norms observed in advanced economies. The dissertation prefers to use premature tertiarization instead of premature deindustrialization as several countries exhibited growing share of their services sector while still they are in pre-industrialization or under-industrialization or stagnant industrialization stage. In fact, the two terms are conceptually referring the same thing. It also presumes that sector structure (sector specificity and production/sector heterogeneity) matters most for progressive productivity gains, development and sustainability. It further claims that the fastest growing low-income SSA economies could not sustain their growth trajectories, and graduated to middle-income status, and eventually capture inclusive and sustainable development, by simply following the CAF strategy and reproducing themselves on a large scale. This does not mean that comparative advantage should be disregarded. Rather, for these countries to achieve economic development and poverty reduction, they need to closely observe the opportunities in the broad global context and build current capabilities/competencies in a way to move their production structure from traditional and low-productivity activities to dynamic and higher-productivity activities that maintain special properties to induce quality jobs creation. This is nothing else but transforming their production structure from diminishing returns to increasing returns sectors/activities. How far do they defy their comparative advantage could, of course, be contentious as it depends on their current domestic productive capabilities. This claim is built on the presence of heterogeneity across products, sectors and processes as well as the prevalence of productivity gaps within the different production sectors/activities.

The research objectives:

Based on the previous statements, the dissertation finds it important to explore the level and patterns of production transformation [which would shape the institutional, social and ideological changes of the economy], centering the analysis on representative countries from East Asia, Southeast Asia, South Asia and SSA. More specifically, the dissertation intends to address the following specific objectives:

(i) To explore the diverging structural change and development path observed in the economy of sampled Asian and SSA countries over the last five decades. Comparing the growth experience and economic transformation process of the two regions based on the analytical foundations of the structuralist and Kaldorian perspective, employing descriptive and up-to-date econometric approaches sounds excellent. Essentially because, the developmental states of East-Asian economies were able to exhibit faster, sustained growth trajectory through rapid learning-based industrialization while SSA economies failed to walk on the same transformation path;

(ii) To examine the weight of structural change effect and within-sector effect in impacting economy-wide labor productivity growth through applying the widely used shift-share analysis, followed by Granger causality test to see if structural change Granger causes overall productivity growth [that is growth is a result of changes in the sectoral composition of output) or the direction of reverse causality chain or bidirectional causation exist;

(iii)To validate or refute the synergetic relationship between manufacturing and agriculture as well as between manufacturing and services without undermining the indeterminate role of diversification in the direction of manufacturing in development and sustainability;

(iv) To examine whether services sector could assume a growth escalator role in low-income economies, complementing manufacturing, in the developing country context of SSA and Asia. In this respect, the empirical exercise in part six tests the validity of Kaldro's growth laws for the sample countries in SSA and Asia, extending the analytical framework to two broad segments of services sector and agriculture. It maintains some quibbles with the claim that *'agriculture is the only growth escalator'* for SSA to achieve sustained catch-up growth, despite agrarian reform (agricultural revolution) plays important part in making learning-based industrialization possible as the Asian experience unveiled. It also contends with the view that the services sector can be the *'next manufacture,' substituting manufacturing,* albeit it has already outpaced agriculture in terms of contribution to GDP at an early stage of development level in several low-income and middle-income SSA countries. In short, the dissertation set to drift from the only agriculture, only industry and only services narratives, in favor of synergy or symbiotic relationship between economic sector/activities without undermining the indeterminate role of industrialization (diversification in the direction of manufacturing) in development and sustainability;

(v) To identify the key determinants of manufacturing across countries in SSA and Asia, and by country groupings apart from investigating the extent of *(de)industrialization*; and

(vi) To examine how big was the divergence between SSA and East, Southeast and South Asian sample economies in terms of production transformation and growth, and whether SSA economies have been experiencing "*premature-deindustrialization*", if there be such an incident, or *premature tertiarization* (with stagnant industrialization, under-industrialization or failed industrialization).

1.4 The Research Questions

In a concerted attempt to validate the research claims and objective presented above, the dissertation attempts to address the following questions:

(i) Could manufacturing maintain unlimited potential to remain pace-setter in the developing country context of SSA and Asia? How does the growth of manufacturing affect economic growth in the long-run? Or Under what condition can manufacturing contribute to economic growth?

(ii) If manufacturing continues to be the prime source of economic and technological power of an economy, could low-income SSA countries afford to industrialize and move up the development ladder given their current capabilities and the digital technology dynamics? Is reindustrialization a viable economic development strategy for SSA under the current global economic setup and fragmentation of industrial production in the GVCs?

(iii) How does the output growth of manufacturing [also skill-intensive services, traditional or Baumol's Diseases services and agriculture] affect its productivity growth? What is the impact of the sector's output growth on the growth of the productivity of the entire economy or non-manufacturing sectors?

(iv) Could agriculture have super capabilities and special qualities to become growth escalator in SSA economies, making the recent impressive growth sustainable? Does industrialization require parallel, or prior, development of agriculture?

(v) Can services-led-development be as dynamic as manufacturing to become perfect substitute and alternative to manufacturing in terms of growth of value added and employment? If so, could SSA countries attain job creation to their growing labor force, poverty reduction and sustainable development through service-led development strategy without factories?

(vi) Could there be growth complementarity or antithetic between agriculture and manufacturing, or between manufacturing and services in the transformation and development process? If manufacturing and services are not antithetical, could the latter stand as *"stimulus* *complement"* to the former so that low-income economies (such as Ethiopia) should move resources to manufacturing and higher-productivity services?

(vii) If there exists structural heterogeneity of production and sectors, and if manufacturing present special elements in making the sustainable development goals of the United Nations more meaningful and sustainable, should lagging countries [such as those in SSA] need a policy shock to change their current pattern of specialization through the promotion of 'target' manufacturing activities, positively interacting with modern and/or high productivity services? If yes, which manufacturing industries should they target?

(viii) What is the impact of structural change on economy-wide productivity growth? Has structural change moved in the right direction in SSA as in the Asian comparator economies? If not, why?

(ix) What have been the likely key driving forces manufacturing development in SSA compared to Asia, if there is one such incident? If there be such an incident of *deindustrialization, could it be best described as premature deindustrialization or premature tertiarization* (one that occur while the economy exhibits stagnant industrialization, under-industrialization or failed industrialization)?

These and related questions seem straight forward with obvious answer, but they are not when it comes to empirical work.

1.5 Empirical Methodology and Data

In an attempt to address the research questions, the dissertation uses time series data, and panel data. The data sources are diverse. Secondary data gathered from various sources (such as the Groningen sectoral database (GDDC); Asian Productivity organization (APO); Pen world Table; World Bank Development Indicators; United Nations Conference on Trade and Development (UNCTAD); International Labor Organization (ILO); United Nations Department of Economic and Social Affairs (UNDESA); etc.) are used for the descriptive and econometric analyses. The time series data used for the descriptive analysis covers the period 1960-2015 depending on availability of reliable and consistent data, and the panel data for the econometric exercises covers the periods 1970-2015. For ease of analysis and focus, the period of analysis is classified into three sub-periods unless otherwise mentioned: sub-period one (1960-1979), sub-period two (1980-1999) and sub-period three (2000-2015).

The dissertation follows both historical/inductive approach with quantitative analysis. On one hand, the conceptualization part provides the different strands of theories on production transformation and development, dealing with the link between structural change and growth in the context of sectoral role in this process. The heterodox literature posits that increasing manufacturing propels growth while the neo-classical and neo-Schumpeterian schools theorize that economic growth is sector-indifferent. The dissertation thoroughly discusses the various theoretical frameworks, and perspectives on production transformation and sustainable development in view deciding on the most plausible analytical and empirical framework to empirically answer the research questions. Also, different empirical strategies are employed for the different data sets to address the specific questions independently. The empirical models and methods are presented in individual parts of the study.

The literature documents several estimation methods with respect to panel data along with their strengths and weaknesses. Generally speaking, empirical analysis of panel data method can be classified into two broad categories: micro-panel and macro-panel models. Micro-panel data contains large number of units (N) for relatively short time dimension (T). By contrast, macro-panel consists of large cross-section dimension and time dimension. Based on theoretical and applied econometric perspectives, Burdisso and Sangiácomo (2016) argue that micro-panel estimators which are developed through placing focus on cross-sectional properties (e.g. fixed-effects estimator, Anderson-Hasio estimator, the Arellano and Bond estimator, or the System Generalized Method of Moment estimators) are not appropriate in macro-panel settings. The present study is moderately large panel (with N = 31 and T=46) and hence, the use of macro-panel data estimation techniques is appropriate. The econometric approaches used in the study should address issues related to cross-sectional dependence, slope heterogeneity, reverse causality, etc.
More specifically, Granger non-causality tests; autoregressive distributive lag (ARDL) approach; common correlated effects (CCE) in its static and dynamic specifications; Mean Group instrumental variables (MGIV) estimation; augmented mean group (AMG) estimator; robust fixed effects model (FE-DK); cross-sectional ARDL (CS-ARDL) approach; cross-sectional distributed lag (CSDL) approach; etc. are used. Each of these approaches shall be presented in the respective parts of the dissertation.

The analytical procedure follows four steps: (i) cross-sectional correlations and heterogeneity among the series determine the selection of appropriate method of analysis. To this effect, the first step of the procedure is evaluating if the variables exhibit cross-sectional dependence. Therefore, the STATA command xtcse2 is used to estimate the exponent of cross-sectional dependence (Bailey et al. 2016) and for (semi-) weak cross-sectional dependence of the variables (Pesaran 2015); (ii) the Swamy (1970) S test of parameter constancy and the Pesaran and Yamagata (2008) and the Blomqust and Westerlund (2013) slope heterogeneity tests shall be used to test the null hypothesis of slope homogeneity; (iii) second generation unit root tests that are robust to cross-sectional dependence and slope heterogeneity are implemented to check the integration order of the series; and (iv) on the basis of the preceding test results, recently developed models that tackle cross-sectional dependence, slope heterogeneity and the like are employed.

1.6 Structure of the Dissertation

This section gives a glimpse of the content of the dissertation along with the contribution of each parts of the study to the literature. It familiarizes the centerpiece of each part: its focus, research questions addressed and hypothesis to be tested with the methods being employed.

1.6.1 Part two: Theorizing the relationship between production transformation and economic development

Part two intends to give conceptual discussions on structural change and to place it in the context of economic development and sustainability along with the different theoretical strands on structural transformation that captures sectoral shifts and other concomitant aspects of shifts in the economic system before discussing the debate on sectoral-led development route in part three and exploring the development and transformation paths of sample countries in Asia and SSA in part four. It discusses the tenets of the classical development theories (along with the Anglo-Saxon structuralism, ECLAC, and contemporary discourses of structuralism), the Kaldorian frameworks, the neo-Schumpeterian and evolutionary theories on the importance of sectoral composition of the economy. It addresses whether sectoral composition and structural change matter for economic development and sustainability; whether shifts in sectoral activities and factors of production towards high-productivity manufacturing activities still contribute to capital accumulation and new productive and technological capabilities as it did in the past.

In short, part two gives review of relevant literature to grasp useful insights on how the dynamic transformation of the production structure of an economy towards the increasing returns sector (chiefly manufacturing) pertains to employment creation, cumulative productivity increases and sustainable development. This way, it contributes to the structural change and growth literature through counter arguing the contemporary services-biased discourse that put the link between industrialization and economic growth in peril, towards framing the analytical framework in the favor of the synergetic relationship between sectors instead of attaching more weight on services-led development route (in part three).

1.6.2: Part Three: Contrasting views on sector-led development path and wealth creation in view of proposing a dynamic synergetic relationship between sectors

As a continuation of pert two, part three seeks to discuss sectoral role of growth. Early development thinkers thought production transformation as synonymous to development and thereby accredited manufacturing maintains unique qualities to drive development and wealth creation of a nation. However, this view has encountered heavy knockbacks mainly since the 1980s, with services-led-growth received much focus and weight to replace manufacturing in terms of value added growth and employment growth and to become the next growth escalator. In fact, the new digital technologies and the consequent shift in globalization, hence growing outsourcing of certain services activities from manufacturing firms, might have intensified the blurring dividing line between manufacturing and services. Also, some proponents of the agricultural-led development strategy posit that agriculture remains the only growth alternative for low-income economies, especially in SSA, partly because industrialization in some of today's mature industrialized economies has agrarian roots.

With the aim at contributing to the debate on sector-led development path (sector-specificity) and wealth creation in undeveloped economies as well as to the debate on industrialization and service transformation, part three devotes to critically and thoroughly review the tenet of the different theoretical strands (past and present) on engine of growth hypothesis. It contributes to the industrialization or the production transformation and development literature by synthesizing the role of manufacturing and other sectors (agriculture and services) to economic development and poverty reduction in the developing economies context in SSA and Asia. Following the sector-specificity and activity-specificity approach (discussed in part two), the lengthy discussion of part three seeks out to vindicate the existence of a synergetic relation between economic sectors and production activities [and the "stimulus complement" role of services sector] through addressing hosts of questions: *Has manufacturing become increasingly jobless and lost its special properties, giving way to the services sector [which is becoming freely tradable]? Could agriculture maintain super capabilities or special qualities to become growth escalator in low-income countries (such as those in SSA making the recent impressive growth sustainable)? Does industrialization require parallel, or prior, development of agriculture? Could there be complementarity or antithetic between agriculture and manufacturing or between manufacturing and services in the transformation and development process? Can services sector be as dynamic as manufacturing and present unique elements that enable it substitute manufacturing? In short, should industrial policy target manufacturing industries, agriculture (and other natural resource industries) or services activities or should it place focus on broad-based sectors/production activities?*

1.6.3: Part Four: Patterns of pr]oduction transformation and growth in Asia and SSA

The Lewisian prediction discussed in section 1.1 earlier suggests that countries may undergo different patterns and sequences of structural change in the course of their development, in that structural change could be good (that is, growth-enhancing) in one part of the globe and bad (that is, growth-reducing) in another part. That is why some countries experience growth miracles that change their poverty landscape, leapfrogging their comparative advantage while others stagnate or even lose headway. The development orientation and pathway of rising living standards in advanced countries and newly industrialized economies was shifting the production structure in the direction of high-productivity, technology-intensive and tradable activities *(most notably manufacturing and modern services), not simply moving from one economic sector to another*. The converse meant that reproducing oneself or shifting resources, typically labor, from traditional agriculture to traditional services could not help capture the gains from structural transformation.

Therefore, part four seeks out to explore, in comparative perspective, the level of economic development of sampled SSA and Asian economies through the lens of production transformation [employing descriptive and empirical analysis]. It hypothesizes that the divergence development path between the regions and across countries in each region pertains to the disparity in the patterns and sequences of structural change attributed, most notably, to differences in their capability and commitment to policy implementation and development friendly political orientation. It intends to give insights on understanding where these two regions stood in production transformation in the past four decades. It examines as to whether the transformation and development journey in the sample economies takes after the conspicuous historical regularities and stylized facts of structural transformation. It also set out to examine sectoral growth patterns in terms of value added, employment and productivity and their contribution to economy-wide growth in output, employment and productivity in view of answering the research questions, corroborating the sector-specificity nature of growth that Lewis and other classical development scholars thought. It decomposes labor productivity growth into constituent parts as well as compute structural change indices and run Granger non-causality tests to draw insights on the nature of the causation between the different structural change indices and labor productivity growth.

1.6.4: Part Five: Identifying the key driving forces for industrial development

Several empirical studies evidenced the existence of an inverted U-shape (a hump-shape) relationship between per capita GDP and the relative share of manufacturing in GDP and in total employment while others question whether such hump-shape relationship exists in real world production. The growing concern of researchers now is centered on *premature deindustrialization* that developing countries encountered at lower levels of income per capita and lower shares of manufacturing in the economy than was the case in advanced economies. It is worrying, because such *deindustrialization* episode in low-income economies, if there be one in reality, could potentially make manufacturing-led development path harder to start and to sustain for these economies. Yet, the debate on *premature deindustrialization* and on the hump-shape curve is ongoing. This dissertation claims that such episode can better be characterized as *premature tertiarization than deindustrialization.*

So, part five seeks to investigate whether the countries under study encountered an episode of *premature tertiarization (or deindustrialization).* It then delve deep to empirically identify all plausible determinants of industrial development (the relative share of manufacturing in GDP and employment) in a way to support the theoretical discussions made in parts two and three in relation to why and in what manner could it be beneficial for developing countries to industrialize and to invest in manufacturing development. It also sheds important insights on why countries in developing Asia achieved higher share of manufacturing than those in SSA (or why some countries become industrial powerhouses while others experienced *stagnant industrialization or failed industrialization or tertiarization* along with under-industrialization). In this way the dissertation contributes to the debate and knowledge gap, evaluating the likely determinants for manufacturing share in GDP and in total employment across sample economies from Asia and SSA employing recent panel data econometric methods that corrects cross-sectional dependence, slope heterogeneity and dynamic common factors apart from investigating the patterns of *deindustrialization or teritiarization.*

Pursuant to the research claims and objectives, the empirical exercises in part five addresses the following questions: *Have SSA experience experienced deindustrialization or premature tertiarization with industrial stagnation while the sample Asian economies follow manufacturing-led development route? If there is indication of employment industrialization in Asia or SSA country groupings in the recent decade, does it give evidence for the relevance of manufacturing in growth and poverty reduction for low-income countries? What other factors determine manufacturing value added and employment share other than per capita income, technological progress and international trade and globalization factors?*

In short, the main contribution of part five to the literature is empirical. It identifies the relative strength of the effects of the different determinants of manufacturing and differences between the country panels in which manufacturing is relatively more, or less, sensitive to the effects of these determinants to shed lights on long-term effects on structural transformation. So, it gives insights into what might help or hinder a country's industrialization.

1.6.5: Part Six: Econometric estimates on sector-led development path

Part six seeks out to empirically confirm or refute verifying the conclusions drawn from the theoretical discussions and descriptive analysis made in the preceding parts. In particular, it intends to empirically test whether manufacturing maintains special qualities to play engine of growth role in the considered SSA and Asian economies, evidencing the existence of a dynamic causal relationship between growth rate in that sector and economic growth in line with Kaldorian and Structuralist traditions. To this effect, *recent panel-data estimation approaches are employed to tackle the endogeneity and reverse causality problems and simultaneity bias with the original Kaldor's growth equations*, in a way to address the following questions: (i) *Does manufacturing still wear its premised cardinal potentials to exhibit engine of growth effects? Or to what extent does manufacturing exhibit growth engine effects in SSA and Asian sample economies? (ii) Can skill-intensive services present special properties that enable them replace or play the role of mere stimulus complement to manufacturing? (iii) Could agriculture have the capacity to be growth escalator in SSA economies?* Addressing these questions is predicted to give useful insights as to whether Kaldorian predictions are relevant to the sample economies in SSA and Asia for relatively long period covering 1970-2015. Additional tests shall be carried out using two broad segments of the services-sector and agriculture sector to see if the growth-propelling potential of manufacturing is shared by the services sector, if not by agriculture sector.

The contribution of part six is mainly empirical, exploring whether manufacturing has still maintained stronger positive effect on economic growth than services and agriculture sectors through applying up-to-date dynamic panel estimation techniques that account for cross-sectional dependence, slope heterogeneity and non-stationarity. To the best of the researcher's knowledge, this is a first attempt of treating these issues in empirical works pertinent to the sectoral engine of growth analysis. It contributes to certain debates in the literature (see parts three and four) such as those that suggest that services may ultimately complement, or take from, manufacturing as an engine of growth in developing countries. It contributes to the overall objectives of the thesis by addressing a lack of knowledge in the literature of the specific limits of the contributions of the manufacturing sector growth, relative to the contributions of the services and agricultural sectors.

1.6.6: Part Seven concludes the dissertation

PART TWO: THEORIZING THE RELATIONSHIP BETWEEN PRODUCTION TRANSFORMATION AND ECONOMIC DEVELOPMENT

2.1. Introduction

Parts two and three, respectively, discuss theoretical strands on production transformation and development, and sectoral role of growth. Part two gives lengthy discussion on the rationales held in the classical development theories (along with the Anglo-Saxon structuralism, ECLAC, and contemporary discourses of structuralism), the Kaldorian frameworks, the neo-Schumpeterian and evolutionary theories while part three tries to contribute to the debate on sector-specificity and engine of growth hypothesis. Thus, part two gives review of relevant literature to grasp useful insights on how the dynamic transformation of the production structure of an economy towards the increasing returns sector (chiefly manufacturing) pertains to employment creation, cumulative productivity increases and sustainable development. This way, it shall contribute through counter arguing the services-biased mainstream development discourse that put the link between industrialization, specifically manufacturing, and economic growth in peril, in favor of the symbiotic relationship between sectors instead of attaching more weight on services-led development route.

2.2 Characterizing the Transformation of Production Structure

This section seeks to examine the origin and evolution of production transformation of an economy. Production transformation and structural transformation, broadly refer to inter-sectoral shifts and upgrading within sectors, are used interchangeably throughout the dissertation. The early development theorists or the early thinkers in structuralism held the view that structural composition of a given economy was strongly intertwined to economic development (e.g. Adam Smith 1776; Young 1928; Lewis 1954; Nurkse, 1953; Hirschman 1958; Myrdal 1957; Rosenstein-Rodan 1964; Kuznets 1966; Kaldor 1966, 1967; Chenery and Syrquin 1975; Chenery 1979; Pasinetti 1981). There was no contention on the requisite of production transformation in sustaining economic growth and forging-ahead; promoting cumulative productivity increases; and diversifying the production structure via increased utilization of under-utilized resources and disguised workforce (the reallocation of labor between sectors with different productivity levels). They beheld, out of convincement, that manufacturing carries some special qualities which are not shared by other sectors, enabling it to play engine of growth role. This is why the classical development theories sought development almost synonymously with industrialization and structural transformation.

Syrquin (1988) described structural transformation as the interrelated processes of structural change accompanying economic development. And, it usually takes root in the context of a sustained rise in income per capita over a fairly long period (Chenery and Syrquin 1975). Conventional development economics text books define "structural transformation" in terms of shifts of the economy towards higher productivity sectors/activities, enfolding three dimensions (Sumner 2018): (i) inter-and intra-sectoral reallocation of economic activities from lower-productivity to higher-productivity activities (sectoral aspect); (ii) the composition or drivers of economic growth in terms of a shift of factors of production in the direction of higher-productivity sectors/activities (factoral aspects); and (iii) the extent of integration in terms of the global economy and a shift from trade deficits and capital inflows that come with liabilities such as profit repatriation or debt repayment to trade surpluses (the integration aspect).

Structural transformation [defined as the long-term and persistent changes in composition of GDP and employment structures from diminishing-return and lower-productivity to increasing-returns and higher-productivity and more dynamic sectors/production activities] was considered as an elemental driving force for sustainable economic growth (Chenery 1960). Precisely, the structural change paradigm developed over the decades of the 1950s to the 1970s development discourse was fundamentally framed in production to mean continuous change and upgrading in the production structure of an economy, in which industrialization[18] has central role to play. Over these periods, structural change would have similar patterns in all economies, whereby "innovative divisions of labor, constrained by market size" was emphasized as playing central role in development (Amsden 1997, quoted in Andreoni and Chang 2016 p. 2).

In this context, structural transformation enfolds two interrelated elements: *The emergence of new, more dynamic, knowledge-intensive and high productive activities replacing old activities, and the movement of resources to these activities away from least productive activities* (Occampo et al 2009). These two elements are interrelated because without the first, the economy may not move forward, and lacking the second, productivity gains are not diffused to the rest of the economy (McMillan and Rodrik 2011). Structural transformation also entails new ways of doing old activities as a result of innovations and productivity increases in existing sectors that may come from product, process and functional upgrading [19] (ECLAC 2012). Therefore, structural

[18] Industrialization, in the view of Chenery (1960), is the process wherein the importance of manufacturing increases and changes are seen in the composition of industrial output and production techniques. It is also accompanied by demographic transition, income distribution, etc.

19 Product upgrading represents the development and commercialization of new or significantly improved products or delivery methods with enhanced performance characteristics (OECD 2005). Functional upgrading refers to

transformation comprises output diversification, product differentiation and technological improvement (Nűbler 2014). Naudé, Santos-Paulino and McGillivray (2009) posit that changes observed in the production structure of an economy can enhance the complexity and diversification of its economic system, reducing its vulnerability to negative external shocks. *What the above suggest is that sustainable growth trajectory and development path entails rapid industrialization and extensive diversification of the economic structure towards high-productivity sectors/activities that produce tradable goods and services, whose demand in the global market is high and elastic.* In this context, therefore, growth, accumulation and relative composition of economic sectors/activities are key pillars of transformation that accompany economic growth. So, what a country produces matter for its prosperity.

An important pattern of transformation of an economy may also involve a transition from 'a low income, agrarian rural economy to an industrial urban economy with substantially higher per capita income' (Syrquin 1988). Also, as Breisinger and Diao (2008) explicitly argued, structural transformation envelopes the process of transforming an economy into a middle-income level from a lower-income one, and/or a move towards a high-income economy from a middle-income one in the development ladder. *This may make production transformation a continuous and dynamic process, involving the transformation not only of a country's economic productive structures, but also it shapes its society and institutions*. That is why Kuznets (1971, 1973) expounds that modern economic growth is possible with structural change in social institutions and beliefs,[20] brought about by the same process of industrialization and urbanization. Bortis (2000) supports Kuznets proposition, arguing that structural transformation was accompanied by 'profound social changes' since the earliest Industrial Revolution.

Given the above, this dissertation places particular focus on the importance of production structure, presupposing that different economic sectors/activities have varying levels of productivity (owing to the structural heterogeneity of production – heterogeneity across products and sectors). Seeing in this lens, the divergence level of development in the Asian forerunners and SSA economies (and across countries in each region) is claimed to hinge most importantly on the quality of the transformation process and growth. In view of this claim, the rest of part two discusses the various theoretical strands on the place of structural transformation in the process of wealth creation and

engaging in new and superior activities in the value chain (e.g. when a firm moves from components manufacturing to product design) (Humphrey and Schmitz 2002).

[20] He posits that shifts in production structure could bring about changes in incentive structures, educational requirements, and the relative positions of different groups in society. Urbanization leads to shifts in family formation, gender relation and personal status. Changes in transport and communication services open up less favored areas and connect factor and commodity markets. The management of these fundamental changes requires legal and institutional innovations, in which the state and other institutions play undeniable important roles.

sustainability. The overall intent is to refute the claim that East and Southeast Asian economies are predestined for learning-based industrialization and sustainability, and SSA for natural resources extractions and agriculture. This may indicate that sustainable development cannot occur without concrete transformation of the production structure; hence, creation of good employment. If so, technologically backward and poor countries should undergo transformation of their production structure to catch-up with the frontier economies or climbing the development ladder up to high-income status. Because, today's rich and mature industrialized countries and those countries that imitated them all followed that route. However, this route may not appear easy for laggard countries to follow in today's technological advancement and fragmented GVCs.

2.3 Theoretical Perspectives on Caching-up, Prosperity, and Sustainable Development

Various academic works have enunciated diverse sources of transformation in the productive structure, with demand and supply side factors closely interact in a mutually complementary manner in shaping the transformation process. The salient signs of successful transformation encompass a surge in per capita income, an increase in the rate of capital accumulation, changes in the composition of economic activities, and the like. Some of the conventional perspectives and recent developments on the subject are briefly reviewed in this section as the empirical analysis in latter parts of the dissertation shall be constructed on some of these theoretical strands.

2.3.1 The Structuralist Perspective:

Chenery (1975) said the structuralist approach differs from neoclassical approach as it 'attempts to identify specific rigidities, lags, and other characterstics of the structure of developing economies that affect economic adjustments and the choice of development policy.' Blankenburg, Palma and Tregenna (2008) described structuralism as a theoretical approach that confronts the neoclassical methods of empiricism and positivism. Structuralism, in their view, assumes an integrated system of distinguishably but mutually constitutive elements; wherein, 'the relationship that constitute structures' are more important than 'individual elements'. This distinguishes it from the neoclassical approach of "methodological individualism", in which the analysis of human action may be performed in a micro approach from the perspective of individual agents (Missio, Jayme and Oreiro, 2015). Street and James (1982) (cited in Missio, Jayme and Oreiro, 2015) vehemently argued that structuralism rests on two basic perceptions: (i) the economic system is identified as an evolving and non-equilibrium process rather than an equilibrium mechanism of stable economic relations centered on market activities; and (ii) human behavior is characterized by customary patterns resulting from cultural conditioning, but capable of intelligent response to changing realities. In contrast, the conventional neoclassical view conceives human behavior as essentially devoted to utilitarianism and pecuniary calculation in a static market system. In short, structural analysis in this perspective is aligned to methodological holism, wherein the analysis emphasizes internal relations (interdependent elements) of the economic system, incorporating systemic properties that cannot be reduced to the analysis of individual elements. It is thus concerned with structural disequilibrium and the implications they pose on trade, balance of payments and the way structural transformation contributes to development and sustainability.

In this approach, economic development is mingled with production transformation. And, the policy direction seems forthright: Shifting the economy (or, production reallocation) from low-productivity sectors or production activities characterized by diminishing returns, to high-productivity sectors or production activities, where increasing returns prevail. This, indubitably, necessitates targeted industrial policy; hence, active role of the state. Given this background, some of the theoretical strands that may be classified within the classical notion of economic development in general and structuralism in particular are discussed below.

A. Lewis and other Classical Scholars - Capital accumulation:

"Capital accumulation" was at the center of the development discourse of the 1950s and 1960s; where economic planning conceptualized in terms of aggregate savings, investments, and surplus labor emphasized to achieve high capital accumulation and the transformation of the productive structure (Andreoni and Chang 2016).

Lewis (1954 pp.155) accentuated that *"the central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 percent of its national income or less, convert itself into an economy where voluntary saving is running at about 12 to 15 percent of national income or more. This is the central problem because the central fact of economic development is capital accumulation."* His model is based on the existence of two broadly defined sectors in a typical developing economy: a large rural sector (characterized as low-productivity, low-wage, priced to average product not marginal product, with widespread disguised unemployment, subsistence or traditional or non-capitalist sector) and a relatively small urban sector[21] (characterized as high-productivity, modern or

21 In the traditional (non-capitalist) sector, there exists surplus labor; hence, wage is set just above subsistence across the whole economy which leads to the movement of labor overtime to the modern or capitalist sector and thereby capitalists capture labor productivity gains as profits for it is the source of growth via reinvestment. The model has been criticized in relation mainly to its assumption of labor abundance in the subsistence sector (and thus the dominance of wage from that sector across the economy) and the emergence of the urban informal sector, albeit surplus labor in the Lewis model includes the urban informal sector (Fei and Rani, 1964; Harris and Todaro 1970; Schultz 1964). Other critiques also challenges the model in two aspects: (i) domestic labor migration may not be

capitalist or industrial sector, and where wages are set by productivity in the 'subsistence sector'). Productivity gains and economic growth cannot be attained without capital accumulation in the higher-productivity sector, in turn, requires the migration of labor from the lower-productivity sector. In this respect, *high capital accumulation was conceived as key source of structural change*.

The scholarly works of Chenery (1960) and Rosenstein-Rodan (1964) advocated that capital investment in industry sector plays central role to promote economic growth in underdeveloped economies. The empirical findings of Syrquin and Chenery (1968) evidenced that the share of investment in GDP would foster economic transformation. In this perspective, therefore, capital accumulation (savings) was conceived as necessary condition without which an economy cannot see high and sustainable growth trajectories. In his *"big-push"* theory, Rosenstein-Rodan (1964) claimed that massive and planned investments through the creation of a new institutional environment, and hence industrialization are the only amicable ways to nurture economic growth sustainably. Likewise, Nurkse (1953) explicated that economic growth is far from being *'a spontaneous and automatic affair.'* He described the *'vicious circle of poverty'* as a *"circular constellation of forces tending to act and react upon one another in such a way as to keep a poor country in a state of poverty."* This is reflected in a low level of investment and capital accumulation, operating both on the supply and demand sides;[22] whereby weak investment causes low level of capital employed in the production process. In this respect, underdevelopment is closely entwined with the type of products produced in the economy, and how they are traded in the international market. So, underdevelopment hinges on shifts of the productive structure in the wrong direction – production reallocation towards low-productivity sectors or activities.

The linear stage economic growth theory of Rostow (1960) too presupposed capital accumulation. He defined his stages of growth as *preconditions for take-off, take-off, and self-sustained stages*, emphasizing that each country has to pass through certain prerequisites before *take-off*. The model considered the *take-off* stage as the eminence stage in the transformation and development process. It thus required a sharp increase (doubling) in the rate of investment (capital accumulation) or

permanent but circular or 'commuting'; (ii) the contemporary scale of inter-sectoral resource flows through the growth of remittances further blurs the link between the two sectors; and (iii) the Lewis transition can take a variety of forms beyond Lewis's anticipation and it is by no means guaranteed that the transfer would be from low-to high-productivity activities (see McMillan and Rodrik 2011).

[22] From the supply side, low level of investment emanates from low level of savings, which in turn is a manifestation of low level of income stemming from low level of productivity attributed to small amounts of capital used in the production process and is related to low domestic savings mobilization in the economy. The low level of income in the economy leads to low level of demand for goods in the domestic market, which inhibits capital formation and the development process. From the demand side, the key factor stifling development was the atrophy of the domestic market caused by low demand for goods, owing to low income level, which in turn discourages the formation of capital. When labor productivity is low, real income is low and the poverty vicious circle is complete.

increase in the share of savings and investment in national income to lift the economy to a sustained growth path out of low-income setting. So, the key insight of the model was the emergence of a leading industrial sector that plays central role during the *take-off stage* in the sense of marking the way for development to other sectors and encouraging transformation of production structure in the economy.[23]

In sum, these theorists had emphasized the necessity of a sustained increase in the rates of capital accumulation to achieve long-run growth and transformation of the productive structure. Their theories were all firmly rooted in production. However, some of them strictly argued that growth based on production should be balanced while others argued for the unbalanced growth hypothesis as given below.

B. The balanced versus unbalanced growth hypotheses:

In the decades of 1950s and 1960s, the importance of sector structure (or production) on sustainable development of an economy was not questionable. There was consensus on the role of industrialization in the economic system, where long-term growth of a given economy was conceived as a 'sector-specific' process. More important focus was placed on the special qualities manufacturing maintains and on how these qualities would spread to the whole economy, stimulating the process of economic transformation and growth. The core intent of their analytical framework was identifying plausible explanations to the underlying causes (obstacles, bottlenecks and rigidities) that block the process of rapid industrialization and development of technologically backward countries. As indicated in the introductory part, these economies have insisted on **trading** (hence, reproduce themselves) rather than **imitating** the frontier economies. Then, much of the debate was centered on whether growth through industrialization should be *balanced or unbalanced* to spur economic development and sustainability. Interestingly, *both perspectives placed due emphasis on sustainable development, in which production and employment play unprecedented role.*

Exponents of the balanced growth hypotheses (such as Rosenstein-Rodan, 1943; Nurkse, 1953) argued that all economic sectors or production activities need to grow to support one another, in the course of development and sustainability. The fact that economic sectors or production activities are interrelated [or complementary] meant that growth will occur across the economy at

[23] The model suggests the ideas of agglomeration and clustering; however, it was one of the most widely debated early theories of structural transformation (Lin, 2010) simply because the analysis was heavily ideologically biased and too simplistic. The model was dismissed also because it gave particular focus on modernization and westernization not necessarily on structural transformation; it was exclusively aimed at transforming poor economies in the image of Western Europe and North America.

a constant rate. Their argument gave rise reflections on the role of demand complementarities and increasing returns to scale in manufacturing, justifying selective industrial policy on the basis of the existence of interdependence between different activities (Chang et al. 2013). Advocates of this perspective call for active role of the state in supporting the productive sectors or production activities that might lack investment from the private sector for different reasons. This further implies that a *big push* might be required by the government to help the economy grow in a balanced way, so that each economic sector exhibits growth.

Rosenstein-Rodan (1943) posits that developed economies have structured and dynamic industrial sector, which underdeveloped economies lacked. So, the latter need massive and planned investments coordinated by the state to see the creation of a new institutional environment and rapid industrialization become a reality. His big-push theory meant that a large-scale development program geared towards jump-starting economic growth through the industrialization process of underdeveloped countries. He raised two critical points with respect to planning: (i) the state needs to coordinate labor training policies to transform peasants into industrial workers, as the automatism of laissez-faire never worked properly in this field. Put differently, from the perspective of an individual firm, investing in training labor is very risky as workers may move to another firm, the state has to invest in such trainings; and (ii) the complementarity influence between different industries that potentiates the dynamic effects of external economies and balances the process of economic growth. The expansion of the market through the creation of a planned complementarity system of industries reduces the risk of demand shortage, and since risk can be considered as a cost, it reduces costs and provides the most important set of arguments in favor of large-scale industrialization. In such a way, a big, comprehensive and balanced investment package between manufacturing industries performed by the state (i.e. the 'big-push') is the key to economic development through positive linkage effects in the productive chain that enhance the dynamic effects of external economies. In this sense, industrialization plays central role in economic development.

Likewise, Nurkse (1953) describes the dynamic forces that hinder the growth and transformation process in underdeveloped economies, which would operate both on the supply and demand sides. He posited that underdevelopment is linked to the kind of products a country produces and how they are traded in the international market. In order to break the vicious circle, a wave of capital investment in various industries should be carried out. This would enlarge the market size, increase productivity and provide incentives for the private sector to invest. The only way out of this

dilemma, in his view, as already indicated earlier, is a more or less synchronized application of capital to a wide range of different industries.
By contrast, proponents of the unbalanced growth hypothesis, mainly Albert Hirschman (1958), posit that imbalances generated between economic sectors could provide corrective reactions, so that growth in latecomer economies could be faster if it is unbalanced. The intuition behind this hypothesis was candid: When the dynamic process of growth is unbalanced, prices for resources may soar when the growth of output is relatively slow, sending signals for investors to allocate funds to address these bottlenecks. He qualifies economic development "essentially as the record of how one thing leads to another" involving not only physical relations of supply and demand, but also technological linkages. This leads to the first insights on the concept of spillover effects, which stem from manufacturing to the rest of the economy [which is approached by contemporary economic development literature such as the Kaldorian and neo-Schumpeterian strands]. Contrarily to the balanced growth advocates, he contends that too many financial resources and planning efforts would be necessary to stimulate the economy, concluding that "if a country was ready to apply the doctrine of balanced growth, then it would not be underdeveloped in the first place" (ibid, pp. 53-54). So, development policies should target certain key sectors (specific industries) with strong interdependencies or linkages with other sectors of the economy in promoting production transformation, as it is not feasible typically in resource scarce economies, to foster all economic sectors simultaneously. Key sectors (sectors with strong linkages) would be capable of generating higher economies of scale with positive effects in terms of productivity gains and cost savings in the later stages of the production processes. This perspective asserts that certain activities, particularly inside the manufacturing industries, are the main growth escalators.

Hirschman (1958) states that development may occur when growth is induced from the leading (targeted) sectors to the follower ones, or from targeted production activities to other production activities, or from one industry to another, or from one firm to another. In this perspective, economic sectors or the productive structure is linked through strong forward and backward linkages[24] to downstream and upstream industries, wherein the linkages reflect physical relations of supply and demand among economic sectors. In this way, he accentuated, successful learning-

[24] While the backward linkage refers to the potential of a sector to stimulate production and investment of sectors that provide its inputs, forward linkage relates to the capacity of a sector to induce productive activities of sectors which demand its output. Whereas forward linkage encourages investment in subsequent state of production, backward linkage promotes investment in earlier stages of production. For Hirschman (1958 pp. 116) backward linkage is important than forward linkage as sectors with backward linkages automatically generate a demand for input. Here, backward linkages involve signaling a lack of (and a potential for) production of inputs to existing economic activities leads to or compels the initiation of a new activity that uses the output of the original production as a direct input. Manufacturing has both strong backward and forward linkages, enabling it to generate higher economies of scale with positive effects on productivity gains and cost savings in later stage of production chain.

based industrializations involve availing adequate support to those sectors or production activities with stronger linkage effects when linkages move to the momentum of structural change.[25] To this regard, the developmental state can play central role to support those industries or to give priority to investments with the strongest linkages to the growth escalator sector. What matters most here is the 'degree' of unbalance and how to implement the unbalanced strategy. The most conducive way of inducing unbalanced growth, according to Hirschman, is to give priority to *"last stage industries,"* perhaps because they could generate stimulating backward linkages and that they are relatively easy to set up as the input initially can be imported if domestically unavailable. As the demand for the intermediate input grows in the domestic market, the incentive of supplying the input locally increases, spurring a dynamic economic development.

Also, Myrdal (1957) based his theory on the understanding that economic development is intrinsically a process in disequilibrium, which contrasts with the neoclassical view of stable equilibrium. He argued that neoclassical trade theories were never developed to comprehend the reality of great and growing economic inequalities and of the dynamic process of underdevelopment and development (ibid, p. 51). His theory is centered on the concept of 'cumulative causation' to analyze the problem of development inequality between nations. In this dynamic, trade and economic relations between developed and underdeveloped economies would impact the development of an economy negatively ('backward effect') or positively ('forward effect'). He also argued that economic development involves not only economic relationships of supply and demand but also institutional and political structures, denominated non-economic factors, which, operating in a process of cumulative causation, reveals challenges to be faced by underdeveloped countries. In his notion of circular cumulative causation, the main idea relies on the fact that free market forces would generally tend to increase regional disparities.

Focusing on social aspects of this cumulative causation, Myrdal's theory laid the groundwork for the fundamental framework for later complementary heterodox theories, such as the Latin American structuralist and the Kaldorian approaches. The central tenets of these approaches have rested on production, and they are briefly reviewed below.

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25 Some commentators criticized this perspective for it gives particular focus on the intermediate and capital goods sector and little focus on agricultural development as it is characterized by low-productivity and relatively weak linkages with other economic sectors or production activities. This is contrasted with Timmer (2005) who emphasizes that a rise in agricultural productivity played pivotal role in the structural transformation process of many successful economies with few exceptions such as Hong Kong and Singapore.

C. Nicolas Kaldor – Increasing Returns, Verdoorn's Law and Growth:

Based on the structuralist approach to development and empirical observations, Kaldor (1966, 1967) theorized the pivotal role manufacturing plays in economic growth, development and sustainability. He joined several other classical theorists to argue the impossibility of understanding the divergence growth paths between countries without employing a sectoral analytical approach.[26] While setting his proposition on the transformation and development process, he made clear distinction between the increasing returns sector (manufacturing) and the diminishing returns sector (agriculture). By arguing that the increasing returns sector should be artificially promoted through targeted policy he challenged the assumption of general equilibrium theory. Inspired by Adam Smith,[27] Young[28] and Myrdal, he claimed that manufacturing has special growth-propelling qualities that trigger a process of cumulative causation that are not shared by other sectors: "to explain why certain regions have become highly industrialized while others have not we must introduce quite different kinds of considerations – what Myrdal (1957) called the principle of 'circular cumulative causation'. Such theoretical framework helps understand the causal relationship between industrial development and economic growth.

His argument, to explain the economic dynamic, rests on the demand side of the economic system (typically the role of aggregate demand, which should be managed to ensure growth). On the basis of the interaction between demand and supply conditions in agriculture, manufacturing and services, Kaldor proposed three Growth Laws with respect to the link between the growth of output, employment and productivity in different sectors of the economy. Thirlwall (2013) said that these 'growth laws' became an important turning point in the economic growth literature, and he summarizes them as follows. *The First Law states that manufacturing industry is the engine of growth – faster growth of manufacturing is associated with faster growth of GDP. The Second Law dictates that manufacturing growth induces productivity growth in manufacturing through static and dynamic economies of scale (also known as Verdoorn's Law). The Third Law states that*

[26] Recently, Rodrik (2016) strongly claims that the division of the world economy into rich and poor blocks is explained chiefly by the difference in the level of industrialization. He also confirmed that catch-up growth by new-Western economies was realized through industrialization.

[27] In his Wealth of Nations (1776), Adam Smith stated that the division of labour is central to explain growth. In his view, the division of labour is limited by the size of the market; hence, growth cannot occur if the market system does not function-well. Thus, he argued, extension of the market through transport and communication internally and through free foreign trade externally play central role in propelling growth.

[28] Young (1928) extends Adam Smith's principle of 'division of labor' to claim that the emergence of new kinds of specialized firms, of steadily increasing industrial differentiation – more than through the expansion in the size of the individual plant or the individual firm (Kaldor 1970 p. 340). In his view, the division of labor largely relies to the division of labor itself. In Young's view, large production at macro level permits increasing returns rather than large-scale production at firm or industry level. He pointed out that 'industrial differentiation, has been and remains the type of change characteristically associated with the growth of production.' Young argued that "the division of labor among industries is a vehicle for increasing returns."

manufacturing growth induces productivity growth outside of manufacturing sectors, by absorbing idle or low-productivity resources in those sectors. The growth of manufacturing itself is relying to a large extent on the growth of demand that must come from agriculture in the early stages of development, and from exports in the later stages.

Kaldor argued that economic development is made possible through learning-based industrial transformation. The logic behind this view is straightforward: Learning-by-doing occurs principally in manufacturing, not in services or agriculture sectors; backward and forward linkages, capital accumulation, spillover effects and economies of scale are stronger in manufacturing than other sectors. In his view, poor countries tend to specialize in land-based sectors – agriculture and mining – subject to diminishing returns while rich countries specialize in increasing returns activities such as manufacturing and sophisticated services activities associated with them, including banking, finance and insurance (Thirlwal 2013). The message to be made here is that not only forward and backward linkages are strongest in manufacturing, but also the scope for capital accumulation, technological progress, economies of scale, and knowledge spillover effects are strong in that sector.

Kaldor (1967) confirmed that economic development in Western Europe was possible through industrialization; hence, manufacturing can play engine of growth role for every country at every stage of economic development. He also posited that industrialization requires modernization of agriculture to ensure food supply. With the growth of manufacturing output, productivity across the economy will increase even in agriculture and services through positive spillovers such as technological knowhow and complementary markets in services. He said that agriculture and industry sectors are not only connected by the Lewis labor transition [the elastic labor supply is due to industry wages exceeding agriculture] but also because agriculture creates autonomous demand for manufacturing, and thus land reform is required if agriculture is not to hinder structural transformation. He also posited that aggregate demand needs to be managed to ensure growth (e.g. policies on public investment, taxation, direct credit) and as exports become increasingly important as a source of demand for the manufacturing sector as the economy grows, global competition requires temporary domestic industry protection accompanied by export-led growth policies.

Kaldor also took the two-sector model to be applicable to trade between developing and developed countries through the export of agricultural products from the former and import of manufactured goods from the latter. He argued that international trade could make developing countries poorer because liberalization would increase exports of agricultural products that are not sufficient to compensate for the loss of manufacturing exports, which produces increasing returns. So, the virtuous cycle or Myrdal's cycle of cumulative causation is that demand and output growth fuel productivity growth due to increasing returns to scale, which in turn fuels capital accumulation.

In contrast to the Solow growth model, Kaldor endogenizes technological progress using the Verdoorn's Law (1949) and dynamics of increasing returns to scale along with giving demand a central role in the long-run (McCombie 1982). His interpretation of the Verdoorn Law is that output growth induces improvements in labor productivity (assuming an elastic labor supply) and not vice versa. Verdoorn's argument was one of cumulative causation where demand rather than supply determines the rate of accumulation. From this theoretical framework, Kaldor (and later Thirlwall) developed models where the growth of exports leads to specialization which then leads to increases in productivity and skills improvements. This then causes resources to move to the export sector. Part six will empirically investigate the validity of the three Growth Laws of Kaldor in Asia and SSA employing static and dynamic econometric approach.

D. The Economic Commission for Latin America (ECLAC) Theory of Structuralism :

While explaining the causes of Latin American underdevelopment, the ECLAC theory confronts the neoclassical growth theory through questioning the efficacy of the prevailing international trade theory. ECLAC proposed a theory of "peripheral capitalism", incorporating core elements presented in the French and Anglo-Saxon structuralsit traditions as well as Keynesian thinking (Blankenburg, Palma and Tregenna 2008). In ECLAC structuralism perspective too, the productive structure composition of a given economy matters to the pace and scope of its sustainable growth and development. Proponents of this theory keep on insisting the need for structural change in the periphery **imitating** the frontier economies, rather than insisting on **trading** agricultural commodities in line with the comparative advantage following (CAF) strategy.

Comparing commodity-producing and industrialized economies, Prebisch (1950) asserted that productivity was essentially higher in manufacturing activities than in the primary activities. In his view, there exists dichotomy in productivity levels between the productive structure of developed (center) and underdeveloped (periphery) countries. This suggests that countries do not follow a universal trajectory towards production transformation and sustainable development; that is, the relations between developed and developing countries are not always mutually beneficial, and the historical particularities of different periods are important (Missio, Jayme and Oreiro, 2015). The approach employs the structural-historical method to identify the underlying relations between countries worldwide; to explain the observable characteristics of periphery countries; and to analyze the dynamics of productive structures typical of those economies.

Thus, the foundation of Latin American structuralism is traced back to Prebisch's 'center-periphery' argument, which acknowledges that hegemonic industrial center and a dependent agricultural periphery constitute the international relations system. This is equivalent to admitting the existence of an original and unequal development process (Missio, Jayme and Oreiro, 2015). Based on this notion, the ECLAC theory places focus on the causes and remedies for the structural problems that the periphery countries faced.

Prebisch identified the causes of Latin American underdevelopment to be found in the system of international free trade. He argued that the prevailing international division of labor compels the periphery to specialize in the production of primary products and the center to specialize in the production of manufactures. He was convinced with the prevailing theory that claims international division of labor would enable all countries to reap the greatest possible advantage from foreign trade. However, his own empirical exercises revealed otherwise. Most importantly, he identified that the terms of trade for Britain, which was an importer of primary products, improved after 1880 while the terms of trade for the primary commodities exporting peripheries became deteriorated. This led him to conclude that the international trade system had benefited only the industrialized countries, which was taken as the main justification for the structural imbalances exhibited between the center and the periphery. By this, he meant that the international trade system had resulted in underdevelopment in one part of the world (periphery), and prosperity, and wealth creation in the other part (center).

Furtado (1961) in like manner expounds that technological progress induces capitalist development through diffusion of new techniques that would result in the rise of production and productivity. In this context, underdevelopment could be understood as a partial and blocked version of development, either because of the uneven spread of technical progress or the limited transmission of productivity gains into wages. In his view, the center established a national innovative system and internalizes new technology by developing an industrial capital goods sector and by spreading the improved technology to all economic sectors. In contrast, the periphery remains dependent on imported technology, which depends to a large extent on the primary export sector. The growth and transformation in the periphery starts from a relative initial backwardness and after a period called 'outward development' new techniques implemented in primary good export activities and in a few economic activities directly related to exports which would coexist with the traditional and backward sectors. Consequently, a sizable low-productivity pre-capitalist sector continues to survive in the periphery, producing a continuous surplus of labor and consequently keeping wages low. The ever-growing demand for goods and services could mostly be satisfied through imports. So, the ECLAC structuralism approach explicates that without industrialization, the asymmetry between the center and the periphery would perpetuate.

E. Summary of the Structuralist Perspective

The structuralist perspective claims that inter-sectoral shifts in value added is the most obvious feature that accompanies structural change. Transformation in this perspective is reflected in the shifting of production and employment toward high-productivity sector (e.g. manufacturing) or production activities. Nonetheless, *structural transformation is a continuous process that can also come about within each of the major economic sectors (*or a process of reallocation of productive factors among economic sectors or production activities, also called upgrading within sectors or production activities). Figure 5 summarizes the theoretical framework and the diverse benefits of structural transformation.

To begin with, output growth can be decomposed into employment growth effect [composed of labor force growth and employment rate effect] and labor productivity gains [defined here as aggregate output per worker]. Aggregate labor productivity growth can result from two sources: (i) within sector productivity gain due to innovations and technological progress within each sector [when capital increases, new technologies are adopted and the knowledge to use them is acquired]; and (ii) inter-sectoral productivity gain or reallocation effect [due to the movement of workers from lower-to-higher-productivity sectors/activities]. The latter constitutes the crucial part of structural change, wherein the movement of workers away from the lower-productivity sector/activities towards the higher-productivity ones benefits both the economy and the workers.

Besides boosting economy-wide and sector-level productivity growth, structural transformation may also have spillover effects via demand, inter-sector linkages, and learning, and induced innovations. When workers migrate to higher-productive sectors/activities, they may become more productive and earn better remuneration, which would increase their demand. In turn, overall output will be stimulated accompanied by the rise in the demand for labor. Additionally, with growth-enhancing structural transformation, the differential in productivity gains between economic sectors will be narrowed, ultimately reducing structural heterogeneity in the economy. Higher-productivity sectors are more dynamic and better positioned to accumulate further knowledge and innovations than lower-productivity sectors. For, sustainable development of an economy could not happen without transformation of the production structure towards high-productivity activities, even if an economy may experience growth bursts using different means (Ocampo, Rada and Taylor 2009). As the economy of developing countries is characterized by large productivity differentials between distinct economic sectors (McMillan and Rodrik 2011), production transformation that results in the improvement in job quality remains a defining moment for those countries to create wealth and develop sustainably. So, low-income economies require not only economic growth but also a dynamic transformation of the production structure.

However, production transformation cannot transpire automatically [for instance, one cannot mechanically shift economic activities or resources from one sector to another and do upgrading in those sectors]. Therefore, transformation in the production structure for underdeveloped countries may face a wide range of capability constraints including political factors, inapt policies, technology, etc. In this respect, industrial policy[29] plays pivotal role to deal with these hindrances, providing a window into different areas of intervention for a developmental state that uses the market as an instrument for triggering long term investment, structural transformation, and rapid and sustained economic growth (Wade 1990). What this implies is the existence of wider room for governments to deliberately affect the structural characteristics of the economy so as to ensure sustainability, which may not happen in the absence of such intervention. In the words of Amsden (1989; 2001), industrial policy involves 'deliberately getting prices wrong' [in the form of tax concessions, subsidies, temporary trade protection and heavily subsidized interest rates on long-term loans while ensuring that firms would not waste these resources] so as to foster learning-based industrialization and sustainable structural change and to improve the capabilities and competitiveness of local firms.

State intervention in different areas was pervasive in many successful cases of transformation, wherein selectivity in terms of specific industries and targeted interventions within the broader framework of the national economy was the rule. This calls for pursuing public-investment-led growth model [with heterodox financing policies] that may also catalyze the private sector. The experience of the East Asian developmental states over the 1960s and 1970s (e.g. South Korea) witnessed the active role of the state in directing economic activities towards greater investments in strategic sectors, specifically towards industrial diversification (Amsden 1989).

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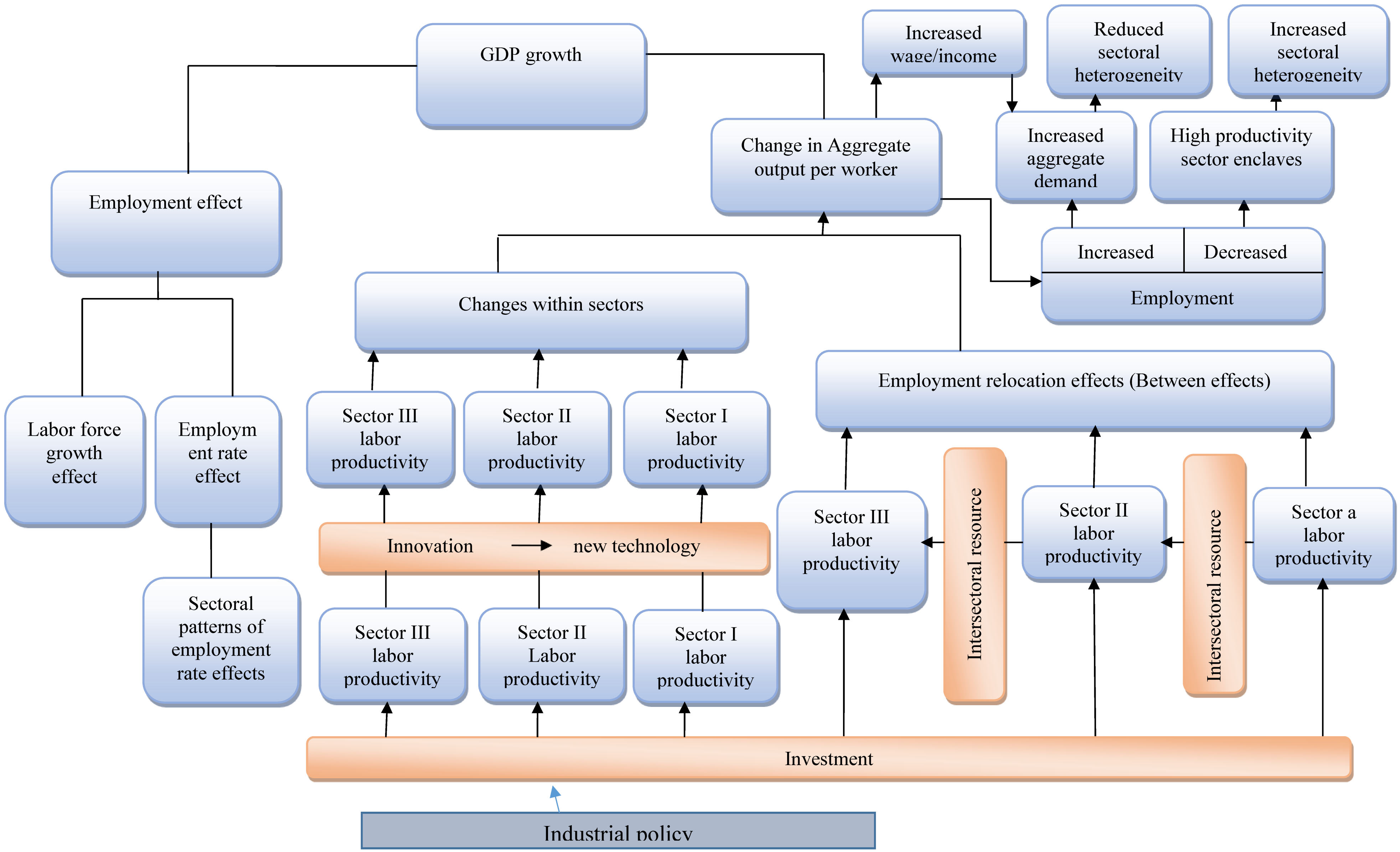
[29] Chang (1994 pp. 60) defined industrial policy as "a policy aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole", emphasizing on selective targeting, strategic orientation and efficiency. Arguing for the necessity of industrial policy in catching-up growth, he cited the following selective industrial policies extensively used by the East Asian newly industrialized economies: export promotion; FDI attraction; imposing macroeconomic policies to encourage savings and selective channeling of credit to firms; pursuing extensive education and skills formation programs to facilitate the capacity of their economies to absorb foreign technology and knowhow, including mandatory worker training schemes; the creation of venture capital funds; and coordination of complementary investments (Chang 2009).

Figure 4: Relationship between structural transformation and growth



The countries defied their static comparative advantage through creating price distortions, wherein the hand of the state 'generally provides the vision and the dynamic push to make things happen that otherwise would not have happened' (Mazzucato 2013 in Storm 2015, pp. 679). According to Mazzucato, the state is understood as 'willing to take risks that business won't', as an 'entrepreneurial – taking the most risky and uncertain investments in the economy' (ibid). *The most compelling questions in this respect include: Why composition of sector structure or heterogeneity among economic activities matter for sustainable growth? How growth in a specific sector/activity induces overall productivity and enhances prosperity of a nation? Which economic sectors and activities within each sector could have high growth-propelling potentials, making it a propulsive sector?* These and related questions will be addressed in parts three to six of the dissertation.

2.3.2 The flying geese model of catching-up:

In his seminal paper written on the development experience of Japan, Kaname Akamatsu documented what he termed *'the wild-geese-flying pattern'* in economic development. The model describes the sequential order of catching-up in the process of industrialization by latecomer economies thru transforming themselves, noting that wild geese fly in orderly ranks forming an inverted V, just as airplanes fly in their formation (1962, pp.11, cited in Lin 2011). Kasahara (2004) argued that this strategy was applied by Japan in the 1960s and 1970s and then followed by other Asian forerunners such as Korea, Taiwan, Singapore, Hong Kong, Malaysia, and Indonesia. *As the leading geese (or the leader country) move up the product ladder to more sophisticated industrial production, the latecomers can move into production platforms for the low cost and low skill manufacturing industries being vacated by the leader country and launch their industrialization process.*

As the model reveals, countries can engage in a process of industrialization and integration into foreign trade on two dimensions: *the intra-industry dimension, the inter-industry dimension, and the international division of labor dimension*. A succinct description of each dimension is given below:

i. The *intra-industry dimension* involves the product cycle in a particular developing country, whereby the country initially imports the goods, later moves to production (a process of industrialization on low-tech manufacturing products) combined with imports (that is the import-substitution phase), and finally moves to exports of the good (which may even become a net exporter);

ii. The *inter-industry dimension* involves the sequential appearance and development of industries in a particular developing country, with industries being diversified and upgraded from consumer goods to capital goods or from simple to more sophisticated products. In this stage, the country prowls its production (learning-by-doing) relying on domestic demand; and
iii. The *international division of labor dimension* involves the relocation of industries across countries, from advanced to developing countries as the latter undergo the process of convergence (see Lin, 2011 pp. 9 &10). In this stage, the country becomes an exporter after having adequate control of the production and quality of the product, relying on foreign demand.

Régnier (2007) claims that the flying geese model permits one to explain how the Asian region emerged by transferring comparative advantages and complementarities from Japan, South Korea and Taiwan through the relocation of productive segments. But, he argued, the successes observed in South Korea may not be fully explained by international trade theories because state intervention was active in implementing strategies to enhance exports and import substitutes. Amsden (2001), Wade (1990) and Ha-Joon Chang (2009) contend that South Korea and other developmental states in East Asia all followed a comparative advantage defying (CAD) strategies. Some scholars argue that the second version of the flying geese model has been successfully applied in China. They argue that if the industrialization of China was based first on foreign demand, it might have been looking now for a new lease of life by trying to conquer its domestic market to reduce its dependence on external markets and sustain its growth-enhancing structural change.

One may ask why the flying geese model is relevant to poor economies such as those in SSA. *Perhaps because emerging economies (e.g. China) have already moved up the technology ladder and diversified their economies toward the production of more sophisticated goods and services, abandoning low cost manufacturing activities in part attributed to increases in labor costs. This is expected to open wide opportunities for developing economies in exploiting the latecomer advantages*. Lin (2011) calls attention to the fact that the rise of China and other emerging economies provides other developing economies, typically those in SSA, to move out of subsistence agriculture into manufacturing. He strongly claims that China can lead the way for the birth of *the next 'newly industrializing' African economies,* and he estimated that some 85 million jobs in manufacturing can be up for grabs when China moves up the next technological ladder and as labor cost increases putting a brake on its global competitiveness. Of course, latecomer SSA economies are expected to compete with Vietnam, Bangladesh and other emerging Asian economies to increase their market share in manufacturing exports. Here again, the capability issue comes to the front.

2.3.3 The technological catching-up perspective:

The technological catching-up perspective, pioneered by Alexander Gerschenkron (1962), held that being backward in technology, and hence productivity gaps, wears higher potential for catch-up growth. It acknowledges that countries at different stage of backwardness stages of development have distinctive resources and production capabilities associated with their own. This claim rests on the level of technology embodied in a nation's capital stock. It deals with the link between national system of innovation and productive structure of an economy. Similar to Rostow, Gerschenkron considered industrialization as a stage like process; but contrary to Rostow, he posited that there were no (and could not be) automatic stages of development, and latecomers did not (could not) traverse the same stages that the frontier industrializers went through. Gerschenkron (pp. 354), through his study on the catching-up process of European countries in the 19th century, postulates that *capital accumulation was never a precondition for achieving rapid industrialization in various European economies that were lagging behind Great Britain*. In his view, latecomers had managed to develop notwithstanding they lacked the so-called prerequisites for development (e.g. natural resources, capital, saving, entrepreneurship, managerial abilities and skills, institutions). He further highlighted that the process of industrialization that helped latecomer European countries to catch-up Britain was determined by the initial degree of backwardness: *"the more backward a country's economy (on the eve of its industrialization), the greater was the part played by special institutional factors (banks, the state or government agencies) designed to increase the supply of capital to the nascent industries*."

The central tenet of the *technological catch-up perspective* rests on **imitation and/or technology transfer**: *that technologically backward countries can* ***imitate*** *knowledge from the technologically frontier economies*. Naturally, technological catching-up via imitation, being cheaper than innovation, could open window of opportunities for the technologically lagging countries to see growth acceleration with sustainable structural change. For the technologically straggler countries, "growth and development are much less about pushing the technology frontier and much more about changing the structure of production towards activities with higher levels of productivity", as technological advance as a source of economic progress may not be as important as it can be for the industrialized economies (UNDESA, 2006 pp29). Put differently, these countries could achieve production transformation and development by transferring technologies from the technologically frontiers at relatively lower cost. *The larger the technology gap, and hence the productivity gap,* *between the forerunners and latecomers, the stronger would be the potential for the latter to see growth in productivity as they can learn from the forerunners* (Amsden and Hikino 1994).

In a somewhat similar way, Kuznet (1973) and Reinert (2007) give more weight on novelty or advancing innovation and technology adoption as necessary condition for transformation and prosperity of a nation rather than capital accumulation. Perez and Soete (1988) assert that follower countries (technologically backward developing economies) can see labor productivity growth through efficient rate of technology incorporation. This meant that the way in which these economies absorb and adapt technologies from leading countries would determine their productivity growth. In this way, cumulative causation is generated through the impact of knowledge accumulation on productivity growth (Nelson and Winter, 2002).

Nevertheless, not all poor countries have the capacity to tap into global technology knowledge as imitation of technological knowledge requires absorptive capacities. Lall (2000, 2002) argued that at early stages of development, technological gaps create the potential for accelerated structural transformation through access to global technological knowledge, but the extent to which such transformation will be realized depends heavily on *the absorptive capacities of countries, sectors and firms*. By this he mean, the lagging countries have to build their capabilities that enable them transfer technology and assimilate knowledge from the technologically frontiers. Technology-related capabilities[30] are chiefly related to basic education level of the society and to specific allocation of human capital and other resources to undertake R&D. Scholars in the Neo-Schumpeterian camp (e.g. Nelson and Winter 1982; Nelson 1996; Oliveira et al., 2003; Cassiolato and Lastres 2008) contend that national systems of innovation, which is shaped by the collective and individual contributions of different agents to the development and spread of new technologies and hence, would not be replaced by foreign technology has pivotal place in technological development and its diffusion in a given economy. Put in other words, national systems of innovation capabilities of follower countries relative to the leading countries will determine their catch-up process.

Abramovitz (1986 pp. 388) argued that *"a country's potential for rapid growth is strong not when it is backward without qualification, but rather when it is* ***technologically backward but socially advanced****"*. Two observations come out from this statement: (i) assimilation of foreign knowledge from the more advanced economies is conditioned on *"social capabilities"* to adapt technological knowledge which are skills developed to a greater extent through education, the quality of

[30] Apart from technology-related capabilities, the literature also documents other capabilities such as production capabilities, human capabilities, social capabilities, etc.; but, it is beyond the scope of the study to discuss them.

infrastructure and institutions that facilitate that adaption including political systems and banking, policies, among others. Building such institutions require allocation of heavy investment capitals; and (ii) the gap between the leading and follower countries will determine the potential of technological progress for backward countries; hence, catching-up takes place when backward countries manage to maintain overtime a technological progress far higher than that of the leading countries, owing to efficiency in absorbing new technologies (Oliveira et al. 2003). This suggests that the advantage of backwardness cannot guarantee unconditional convergence; the lack of convergence is thus explained by the lack of productivity knowledge. This requires direct policy intervention (the formulation of appropriate policy, Hirschman 1958)[31] including deliberate and less spontaneous state action to increase the supply of capital to domestic entrepreneurs.

For successful transformation towards the sectors/production activities with higher-potential for cumulative productivity increases requires the capacity of the country in question to ease technological gap and move up the quality ladder. *The question is how do countries move up the quality ladder of the division of labor – how moving from one set of activities to another is possible?* Specifically, could today's backward countries easily **imitate** their frontier economies? There is no straightforward answer to such question. For those technologically backward countries that are starting from a low base, such as those in SSA, building such capabilities becomes a low-development trap though it may not be impossible to achieve. The question pertains fundamentally to the 'accumulation of competences' or capabilities of countries [which are entwined knowledge spillovers, technology transfers and human capabilities] to absorb technological knowledge that play pivotal role in increasing productivity, creating new products and propelling economic growth through creating economic externalities. To move up the quality ladder of the division of labor, *countries should improve or upgrade the absorptive and technological capabilities of the domestic economy to reduce technological gap;* yet this necessitates full understanding of micro-level exploration of the economy as learning and technological absorption takes place at firm level.

Productivity increases and efficiency of firms may contribute immensely to sustainable development and welfare gains. The question is how firms can secure their productivity and efficiency? Learning and innovation involve a complex and cumulative interactions between firms

[31] The presence or absence of it would differentiate the capability of different economies to either catch-up with the advanced economies or to stay poor. This is why majority of SSA failed to move up the quality ladder and remain dependent on primary production and stacked at low-income level. By contrast, the Asian tigers succeeded in deliberately assimilating technology and moving up the quality ladder following Japan, which itself had assimilated foreign technology. The other Asian forerunners also followed that route. They all developed new manufacturing industries applying foreign knowledge and became competitive worldwide, diversifying their economies from largely agrarian economy to industrial (manufacturing and modern services) economies.

and their environment including network of customers and suppliers, technological infrastructure, institutional and organizational framework, and knowledge-creating and diffusing institutions. One point of argument here is that the repetitive interactions of firms with their partners and customers could enable them build or accumulate their competences. They can also coordinate research activities and/or exchange research results on the basis of binding contractual agreements (like, arrangement on common research projects) with positive implications for all parties. On one hand, such agreement would remove R&D hindering incentives, and on the other, knowledge can easily be diffused and disseminated. However, this is just one side of the story. For firms investing in R&D to bind themselves in such arrangement and thereby realize the spill-over effect, there should be incentive mechanism. Anyhow, firms in technologically backward economies do not afford investment expenditure on R&D. So, they depend on acquiring state-of-the-art technology from technologically frontier economies via the import of knowledge intensive manufactured goods (both intermediate and capital goods) and attraction of FDI. Thus, growth and transformation strategies crafted at macro level need to take into account the set of activities in which domestic firms have a comparative and competitive advantage. Private-public cooperation is of great importance as the success or failure of individual firms happens within a system (Lall and Nebula 2004). This meant that the functioning of innovation systems in a country determines the scope for upgrading its technological capabilities.

A broad dissemination of knowledge across the entire economic system is sin qua non to ensure successful technology upgrading. But, dissemination cannot come forth from nothingness. It requires strong public policies and institutional infrastructure, among others, industrial clusters, extension services, productivity standards, technical information services and quality control institutions. Technological upgrading also requires technological commercialization infrastructure that can put into practice the new knowledge created, which include intellectual property rights protection systems, technology transfer offices at universities and research institutes, science and industrial parks, business incubators, and early-stage technology finance and venture capital (Dahlman 2010).

In short, the specific conditions to achieve technological upgrading have to do with the various channels for firms to acquire technological knowledge to upgrade their capabilities. Such channels include informal learning, learning from FDI partners, licensing, strategic alliances and co-development (Lee 2013b), which vary with the level of countries development. At early stage, technological knowledge is mainly embodied in imported machinery, and the main channel for capacity building relates to learning by doing. In an intermediate stage, domestic firms recognize the need for more systemic learning and technological development and tend to resort to technological licensing, or seek for knowledge transfers from FDI partners. This tends to be complemented with increasing in-house R&D capacity. At a later stage, once the channels of licensing and learning from foreign partners have reached their limit, domestic firms rely on public-private R&D consortia, existing literature, overseas R&D outposts, co-development contracts with foreign R&D firms and international mergers and acquisitions (see UNIDO 2016).

2.3.4 The Pasinetti and Agent-based Evolutionary growth perspective:

The Pasinettian model of structural change and agent-based evolutionary growth theories are contrasting to the balanced and unbalanced growth debate, for they predicted the economic system to be in a state of continuous change (state of disequilibrium and instability), in constant evolution. The Pasinetti model (Pasinetti 1981; 1993; 2012), being founded on post-Keynesian and classical development discourses, stresses the inevitability of structural change, explaining economic growth from supply and demand sides in chorus. The model predicts that disproportional changes in technology along with disproportional changes in demand among the various sectors results in a disproportional growth of the economy and in a deep change in its structure (Fada 2018). Structural change in the model is not endogenous as it is driven by exogenous technical progress (which increases real per capita income via lower prices). In turn, higher per capita income could be translated into higher consumption goods, but this may not be spread evenly across all goods; for, goods with a higher elasticity of demand would take higher shares of consumption expenditures and this process gives rise to structural changes.

The role of demand in the model is restricted to determine an evenly expenditure of the increasing per capita income; hence playing critical role in the determination of equilibrium growth rate both in the short- and long-run. The model premises that sectoral demand is endogenous but not affected by technical coefficients while disequilibrium and instability are the normal state of affairs. Technical progress due to exogenous learning activity has two effects in a sector: (i) *the reduction of the labor coefficient in that sector and the consequential increases in productivity*; wherein, increases in productivity lead to increase in per-capita income. These are two facets of the same phenomenon; the first implies the second while the composition of the second determines the relevance of the first; the one cannot be considered if the other is ignored. However, consumers do not expand their demand for all goods proportionally. Consumption expansion follows Engel's law, which states that when consumption of one good satiates, only then attention turns to the next higher good in the hierarchical ordering; and (ii) *the emergence of new products*. Over time, the labor and demand coefficients of a sector are modified by technical progress and by changes in consumer tastes and needs. If the rate of variation of these two coefficients is equal, different sectors would expand proportionately. In that case, the structure of the economy remains unchanged over time. This is what happens in the traditional models of exogenous growth. However, nothing guarantees that these rates will remain the same. If the rates are different, as normally happens, the economy experiences structural dynamics of employment. In short, the model presumes that labor and demand coefficients are exogenously determined while structural dynamics of technology and demand generates structural dynamics of employment.

The agent-based evolutionary growth theory introduced the mechanism of productive diversification that can be interpreted as a type of structural change. The early works in this line of research placed focus on the role of technology dynamics and innovation in economic growth, concentrating less on full analytic solutions and more on illustrative simulations including agent-based modeling (Nelson and Winter 1982; Dosi 1982). Specifically, Nelson and Winter (1982) introduced an evolutionary theory of production and economic transformation based on the works of Schumpeter, [32] in which production and competition involves a complex process of differentiation among firms based on their innovation capabilities. And, the innovation process takes different forms that encompass the development of different products and processes, permanent search for new technologies, organizational capabilities and markets offering extra-ordinary gains to the innovative firm. Such dynamics would, according to Nelson and Winter, have evolutionary character through an incessant innovation process.

Ciarli et al. (2010) offer a theoretical analysis of long-run economic growth as an outcome of continuous structural changes. In their agent-based micro-founded framework, the authors investigated the properties of a growth model that embeds the relation between technological and organizational change, income distribution and the dynamics of consumption affecting macroeconomic growth. Microeconomic behaviors are modeled in line with the large and consolidated evolutionary theory of technical change and economic growth while the macro-framework borrowed from structuralism, including the presence of a capital sector and endogenous consumption classes. They observed and explained the interactions between technological change, firm organization, income distribution, consumption behavior and growth. The authors confirmed the relevance and interdependence of these structural changes and underline their microeconomic sources.

[32] Schumpeter (1912) suggested that in the process of production and competition, the introduction of basic innovations leads to a process of creative destruction in which sectors associated with the old technologies decline and new sectors emerge and grow.

2.3.5 Utility-based explanations for structural change:

Recently developed growth models in the neo-classical line tried to combine structural change at the sector level with Kaldor's facts at the aggregate level. In their demand-driven work, Kongsamut, Rebelo and Xie (2001) built a two-sector model, defined as a generalized balanced growth path, which is a trajectory consistent with the dynamics of structural change and along which real interest rate is constant. The model is based on Engel's Law with structural change being driven by income effects. It also used a Stone-Geary utility function in a view to generate different income elasticity for different goods and sectors. Income elasticity of demand was assumed less than unity for agricultural goods, equal to one for manufacturing goods and greater than one for services. However, the utility function employed is only applicable when working with a small number of goods. Additionally, the authors relied on the widely criticized knife-edge condition that ties together preference and technology parameters and implies constant relative prices.

Then, Ngai and Pissarides (2007) formalized the first mechanism that derives structural change purely from different total factor productivity (TFP) growth rates of economic sectors. They show that, given a low (below one) elasticity of substitution between the final goods produced by each sector and assuming that all goods have unit income elasticity, different TFP growth rates predict sectoral employment changes. Their model contains many consumption goods and a single capital good, supplied by manufacturing. They assume identical Cobb-Douglas production functions in all sectors except for their rates of TFP growth. Each sector produces a differentiated good that enters a constant elasticity of substitution (CES) utility function. Their findings are consistent with the evidence concerning the decline of agriculture's employment share, the rise and then fall of the manufacturing share, and the rise in the services sector share. The key requirement for their result is a low substitutability between final goods. They claim that their finding confirms Baumol's assertion that the production costs and prices of the stagnant sector should rise indefinitely and labor should move in the direction of the stagnant sector. However, it contradicts with Baumol's conclusion as more weight is shifted to the stagnant sector, the economy's growth rate will be on a declining trend and eventually converges to zero. The reason for the contrasting result is that Ngai and Pissarides included capital in their analysis which was left out in Baumol (1967).

Foellmi and Zweimueller (2008) developed a growth model which they claim is consistent with both the Kaldor and Kuznets facts, based on the assumption of hierarchical preferences. Their model shows that reallocation of labor is driven by differences in income elasticity across sectors. The basic tenet of the model is that households expand consumption along a hierarchy of needs, in which goods are weighted according to their essentiality. In order to depict the equilibrium process of growth and structural change consistent with Kaldor's facts, the 'hierarchy function' that characterizes the willingness of consumers to move from high priority to low priority goods, must take a particular form with some specific characteristics. They adopt a particular form of power function. They claim that the model is capable of generating movements of labor out of agriculture and into services, as well as a hump shape in the evolution of the manufacturing share with a period of increasing manufacturing employment followed by a period of de-industrialization, replicating empirically observed patterns. The model differs from other models, which also adopt utility-based explanation for structural change with non-homothetic preferences, in that it introduces a situation where new goods are continuously introduced. Each new good starts out as a luxury with high income elasticity and ends up as a necessity with low income elasticity. They argue that these non-linarites in Engel curves generate consumption cycles that account for structural change. For the sake of simplicity and to highlight the demand channel, the authors *assume exogenous and identical productivity growth across all sectors, the relative price structure remains constant overtime*. The model tries to address the issue of structural change along a growth path consistent with the Kaldor facts, but relying on income effects alone in order to explain structural change.

Acemoglu and Guerrieri (2008) construct a two-sector general equilibrium growth model that highlights a supply-side reason for non-balanced growth related to Baumol's thesis. Their model allows for differences in capital intensities across sectors in which *structural change is mainly supply-driven*. The determinants for relative price dynamics in their model are capital deepening and sectoral factor intensity differences. They illustrate this mechanism using an economy with a constant elasticity of substitution preferences between two sectors and Cobb-Douglas production function within each sector. They show that "the interaction between capital deepening and factor proportion difference across sectors to non-balanced growth while being still consistent with greater capital intensity" as increases in the relative output of the more capital-intensive sector while simultaneously induces a reallocation of capital and labor away from that sector. They also show that provided the elasticity of substitution is less than unity, one of the sectors (typically the more capital-intensive one) grows faster than the rest of the economy, but because the relative prices move against this sector, its (price-weighted) value grows at a slower rate than the rest of the economy. They also demonstrate that capital and labor are continuously reallocated away from the more rapidly growing sector, thus generating structural change. Calibration of the base line model reveals that convergence to equilibrium is slow with the aggregate capital share and the interest rate remain roughly constant while the equilibrium path exhibits sectoral employment and output shares changing considerably. Despite reconciling structural change with balanced growth, in this model the Kaldor facts hold only asymptotically. Regarding the demand side, the authors do recognize the importance of income effects but abstract from non-homothetic preferences, placing the source of structural change on the supply side of the economy.

2.4 Sector Specificity and Heterogeneity within Sectors/Production Activities

The core insights drawn from the preceding discussions are three-fold: *(i) production structure and their transformation play instrumental role in the development process; (ii) an economy comprises a growth escalator sector [which maintains special properties to push the economy forward via fostering productivity, generating profits and wages, propelling economic growth, generating employment and pulling the destitute out of dire poverty in a significant rate], and a lagging or stagnating sectors [characterized by lower-productivity withering the growth record of the economy]; and (iii) different economic sectors and production activities exhibit structural heterogeneity.*

One may thus hypothesize that *differences in sector structure or composition of production activities spell out the divergence in the pace of development and sustainability among developed and developing blocks, rich and poor countries, as well as across the rich and poor cores.* What this suggests also that *economic development is a sector/activity specific phenomenon* (Tregenna 2009),[33] which is in stark contrast with the mainstream development discourse (e.g. Solow-Swan type growth models, the AK model) that considered economic growth to be sector-indifferent (Palma 2005). This implies that the qualitative differences between different patterns of economic growth (Hirschman 1958), and sustainable economic development rest heavily on *the proportion of the production structure at sector level, from what a country produces (exports) and how it is produced* (Reinert, 2007). Structural change is recognized moving in the right direction to spur catch-up growth and development if the economy in question has been releasing labor from the traditional or lagging or stagnating sector [usually agriculture, which maintains large surplus, unemployed or underemployed labor] to the modern or dynamic sector characterized by higher-productivity and increasing returns to scale. *This, according to Tregenna, requires not only levels of productivity at a point in time but also the scope for cumulative productivity increases – that is, productivity increases that build on one another in a virtuous circle.*

[33] Recent studies also reveal that what countries make or produce matter for growth (e.g. Hausmann et al 2007; UNIDO Industrial Development Report 2009). Palma (2011) claimed that growth is a product specific phenomenon. The idea behind sector/activity/product specificity is that a unit of value added may not be equivalent across sectors/activities/products with respect most notably to the sector's/activity's/product's growth inducing effects. So, there exists a strong linkage between a country's sector structures (sectors/activities/products) and the level of its economic growth and prosperity. Thus, transferring resources to the productivity growth enhancing or growth inducing economic sectors/activities can contribute to sustainable growth of the economy through 'its direct contribution to total output (via growth in its value added) and its growth inducing effect (when a rise in its value added is translated into an increase in GDP by a factor exceeding that direct increase in value added) (Tregenna 2008).

The various economic sectors or production activities where countries specialize may have disparate contribution to their sustainability and development. The dual economy model corroborates this line of argument, hypothesizing that *'a country was poor because it had a large subsistence sector, characterized by low productivity and low wages, and a small capitalist sector where productivity and wages are presumed to be higher.'* The implicit conjecture here is that the capitalist sector, classically manufacturing, has a special properties enabling it to "act as a pace-setter of the development process and as a source of its dynamism" (Eshetu 1990). *So, rich countries got rich by building up their capability in diversifying the production structure headed for high productive economic sector or production activities, and poor countries remain poor as they failed to specialize in economic sectors or production activities that have higher potentials for cumulative productivity increases*[34] *and high world demand*. Additionally, *the possibility of resource shifts within economic sectors indicate the existence of heterogeneity among various activities within sectors [that leads to different growth-propelling effects potential], although they share some common characteristics.*

Tregenna (2015) posits that the various "activities within sectors vary widely in terms of their degree of technological advancement, export orientation, strength of backward and forward linkages, productivity and scope for cumulative productivity increases, scope for increasing returns to scale, and other characteristics important for growth." She further highlights that the services sector is where heterogeneity exists characteristically as various activities are classified within it (although their production and consumption are not separable in time and mostly in space as well). She defined activity-specificity as differentiation by type of activity as opposed to by sector and the growth-enhancing potential therein; yet, there exists important relationship between sector-specificity and activity-specificity as sectors have common characteristics that are relevant for growth.

Part three will present contrasting views on engine of growth role of economic sectors and establishes the claims this dissertation made at the introduction part and with which shall the econometric exercises in part six be built, in view of moving ahead the debate on sector structure and growth.

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[34] Sectors/economic activities characterized by increasing returns, technical change and innovation in production process carry productivity enhancing potential. The productivity increases are presumed to spread in the form of increased wages primarily in that sector and gradually through the rest of the economy. As Reinert (2007) argues when new knowledge and production techniques maintained by these dynamic sectors are emulated by others, their profitability falls. To this end, only constant innovations sustain welfare gains and that steady growth would be result of a successful sequence of innovations in production structures (i.e., of micro and, particularly, meso economic processes). This does not, however, mean that fundamentals are not needed or macroeconomic policy is not potent in either restraining or propelling growth.

2.5 Summary and Discussion

Part two, through a systematic review of the different theoretical strands, justifies the claim that economic development intrinsically entails structural transformation, defined as shifts in the composition of production structure of an economy or the relative importance of economic sectors in terms of output and employment share, changes in the location of economic activity and other concomitant aspects of industrialization. The production transformation perspective accentuates that growth alone cannot ensure inclusiveness, transformation of the productive structure and sustainable development [defined as a process of fundamental structural changes embedded in shifts in the compositions of the productive sectors]. Referring to Kuznets, Syrquin (2007 pp. 4) states that "… Once we abandon the world of homothetic preferences, neutral productivity growth with no systematic sectoral effect, perfect mobility, and markets that adjust instantaneously, structural change emerges as a central feature of the process of development and an essential element in accounting for the rate or pattern of growth. It can retard growth if its pace is too slow or its direction inefficient *(or misguided),* but it can contribute to growth if it improves the allocation of resources..." This does not seem puzzling given that the production composition constitutes the structural basis of the development process.

Part two also underlines the existence of structural imbalances or heterogeneity among economic sectors and production activities within each of the broader sectors. This meant that different economic sectors or production activities have varying productivity level with varying potential for capital accumulation, economies of scale, innovation and cumulative productivity increases, employment creation, etc. It claims that *nurturing structural transformation is a moment imperative for developing economies, in particular for low-income SSA countries, to transform their production structure and employment generation for the growing young people, to reduce economic volatility and foster sustainable and inclusive economic growth.* The different perspectives underscore that manufacturing has special qualities [which will be discussed in part three] that are not present in other sectors, which could allow it playing central role in economic development and sustainability. Employment creation, productivity increases and sustainable growth is not possible without production transformation. This implies that the United Nations Sustainable Development Goal could not be sustainable without meaningful industrial transformation. This view contrasts with the growth models that tend to attach equal weights to all economic sectors (as if they are similar enough to be aggregated into a single representative sector, Rodrik 2014) in explaining aggregate productivity growth and treats structural transformation as something that can occur automatically once economic fundamentals are in place.

One may logically ask here: *what is the relevance of sectoral heterogeneity on low-income economies?* Most of the low-income countries are agrarian where small-scale family farming and traditional and informal services activities dominate the economic structure. Such traditional activities and subsistence agriculture are characterized as technologically backward [low potential for innovation] and stagnant with diminishing returns and low-productivity potential. By contrast, the modern industrial sector (perhaps also, the highly skill-intensive services which are not widely available in low-income settings) offers *high potential for cumulative productivity increases, increasing returns and technological innovation*. Indeed, *the presence of productivity differences within this sector* should not be overlooked. This is why *structural transformation is said to have enfolded shifts of resources between sectors and within sectors* – that is, shifts towards more skill- and knowledge-intensive activities or towards activities with greater potential for learning and cumulative productivity increases. For low-income and technologically backward economies to climb the quality ladder of the division of labor [or economic development ladder], they need to adopt and adapt productivity-enhancing knowledge from abroad: the former refers to the use of the technology as it is, and the latter requires customization of the imported technology or assimilation of the foreign knowledge to domestic economy specificity.

Additionally, existing allocation of factor inputs in such low-income agrarian economies could not be optimal[35] for sustainable growth, or in the words of Amsden (1991), allocation of factor inputs does not capture the dynamics of industrial change. But, the possibility for sustained structural imbalances, due to structural heterogeneities of real world production, suggests the presence of a *symbiotic interdependence* between structural change and economic growth. Therefore, these countries should undergo a typical pattern of structural change to move up the quality ladder and break the trap of underdevelopment and poverty. What does this quality pattern represent? During the initial rung of the development ladder, the primary productive sector (typically agriculture) dominate the production structure of the economy. The industry sector (more specifically manufacturing) will dominate in the next stage, with the rise in per capita income level. At a later stage, the share of the services sector will become dominant. Such pattern of structural change reflects the existence of productivity heterogeneity across products and sectors/activities.

Although the rate at which resources release to the higher-productive sector/activity would determine the nature and level of structural change and economic growth, this dissertation does not

[35] This contrasts with the neo-classical approach that posits that any existing allocation of factors of production is optimal for growth. For, market forces would correct any sub-optimal allocation through equilibrating process in marginal returns such that any disequilibria would be merely temporary and self-correcting (Tregenna, 2015).

disregard the importance of developing broad based capabilities in sustaining economic growth trajectories. It remains important to see the relationship between structural transformation and production capabilities, to synthesize how to make sure that resources release from the lower-productivity sector should end up to higher-productivity sectors/activities. Structural transformation itself could be a manifestation of the deeper differences between countries with respect to capacity to invest (national savings, attraction of foreign capital), capacity to absorb knowledge, wage level, costs other than wages (e.g. corruption, civil war), balance-of-payment constraints, specialization in goods with low or with high growth of world demand, competition from low-wage or high-wage countries, amount of profits fleeing abroad, political settlement, etc. Yet, the scope of the dissertation is delimited to empirically examine the divergence paths in SSA and Asian sample economies from the perspective of production transformation and to explore which economic sector has higher potential to play engine of growth role in the economy than others, or to check if there is complementarity between economic sectors. Historically, the level and quality of transformation in the production composition explains the divergence between prospered and laggard countries, between rich and poor economies. It involves diversifying the economy away from dependence on primary commodities to one that is based on value addition in agro-industry, manufacturing, and knowledge-based and skill-intensive services; greater application of technology to upgrade agricultural processes and improve agricultural productivity.

While answering the question *how would changes in sectoral composition of national output occur (what drives structural change),* the various perspectives can be boiled down into two main strands of views, each representing one key driver behind structural change relating to the demand- and supply-side of the economy.

Demand-side hypothesis: A shift in the structure of final demand (changing consumer demand) with rising income level is the prime cause for the change in the composition of production and employment at sector level. This suggests that structural change is a byproduct of growth – causality chains extend from growth to structural change. Fisher (1939) and Clark (1940, 1957) said, in the course of transformation and development, resources shift initially to industry from agriculture and then to services sectors.[36] As the preferences of economic actors change on account of the rise in income, the demand composition of the three sectors varies with the rise in affluence (Dietrich

36 Clark employed Maslow's 'hierarchy of needs hypothesis' stipulating that services satisfy higher needs than goods, and that, as income grows, a higher share of income will be used for the purchase of services. By this he meant that final demand will shift to services once the demand for manufactured products becomes saturated. Also, Schettkat and Yocarini (2003, pp. 3) emphasized that, at later stage of development, "higher share of income will be used to purchase services" positioned at the top of the pyramid. Pasinetti (1981) claims that the role of demand in structural change is immense owing to Engel's law that stipulates the share of income spent by a person on food (agricultural products) decreases with the rise in income while the share of income spent on manufacturing products increases.

2009). This hypothesis acknowledges that agriculture and allied activities can be the bastion of a given economy during the initial stage of development, in terms of share of output and employment. With the rise in per capita income and subsequent improvement in standards of living (once people gratify their basic needs), the demand for primary products will saturate, giving way for the growing importance of more dispensable industry (mainly manufacturing) products, to which labor and other resources crowd in. With a further rise in real per capita income, consumers' demand will shift toward the services sector and consequently, the share of the services sector in GDP and employment will exceed those of agriculture and industry sectors. Fourastié (1969) reached to the conclusion that the share of services rises continuously in the course of economic progress.

The message to be made from the above is that, with the rise in per capita income, resources (final demand) shifts away primarily from the lower-productive traditional sector [subsistence agriculture] to the higher-productive and rising demand manufacturing industry, and then to the lower-productive (but rising demand) services sector. However, labor may not necessarily have lower productivity in agriculture sector than in manufacturing and services sectors. Also, this may not be always the case in poor economies, as production and employment in many of those economies now shift from agriculture directly to services sector, in particular to the traditional and low-productive services activities.

Supply-side hypothesis, also called **unbalanced productivity growth hypothesis:** In this perspective, growth emanates from changes in the sectoral composition of output rather than the other way around. This hypothesis upholds that technical progress (i.e. an increase in technical knowledge that allows, for instance, for better production process) in a given sector plays central role for structural change through fostering labor productivity increases. It endorses that the evolution from low-income, rural agrarian economy into urban industrial economy relies on technological progress, hence faster and higher productivity growth. The growth process is stemmed from the movement of capital and labor from less- to more-productive sectors. This movement induces economy-wide productivity growth, which in turn, raises per capita income, demand, investment and growth (Fada 2018). Technological progress can either foster the creation of better production technologies that allow to reduce unit costs in producing the same products, and to enhance productivity improvements or produces new products, often with higher quality, that can satisfy the same needs better than existing products (Baumol 1967; Krüger 2008b). Productivity increases, in turn, is thought to be higher in manufacturing than in services sector attributed mainly to technological advancement and innovation in it. That is why the structuralist approach claims that economic development and sustainability is intertwined with diversification of the production structure on the way to the manufacturing sector. This recognizes *the prime importance of cumulative labor productivity increases in achieving sustainable growth*.

However, the demand- and supply-side explanations could seem complementary and supportive rather than antithetical. Both hypotheses accord that economic development entails the movement of resources from a stagnant or traditional sector characterized by low- productivity, traditional technology, and decreasing returns to a more dynamic sector characterized by high-productivity and increasing returns. Both accentuates that growth bursts are not enough if they are not accompanied by structural change which is moving in the right direction. Higher economic growth (measured by GDP) in one period, through rising income and changing demand, leads to a higher speed of structural change in period two measured either in terms of real value added shares or employment shares of the major economic sectors or make structural change to be in a constant evolution (Dietrich and Krǜger 2008; Dietrich 2009). Fada (2018 pp 6) points out that the two hypothesis fades away when one delves deep into the Pasinetti approach. He contends that, in the Pasinetti (1993) model, "a strong interactive relationship is envisaged between the change of coefficients of production due to technical progress and the changing composition of consumer demand, both stimulated and shaped by the process of 'learning.'" He continued to argue that structural change may arise from two situations: "Without changes in demand composition if changes in the matrix of coefficients of production due to technical progress take place; and without changes in the matrix of technical coefficients if changes in the vector of final demand due to consumers demand occur." He called the interaction of the two "cumulative causation" that operates via multi-sectoral multiplier. In the multi-sectoral multiplier scenario, the rise in expenditure in one sector may spread its multiple effects in other sectors depending on their own income elasticities of demand, which according to Engel's law are bound to change, differently in different sectors as aggregate takes place. A cumulative causation process arise in turn, as "the sectors with higher expansion in demand will have higher capital investments and higher increases in productivity, which will cause new increases in income levels and in demand according to sectoral income and price elasticities." This interaction is stimulated by factors lying on the demand and supply sides of the driving forces of structural change. Identification of these factors is necessary to choose appropriate policy measures (ibid, pp 7).

PART THREE: CONTRASTING VIEWS ON SECTOR-LED DEVELOPMENT PATH AND WEALTH CREATION IN THE CONTEXT OF PROPOSING A DYNAMIC SYNERGETIC RELATIONSHIP BETWEEN SECTORS

3.1 Introduction

As indicated in the preceding part, classical development economists took production transformation [thereby learning-based industrialization] as synonymous to development. They fully accredited that manufacturing has unique qualities to drive development and end poverty. However, this view has encountered heavy knockbacks mainly since the 1980s, with services-led-growth enjoyed biased favor to replace manufacturing in terms of growth in value added and employment. Accordingly, outsourcing and off-shoring of manufacturing activities and manufacturing production became the rule in the mature industrialized economies up until the outbreak of the global financial crisis in 2008 and the consequent economic recession that hit the economy mainly of advanced economies. The economic recession has put qualm on the efficacy of the services-led growth hypothesis and once again manufacturing won the attention of policy makers and governments in advanced economies. As a case in point, the European Commission (2012b) set out to increase the share of manufacturing in GDP to 20 percent by 2020 from the current level of around 16 percent in a way to see high growth and quality job creation. This may give impetus to the importance of manufacturing in economic development and sustainability as economic activities associated with industrialization in the past would never vanish. Nonetheless, the new digital technologies and the consequent shift in globalization and the growing blurry in the sectoral characteristics may deepen the blurring dividing line between manufacturing and services. Also, some proponents of the agricultural-led development strategy strongly posit that agriculture remains the only growth alternative for low-income economies [especially in SSA], in line with the agrarian root of industrialization in some of the mature industrialized economies.

With the aim at contributing to the debate on sector-led development path and wealth creation, part three devotes to critically and thoroughly review the tenet of the different theoretical strands (past and present). It is one of the few attempts vindicating the existence of a symbiotic complementarity between economic sectors [and the "stimulus complement" role of services sector to manufacturing] through answering host of questions: *Has manufacturing become increasingly jobless and lost its special properties, giving way to the services sector [which is becoming freely tradable]? Could agriculture maintain super capabilities or special qualities to become growth escalator in low-income countries (such as those in SSA making the recent impressive growth trajectories sustainable)? Does industrialization require parallel, or prior, development of agriculture? Could there be complementarity or antithetic nature between agriculture and manufacturing or between* *manufacturing and services in the transformation and development process? Can services sector be as dynamic as manufacturing and present unique elements that live up to the various properties that have made manufacturing the engine of growth in the past so that they become perfect substitute for manufacturing? In short, should industrial policy in developing countries target manufacturing industries, agriculture (and other natural resource industries) or services activities or should it place focus on broad-based sectors/production activities to bring about development?*

3.2 Manufacturing-Led Development Journey

The classical development discourses accentuated the commanding weight manufacturing maintains in sustainable development. Kuznets (1965 pp. 194) said that manufacturing is pace-setter because it embraces "a complex of commodity producing activities primarily engaged in fabrication, in changing commodities rather than in growing them or attracting them from water or ground." Kaldor and other scholars in the structuralist camp extensively and firmly expound that latecomer countries cannot develop and end poverty neglecting production and employment, for which manufacturing assumes a unique place (UNIDO and UNU-MERIT, 2012).

Some renowned contemporary scholars (e.g. Ha-Joon Chang; Dani Rodrik) extensively and strongly argue that *a dynamic manufacturing industry is still a necessary precursor for latecomers to build a vibrant economy and end poverty, albeit the fragmentation of industrial production in GVCs and technological dynamics brought both opportunites and risks*. Manufacturing, said Rodrik (2012), has been the most reliable lever for rapid and sustained growth of the economy of today's rich countries and newly industrializers.[37] By this he meant that most countries that saw sustainable development, throughout the history of capitalism, were the ones that built a strong manufacturing base. Tregenna (2015) firmly explicates that *"Our modern world is in many ways the product of industrialization."* In defending this claim, she said that "the Industrial Revolution enabled sustained productivity growth in Europe and the United States for the first time, resulting in the division of the world economy into rich and poor nations." This view supports Kuznet's claim, already indicated in the introduction part of the dissertation, where countries that underwent rapid and learning-based industrialization **imitating** the frontier ones achieved economic development while those insisting on **trading** traditional agricultural products remain where they were seeing little progress in changing their level of underdevelopment, living standard and poverty landscape.

37 In his view, industrialization was the driving force of rapid growth and prosperity in England in the 18th century, Southern Europe over the 1950's and 1960's, Japan in the 19th century and in East and Southeast Asia since the 1960's, but eluded most of the countries of the less well-off developing economies, such as those in SSA. The empirical works of Occampo et al. (2009) also lent support for the existence of a strong causal relationship between growth rates of manufacturing and GDP for sample of 57 developing and transition economies grouped into 12 regions over the period 1970-2007.

Industrialization was responsible for the successful catching-up and convergence of East and Southeast Asian economies with the West (such as Western Europe, Western Offshoots, Eastern Europe, Former USSR and Japan). Recent success stories, such as China, are manufacturing-led development route.

The UNIDO (2009) report bluntly confirms that no country, excepting a small number of oil exporting or natural resource bonanza countries [such as Kuait and Qatar] or handful of financial havens [such as Monaco and Lichtenstein], have ever managed to climb to high-income level and end poverty without industrialization, and empty of a dynamic industrial upgrading.[38] However, it may be imprudent to generalize that natural resource based industries are always growth retarding. Instead, the argument meant that those economies may hardly sustain their growth accelerations and improve their economic complexity without transforming their production structure on the road, mainly to high-productivity manufacturing. This is in part because the production and employment creation capacity might be lower in resources enclave activities, such as mining, animal breeding, etc., than that of manufacturing (Chang 2014). *The question remains what special features and capabilities can manufacturing present to drive economic transformation and sustainable development, which might not be shared by sectors?* The rest of this section briefly discusses the underlying characteristics or the special qualities that explain the traditional importance of manufacturing for economic development sustainably and poverty reduction.

Unlimited expansion potential in producing innovative products (including technology itself) and/or higher contribution to cumulative productivity increases: Learning-by-doing, innovation, and technological development, which play instrumental role to diffuse technological progress in the economy, are predicted to be higher in manufacturing than other sectors. Manufacturing, through generating higher learning opportunities for accumulating the required skills and technological capability, would bring about economy-wide productivity growth, despite the expansion in that sector might come at the expense of other sectors with lower average productivity growth (e.g. subsistence agriculture) (Tregenna 2008). Shen, Dunn and Shen (2007) corroborate this statement saying that new technologies originating in manufacturing are dispersed

[38] Andreoni and Tregenna (2018) highlighted that upgrading can take four forms, which include: (i) *Process upgrading* - improved production methods that transform inputs into final products more efficiently through the reorganization of production or the introduction of superior technology; (ii) *Product upgrading* - moving into more sophisticated product lines in terms of higher unit-value products, rather than moving to a different part of the value chain; (iii) *Functional upgrading* - involves performing new, superior functions in the value chain, such as design or marketing, or abandoning existing low value-added functions to focus on higher value-added activities; and (v) *Inter-sectoral upgrading* - which entails applying the competence acquired in a particular function or industry to move into a new sector. For instance, Taiwan used its competence in producing televisions to make monitors and then to move into the computer sector.

to other sectors (e.g. services sector) in part by using higher productivity innovative manufacturing inputs in the production process.

Kaldor (1966) explicates that manufacturing carries unlimited expansion potential because innovation and technological progress in manufacturing enable it drive static and dynamic economies of scale[39] relative to other sectors, providing a host of spillovers and boosting cumulative productivity increases and competition in the economy (Tregenna 2009). Dynamic returns induces productivity increases attributed to learning-by-doing[40]or the process of acquiring technological capabilities through practice and technological change to manufacturing output while static returns induces the level of productivity to the scale of manufacturing output. In his view, dynamic economies of scale associated with manufactures (governed in turn by demand) induce sustainable growth through reducing external constraints. So, the sources for the relatively higher and faster productivity increases in manufacturing rest on technical progress as the higher technical progress in manufacturing could "increase the efficiency of factor inputs (embodied technical change), it could lead to economies of scale, and it could manifest itself in the form of increased physical capital per head" (Eshetu 1990, pp. 238). Andreoni and Gregory (2013) confirm the existence of greater possibilities for exploiting economies of scale induced by large-scale production and technical indivisibilities both within and across sectors. Higher learning opportunities in manufacturing make it center of learning for the economy, opening wider door for both embodied and disembodied technological progress[41] (Cornwall 1977; Szirmai 2012; Chang et al. 2013).

Manufacturing lends itself much more easily to mechanization and chemical processing than agriculture, services and other branches of the industry sector (Chang 2014). This induces faster growth in it, in turn, absorb resources from low-productivity sectors or production activities,

[39]Static economies of scale, which represents output level or sector size, occur when doubling total investment results in more than doubling the volume of the new production. So, considering that the factor prices used in that investment are kept constant, the long-term unit cost reduces. Dynamic economies of scale, which refers to the effect of learning by doing, occur when a firm is able to reduce long-term unit costs by implementing effective innovation over time and, thereby it tends to accumulate learning-by-doing, knowledge and major technological capacity. Learning by doing is a function of both cumulative past output and/or cumulative production experience overtime.

[40]In this perspective, learning by doing is more important in manufacturing than in other sectors. By employing steel and textile industries, Young (1928), illustrated how economic progress partly depends on the increasing returns realized by "progressive division of labor and specialization of industries." The reverse is true in sectors, such as agriculture and mining, where increasing returns (e.g. land is a fixed factor of production) is less available.

[41] "Disembodied technological progress refers to changes in the knowledge of product and process technologies in firms and in the economy. It refers to general advance in sciences, technology, and the state of knowledge; changes in the stocks of knowledge available to firms, sectors, or countries; improvements in the level of knowledge absorbed by employees and managers in educational institutions and on the job (Maddison 1987); learning-by-doing by workers and managers on the job; improvements in the collective technological capabilities of firms or the social capabilities of countries and finally positive external effects of investment in knowledge; and new technologies, through spillovers from firm to firm or from country to country as a whole while embodied technological progress refers to the shift from technologically less sophisticated to more technologically advanced capital goods' (Sizimari 2011 pp. 13-14).

commonly known as *structural change bonus*. But, some observers (UNIDO 2012) contend that the structural change bonus may not be circumscribed to manufacturing when the shift of resources is taking place from less to more dynamic sectors or production activities (and if competition works well). If so, diversifying manufacturing activities would beget cumulative productivity increases both in itself and in other economic sectors or production activities. *The converse meant that non-manufacturing sectors have limited scope for innovation and technical change, hence limited potential for expansion and cumulative productivity increases*. But, as will be discussed later, recent evidences suggest that certain segments of the services sector share some features of manufacturing.

McMillan and Rodrik (2011) found out that labor productivity in manufacturing is, on average (over all countries included in their sample), two times higher than agriculture; the average manufactures-agriculture productivity ratio being 2.3 in Africa, 2.8 in Latin America, and 3.9 in Asia. This finding supports Chang's (2007 pp. 213) firm argument: "History has repeatedly shown that the single most important thing that distinguishes rich countries from poor ones is basically their higher capabilities in manufacturing, where productivity is generally higher, and, most importantly, where productivity tends to (although does not always) grow faster than in agriculture and services." This could be associated with differences in technology, real wage levels not compensated by differences in rates of profit [if wages are lower, then other things equal, value added per worker is lower because prices tend to cover costs] and different profit rates due to differences in barriers to entry (Reinert 2007).[42]

Wider scope for capital accumulation and intensification: The Lewis dual economy model theorizes that manufacturing generates profits, and thereby induces capital accumulation, which was considered as the main driver for industrialization and sustainable development. Tregenna (2008) posits that more rapid capital accumulation is linked to more rapid technological advancement as new technologies are embodied in capital goods, which is chiefly concentrated in the manufacturing sector. Likewise, Szirmai (2009) said, capital accumulation can be realized more easily in spatially concentrated manufacturing than in spatially dispersed agriculture. In another study, Sizrmai (2011) found out that capital-intensity has been higher in manufacturing (and also in other industrial sub-sectors such as mining, utilities and construction) than in agriculture and services sectors. In this sense, shifting resources to manufacturing is imperative to enhance capital

42 Whatever the reason might be, the existence of productivity gaps between sectors suggests the relatively higher scope for further cumulative productivity increases in manufacturing than in agriculture or services sectors. Labor productivity growth in the services sector is presumed to be lower than that of manufacturing, implying *the cost disease of services,* which refers to an overall slowdown of productivity due to over-dependence chiefly of labor intensive services such as personal services (Baumol, 1967). However, caution is in order while interpreting this hypothesis as Baumol distinguished between progressive and stagnant industries, explicitly stated that some services branches can be progressive as well. His argument sends light on the difficulty of increasing productivity in labor intensive services than in manufacturing, simply because economies of scale barely realized in the services sector.

accumulation. However, the findings of some recent empirical studies come up with mixed evidences, in that other economic sectors can also be capital intensive. For instance, Nude and Sizrmai (2012) documents that capital-intensity in agriculture surpassed that in manufacturing during 1970 to 1990 attributed to two possible reasons: *modernity in agriculture, the fall in the capital-intensity share of manufacturing, and that nonmanufacturing activities became more capital-intensive*. Most importantly, productivity in agriculture has been improved through the use of more capital-intensive technology such as greenhouse farming, intensive cattle and poultry farming, use of combines and so on; but, the share of agriculture in GDP and in total employment was trending downward. However, these findings may not sound relevant for economies wedged in dire poverty, where smallholder agriculture, employing traditional mode of production, and traditional and informal services activities dominate, and dire poverty is widespread.

Linkages and spillover effects are reputed to be more powerful in manufacturing than other sectors. Linkage effects here represent the direct backward- and forward-linkages between manufacturing and non-manufacturing sectors (via its direct and indirect intermediate purchase of inputs and sales of its products), creating positive externalities to investments in particular industries that transmit growth from manufacturing to other sectors. Manufacturing modernizes agriculture and mining, from which it obtains raw materials through backward- linkages, and ascribed for generating services activities through forward linkages. Also, manufacturing has strong spillover effects on other parts of the economy, mingling varied intermediate inputs to produce a final product. The fact that manufacturing has strong spillover effects meant that embodied and disembodied knowledge generated within it connects within and across sectors.

Strongest scope for tradability and hence, easing balance of payment constraints: The contribution of a growth propulsive sector to a given economy is said to be substantial when export earnings from it exceed import values – that is, if the sector is a net-generator of foreign currency through increasing investment and financing import needs for other productive activities in the economy. Manufacturing has high potential in generating less volatile export earnings. Primary commodity exporting economies are generally balance of payment constrained, with phenomenal implications on sustainable growth trajectories. For, primary commodity exports have low-income- and - price-elasticity of demand, hence suffered from declining terms of trade (Prebisch 1950). In contrast, terms of trade for manufacturing goods are presumed to be relatively stable. Thirlwall (1979), in his balance of payment constraints model[43] recognizes that long-term growth is given by

[43] Araujo and Lima (2007) built a multi-sector version of Thirlwall Law, integrating the balance of payment constrained growth model with Pasinetti's structural economic dynamics model and disclosed the impact of changes in the productive structure on economic growth. The model predicts that economic growth rate is directly proportional to export growth rate of

the ratio of exports growth rate to income-elasticity of demand for imports. In his view (generally, in Kaldorian tradition), the ability of a given economy to sustain its export competitiveness determines the sustainability of its growth. In turn, export competitiveness relies heavily on the complexity and sophistication of manufacturing products, to relieve balance of payments constraints, and induces sustainable growth through generating net-foreign exchange earnings.

The main idea here is that a country can ease external constraint to growth in the long-run if it manages to diversify its export composition towards manufactures and tradable modern services. Countries that succeeded in industrial transformation have more diversified and complex export compositions, which are dominated by high-tech manufacturing and knowledge-based goods. Cimoli et al. (2010), employing a multi-sector approach for a sample of 29 countries, documented that the inequality between countries fell in the countries that sought to transform their economic structure towards sectors with a high income elasticity of demand for exports relative to imports.

Large contribution for employment generation (and good quality jobs): Manufacturing can generate high quality job opportunities for a large number of unskilled and moderately skilled labor forces who are engaged in lower-productive subsistence agriculture and traditional services. The experience of prospered and frontier economies evidenced that industrial transformation was accompanied by huge share of manufacturing employment to total employment. Also, in today's emerging developing economies, manufacturing may generate high paid permanent jobs compared to agriculture and traditional services, albeit it may not deliver with the same number of jobs as in the past. For example, manufacturing (both formal and informal activities and manufacturing-related services) absorbed about 470 million workers worldwide by 2009 (UNCTAD 2012).

3.3 Agriculture-led Development Journey

Advocates of the agricultural-led development path posit that the role of agriculture in the structural transformation and development process is marginalized and belittled. Basing their argument on the canonical principles of comparative advantage, they seem to point out that *agricultural growth is the only viable route for low-income countries to build a vibrant economy and see a sustained growth boom. This means, in the low-income settings, a solid productivity growth of agriculture is the key driving force for development and sustainability, inducing economy-wide transformation and inclusive growth trajectory*. That is why Myrdal (1957) argued that "the battle for long-term economic development will be won or lost" in agricultural sector. Nurkse (1953) also claimed that

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a sector; the proportionality is related inversely to the sector income-elasticity of demand for imports and directly to the sector income-elasticity. They further noted that a country may raise its long-run growth rate by favorably changing the sectoral composition of its trade, albeit the sectoral elasticities and the growth rate of world income remain constant.

'the spectacular Industrial Revolution in [England] would not have been possible without agricultural revolution that preceded it'. In short, industrialization could be successful or stalled depending on the level of agricultural transformation - that is, *agricultural revolution is a precursor of Industrial Revolution*. Very recently, Storm (2015 pp. 681) highlighted that "there could be no industrial development until food security was established as a 'mindset' among urban workers and capitalists. This became clear from the successful industrialization of South Korea and Taiwan, and later on of China, which was preceded by significant increases in agricultural labor productivity, food production and food security."

Early proponents of the agricultural-led development path (e.g. Johnston and Mellor 1961; Shultz 1964; Lipton 1968) called attention to the direct and indirect contributions of agriculture in the economy, where successful industrialization and sustainable growth remain wishful thinking without modernization and development of agriculture. The direct contributions of the sector to the economy rest on the supply of food for domestic consumption; of foreign exchange through export earnings (which are used to finance imports of intermediate and capital goods); of domestic savings for industrial investment; of reserve army of labor for the non-agriculture sector; and of source of purchasing power to create effective demand or market for manufacturing output. The sector has also indirect non-market linkages, contributing to economic growth through supplying better caloric nutrient intake, food availability and food price stability (Timmer 1995)[44]. A brief overview of these contributions is given below.

Contribution to inclusive and catch-up growth: Given the titanic size of subsistence agriculture in many low-income countries, it would simply remain wannabe to envision poverty alleviation snubbing agriculture (Scultz 1964; Lipton 1968). Productivity improvement in the sector can contribute not only to "faster poverty reduction" but also "prevent distress migration from rural areas into urban unemployment" (Headey, Bezemer and Hazel 2010). The East and Southeast Asian forerunners, with the exception of the city states of Singapore and Hong Kong, achieved inclusive and sustainable growth through a vivacious agriculture sector.[45] Some empirical works have evidenced the sector's potential in triggering inclusive growth at least in the early stage of development and production transformation.

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[44]Federico (2005) categorized the major roles of agriculture in the process of economic growth in three groups: the product role (through which it feeds the population and generates foreign currency through the exports of agricultural produces); the factor role (in which, it supplies labor force and capital to industry and services sectors); and the market role (in which, it serves as outlet for products from the manufacturing sector).

[45] More specifically, governments of the respective countries placed particular focus on the rural economy while crafting their development strategies. Accordingly, they became surpluses producers through green revolution - that is, through the adoption of new farming technologies and/or the use of conventional high-yield breeding.

The findings of Gollin, Parente and Rogerson (2002) reveal that: (i) growth in agricultural productivity induced economy-wide productivity growth for the sample of countries included in their study over the periods covering 1960 to 1990; (ii) agricultural productivity growth directly contributes to 54 percent of GDP growth; (iii) countries experiencing increases in agricultural productivity were able to move workers from agriculture into other sectors, contributing to a further 29 percent of GDP growth; and (iv) the other sectors contributed merely 17 percent. This led them to conclude that *agriculture has higher potential for growth and poverty reduction in poor economies than other sectors*. Tiffin and Irz (2006) run causality tests to look into the direction of causation between productivity growth in agriculture and non-agriculture sectors. Their findings indicate, in most cases, *causality runs from agricultural output per worker to GDP per-capita, leading them to claim that agriculture has special elements to play engine of growth role*.

Using a two-sector model of endogenous growth combining Engel's Law with learning-by-doing in industry sector, Matsuyama (1992) examined the role of agricultural productivity in industrialization and economic development. Making a distinction between open and closed economies, the model presumes a competitive labor market and an equalized wage rate across the two sectors (agriculture and manufacturing), based on two assumptions: (i) preferences are non-homothetic and the income elasticity of demand for agricultural good is less than unity; and (ii) productivity of manufacturing increases overtime attributed to learning-by-doing. Manufacturing is the increasing returns sector while agricultural productivity in the model is determined purely exogenously. For the closed, landlocked economy case, the model predicts a positive link between agricultural productivity and economic growth; exogenous increase in agricultural productivity fosters development owing to lower potential of trade. An economy with less productive agricultural sector allocates more labor to manufacturing and will grow faster. By contrast, an economy with a more productive agricultural sector squeezes out manufacturing, de-industrializing over time and growing slower. On the other hand, for the small open economy case, the model predicts negative link between the two variables. The author then suggests that a country's openness should be a crucial factor when planning development strategy and predicting growth performance. *In this and other models, productivity increases in agriculture is taken as prerequisite for economic development partly because that sector accounts for a large share of the labor force and a good portion of output share*.

But, the debate over the direction of causality between agriculture and economic growth is not precise in empirical works. Some scholars (e.g. Gollin 2010; Diao et al. 2010) evidenced that growth in agricultural productivity would have substantial aggregate effect, triggering economic growth. Others contend that, as agriculture is a diminishing return sector and that learning-by-doing occurs in the increasing returns sector, the development of that sector would heavily rely on technological progress and inputs from the increasing return sectors (typically manufacturing). Not only does technical progress in manufacturing induces agricultural productivity, but the sector may also benefit from the wider economic growth. In this case, therefore, the causation is anticipated to run from economic growth to agricultural development (Hua 1988).

Sources of surplus labor, capital and foreign exchange: The dual economy model predicts that productivity gains in small-scale subsistence agriculture is relatively lower than the modern capitalist sector; the latter pays relatively higher wages, encouraging unemployed and under-employed workforce to move out of the former to itself where productivity gain in it is high. With the rise in per capita income, the demand for labor in agriculture goes down for at least two reasons: (i) the demand for food items increase with the rise in income, but at a slower rate; and (ii) productivity per hectare in agriculture increase, on account partly of the use of fertilizers, quality seeds, pesticides, better farming technology such as tractor, and proper irrigation facilities. As a result, the same amount of crops can now be produced from a given plot of land with relatively lower number of workers. In contrast, the demand for manufactures increases at a faster rate, inducing the sector to expand and to absorb large numbers of labor from the countryside. The absence of this would restrain changes in the structure of production and leave the economy in vicious circle of underdevelopment. If that is the case, *the development journey of undeveloped economies should start with agrarian reform and agricultural transformation.*

Early advocates of this view conjecture the instrumental role agriculture plays in generating domestic savings or surpluses that are required to finance industrial transformation as investment in most developing economies still relies heavily on domestic savings. The sector also generates the largest share of foreign exchange for the financing of capital goods and intermediate inputs in economies where exports of monoculture agricultural commodities predominate.

Scope for production and consumption linkages: Adherents of the 'agriculture-led' development path perspective strongly argue that successful production transformation could only be possible with a thriving agriculture sector in the short- to medium-term period (Meier 1989; Bresinger and Diao 2008). Many of them (e.g. Johnson and Mellor 1961; Johnston 1970; Nalitra 2006) claim that growth in the sector can propel growth of the economy through generating production and consumption linkages within itself, interactions between itself and the rest of the economy [or interactions between the rural and urban economy]. *Agricultural production creates forward production linkages, through supplying more inputs to nonagricultural production, and backward* *production linkages, through its increased demand for modern inputs produced by manufacturing industries, and marketing and trade services provided by the services sector.* Thus, agricultural sector, being the key supplier of resources for agro-processing activities and processed food marketing that can give growth opportunities, plays part in import substitution.

Additionally, agriculture creates consumption linkages through increased rural incomes, increasing the demand for a wide variety of consumption goods provision of effective internal market for industrial goods. The growth of non-agricultural sectors are indubitably affected by the structure of rural demand. Improvement in agricultural productivity could improve earnings for farm households and boost the demand for manufactured products, which would stimulate manufacturing production. In contrast, an ominous performance of agriculture may cripple growth in non-agricultural sectors through weakening the purchasing power of the rural economy, where subsistence farming prevails, due to the fall in on-farm incomes. If income of the rural sector is low attributable to lack of increased agricultural productivity, their demand for domestically produced manufactures will also be low. A precarious growth in agricultural productivity prevents it from the supply of raw materials for manufacturing industries and, as noted above, affects the purchasing power of the rural people with undesirable repercussions on the domestic market for manufactures.

The above indicates that *the prospect of industrialization depends on the growth of agricultural productivity, suggesting the presence of growth complementarities between agricultural and nonagricultural sectors.* Hayami (2001 pp. 84) asserts that "successful industrialization cannot be expected without the parallel effort of increasing food production to avoid the danger of being caught in the Ricardian trap", one where increased labor cost (wage) restrains industrial growth and eventually drive the economy into a stationary state without further growth. Schultz (1953) posited that agriculture secures subsistence requirement for the rural people and feed the growing population in non-agricultural sectors. But, when agriculture fails to stabilize domestic food production and ensure food security, it remains wishful thinking to envision sustainable, broad-based and equitable growth. In his view, the level of income for the majority of poor economies is extremely low and therefore, a good deal of income is required for food; where, the demand for food depends on the rate of growth of population and the growth rate of per capita income. The challenge of the industry sector is to feed the growing population, making agriculture vibrant. If agricultural production remains stagnant, increased employment in the other sectors would lead to food shortages. The excess demand for food over food production may result in soaring prices of food, with serious repercussion on costs of living, typically for low-income people whose food consumption share is high. However, Matsuyama (1992) is skeptical of the validity of Schulz's food-problem thesis, claiming that food can be imported, reducing the need for generating food surplus in the national economy. In turn, this argument may become dubious if food purchase in the global market becomes costly. The rise of food prices was part of the reason for the global land grab in developing countries observed after the 2008 crisis.

Anyways, the argument goes on, a dismal performance of agriculture and the consequent fall in surplus output, and hence, the inability to satisfy the food demand for the modern sector would affect the level of capital accumulation. This does not, however, suggest the impossibility of importing agricultural products to meet domestic demand, but import may not be a viable option to ensure long-term food security in foreign exchange constrained low-income economies. So, Gollin (2010) said that these economies need to intensify agricultural production. Per projections of the United Nations (2013), world population will reach 9 billion by 2040 while the world food requirement is estimated to increase by 70 percent from the current level by 2050 (Bruinsma 2011). This implies that agricultural production has to increase so as to save food and inputs costs via supplying food for the growing number of population, and raw materials for expansion of agro-processing activities.

The question one may raise at this juncture is: *Can agriculture, through the afore-discussed channels, ensure sustainability and development as manufacturing does or only serves as sources of growth at the initial stage of development and transformation of low-income economies?* This question will be addressed in section 3.5.

3.4 Services-led Development Journey

As already indicated earlier, the manufacturing-led development route encountered severe attack from scholars who unequivocally praise the pro-service-led development hypothesis. Proponents of this hypothesis contend that the Great Transformation (industrialization) has gone, attributed to intensification of globalization and development of Information Communication Technology (ICT), paving the avenue for the era of Services Transformation. Nevertheless, not all scholars who belong to the pro-service discourse endorse the service-led development journey without core manufacturing. It thus sounds interesting to examine the different theoretical strands (service-led vs service-biased) on the question: *Could a service-led development path be accurate for developing countries without a parallel, or prior, agriculture and manufacturing development? Could employment growth in services be considered as sources of development or a mere consequence of it? Can services grow in low-income countries sustainably, serving as a source of productivity gains and enabling these countries to see catch-up growth accompanied with employment creation (especially for unskilled labor) in the absence of a manufacturing core? If yes,* *can they develop through service-led export; for instance, through the export of labor instead of the export of goods produced through the use of that labor?* These questions shall be addressed in section 3.5 later in a way to authenticate the "*stimulus complement"* hypothesis, hence moving ahead the debate on manufacturing-led vs services-led.

One strand of view, advocating services-led development path, conjectures that latecomer countries can move up the quality ladder through the expansion of services, without factories. In this perspective, therefore, *services can truly "substitute" or "replace" manufacturing to become pace setter in the economy* because the advances in ICT makes the *services sector as dynamic as manufacturing.* For the advances in ICT facilitates the development of *new varieties of knowledge and skill-intensive services (such as finance, engineering, consulting, etc.).* The expansion of these services segments enable the sector to share some of the underlying traditional unique features that were conventionally attached to manufacturing such as high potential for cumulative productivity increases, tradability, increasing returns to scale, suitability for technological progress, skill development, etc. (see Ghani 2009; Szirmai 2009; Buera and Kaboski 2012; Ana M. Fernandes 2007; Clemes et al. 2003). Advocates of the services-led view argued that services sector has the potential to substitute manufacturing to play central role in cumulative productivity increases and employment creation partly because expansion of new digital technologies (e.g. robotics) make manufacturing increasingly jobless and services increasingly tradable. As a result of automation of manufacturing, workers continue to crowding in services sector with the effect of distending of employment in the sector. As such, the value added and employment share of services in GDP and total employment worldwide reached 61 percent and 63 percent respectively in 2015. Interestingly, between 25 and 60 percent of employment in manufacturing firms can be found in R&D, engineering, transport, logistics, distribution, marketing, sales and after-sales services, information technology, management and back-office support (Miroudot and Cadestin 2017). This pattern could be explained by the increasing outsourcing of these activities to services sector by manufacturing firms or the expansion of industries without smokestacks (including agro-industrial and horticultural value chains; tourism; business and trade services such as ICT based services, and transport and logistics) (Newfarmer et al. 2018).

Based on his study on South Asia, Ghani (2009) reached to the conclusion that productivity gains in services sector has already outpaced manufacturing, and that productivity growth in South Asia's services sector matches labor productivity growth in manufacturing of successful East Asian economies. Additionally, scale economies have become important in these services with the marginal cost of providing additional unit of some digitalized services approaches zero. Most importantly, in services that require high levels of fixed assets such as data centers, search engines and cloud platforms, costs rapidly fall with scale (Fontagné, Mohnen, and Wolff, 2014). Ghani and Kharas (2010) assert that financial, telecommunication and business services can be digitally stored, codified, and more easily traded internationally so that they can allow countries to benefit from technology diffusion, and access to foreign demand. Jorgenson and Timmer (2011) espouse that traditional services [comprising lodging, house-cleaning, distribution, education and healthcare and the like] are increasingly complemented by skill-intensive services [such as finance, banking, insurance, communication and business services].

Apart from productivity gains due to the growing application of ICT, scale economies and technological advance, the services sector account for a substantial share of exports in value-added terms. India is cited as success story in terms of services exports such as software, accountancy and the reading of medical scanning images (this will be discusses later, comparing India with China). The Economist Magazine (in its May 19, 2011 edition) reported that few countries such as India and Sri Lanka have broken the classical development discourse by heading straight to services without strong manufacturing sector, where the growing importance of services reflect sector-specific productivity gains rather than rising income. More recently, Heuser and Matto (2017) evidenced that the share of gross services exports in total world gross exports remain at about 20 percent since 1980; but, the share of services in value added terms grew from below 30 percent to above 40 percent. Also, tourism has become the major source of foreign exchange earnings of the economy of some countries in Africa such as Rwanda, Tanzania, Uganda and Tunisia (ECA 2015).

The message from the foregoing is straightforward: '*Service-led development journey' is as possible as 'manufacturing-led development journey' in low-income economies.* The implicit policy prescription is, therefore, simple: Low-income economies can pursue a service-led development route bypassing the conventional manufacturing-led development route implemented by today's advanced countries. This may be the reason why Dasgupta and Singh (2005) posit that the pattern of *structural change exhibited in developing countries is in stark variance with that exhibited by today's advanced economies*. This is because, in many of them, manufacturing employment began to fall early by historical standards, experienced *"premature deindustrialization."* Also, services sector grew at a faster rate (hence its contribution to GDP exceeds manufacturing's contribution) even in low-income SSA economies. This is why, Gollin (2018) argues that "There is no reason why growth and development could not occur without industrialization." Likewise, Blinder (2006) claims that the potential of services to *"substitute" manufacturing* is beyond question for three reasons. They are: (i) the world has already entered in the era of *"services transformation*" or *a* *'post-industrial society'* epoch, where the globalization of services (global value chains – GVC) yields splendid potential market for the sector (McKinsey 2005); (ii) the new digital technology 'provides alternative opportunities for developing economies to find niches [46] beyond manufacturing, where they can specialize, scale up and achieve impressive growth just like the industrializers' (Ghani and Kharas 2010); and (iii) the massive increase in firm size makes the procurement of some services from specialist providers more lucrative than producing them within a dep]artment of a manufacturing firm - which is one dimension of service transformation.

The second strand of view deem services sector (typically ICT, profession business, legal support and finance, etc.) as "*complementary" rather than "substitute" to manufacturing in a pro-growth perspective*. For instance, Ghani and O'Connel (2014) held the view that services could assume a growth escalator role in low-income countries, "complementing not necessarily replacing manufacturing." In this perspective, therefore, countries can expand services alongside core manufacturing so as to deliver sustainable growth – which is referred in the literature as *bundling.* They need to build a strong manufacturing base to benefit from capital accumulation, domestic inter-industry linkages, spillover effects and ultimately to attain inclusive growth sustainably, through the co-evolution of the two sectors. This perspective recognizes the existence of heterogeneity across services sector in that not all services activities can share many of the unique features of manufacturing. This meant that the contribution of services to economic development and rising living standards depend on the nature of services activities being developed. The modern, knowledge- and skill-intensive services[47] present special qualities as manufacturing does to achieve economic growth as they are characterized by relatively higher technology content, economies of scale and global competitiveness compared with other segments of the services sector.

The stylized facts of structural transformation identified earlier suggest that the demand for services has positive and linear relationship with per capita GDP. This implies that services demand

[46]However, Andreoni and Tregenna (2018) assert that companies often require multiple sets of complementary production capabilities that cut across multiple stages of the value chain and different technology domains to capture 'high-value niche' opportunities along the value chain via tasks specialization. In their view, this could be more pronounced in the case of complex high-tech high-value products or components. As a case in point, "the task specialization in design often requires direct access in the same local industrial ecosystems to specific production capabilities for prototyping and manufacturing to scale up products and processes. This means that task specialization requires the identification of complementary sets of capabilities that constitute the technology platform underpinning the task or set of related tasks. Traditionally, these sets of capabilities were developed within vertically integrated firms (Penrose, 1959), or within industrial blocks. The possibility for firms in a certain location to develop a competitive advantage in a certain task/stage, and thus to capture a 'high-value niche', will depend on complementary sets of different capabilities whose development might require involvement in more than one stage of the same (or other) value chains."

[47] Interestingly, skill-intensive services, being emerged owing to technology advancement (that provides technology, transportability and tradability), share little commonality with the traditional services segments. If that is the case, sustainable development through services sector may not be a viable growth option for poor countries (such in SSA) with a large subsistence agriculture sector accompanied by large traditional services and informal economic activities.

increases with the rise in affluence, typically in advanced economies. Andreoni and Chang (2016) validate the growing importance of services arguing that people are eating out or ordering take-away rather than cooking themselves, looking for others to take care of their children and so on. Notwithstanding the same amounts of goods are consumed, an extra layers of services are being added to the 'consumption basket.' Also, people strive to have more available income so as to spend more on services.

Be that as it may, the present dissertation finds the second strand of view appealing as the new digital technology revolution may lead to the confluence of sectoral characteristics and ultimately making the dividing line between manufacturing and services sector increasingly blurred – in which case, services can truly stand as *"stimulus complement"* to manufacturing.

3.5 Discussion: Proposing sectoral synergetic interdependence relationship

A. Setting the Claim:

The preceding sections reviewed the central tenet of the different sector-specific development discourses (past and present) seeking to answer the pressing question: *Which economic sector can have unlimited potential to become pace setter in the transformation and development process*? This section intends to carefully examine the different perspectives in the context of evaluating the *validity of the synergetic relationship between agriculture and manufacturing, and manufacturing and services sectors*, if not strictly proposing balanced growth model.

Everything is interconnected in the economic system. One cannot discuss about development without production and employment; without reading of the economic history of developed economies and acknowledging structural heterogeneity of the economy: each sector has distinct characteristics. So, it is difficult to separately discuss or define anything clearly. In this respect, therefore, it is natural to repeat oneself. It is difficult to draw stylized fact with respect to sectoral role in economic transformation and development process that is clear, defined, and accepted by all. For instance, Kaldor's engine of growth hypothesis is not given in a definitional sense, but in a causal sense. So, the arguments we read are not actually definitions, but simply formulations (claims) that explicate certain strengths and flaws.

At times, the discussion may seem contradictory. This is simply because synergy by its conception involves logging a middle course between polarized ideas (extremes). In short, synergy rejects extremes and often calls for the 'middle way,' neither too far to the right nor to the left. Often the truth in real world production is neither one alternative nor the other but both. Choosing synergy generally requires that accept ambiguity, uncertainty, mystery and paradox. For instance, manufacturing has indispensable role in the economy; but, agriculture should not be marginalize and belittled, nor services be ignored. The economy needs both, despite manufacturing conventionally has special place to play pivotal role than others.

The economic system is the result of a cooperation (synergy) or symbiotic between economic sectors or production activities. For instance, Andreoni and Chang (2016) point out that many of today's manufacturing products are 'productive systems' supporting the provision of a wide-range of high-value customized services. Smart products (such as smart-phones and cars as well as modern production machines) are cited as examples. In their view, therefore, when countries lose manufacturing capacity, they lose the ability to export those services that require those manufacturing products that act as product systems for them. On one hand, manufacturing products play vital role in boosting the tradability of services activities. On other hand, some high-productivity services (e.g. finance, transport and business services) are producer services whose main customers are manufacturing firms. Additionally, producer services (e.g. engineering, design, and management consultancy) cannot maintain their export ability without a strong manufacturing industries, as insights gained from the interaction between the service provider and the clients are crucial for those services. Manufacturing serves as important source of inputs for services activities and of demand for modern intermediate services inputs including financial, transport and logistics, and business services. A weakening manufacturing base will eventually lead to a decline in the quality and the exportability of those services. This all suggests the existence of dynamic synergetic relationship between the two sectors.

The same is true with respect to the relationship between manufacturing and agriculture. Agriculture supplies labor and other inputs to manufacturing and food to the workers. Ensuring food supply demands modernization of agriculture. On the other hand, the expansion of manufacturing production, productivity growth across the economy will increase even in agriculture and services via positive spill-overs such as technological knowhow and complementary market in services. Agriculture and manufacturing are not only connected by the Lewis labor transition (elastic labor supply is due to industry wage exceeding agriculture) but also because agriculture creates autonomous demand for manufacturing and hence, land reform is required if agriculture is not to hinder structural transformation.

This way, the dissertation may contribute to the debate over sector-led engine of growth hypothesis, claiming (which will indeed be validated or repudiated in subsequent parts) that: *(i) agriculture has important part to play during the initial stage of production transformation and development; (ii)* *high-productivity manufacturing could still become pace-setter in the economy; and (iii) the modern skill-intensive, tradable and high-productivity services activities can have unique elements to function as "stimulus complement" to manufacturing. In simple terms, it is like proposing a synergetic relations or causation between manufacturing and non-manufacturing sectors, and among heterogeneous production activities within manufacturing and services sector.*

This has been missing or receiving little attention in the debate hitherto - advocates of each of the three sectors either completely ignore or place little focus on the possibility for the dynamic synergetic relationship between them. It should be worth noting again that *proposing the synergetic interdependence relationship between economic sectors/production activities (without ignoring heterogeneity, sector/activity specificity) meant that the discussion has to accept ambiguity, uncertainty, contradiction and paradox.*

B. Does agriculture maintain special qualities to become alternative growth escalator in low-income economies (mainly in SSA) without parallel industrialization?

The answer to this question is Big No! *The sector cannot have superior capabilities for unlimited expansion and cumulative productivity increases to play engine of growth role.* But, by no means should agriculture be relegated and marginalized. Because, the sector has important role to play in the production transformation and development process of agrarian societies, where small-scale subsistence farming takes dominant place in the economy. In majority of these economies, productivity in labor and land remains low while they are land-abundant that can be allocated for large-scale commercial farming. According to the agrarian reform or agricultural revolution argument, these economies may still have ample potentials for productivity increases in agriculture through the use of better farm inputs, new technologies and diversification into new crops.

The present dissertation has some quibbles with the hypothesis that dictates agriculture to be *"the only possible engine of growth for most SSA countries."* Primarily because, this hypothesis rests, by and large, on the principle of trading, according to which SSA economies should continue specializing in the production and exports of primary commodities [rather than in manufacturing] which are prone to price volatility in the international market. The fact that majority of the population, in most of the countries, are residing in the countryside and that rural poverty is widespread may make agricultural-led development journey as springboard to start with the process of industrial transformation and sustainability. The over reliance on exports of raw materials for foreign exchange earnings to finance the imports of manufactured goods (consumer goods, intermediate and capital goods, etc.) from industrialized and emerging economies may, however, hamper economic development and sustainability.

It is true that, the wellbeing of the entire economy of most SSA countries relies heavily on what is happening in agriculture and allied activities given the lower share of industry sector both in GDP, in employment and in export earnings. As such, a good performance of agriculture is considered mostly as good performance of the whole economy, for the sector fetches a good share of value added and employment (although the share of services sector has been on the rising territory), and generates the largest portion of foreign exchange earnings. However, it is equally true that a higher share of that sector in total employment and in GDP alone may not necessarily mean that the process of economic transformation, diversification and development should remain agricultural-based. *Although agricultural transformation needs to come first to move up the quality ladder of the division of labor, it cannot come to reality without a parallel expansion of factories. There is no historical or empirical evidence to conjecture that SSA should rely solely on trading based on existing comparative advantage instead of building their latent comparative advantage or competitive advantage. Neither is it true to allege that the existing complementarity between economic sectors has trapped SSA in a low position on the product quality ladder.*

Seeing from the eye of Lewis's proposition discussed in section 1.1, most poor economies with subsistence agriculture (e.g. those in SSA) have failed to **imitate** the manufacturing-led development path followed by the frontier economies partly because they lacked the political commitment and well-thought industrial policy to diversify their production structure in the right direction and create good quality employment. Typically, they failed to undergo meaningful industrial transformation, to the extent possible of "leapfrogging" their current comparative advantage, simply because they lacked the required capabilities or competences. Does this mean that they should continue to reproduce themselves relying on traditional and subsistence agriculture because they lack the capabilities to industrialize? Not so convincing, most importantly because the potential for unlimited expansion of agricultural production could be constrained by various factors; some of which are succinctly presented below.

First and foremost, agriculture in most of the economies is dominated by smallholder farming, which is often vulnerable to climate change and the vagaries of nature. Large-scale production or commercial farming is either lacking or is very small [though the recent growing interest of international agri-businesses to invest in SSA with the rise in food prices after the 2008 financial crisis] to accelerate industrialization and good quality employment creation, to achieve food self-sufficiency and to change the dire poverty landscape. The economic history of today's frontier economies witnessed that no country can climb the ladder of the division of labor and succeed by specializing on subsistence agriculture, reproducing itself. The usual rhetoric is that natural resources are freely available while idle arable land in agrarian economies is massive. However, the reality is far from that; for, land is fixed while population growth in SSA is higher than any other region in the world. Also, small-scale farmers produce for subsistence requirements, or to exchange for food and materials produced by other farmers as well as to meet their demand for some consumer goods. Most importantly, productivity increases in agriculture is highly constrained in terms of time, space, soil and climate (Chang 2010). This implies that *the sector may not be able to see sustainable growth, independently of manufacturing and services sectors.* The well-off economies had, according to Chang, experienced productivity increases in agriculture by using machinery, chemical fertilizers, pesticides and genetically modified organisms, which are all manufactured goods. So, technological backwardness along with the vagaries of nature could highly constrain production expansion and productivity increases in agriculture, making it dubious to serve as growth escalator in poor economies.

Secondly, although the rural economy absorbs the largest share of the labor force, the wage gap between the rural and the urban sectors is large. Wages in agriculture is estimated to remain lower than those in industry (manufacturing), which might in part be explained by fixed or volatile prices for agricultural produces and relatively lower-productivity of small-scale farming. The fact that agriculture is characterized by diminishing returns meant that its output would increase less proportionally with the increase in labor supply. Early development theorists [e.g. Young, Kaldor] postulate that expanding production in sectors or production activities exhibiting diminishing returns generate low outputs; for, in such sectors or production activities output would increase up to a point after which the crucial resource is no longer available at the same quality or in the same quantity as before. In such cases, expanding the variable factor (e.g. adding labor to the same plot of land) would give smaller return for every unit of the variable factor added. Even with the increasing productivity through new technology, expansion in the sector will, in due course, run into diminishing returns. So, more works are needed to produce the same output per unit of labor. This would suggest the need to move the economy [such as the release of surplus and disguised labor] away from agriculture to more dynamic non-agricultural activities, which would have high potential for generating more quality jobs and cumulative productivity increases. This may, in turn, open wider room for fostering income increases in agriculture too. But, this cannot happen automatically and cannot be costless, entailing a good industrial policy including competency building.[48]

[48] In fact, some observers contend that the intensification of globalization to its highest level accompanied with the new digital technology dynamics may pose a challenge for these economies to benefit from manufacturing as key driver of their development.

Thirdly, producers of primary agricultural products are price takers; hence, they sell them at whatever price the market gives, owing essentially to the difficulty of boundless diversification coupled with perishability of the products. Also, production in the sector may often depend more on timing of sales and financial muscle than on cost efficiency of production (Reinert 2007). Relative to manufactures, the market for primary commodities is more competitive. Producers engaged in primary commodities usually convey all surplus to consumers while producers of manufacturing products, majority of being operating in oligopolistic markets, can charge higher prices on customers for their surplus produces.

Fourthly, the famous Prebish center-periphery hypothesis postulates that sustainability and development based on production and exports of primary commodities is dubious for different reasons. Most importantly, the demand for agricultural products may not always move together with their production level. Compared with manufacturing goods, they are susceptible to suffer from price volatility in international markets (partly on account of their sensitivity to changes in global supply and demand) and relatively lower income-elasticity of demand [Engel's law]. It may be difficult to boost supply of agricultural goods when demand goes up and halt production when demand falls. Therefore, countries specializing in the production of primary agricultural commodities may not benefit much from the global expansion of markets for manufactures and services.

Lastly, the capacity of agriculture to expand production unlimitedly in the presence of scarce and fixed natural resources, such as land, is dubious. Productivity improvement in the sector may rely to a large extent on the use of labor-saving technologies. MacIntyre et al. (2009) have also identified other likely challenges that may restrain sustainable growth in agricultural production in the future, among others: (i) land degradation attributed to different factors and fragmentation of land due to higher population density, affecting a good deal of all cropland; and (ii) climate change with accompanying water shortages worldwide is amplifying the frequency and intensity of such extreme events as floods, cyclones, and droughts.

For all the above reasons, *the potential of agriculture to become the only growth escalator sector in SSA is very limited.* A sector would serve as pace-setter or growth engine, if it can alter the production structure of the economy and create quality employment; induce cumulative productivity increases; generate high profits and wages; foster capital accumulation and innovation; trigger rapid, high and sustainable growth momentum and catch-up with the frontier economies more than other sectors – which agriculture in SSA lacks. Had subsistence farming maintained these special properties, many SSA economies would not have continued trading primary products and stayed poor. The experience of East and Southeast Asian forerunners including China suggest that SSA can see catch-up growth if they manage to swiftly climb the stepladder towards more productive agro-processing and manufacturing activities than specializing in small-scale farming. If that is the case, should SSA economies relegate and marginalize agriculture in favor of non-agricultural activities such as services? Again, the answer is No! *Here comes the possibility for the existence of synergetic relationship between agriculture and non-agricultural activities into the picture.*

C. Why and when do synergy between agriculture and manufacturing matter?

The manufacturing-led development path holds that *growth in manufacturing causes agricultural growth*; hence, the future hope for low-income countries "rest in large part on fostering new manufacturing industries"[49] to achieve economic development and end poverty. For some observers, this may or may not necessarily require agricultural revolution, simply because some of today's advanced economies had managed to develop or prosper without a blossoming agriculture sector. Nonetheless, this may not be possible for all economies, because not all countries have similar capabilities and assets to undergo rapid industrialization; low-income countries may find it challenging "to produce a growing volume of manufactures."

One of the arguments for the need for structural change towards high-productivity sector/production activities (such as manufacturing) in SSA today is the quality status of the growth acceleration observed over the 2000s that left large number of people unemployed and hostage of extreme poverty. This makes employment creation compulsory, requiring the allocation of higher investment funds on economic sectors/production activities that have higher potential to become "a major source of economic dynamism," in turn, necessitates the need to implement targeted industrial policy. In this respect, Chang (2009) said that Danish agriculture in the late 19th century and early 20th century is one example of successful industrial policies targeted at agriculture. Brazil and Chile were also successful stories in agro-industry. Yet, he confirms that manufacturing still matters. This may lead one to ask: *Could low-income SSA economies afford to neglect agriculture and expand manufacturing in view of creating more and good quality jobs, and of annihilating poverty trap*? Such question may demand a closer look at economic history and the current feature of globalization and technological advance. Economic history witnesses that the Industrial Revolution in Europe came after a period of considerable improvement in agricultural productivity. The industrial transformation and development experience of the East Asian tigers followed the same route,

[49] Eshetu (1990, pp. 238) held a very strong dictum "*…if today there is much obstinate insistence on the necessity of industrialization, it is not because of an infatuation with industrialization per se, but because it is inconceivable to think of a viable development strategy that does not accord industrialization its due place."* This means that the transfer of agricultural surplus to manufacturing was critical precursor for growth-enhancing structural change, productivity increases, innovation, and transition out of dire poverty.

wherein agrarian reform and agricultural transformation preceded learning-based industrialization. Arthur Lewis (cited in Storm, 2015 pp 682) pointed out that *"Now if the capitalist sector produces no food, its expansion increases the demand for food, raises the price of food in terms of capitalist products, and so reduces profits. This is one of the sense in which industrialization is dependent upon agricultural production, not profitable to produce a growing volume of manufactures unless agricultural production is growing simultaneously. This is also why industrial and agrarian revolutions always go together and why economies in which agriculture is stagnant do not show industrial development."*

What does such historical anecdote tell us on the prospect of today's low-income economies in SSA? The countries may consider **emulation** of emerging and industrialized East Asian economies to undergo rapid industrial transformation, employment creation and sustainable development. However, this may appear difficult given the current capabilities and competencies those countries have and the nature of the fragmented GVC and digital technology dynamics. This does not either suggest that they need to gear their development policies towards solely on agricultural production in line with the CAF strategy orientation. The saying goes, a diversified economy based on agriculture and manufacturing would have stronger stimulus for sustainability and development than an economy based on agriculture alone *a la* Fredrick List and other early development thinkers. Such synergetic orientation requires a clear and well-articulated industrial policy, which also envelops capability building including infrastructure development (and hence, public investment) and so on. The prospered economies globally would not have possibly been prospered, had the growth of their agricultural sector seen precarious performance at their earlier stage of development - a testimony for the *possible existence of causal relations between manufacturing and agriculture sectors*.

Kalecki (1955, cited in Storm 2015) called for 'balanced growth' between the two sectors, where the "balance" is dictated by the need to keep wage-goods inflation. This could not, according to Kalecki, be forced to reality without "careful management of the terms of trade between agriculture and industry, so as not to depress them too much (in order not to kill the agricultural goose which lays the golden eggs for the industrial sector), nor to let them increase too much (as this would hurt industrial real wages and profits, and prematurely stall industrial expansion)." Hirschman (1958) articulates that *manufacturing exercises pull and push forces on agriculture (which is characterized with few linkages) and other sectors in line with its system of linkages*. *Linkage in this sense goes beyond the presence of strong interdependence between agriculture and manufacturing - a causal relationship between the two sectors*. Nonetheless, the theoretical framework of Hirschman's unbalanced growth model does not offer clear hints on the direction of causation. In like manner, the

Kaldorian growth theory posits that the linkages between economic sectors could be complex, circular and cumulative. *More specifically, one can expect a bi-directional cumulative and dynamic causation between agriculture and manufacturing sectors,* albeit the possibility for differences in the magnitude of the coefficient.

The following observations may come out from the foregoing discussion:

First, the contribution of agriculture to structural change of the economy may go beyond its role as refuge to the growing labor force, and shedding labor to manufacturing and other sectors. On one hand, p*roductivity enhancing measures in agriculture can complement and encourage investment in manufacturing industries*. On other hand, agriculture supplies raw materials (inputs) for manufacturing activities through forward production linkages [hence, supporting industrial transformation] and wage goods at affordable prices to the growing industrial workforce. Also, production in agriculture demands various inputs through backward linkages. Hence, expanding farm incomes would foster demand for domestically produced consumer goods (produced by infant industry), and thereby, creating demand linkages for same. So, enhancing the linkages between agriculture and manufacturing production is imperative: Robust growth in agricultural sector can be stimulant to growth in manufacturing and other sectors, and conversely, the sector has to see technological advancement far exceedingly with population growth and the forces of diminishing returns in land and other fixed factors.

Second, *manufacturing triggers growth in agriculture through increased demand, productivity improvements, and cheaper supply of manufactures while at the same time creating secured market with greater purchasing power*. This means, widening manufacturing production could embolden rural transformation through the supply of innovative and productive inputs (e.g. chemicals, fertilizers, pesticides) and capital goods (e.g. tractors, water pump) to agriculture sector. The use of these productive inputs and farming technologies along with high-yielding varieties of seeds boost productivity in available farm land. In today's rich economies, productivity increases in agriculture (e.g. Duch agriculture) was realized through the application of manufacturing-style organizational knowledge such as computer-controlled feeding or temperature control (see Chang 2014)[50];

Third, *foreign exchange earnings from the export of primary agricultural commodities can finance imports of capital goods for technological upgrading and capacity building in manufacturing*. This may hardly be immune from a challenge though. Excessive dependence on exports of unprocessed

[50] When it comes to SSA, agriculture is currently unable to supply the required raw material inputs to food-processing, textiles, leather and other light-manufacturing activities, hampering the optimal use of even existing production capacity.

primary commodities leads to volatile foreign exchange earnings with deleterious implications on public investments, and on production in other economic sectors;

Fourth, *although the prosperity and development of a given economy is determined by the size and competitiveness of its manufacturing industry*, agricultural production has to grow simultaneously because *'sustained level of agricultural produce is critical, most notably at the early stage of transformation and development, in which manufacturing relies to a large extent on the rural economy for labor shedding, savings, food supply for the growing population, and agricultural raw materials for industrial processing and demand for light-manufacturing goods*.' But, how could it be achieved is big a concern. This requires the supply and processing of raw materials produced domestically to the manufacturing sector (with adequate quantity and quality) to reduce the sector's dependence on imported raw materials. In turn, integrated industrial policy is vital to develop agriculture production along with manufacturing production;

Fifth*, the causation between the two sectors is complex, dynamic and synergetic in part because the growth of manufacturing relies on the rural market to the extent that the rural market depends on the purchasing power, labor market and technological advancement in manufacturing with the aim of raising its wage level*. This proposition dictates that low-income economies could not generate quality employment for the growing young people without expansion of core manufacturing activities. Currently, young people in most of these countries are migrating from agriculture to traditional and less-productive services activities and this pattern may likely prevail unless the countries build their capabilities to change the production structure of the economy. Eshetu (1990, pp. 258) said that *"It may sound paradoxical but the struggle for industrialization can be won only to the extent that the struggle for agricultural development is won."* By this, he meant that *a stagnant agriculture sector could likely hinder industrialization and sustainability.* Put in other way, *the effort to build a vibrant manufacturing industry can bear fruit only when agricultural production expands simultaneously*. This statement corroborates Kuznets, who seems to suggest that 'the growth of agriculture over the period of transformation is higher than the level exhibited in its pre-transformation period.' If that is the case, *the transfer of labor and other resources from agriculture to manufacturing and the shifting of the productive structure in the direction of manufacturing are consequences rather than causes of industrialization*; and

Finally, *green revolution would enhance productivity increases in agriculture sector if manufacturing is strong enough to push agrarian change technologically*. The shift of resources towards higher productive manufacturing activities may not emerge in economies where agricultural production is feeble, irrespective of the growth pace of nonagricultural sectors. Such relationship between agriculture and manufacturing further implies that development strategies in agrarian economies that pay little attention to agricultural transformation cannot successfully undergo rapid industrialization and may end up with dismal economic growth that leaves the largest proportion of the population to live in abject poverty. This may suggest that *policymakers and governments in low-income agrarian economies have to craft a solid agricultural transformation plan, integrating smallholder farming along with enhancing manufacturing expansion. Such plans need take into consideration the country's capabilities, otherwise the structural transformation plan or development strategies would end up nowhere*.

D. Can services sector be as dynamic as manufacturing and become the new growth escalator, immensely contributing to employment creation, real wage growth, productivity gains and sustainability?

Recent scholastic works (e.g. Eichengreen and Gupta 2009; Basu 2015; Gilchrist 2016) audaciously explicate that a *"services-led development journey" may become the rule rather than the exception* in the 21st century for various grounds, among others:

First, manufacturing has become increasingly technology- and skill-intensive, losing its potential to absorb large numbers of young, unskilled workforce as it did in the past. The fall in the share of manufacturing employment and value added in total employment and GDP globally flash lights on the growing importance of services and the gradual reliance of manufacturing on services – known as, the '*servicification of manufacturing'*;

Second, most of the pro-development elements conventionally restricted to manufacturing [such as, scale economies, innovation, and learning-by-doing and international competitiveness] might be increasingly shared especially by the skill-intensive and knowledge-based services activities [e.g. professional and business services]. So, productivity gains in these services segments can exhibit progressive pattern attributable to expansion of digital technology and fragmented GVCs. Additionally, they became increasingly freely tradable in international market attributed to ICT revolution, whereby the volume of trade in services has been expanding more rapidly than that in manufactured goods (measured typically in value added terms), as a result of proliferation of digital technology – known as *international servicification*;

Third, certain services activities (such as transport and distribution) play important role in global value chains. Heuser and Mattoo (2017) identified domestic services inputs (indirect domestic services value added in exports) and foreign services inputs (foreign services value added in exports) as indicator of GVC trade. Their findings demonstrate that direct exported services increased substantially during 1995-2011; hence, 65 percent of the growth of services value added in exports was attributed to an increase in services embodied in other exports[51];

Fourth, the deregulation of services markets has resulted in a massive inflows of FDI in tradable and high-productivity services activities; and

Finally, a service-led development path is greener and sustainable.
Therefore, *low-income and agrarian economies can move away from subsistence farming towards services to* achieve development and sustainability*, without the need to expand core manufacturing*[52].

The present dissertation joins skeptics who riposte that service-led development proposition is biased given the fact that skill-intensive services were and still are less available in developing economies; hence, prescribing service-led development route for low-income economies without factories (*premature tertiarization*) is implicitly advising them to shift resources to low-productivity traditional and informal services activities bypassing core manufacturing. Such hypothesis has two serious gaps: (i) most of the time it deserts the possibility for synergetic relationship between manufacturing and services sectors; and (ii) it considers services as perfect substitute to manufacturing, completely also neglecting the sector's dependence on manufacturing. In reality, notwithstanding non-manufacturing industries without smokestacks increasingly share the role manufacturing has historically played in the transformation and development process (Newfarmer et al. 2018), services cannot replace manufacturing as *the two are not perfect competitors and perfect substitutes.* Indeed, the modern, skill- and knowledge-intensive segments of the services sector may carry the unique potentials of the growth propulsive manufacturing industry which would enable the sector to become *'stimulus complement' to manufacturing.* This proposition is much in line with the Greek word *"*συνεργία **synergia** - *Synergy"* defined in the present context as multi-sectoral cumulative causation or symbiotic relationship between sectors.

In a broad context, it centers on the proposition that *everything is interconnected in the economic system*. This claim does not contradict with the presence of heterogeneity across economic sectors/production activities [as both manufacturing and services sectors have relatively high-and low-productivity activities, albeit variation among them is expected]. However, **at times the**

[51] This view questions the plausibility of the following arguments: (i) splintering or outsourcing of services activities from manufacturing firms; (ii) the growing importance in a GVC world connecting service like telecommunications and transport; (iii) the growing services component in sophisticated manufacturing goods such as software in cars; and (iv) the increase in the prices of services tasks relative to manufacturing tasks as manufacturing tasks are easier to offshore to lower cost locations.
[52]Eichengreen and Gupta (2009) identified two distinct stages with which services sector plays important part in development and sustainability: (i) when an economy shifts from low-income to middle-income status, a variety of different forms of services activities may grow rapidly; and (ii) when the economy moves up the quality ladder beyond middle-income level, more complex and sophisticated services activities (e.g. information technology, finance, etc.) become more important.

discussion may appear contradicting, essentially because Synergy, as indicated earlier, by definition involves a middle course between polarized strands of views (that is, between the different strands on the single-sector-led development journeys reviewed in sections 3.2 to 3.4).

The rest of the discussion below is thus intended to substantiate the plausibility of **the *'stimulus complement'* hypothesis (neither manufacturing nor services; but, both amid the fall in the share of manufacturing in the economy**), which would be verified or refuted empirically in latter parts of the dissertation. It should also be worth noting that, as was the style in the preceding parts and sections, **some concepts and arguments might often be repeated perhaps from different perspectives.**

E. Industrialization giving way for services transformation?

The gradual and steady decline in the share of manufacturing in total employment and GDP is neither considered as a new phenomenon nor it proves the end of industrialization [characterized by the shifts of employment from agriculture to manufacturing driven by mechanization], giving way for services transformation [what is generally called the post-industrial society that shifts labor from manufacturing industries to services driven by digital technologies]. However, such strong claim implies that the loss of manufacturing employment (and value added) did not severely dim its relevance given the dynamics of the new digital technologies. Neither does it reflect that the economic activities related to manufacturing-led development route in the past have waned. It may thus be appealing to look into the likely causes for the gradual and steady decline of manufacturing in total employment and in GDP (which has been more pronounced in advanced economies than otherwise) in a way to vindicate the *stimulus complement* function of services sector. The various causes that explain the gradual and steady fall in manufacturing employment can be boiled down into two pillars: *Deindustrialization and Servicification of manufacturing.*

The discussion in sub-section (C) suggests that the services transformation hypothesis toppled down the stylized facts of structural change as the argument fully rests on the growing importance of services in manufacturing activities and transformation of manufacturing itself at firm level. As such, *servicification* covers three dimensions: (i) the increased use of services inputs by manufacturing firms in their production processes, also termed *embodied services*; (ii) the increase in services activities within manufacturing firms (in-house provision of services activities); and (iii) the bundling of services with goods, called *embedded services*. The third dimension perceives that several high value manufactures are 'complex bundles or hybrids of goods and services interactions' (Cernat and Kutlina-Dimitrova, 2014). A range of recent studies document that manufacturing has entered on the attenuation territory because the world has entered into the era of "Services Transformation." Some scholars (e.g. Baldwin) bluntly speak about the end of industrialization, advising developing economies to follow the Indian way (service-led development path) rather than the Chinese way (manufacturing-led development path). In their view point, manufacturing production relies to a greater extent on services than vice versa – so the "Great Transformation" (which begot big dividing line between imitating rich and the trading poor countries) has been replaced by "Services Transformation." Such proposition may implicitly imply that the relevance of manufacturing for development and sustainability is dubious. If that is the case, latecomer economies can bypass core manufacturing as it has become increasingly automated and jobless, relying greatly on services which became increasingly tradable and productivity enhancing.

The *deindustrialization hypothesis* states that the loss of manufacturing jobs in mature industrialized and advanced economies is a natural process of transformation and development. For instance, Andreoni and Gregory (2013 pp. 9) evidenced that, most advanced countries have, on average, lost almost half of their manufacturing industry's share in GDP since the start of the 1960s, attributable to an accelerated process of *deindustrialization*. Yet, they did not commend that latecomer economies have to transform their economic structure in the direction of services, forsaking the 'manufacturing-led development path' hypothesis of the early development theorists. Instead, a wide array of supply and demand side explanations[53] have been given to authenticate the continued relevance of manufacturing in development and sustainability, albeit the increasingly tradability of some knowledge- and skill-intensive services and the gradual loss of manufacturing jobs chiefly in the most advanced economies. Most importantly, *deindustrialization* is explained by an increasing interconnectedness of countries globally (globalization) and/or expansion of international trade; technological progress (faster and higher productivity growth in manufacturing) and the consequential fall in prices of manufactures; change in demand (consumer's preference); an increasing relocation of manufacturing industries from the West and North America to emerging and developing economies and shifts in manufacturing production from low-tech to medium-tech and high-tech (offshoring/product fragmentation); a growing outsourcing of business services out of manufacturing firms (outsourcing) and blurry boundaries between manufacturing and services

[53] Rowthorn and Coutts (2004) classified the various causes and determinants of *deindustrialization* as follwos: (i) the reclassification of jobs from manufacturing to services attributable to 'specialization' through the outsourcing of activities to domestic service providers; (ii) the shrinking of manufacturing share in total consumer spending owing to the fall in the relative prices of manufactured goods that emanates from faster productivity growth; (iii) slower employment growth in manufacturing than in services due to higher productivity growth in manufacturing than in services; (iv) the negative effects of international trade (specifically imports from lower-cost producers) on manufacturing employment in advanced economies; and (v) the negative effects of lower rates of investment on the share of manufacturing (in both GDP and employment), in view of the fact that investment outlay goes disproportionately into manufacturing.

(statistical illusion) as well as development of industries without smokestacks (such as tourism, ICT, agro-industry and horticulture).[54] A thorough investigation on the consequences of these supply side and demand side factors is beyond the scope of the dissertation as the discussion here is delimited to substantiate *the continued importance of manufacturing and the 'stimulus complement' role of the modern skill-intensive services.*

Additionally, *premature-deindustrialization*,[55] has become a hot research topic since recently. It is conceptualized as a trajectory of industrialization where manufacturing employment and output began to fall much earlier than the historical experience and at per capita income level much lower than that at which developed economies started to deindustrialize (Palma, 2005; Dasgupta and Singh, 2005; Tregenna 2009; Rodrik 2016). Controlling for population size and per capita GDP in a sample of 42 economies between 1950 and 2012, Rodrik (2016) finds a lower share of manufacturing in employment and value added over time, as reflected in the magnitudes of coefficients of decadal time dummy variables, which are negative and larger over time. His findings have come out with regional differences; while the triumphant Asian economies have managed to specialize in core manufacturing activities, other economies (especially those in SSA and Latin America) have been lagging behind. The occurrence of *premature deindustrialization* in low- and middle-income economies is worrying and puzzling, not only because the share of manufacturing in total employment remains meager, but also most of the workforces released from the countryside have continued to crowd in the Baumol's diseases services. Typically, a good share of employment opportunities in most of the countries have been created in government, personal and social services as well as in retail trade and housework services, which have limited potential for productivity improvement. In short, *the low and stagnant level of industrialization in low-income countries is associated with the failure to industrialize, or stalled industrialization – a situation where output and employment shares of manufacturing remain stagnant at modest levels*.

[54] Additionally, Palma (2005 cited in Tregenna 2016b) proposed the 'Dutch disease' as a prime cause of *deindustrialization*, which stems from the fact that commodity-rich countries have a lower path of *deindustrialization* than commodity-poor countries. When some of the commodity-poor countries have become commodity-rich, they have seen an 'additional' degree of *deindustrialization*, attributed to moving from one (higher) path of *deindustrialization* to the other (lower) one. So, 'Dutch disease', said Tregenna, can only be considered as 'additional' level of *deindustrialization* related to the latter movement. This 'additional' degree of *deindustrialization* is not only found in cases where a country discovered significant natural resources but also when countries have developed significant export finance or tourism. But, Tregenna argued that this can also take place as a result of policy shifts (markedly trade or financial liberalization) in middle-income countries-as has happened in Latin America since economic reform.

[55] Tregenna (2015) identified two aspects relating to the point at which de-industrialization commences: (i) the level of per-capita income at the onset of deindustrialization; and (ii) how high is the share of manufacturing in GDP and employment.

A closer look at regional manufacturing share shows that deindustrialization in some countries could generally be considered as ephemeral, which can be reversible (e.g. China[56]). Nonetheless, there are cases where the fall in the share of manufacturing employment is not accompanied by the drop in the share of value added. Can we say that such countries are deindustrialized (be it natural or premature)? It is difficult to jump into conclusion. Standing on the positive side, one may argue that the countries might be industrializing or reindustrializing. In this scenario, therefore, the use of tertiarization (natural or premature) might sound sensible. However, the two terms do not seem antithetical, given that both refers the shrinkage of manufacturing share in GDP and in employment is accompanied by the rise in the share of services. Whatever, the case this dissertation will replicate Rodrik's (2016) model in part five to investigate if the sample economies have already encountered *deindustrialization* (a lower share of manufacturing in GDP and in employment overtime, as reflected in the magnitudes of the coefficients of the decadal time dummy variables which turn out to be negative and larger overtime) or *premature tertiarization* with the magnitudes of coefficients of the decadal time dummy variables come out positive and larger overtime or a mixed results across country groups. The focus of the discussion in sub-section (F) below is to review the likely determinants of (de)industrialization or servicifcation with the intention of justifying the *"stimulus complement"* hypothesis in a broader context while at the same time answering the question: Has industrialization gave way to services transformation?

F. A Glimpse of the key drivers in pursuit of the "stimulus complement" hypothesis

RELOCATION/OFFSHORING: *The shifts observed in the location (geography) and structure of manufacturing production may give evidence for its continued importance for sustainable development rather than culmination of its legacy.*

Not only have the shrinking of manufacturing employment occurred gradually and steadily, but also the pace of decline evolved differently in different industries and countries - with no exception for high-tech manufacturing (Pilat et al. 2006). Most specifically, the shrinkage of manufacturing employment share has been more pronounced in some advanced countries [e.g. the United States, Japan, Germany, and Switzerland] than others depending on the nature of industrialization. Gilchrist (2016) pointed out that digital technology has changed the nature of manufacturing typically in advanced economies where industrial robotics[57] is widely used in the production process (i.e.

[56] A study by Bosworth and Collins (2008) shows that China has exhibited a shrinkage of its manufacturing share in the 1990s due to downsizing of state owned enterprises and rapid expansion of manufacturing in the 2000s with its accession to World Trade Organization (WTO).

[57] The installation of industrial robots [autonomous or semi-autonomous machines] has been growing persistently and predicted to continue growing in the future. The stock of industrial robots worldwide reached 1.8 million in 2016, which was

replacing the ‘manu’ with robots) – so that some scholars [such as Baldwin] speak of ‘robofacturing.’ However, whether technological advancement enhances wealth creation and development through rapid industrialization or make it harder to start on and more difficult to sustain it [to undergo industrial transformation and upgrading] calls for a clear understanding of which countries have widely used industrial robots and in which manufacturing industries (IFR 2016; UNCTAD 2017). This implies that the shrinking of manufacturing jobs in mature industrialized economies due to technological advance and application of robotics does not mean that manufacturing-led development path is outdated. Neither could it make the services sector growth engine, albeit technological advances made manufacturing more capital- and skill-intensive than before, which might have contributed to the steady growth of modern services activities in mature industrialized countries. Rather, manufacturing maintains its unique elements in terms of export earnings; driving technological change, automation and innovation; and cumulative productivity increases regardless of gradually losing its relative share.

The gradual loss of manufacturing jobs (chiefly, low-wage jobs) and the shifts in the distribution of manufacturing output are associated with shifts in the location of manufacturing industries and offshoring[58] of manufacturing production. With the overarching goal of reducing production costs, multi-national firms have relocated labor-intensive assembly and routine production jobs away from Western Europe and North America to emerging and developing economies, where labor costs are relatively lower such as China, India, Vietnam, Eastern Europe, etc. in recent decades (UNCTAD 2013; Haraguchi et al. 2017). Not only has ICT revolution reduced barriers associated with geographic distance, but also the fall in trade barriers and transport costs caught the eyes of many multi-product transnational corporations and companies to outsource parts of the value chains (or non-essential business function) to other companies (typically third-party services providers which assume the duties on a contractual basis) (Kollmeyer 2009).

Relocation of manufacturing industries/activities (production structure) to low-wage regions of the developing world might have twin effects: (i) host countries placed principal focus to the production

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1.6 million in 2015 and predicted to reach to 3 million by 2020 (IFR, 2016a; 2017). Developed countries made up 60 percent of industrial robots stocks in 2015, with two advanced economies (Germany, Japan and the US) accounting for 43 percent. Although industrial robot deployment has been rising in developing countries, it is heavily concentrated; as two Asian economies (China, Japan and South Korea) accounted for 46 percent of the estimated global stock of industrial robots in the same year. The use of industrial robots is also heavily concentrated in automotive industry followed by electrical/electronics industry (including computers and equipment, radio, TV, and communication devices, medical equipment, precision and optical instruments), rubber, plastic and chemical products, metal and machinery. In 2016, two-thirds of robot use goes to automotive and electrical/electronic industries.

[58] Offshoring of production contains both the manufactures of physical goods and its necessary inputs (such as design, R&D, engineering, marketing, distribution, etc.) – this covers the full sequence of tasks involved from inception to final assembly and delivery.

of basic consumer goods and basic metals, which would enable them improving the share of their manufacturing value added in total value added domestically and increase the sector's share in world GDP; and (ii) firms enjoyed more access to new consumer markets. In such process, middle-income economies may fuse their productive structure and secure a place in the GVC while low-income economies may see growth acceleration due to structural change towards manufacturing industries. As a result, there emerged disparity between the mature industrialized economies on one side, and the emerging and developing economies on the other.

However, the shifts of manufacturing industries away from the mature industrial countries is skewed mainly towards Asia and Pacific region, albeit disparities observed across countries in that region too. Most notably, the region exhibited rapid industrial transformation that induced sustained growth and quality employment creation over the last two decades. This is why Haraguchi et al. (2017) claim that *premature deindustrialization* might have been caused by growing concentration of manufacturing in handful countries; China, with its continued high share of manufacturing in GDP, can be a notable example. China has been exceptionally and astonishingly experiencing a leapfrogging performance to become the largest manufacturing hub, worldwide. The share of manufacturing value added in both current and constant prices exceeded 30 percent, far higher than the developing countries average share of 11 to 14 percent. Likewise, its manufacturing employment share stood above 15 percent since the end of the 1980s until it increased to 18 to 20 percent since 2007, exceeding the share of 11 to 12 percent in developing countries for most of the period between 1970 and 2013 (Haraguchi et al. 2016). The nation was key producer and exporter of tobacco, textiles and leather goods industries during 2000. It became the leading manufacturer in apparel, rubber and plastics, non-metallic products, basic metals, electrical machinery and vehicles since recently while performing well in other industries. In sum, the shifts in the location of manufacturing industries to developing economies seems to be one cause of *deindustrializatio*n in mature industrialized economies. At the same time, this lends strong support for the continued importance of manufacturing in sustainable development, poverty reduction and rising living standards, making the '*stimulus complement*' hypothesis for services to manufacturing permissible.

The question one may ask at this juncture is as to how could such shifts in manufacturing industries relate to *deindustrialization?* On one hand, the shifts of labor-intensive or traditional industries (including food, apparel, footwear and textile industries) to developing countries away from mature industrialized countries have resulted in the drop of these industries (hence loss of manufacturing jobs) in the latter. This may suggest that realignment of international division of labor allows the former to specialize in labor-intensive manufacturing jobs and the latter to specialize in high-skilled activities such as strategic management, product development, marketing and finance (Kollmeyer 2009). On the other hand, divergence trends in manufacturing production between regions and across countries pertained to the shifts in the structure of manufacturing production to more sophisticated and newer industries away from traditional industries, attributed to technological advancement and innovations. Manufacturing production in emerging economies saw shifts away from labor-intensive or traditional industries, with such manufacturing industries as base metals, transport (e.g. railway rolling stock, ships, aircraft), televisions, machinery (both office and factory), furniture and medical equipment showed faster growth compared with the more traditional industries over the same period. With no surprise, low-tech manufacturing industries are dominant in developing and emerging economies, despite the share of medium- and high-tech industries in total manufacturing has been trending upward. By contrast, the structure of manufacturing production in mature industrialized countries is skewed to medium- and high-tech (technologically complex) manufacturing industries, leading to the fall in employment share of the sector, hence *deindustrialization*. Again, this gives evidence for the sector's unlimited potential for expansion and its central role in the production transformation and development process.

One may still conjecture that manufacturing today is not what it used to be and may no longer deliver fast growth; *the new digital technology dynamics has altered the labor intensity of manufacturing as it becomes much more capital-and skill-intensive*. This means that manufacturing cannot absorb unskilled workers in sufficient numbers as it did in the past; as innovations [3D printing, computer intelligence and industrial robotics, etc.] are all labor-displacing (McKinsey 2010). Additionally, many traditional industries such as apparel, footwear, textiles and steel are likely to face shrinking global markets and over-capacity, driven by demand shifts and environmental concerns. *Does this mean that manufacturing is out extraneous? No*. Basically, the shifts of labor to the services sector is partly explained by inter-industry division of labor as manufacturing firms are increasingly outsourcing certain activities to service giving industries (this will be elaborated later). The fact that the services sector of most low-income economies is dominated by traditional activities implies that the potential of generating more quality jobs is limited unless the countries direct investment in industrialization.

TECHNOLOGICAL CHANGE [FASTER AND HIGHER PRODUCTIVITY GROWTH]: *The higher and rapid productivity growth in manufacturing relative to other sectors drives deindustrialization especially in mature industrialized economies, a testimony of the existence of interdependence between manufacturing production and technological innovation; hence, its greater importance in development and sustainability is beyond doubt.*

Generally speaking, productivity growth differs between regions and across countries same region. Rowthorn and Ramasway (1999) confirmed that the relative, gradual and steady fall in the share of manufacturing employment in advanced economies over the 1980s and 1990s was explained by the faster growth of productivity in manufacturing than in services sector. This may imply that productivity growth has inverse relationship with the prevailing demand for labor. Because, high-productivity firms can maintain their existing levels of output each year through the use of labor-saving technologies and logistical strategies (Kollmeyer 2009). Tregenna (2009) said that the *deindustrialization* process observed in some countries is attributed to the decline in labor-intensive manufacturing more rapidly overtime compared with services. This means that as manufacturing consistently outpaces services in productivity growth provided that the pattern of demand between the two sectors remains constant, then the growth of employment should contract in the former where demand for labor shrinks and expands in the latter where the demand for labor remains more robust. Chang (2014) argued that learning dynamics is far higher in manufacturing than in services as the use of automation, mechanization and other labor-saving technologies is more frequent in the former compared with the latter.

Conventionally, the potential for productivity improvement in (most traditional) services is predicted to be limited compared with manufacturing, attributed to their labor-intensive nature. However, recent studies evidenced that productivity increases, scale economies, technology use, and tradability are no more restricted to manufacturing, but shared by certain services activities. Nayyar (2013) argued that procuring certain services from specialist providers appears more lucrative than producing them within manufacturing industries as scale economies can be achieved in services segments that are closely linked to innovation and use of digital technology (e.g. data centers and search engines). An estimate by McKinsey Global Institute (2012) shows that manufacturers in mature industrialized economies spend 20 to 25 cents on services inputs for every dollar of output. The report further highlights that heterogeneity in gains of productivity among services is said to exceed that of manufacturing industries. The sheer weight of the high-tech services provision companies are concentrated in the technologically frontier economies, although some of these services activities are expanded in a few emerging economies such as India. Not only in advanced economies, but also in emerging and developing economies, the growing contribution of services in employment and productivity gains may induce productivity growth in manufacturing through the use of logistics, banking and IT services.

A recent study by IMF (2018) evidenced significant overlap between productivity growth among manufacturing and services sectors; the gap in productivity gains between the two sectors has dropped since 2000 across developed and developing countries. More specifically, average productivity growth in services has recently outpaced that in manufacturing in several developing countries (including China, India and some in SSA), despite the existence of differences across sub-sectors. Productivity growth in certain services activities has been as fast as the top productive manufacturing industries. As a case in point, labor productivity in transport and communication, finance and business services appeared to be comparable to, or higher than, in manufacturing industries across a sample of 19 developed and 43 developing economies. The findings further suggest that services with favorable productivity dynamics generate employment and play pivotal role in stimulating economy-wide productivity growth. This means, Kaldor's second and third Laws, which reflect the superior potential of manufacturing in productivity increases, are no longer exclusive to manufacturing.[59]

What the above suggests that the explosion of technological advancement (digital technology and automation) fosters productivity growth in the skill-and knowledge-intensive services, enabling them to serve as *'stimulus complement' to manufacturing.* What is worrying, however, is that the workforce migrated from agriculture across developing countries over the past few decades are crowding in the low-productivity traditional services segments [including wholesale and retail trade, hotels and restaurants] while some of them are non-traded and constrained by the pace of expansion in domestic demand (Rodrik 2013). Additionally, the quality of employment (measured in earnings and compensations) among the traditional services segments is far lower than manufacturing, despite in some rare cases the quality of manufacturing jobs in low-income economies may not appear better than self-employment in services. This finding is in stark contrast with Chang et al. (2013) and Chang (2014) who confirm that manufacturing continued to place labor on a productivity path that rises up to the global frontier. This gives supportive evidence for the validity of Kaldor's Third Law - the gains in productivity of other sectors is associated with innovation in manufacturing - citing examples (Chang et al. 2013).

The continued precipitous fall in the share of manufacturing industry in total employment in developed economies (such as France, Germany, the United Kingdom, Japan and the United States) is, according to Tregenna (2009), "associated primarily with falling labor intensity of manufacturing rather than an overall decline in the size or share of the manufacturing sector." But, the question is why cumulative productivity in manufacturing grows faster than [productivity in] services and other

[59] For instance, finance services in Hungary, Russia, and Slovenia as well as telecommunication services in South Korea and Lithuania exhibited above average productivity growth and increased employment shares over the 2000s. Also, services that rank the top third of the productivity growth distribution during 2000-2010 accounted, on average, for around 30 percent of total services employment and close to 20 percent of aggregate employment (IMF 2018).

sectors? The answer lies at the sector's higher potential for innovation and technical progress relative to services and other sectors. Chang et al. (2013) argued that the most productive agricultural economies in the world are heavy users of chemicals, fertilizers, pesticides and agricultural machinery. The world's most productive services economies rely on top-tier computer technology, transport equipment and in some instances, mechanized warehouses. These also take form through organizational innovations originating from manufacturing; for instance, large retail chains often apply modern inventory management techniques that were developed in manufacturing. Productivity improvement in most services are heavily dependent on technology import from manufacturing as it is the hub of innovation, although its share in GDP and employment has been shrinking mainly in advanced economies.

Again, why is innovation inexorably manufacturing-oriented? This is essentially because, the *"making" of material things is acquiescent to technological improvement, automation, mechanization, and other forms of innovatio*n. In other words, manufacturing applies mechanization, robotics, innovations and other advanced technology more than services sector, despite innovation may be low in some traditional manufacturing activities. Notwithstanding the existence of some high-tech service activities, innovations applied in services almost always need the use of new machinery and equipment, which are produced by the "machine tool"[60] industry (Rosenberg 1963; Kim 2016). This may give supportive evidence for the existence of strong links between manufacturing and innovation, where countries succeeded in moving up the manufacturing quality ladder can more likely be fruitful in innovations, climbing up the global technology frontier.

In sum, *the relative decline in the share of manufacturing employment neither repudiates its vital importance in economic development of nations nor gives strong evidence for the superiority of services sector over manufacturing to play engine of growth role. Instead, the contribution of manufacturing to economy-wide productivity growth in developed economies exceeded its share of value added, reflecting its superiority over services and other sectors in cumulative productivity* increases. This refutes the polarized service-led development hypothesis that claims the days for manufacturing to play engine of wealth creation and prosperity have already gone, leaving its place for services sector. Instead, the expansion of services that satisfy the underlying characteristics of manufacturing that gave manufacturing the traditional importance for economic growth and poverty reduction would give strong support for the *stimulus complement* hypothesis.

[60] A machine tool is usually defined as a power-driven metal working machine, not portable by hand, and powered by an external source of energy. It is designed specifically for metal working either by cutting, forming, physic-chemical processing, or a combination of these techniques.

DEMAND (CONSUMER PREFERENCE): *Continuous diversification of demand over time for manufactured goods due to the price effect is one of the internal causes of (de)industrialization.*

As already indicated in part two, demand-side approach of structural transformation hypothesizes that with the rise in per capita income, the decline in the share of agriculture in total expenditure is accompanied by the increase in the share of manufactures. With a further increases in per capita income, the demand for services may outpace that for manufactures. Does this give strong evidence for the super capability of services to achieve economic development, poverty reduction and rising living standards without core manufacturing? How could it be so! On one side, the faster growth of services demand may pertain to the dynamics of production transformation when consumers begin to demand relatively more services than manufactured goods with the rise in their affluence; this will bring down the relative share of expenditure in manufactures. For some commentators this pattern suggests that service is a by-product of development. On other side, the relative fall in spending on manufactured goods[61] is partly associated with the price effects as several manufactured goods become affordable to more consumers now than before. The fall in the price of manufactures stems from the faster growth of productivity in manufacturing relative to the total economy. For instance, the price of manufactured goods relative to the total economy in 2014 was just 70 percent of what it was in 1991 (Haraguchi et al. 2017). Most notably, the price fall for chemicals and ICT equipment benefits the overall economy as more affordable ICT investments contribute significantly to growth in other sectors (notably, manufacturing and services activities that use ICT), thereby increasing the indirect multiplier effect of manufacturing to the economy (McKinsey, 2012).

Apart from faster productivity growth, the relatively steady fall in the prices of manufactured goods compared to other goods and tradable services is explained by product and process innovation and competition in the product markets. In this case, therefore, the price fall for manufactured goods boost their demand worldwide (e.g. computers and mobile phones) and at the same time encourage firms to invest in expanding production and employment. This makes Rodrik (2016) and several other scholars to claim that the price fall for manufactured goods has phenomenal implications on the sector's weight in national accounts. Rodrik (2016) confirmed that the value added share of manufacturing in GDP at current price peaks much earlier than its share at constant price though not so early as manufacturing employment share. Such difference is explained by relative price changes

[61] The findings of Rowthron and Coutts (2004) show that the decrease in the share of monetary income spent on manufactured goods in advanced economies is explained by the drop in the relative prices of those goods rather than stagnation of the real quantity of manufactured goods consumed. The authors posit that rising imports from low-wage countries alongside productivity increase at home make manufactured goods in advanced economies so inexpensive, allowing consumers to buy much more with a smaller fraction of their income.

over the course of development. The relative share of manufacturing tends to fall as countries get richer, tending to depress the sector's share at current price.[62] Faster growth of manufacturing productivity reduces relative prices of manufactured goods through standard supply-demand channels, which in turn causes nominal manufacturing value added to reach an earlier peak than real manufacturing value added. All in all, the fall in the share of manufactured goods in total expenditure may reflect the importance of manufacturing for development. Therefore, the high-productivity, modern and tradable services can serve as *stimulus complement* to it.

As a recent UNIDO estimates show, the importance of manufacturing in consumption come out to be far greater than its contribution to GDP and employment creation; it accounts for 30 percent to 50 percent of world consumption, two to three times larger than the share in world GDP or employment. This may imply that the growth of domestic demand [attributed to population and income growth, income elasticity, etc.], hence the growth of consumer spending on manufacturing goods, triggers value added growth of the sector. The concern here relates to the sustainability of domestic demand-led growth of manufacturing output. Given the projected higher growth of population and income in developing economies, the demand for manufactured goods in these economies is expected to remain higher than that in mature industrialized economies. This may not either sound surprising for two reasons: (i) the demand growth for consumer durables and services become higher than the demand for food, textiles and apparel with the rise in income; and (ii) the consumption of manufactured goods and services would go up with the rise of the middle-class, which is dubbed as diversification of demand away from basic necessities. In turn, the higher demand for these goods would create new income opportunities for firms serving the new sources of demand (ibid). The increase in the demand for new varieties of goods produced by sophisticated manufacturing industries to an adequate level would encourage firms to shift investment to emerging sectors to produce the new products, and thereby to increase variety in the economy and improve the nominal income of workers and entrepreneurs.

In short, the price fall of manufactured goods resulting from faster productivity increases and product process innovation would boost the purchasing power of all consumers as they can allocate to new varieties of non-essential manufactured products. It is this process of continuous diversification of demand over time that gives impetus to the emergence of new industries and the creation of new varieties of manufactured goods – a key requirement for sustaining economic development over the

[62] To illustrate this proposition, he compared the pattern for Great Britain, US, South Korea and Mexico. The relative price of manufactures has more than halved in the US since the early 1960s while Great Britain saw a rather smaller decline. South Korea has been growing extremely rapidly and relative price of manufacturing sharply dropped by 250 percent. By contrast, relative prices of manufactures remain more or less flat in Mexico. In his view, these trends could be consistent broadly with a technology-based explanation for the manufacturing hump.

long-term. So, it contributes to improvement in consumers' welfare and production in other sectors of the economy that use manufacturing goods as inputs (on account of the decline in the prices of manufacturing goods).

STATISTICAL ILLUSION: *The blurring boundaries between manufacturing and services sectors/activities*

The extent of *deindustrialization* in terms of the gradual and steady decline of relative manufacturing employment share (and the increasing importance of services in this respect) is associated with 'statistical artifact' or 'statistical illusion' (Rowthorn and Coutts 2004; Tregenna 2015) that runs counter to the perspective of services-led development journey as it indicates *changes in statistical classification rather than changes in the nature of the activities*. In this context, the extent of *deindustrialization* seems to be overestimated, owing to the difficulty of clearly demarcating the boundaries between manufacturing and services activities. A wider definition of manufacturing, which would include all the services inputs embodied[63] in the final output of manufacturing, would increase the size of the sector. The Industrial Development Report (2013) prediction shows that the number of manufacturing related jobs in services sector worldwide went up from 73 million in 1995 to 95 million in 2009 partly attributed to outsourcing or 'contracting out'. *This may ive indication for the existence of a symbiotic relations between manufacturing and services.* Many activities that were previously performed in-house by manufacturing firms have been increasingly outsourced to specialized services providers, inducing a reclassification of manufacturing activities in favor of services. More precisely, several services activities used to be done in-house by manufacturing firms and hence, counted as manufacturing output such as design, IT, communications, data processing and engineering activities, banking, insurance, accounting, R&D, transport and logistics (cleaning, catering, security guards), legal support, and post-production services (such as marketing and sales,

[63] Embodied services are specialized services bought by manufacturing firms to be used as input in the production stage of manufacturing value chains and contained in the final assembly (Heuser and Mattoo 2017). Such services can either be performed in-house by a firm's department or outsource from external suppliers or services firms (Kelle 2013), depending on the firm's decisions on whether to internalize a particular activity or keep it external. Manufacturing firms outsource services activities which have conventionally been provided in-house on their core manufacturing competences, seeking to separate services functions in manufacturing from core manufacturing production. In this case, the activities move from the manufacturing to the services sector with the consequential effect of raising the share of services in GDP, creating statistical illusion. Additionally, manufacturing firms may find it more profitable to 'contract' out services activities to specialist providers than to produce them in-house attributed to larger scale and the application of new technologies that increased the complexity of production, which refers to 'splintering' (Bhagwati 1984). Some scholars contend that more intensive use of services inputs by manufacturing enterprises is associated with the development of global value chains (GVCs), where firms increasingly outsource tasks in the value chain and thereby boost the demand for services providers (Baldwin and Lopez-Gonzalez, 2015). The 'service transformation' literature documents that ICT advances and lower trade costs made services becoming an integral part of regional and GVCs. As services are no longer constrained by domestic demand, they can be expanded and exposed to international competition, which may in turn, enhance the sector's productivity. The new digital technology dynamics make services to intensively use ICT and manufacturing to be more capital-intensive; hence, employing more high-skilled workforce in both sectors.

customer support) are outsourced to specialist service providers (see Palma 2005; Rowthorn and Coutts 2004). The outsourcing of such manufacturing activities have thus become one source of *de-industrialization* in high-income (and possibly also in middle-income) countries particularly since the 1980s.[64] Hallward-Driemeier and Nayyar (2017) assert that *premature deindustrialization* may be attributable, at least, in part to outsourcing, whereby what was earlier classified as 'manufacturing' are now 'services' and therefore, what was earlier subsumed in manufacturing value added is now accounted for as services sector contributions to GDP– which is generally referred to as *statistical artifice*.

The outsourced activities are not considered as pure services though their value added is counted as services output rather than manufacturing output. Not only do the jobs created in those non-pure services activities show up as 'services' sector jobs but also services become bloating with no real change in the activities undertaken. These activities 'are triggered by manufacturing growth; they linger somewhere on the periphery between the two sectors' (UNIDO 2012, 2013). In short, the blurry distinction between the two sectors not only makes the measurement of inter-sector interactions more complex, but it makes the hypothesis that modern services being '*stimulus complement'* to manufacturing crystal clear. In the words of Ha-Joon Chang, manufacturing firms are "doing" much more than "making" products in a way to meet the needs and requirements of their customers. Most often, services offered in this case can either be explicit (such as pre-and post-sales service of a product) or embedded[65] in the solution (such as design activities).

The "simple curve" illustrated in Annex III, figure 3 unveils that the core production phase in manufacturing goods value chain is increasingly the less pivotal part in the creation of value-added from producing goods. All in all, the services sector needs manufacturing firms. In turn, manufacturing firms need services such as telecom and travel to connect workers in global production networks, logistic providers, banks and IT service providers.[66] For instance, estimate

[64]Policy makers and experts in mature industrialized economies expressed their concern that the offshoring of manufacturing production may lead to deterioration of 'industrial commons' (Pisano and Shih 2009) and hence, losing the capacity to innovate next-generation technologies, and innovative products. In other words, the deterioration of industrial commons underpinned by dynamic manufacturing industries may result in the decline in the important technological capabilities that stem from the interaction between product development, next-generation production technologies and process engineering. So, the deterioration of industrial commons, comprising reduced operations by local suppliers of materials, components and production technologies; a decline in process engineering skills, manufacturing know-how and leadership; a deterioration of prototyping, test-bed and pilot-manufacturing infrastructure (O'Sallivan and Mitchell, 2013 pp. 43), may risk reducing the country's capacity to compete in some of the most important new industries.

[65] Embedded services are services that are produced by manufacturing firms and sold to the consumer often bundled with goods (The National Board of Trade, 2016).

[66] In the US alone, 47 million jobs in the sector depend on business from manufactures. If one counts those and one million primary resources jobs related to manufacturing (e.g. iron ore mining), total manufacturing-related employment in the US would have totaled 17.2 million versus 11.5 million in official data in 2010. If outsourced services are included, services jobs in US manufacturing-related employment exceeded production jobs; 8.9 million in services versus 7.3 million in production. And, for every dollar of output, US manufacturers use 19 cents of services inputs, generating USD 900 billion a year in

shows that, depending on the segment, 30 to 55 percent of manufacturing jobs in advanced economies are service-type functions, and service inputs make up 20 to 25 percent of manufacturing output (McKinsey 2012). Berlingieri (2014) reported that the share of employment in professional and business services in total employment went up by 9.2 percentage points in the US during the period 1948 to 2007, contributing to 40 percent of total employment in services. When finance and real estate are included, the contribution to total employment growth and GDP growth in US services stood at 50 percent and 94 percent, respectively. Likewise, Neuss (2016) documents that finance, real estate, professional and business services saw substantial growth in Europe since 1970. Accordingly, employment in those services was multiplied by 3 in the EU15 between 1970 and 2007, which corresponds to average annual growth rate of 3.1 percent. In contrast, economy-wide employment grew only at 0.2 percent. The large part of the growth in employment was accounted for by professional and business services with their share in total employment increased from 3.4 percent to 12.7 percent over the same reference period.

The above point suggests for the dependence of services on manufacturing, at least for two reasons: (i) productivity increases in services sector is possible through the use of productivity enhancing inputs from manufacturing. As a case in point, Chang (2014) argues, technology advances in software and ICT services would not come to reality without advancement in ICT hardware produced in manufacturing such as silicon technologies, data storage and data transport and data infrastructure; and (ii) business services that saw impressive growth in the past few decades [such as banking and insurance, communications, etc.] as well as producer services [that comprise transport, design, retail, supply chain management and engineering] were depending heavily on manufacturing firms as their customers.

Schmenner (2008), conjectures that the distinction between manufacturing and services firms (that took manufactured products to market or supplied manufacturers with their raw materials) was clear before the late 1800s. Antecedents to the services-led path to growth had traced back to the 1850s when almost all manufacturers were engaged in manufacturing, offering no services whatsoever. Thus, firms lacking manufacturing strength pursued a business strategy of bundling manufactured goods to downstream services in a way to establish barriers to entry for potential competitors. Conversely, those companies that led the way for providing bundles of goods and services (PSS)[67]

demand for services while services create USD 1.4 trillion in US manufacturing demand. In China, this interdependence amounts to USD 500 billion in services demand and USD 600 billion in manufacturing demand (McKinsey 2012).

[67] Baines et al. (2007) described such combination of goods and services as a special case of *servitization* which values asset performance or utilization rather than ownership, and achieves differentiation through the integration of product and services that provide value in use to the customer. Put in other words, PSS is a specific type of value-proposition that inherently focuses on fulfilling a final need, demand or function (Tukker and Tischner, 2006). Sawhney, Balasubramanian and Krishnm,

together dominated their industries for decades. A number of manufacturers producing new and innovative products had managed to integrate their offerings with services to help marketing and controlling the supply chains. With the increasing outsourcing of services activities (particularly production-related services), the bundle of interactions that connects manufacturing to services became increasingly dense. He posits that greater *servitization*[68]occurred among manufacturers of high technology products that are not produced by continuous flow processes.

It should be noted that bundling of goods and services [69] is a manufacturing business model - a move by manufacturing firms from selling a product to selling product-centric services or a move from a transactional manufacturing business model to a relationship model where through service provision value is co-created with the customer as the product is used. Cook (2004) classified PSS into three classes: Product-oriented PSS, use-oriented PSS and result-oriented PSS[70]. They all can affect the distribution of value added across industries - create value which may end up either in manufacturing or in different service segments, depending on the type of PSS. In such system, therefore, the lines between manufacturing and services are increasingly blurred. The high share of firms selling goods and services indicate that product-oriented PSSs are common, for instance, with respect to

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2004) highlighted that traditional manufacturing firms were motivated by to cope with market forces, recognizing that services in combination with products could provide higher products than products alone. This may imply that manufacturing firms combines goods with services to increase the value of products to users, to differentiate products from competitors, to customize, upgrade and prolong offers (Cusumano, Khal and Suarez, 2015). This could be done at different stages of sales and after-sales relations with the customer (such as installation services, repair services, maintenance services, etc.), usually using service as a complement but also as a substitute for manufacturing product (e.g. firms lease products rather than sell them). Baines and Lightfoot (2013, cited in Baines et al. 2016) classified the services manufacturing firms offer into two categories: (i) base services (e.g. goods and spare parts); (ii) intermediate services (e.g. helpdesks, training, maintenance, product repairs, condition monitoring and overhauls); and (iii) advanced services (e.g. customer support agreements and outcome contracts).

[68] The expression 'servitization' (first appeared in Vandermerwe and Rada 1988) is defined as "the increase in sales of services by manufacturing firms either as substitute or complement" (Cusumano et al. 2015) or "a process of building revenue stream for manufacturers from services" (Baines et al. 2007).

[69]Van Ostaeyen et al. (2013) has criticized this classification for failing to capture the complexity of PSS examples found in practice and proposed an alternative that categorizes PSS types according to two distinguishing features: the performance orientation of the dominant revenue mechanism and the degree of integration between product and service elements. According to the second distinguishing feature, a PSS can be designated as segregated, semi-integrated, and integrated, depending on to what extent the product and service elements (e.g. maintenance service, spare parts) are combined into a single offering.

[70] Under Product-oriented PSS, the ownership of the tangible product (e.g. an automobile) is transferred to the customer, with additional services such as maintenance contracts and financing scheme. In this case, the company sold to the customer a full solution that takes care of the financing and maintenance so that the customer does not have to deal with other companies and spend time arranging everything required to own the car. In use-oriented PSS, the ownership of the tangible product is retained by the service provider who sells the functions of the product through modified distribution and payment systems such as leasing, renting, sharing and pooling. What is sold to the customer is the usage rights. If for instance, a customer rent or lease a product (e.g. automobile) instead of buying it, the contracting firm retains the ownership of the product but the customer get a very similar solution in terms of having the product without dealing with its maintenance and financing. However, the contracting company provides a service and will now be classified as a service company if this is its principal activity. Result-oriented PSS is a PSS where products are replaced by services that directly fulfil the customer needs; for example, voicemail replacing answering machines. When transportation services in a car from one location to another is sold to the customer (in a taxi or with a private driver), the company will be classified in the service sector if that is its main activity.

intermediate services such as maintenance and repair as well as installation services that come with any machine or equipment. On the other hand, Bernard et al. (2017) contend that firms that switch industries (such as Xerox[71]) can explain a significant part of the *deindustrialization* process observed in some economies. The fact that the principal activity of a firm switched from manufacturing to services meant that the business model has an impact on the boundary between manufacturing and services. *Does this all give supportive evidence for the irrelevance of manufacturing? No. Empirical studies rather confirm its continual importance.*

Regardless of the difficulty in measuring the interactions between manufacturing and services on account of outsourcing, empirical studies on the connection between manufacturing and services activities using input-output Tables lent supportive evidence *to the existence of strong interactions and interdependencies between the two sectors, and to the continued pivotal role manufacturing plays in production transformation and sustainable development*. Indubitably, this relationship is said to have had different magnitude across countries with level of development. *Much as the symbiotic relationships between agriculture and manufacturing at the early stage of development, there would be strong linkages between manufacturing and services sectors at more advanced levels of development*. The seminal work by Park and Chan (1986) is worth reviewing here. They examined the linkages between the two sectors through cross-country analysis of input-output Table, and found an 'asymmetric dependence relationship' between the sectors. Their findings show that service activities tend to depend largely on inputs from manufacturing than vice versa. In addition, manufacturing is an important source of demand for modern intermediate service inputs such as financial services, transport and logistics and business services. The capability of the services sector to generate and sustain a high level of employment rests heavily on its vital linkages with manufacturing. Their findings show that manufacturing has larger multiplier effects than services, generating two- to three-fold larger impacts on the economy because of the denser backward-and forward-linkages formed within and around it. This meant that the services sector exhibits fewer inter-industry linkages than manufacturing does. In terms of indirect multiplier effect, manufacturing is playing central role in fostering employment opportunities in the services sector. In sum, *Park and Chan theorize the existence of a symbiotic relationship between services and manufacturing wherein*

71 Xerox was an American Photocopier manufacturer, which now positions itself as an enterprise for business process and management. The company is now engaged in document publishing and production services, document management and business process outsourcing with most of the photocopy machines now provided as part of a subscription covering all office document-related needs with a fixed price per copy. In short, Xerox moved from a photocopy manufacture to technology-led service provider, "providing a service of managing documents from the moment they are created (whether by hand or machine) via the copying, distribution and archiving activities."

the "growth of the service sector depends not only on that of manufacturing sector, but also structural change of the former is bound to affect the latter."

The findings of Guerrieri and Meliciani (2005) suggest that the capacity of a given country to develop competitive and export specific services activities (such as finance, communication and business services) relies to a large extent on structural and technological composition of its manufacturing industry. This is straight-forward as different manufacturing industries require different producer services and tend to use them with different degrees of intensity. To be more specific, some manufacturing industries (such as office and computing machinery, electrical apparatus, industrial chemicals and the like) are more intensive users of producer services than others. Their findings also suggest a 'virtuous cycle' in that the same service producers can be intensive users of these producer services while Information and Communication Technologies (ICT) would have phenomenal implications on trade performance of these producer services. Additionally, their findings give insight on the central role manufacturing plays in generating demand for the growth of skill-intensive and high-productivity services. This meant that the growth of services sector is closely connected to manufacturing, and hence, the quality of the high-productivity services activities of a country relies to a large extent on the strength of its manufacturing industry. That is why Change (2014) argued that manufacturing remains the driving force for new productive knowledge to the rest of the economy, validating the claim that *knowledge-intensive services are in one way or another spin-offs from manufacturing production*.

Similarly, Pilat and Wolf (2005) found that manufacturing industries appear to be interacting much more strongly with other industries than services both as providers and users of intermediate inputs, albeit the increasingly blurry boundaries between the two sectors. Region wise, manufacturing in mature industrialized European economies is interacting more with services than before – that is, *manufacturing uses more intermediate services and employs an increasing number of services-related labor force. This trend is partly to do with outsourcing, which overestimates the use of services in manufacturing, and with rising interdependencies of manufacturing output with some skill-intensive services (such as ICT). However, the role of manufacturing is far greater than that of services sector, despite services are now contributing more as providers of intermediate inputs and services related workforce to the performance of other industries.*

At least four observations can be drawn from the empirical works reviewed above and similar other studies: (i) modern services activities may play important role in the economy as manufacturing has done in the past if only they are interacting with sophisticated and newer manufacturing activities with technological breakthrough; in that case, the linkages between the two sectors is expected to be strong at more advanced levels of development than at early stages of development; (ii) technological linkages that stem from manufacturing industries can bolster the capacity of a country to spawn technological change. In this regard, the pivotal role played by certain 'mother industries' (often called the machine tool industries) should not be neglected to have full picture of how and why manufacturing matters (a brief review will be given below); (iii) manufacturing is important source of inputs for services activities and of demand for modern intermediate services inputs including financial, transport and logistics, and business services. Although the two sectors use each other's inputs, manufacturing depends less on services than the other way round; (iv) the fact that business and producer services contribute to smooth operation of manufacturing may support the claim for the synergetic relations between manufacturing and skill-intensive services, with the latter serving as *'stimulus complement'* to the former. Given that producer services have strong and close linkages with manufacturing production, countries may benefit from both exporting these services and co-locating them within national boundaries. Seeing from this angle, countries that lose their competitiveness in manufacturing may possibly lose most important services. In some manufacturing industries, outsourcing may appear more sensible than producing (e.g. desktop computers, consumer electronics, active pharmaceutical ingredients and commodity semi-conductors) while in others the risk of separating these activities are enormous (e.g. Biotech drugs, nanomaterial, etc.). The fact that *the bulk of the more dynamic services activities rely on a strong manufacturing base meant that manufacturing can still have the potential to be growth escalator while the dynamic services activities could become "stimulus complement" to it;* and (v) *if the presumption that calls for bi-causal relationship between manufacturing and services works, developing economies can diversify their production structure in the direction of manufacturing with the services sector serving as "stimulus complement" to manufacturing*.

Some recent studies have opted to use the Global Value Chain (GVC) approach to tackle the statistical challenge in measuring manufacturing and services sectors employment and output. With a view to reinforce the key observations presented above, the relative shares of manufacturing, agriculture and services sectors are given in Table 2, which are based on input-out Tables for 43 countries (developed countries and the BRICS) and 56 industries over the period 2000-2014 (World Input-Output Database, Timmer et al. 2016).

Table 2: Share of manufacturing and services employment and value added at current price

	Employment Share (percent)				Value Added Share (percent)			
	2000	**2005**	**2010**	**2014**	**2000**	**2005**	**2010**	**2014**
Primary	37	33	29	26	4	5	6	7
Manufacturing	14	14	14	15	18	17	17	17
Services	49	53	57	59	77	78	77	76

Note: The input out Tables account for 85 percent of world output and there is also a 'rest of the world' for the 15 percent of remaining output so that any trend observed reflects the entire world economy except for data on employment. The rest of the world is not included in the socioeconomic accounts of WIOD.

Source: World Input-Output Database (WIOD)

Three observations are evident from the Table: (i) the relative share of manufacturing employment remained stable moving from 2000 to 2014 while the relative share of the primary sector has decelerated by 11 percentage points and that of services increased by 10 percentage points,; (ii) the share of the primary sector in value added is far smaller than the share of the services sector, which amounts to two-quarters of the world GDP, despite showing a one percentage point fall from 2000 to 2014; (iii) based on the stylized facts of structural transformation, one may predict the movement of employment from the primary sector to manufacturing (and also from agriculture to services sector) in developing economies and from manufacturing to services in advanced countries; and (iv) *deindustrialization* of different sort (or teritarization) might have appeared at country or firm level rather than at aggregate level.

TRADABILITY: *Most services are non-tradable meant that services cannot substitute manufacturing but play a "stimulus complement" role.*

International trade theory postulates that trade allows countries to specialize in different types and varieties of goods and services according to their capabilities. This, combined with the physical properties of most manufactures (tangibility, durability, and transportability), elucidates why manufacturing remains dominant in international trade. True that certain services (such as ICT, banking, insurance, business services, etc.) have become more tradable, attributed to the increasing connectivity of global businesses, technological development (typically, the drop in the cost of phone calls and use of the internet) and the reduction of regulatory trade barriers (Ghani and Kharas 2010). A recent report by McKinesy Global Institute Analysis confirms that emerging economies have exported close to 40 percent of their total output in business services and ICT in 2016. India[72] is the

[72]Loungani et al. (2017) confirm that India became the largest exporter of telecommunications, computer, and information services in the world, with an export value of USD 74 billion in 2014. Also, it has exported more than 95 percent of the industry's output in 2016, exceeding South Korea (61 percent) and Poland (53 percent).

most cited success story in the export of services [and hence, a prototype of service-based growth]. Globally, trade in business services and ICT represent 40 percent of total services exports; travel and logistics services amounts to 40 percent and financial services 10 percent. Growth in the exports of business services and ICT raised the share of the services sector in total exports worldwide from 20 to 24 percent.

Heuser and Mattoo (2017) evidenced that the share of services in global trade is growing in value added terms attributed partly to the growing use of services as inputs mainly in manufacturing – which is referred to as *international servicification*. In other words, the share of services in value added trade is substantially larger than the share of services in gross trade. As can be evident from Table 3, services export measured in value added terms increased to 43 percent in 2009 from 31 percent in 1980 while services export share measured in gross exports increased marginally from 18 percent to 21 percent over the same reference period. Global exports in services as a share of total world gross exports has increased marginally from 20 percent in 1980 to 22.5 percent in 2016.

Table 3: Gross exports and value added exports of goods and services as a percentage of total world gross exports and total world value added exports, respectively (%)

	Gross exports of goods and services as a percentage of total world gross exports		**Value-added exports of goods and services as a percentage of total world value added exports**	
	Goods	**Services**	**Goods**	**Services**
1980	82	18	69	31
1995	80	20	61	39
2009	79	21	57	43

Source: Heuser and Mattoo (2017) based on Johnson and Noguera (2016)

According to Miroudot and Cadestin (2017), the overall contribution of services to exports would be large if services embodied in manufacturing exports are included. To this end, they decomposed services exports into services directly exported (that is, exports of services companies) and those embodied as inputs – that is, services as a final good exported directly or as an input exported indirectly via manufactures. Based on data from sample of OECD countries (with two data sources: TiVA databse, labor force surveys and ORBIS dataset), they found that services input, whether domestic or foreign, accounted for 35 percent of the value of manufacturing export. Given that manufacturing firms can produce services in-house and by adding such services activities, the share of indirect services value added in manufacturing exports is estimated to raise to 53 percent. When combined with the direct services exports by services firms, this brings the total contribution of services exports to two-thirds.[73]

Notwithstanding the increasing tradability of some services activities, manufacturing goods are still more tradable than those services. The bulk of traditional services are less tradable, chiefly because they require proximity between consumers and producers [e.g. eating in a restaurant, getting a haircut, medical examination, cleaning, grooming, public utilities, etc.].This may not be the case with manufacturing goods. So, countries that maintain strong manufacturing base can foster their export earnings, hence benefiting the whole economy through easing balance of payment constraints. When the export basket of an economy is dominated by manufactured goods, it would generate foreign exchange earnings in sufficient amount so that it can cover increasing import costs and demonstrate productivity increases and sustainable growth. This may not be the case with countries that intend to follow services-led growth (especially, countries where traditional and non-tradable services activities dominate), as they may face challenge with easing trade balance constraints. That is why this dissertation claims that services can serve merely as *'stimulus complement'* to manufacturing rather than becoming the new growth escalator 'substituting manufacturing.'

Interestingly, some producers and business services, which are considered tradable, would in many cases located within the national boundaries of the firms that they serve. According to Pisano and Shih (2012), in the UK and the US, software services, information technology services, R&D services and management consultancy services are often developed and specialized to serve a core manufacturing activity. This may suggest that all countries need manufactured goods; but, low-income countries with large population may find it difficult to afford the import of all manufactured goods. In most of these economies, foreign exchange reserve position is low and hence, governments set tight capital controls. So, it is almost impossible to be successful in international trade and have a healthy trade balance without building strong manufacturing sector. A comparison of China and

[73] The other major findings of their study are: (i) all manufacturing industries relied on the same mix of services inputs: distribution and business services constitute one-third share each while transport, finance and other services took up the remaining one-third; (ii) services value added in world manufacturing exports registered a one percentage point growth in between 1995 and 2011; industries exhibited higher percentage points were utilities (8 points), wood products, paper, print and publishing (5 points). Country wise, the services value added in China and the US influenced the aggregate results, though no meaningful changes were observed in the value added (slightly dropped for China and increased for the US); (iii) manufacturing exports tend to rely heavily on foreign services outsourcing from abroad: in 2011, all manufacturing industries had higher shares of foreign services value added with above three percentage increases in such industries as chemicals, rubber and plastics, ICT and electronics while domestic services value added plummeted in most manufacturing industries. Interestingly, all sampled economies excepting China and the Philippines have shifted towards foreign services inputs. More specifically, above 8 percentage point growth of foreign services value added in gross manufacturing exports was observed in Ireland, Luxembourg, Poland and Turkey; (iv) the share of services employment in manufacturing firms was trended upward. A larger share of employment for core manufacturing activities tended to concentrate in traditional low-tech manufacturing industries such as textiles, and apparel, wood or non-metallic minerals. Expressed in value added terms, in-house services fetch on average 15 percent of gross manufacturing exports; and (v) firms engaged in the sale of both goods and services account for share of total sales and exports up to 69 percent.

India may shed some lights: *India is considered by many as a success story in the export of services (comprising software, accountancy, and the reading of medical scanning images) while China has seen manufacturing-led growth journey (has a big industrial base), gaining almost 16 percentage points of world manufacturing in just two decades.*

Some scholars are prescribing a service-led development route, following India. However, India's manufacturing base is not weak as compared to its peer lower-middle income countries. It is one of the 6 rapidly industrializing nations (China, Korea, India, Poland, Indonesia and Thailand). As to whether service-led growth in India enables it to sustain its growth trajectories and to climb to high-income level and whether service-led development route is inclusive needs an empirical exercises based on input-output Table. As can be evident from the first row of Table 4, the share of manufacturing exports in total gross exports of China was above nine-fold of services in 2015. In contrast, the sectoral share of exports in India was relatively balanced, where export earnings from manufacturing and services [74] accounted for 54.9 percent and 43.3 percent of total exports respectively. Surprisingly, services exports value in absolute value terms appeared comparable between China (USD 212 billon) and India (USD 176 billion).

Table 4: Manufacturing and services exports as a percentage of total gross exports and total value added exports for China and India, 2015

	China			India		
	Man.	Serv.	Other	Man.	Serv.	Other
Gross exports as % of total gross export	89.1	9.7	1.2	54.9	43.3	1.8
Gross exports as % of total value added export	50.7	34.8	14.5	29.7	51.7	25.3
Decomposition of manufacturing exports, VAD	55.8	29.7	14.5	49.5	25.2	25.3
Decomposition of services exports, VAD	9.2	84.1	6.7	5.7	87.0	7.3

Source: OECD TiVA Database

However, as already said, the contribution of services is alleged to be different whether one follows a balance of payment statistics or value added approach. Generally arguing, the increasing use of specialized services inputs in manufacturing is difficult to capture through gross services flow while conventional trade statistics cannot distinguish the sources of value added in terms of country and

[74] However, disaggregation of services by sub-sectors suggests that traditional services (including trade, distribution and transport) took the lion share of services export in China and IT services followed by transport, trade and other business services in India. This may give insight on the production composition of the respective countries: China is a mega economy, managed to build a big industrial base with its services export concentrated in traditional services to meet the high demand from its manufacturing industry while India maintains a good services sector and competitive manufacturing industry with IT or computer services dominate its services export.

sector origins. For instance, the study by the National Board of Trade (2016) for sample of European Union countries in between 1995 and 2011 revealed that services input constitute, on average, 27 percent of the cost share in manufacturing, of which 13 percent was imported (there has large differences across countries with respect to average import share, though). The report shows that manufacturing companies are important services exporters; at country level, services exports coming from manufacturers (when manufactured goods are exported with embedded services) account for 25 percent of total services exports in Germany and Sweden; 35 percent in Italy; and 16 percent in Austria and Czech Republic; EU's average share of services value added in manufacturing exports amounted to 39 percent in 2011, grew by two percentage points from 1995, though cross country differences was substantial.

Focusing on row two of Table 4, the share of services in export is still dominant while the manufacturing share of exports in China dropped to 50.7 percent from 89.1 percent. In both countries, the share of services value added in exports exceeds its share in gross exports. However, the share of manufacturing in China exceeds that of services share and the reverse is true for India. The percentage share (decomposing manufacturing and services exports separately) given in rows three and four provide some similarities. In both countries, the value of services exports was driven from services only, but the largest share of the value added for manufacturing exports was originated from the services sector. This may be explained by the nature of the services sector itself – as for instance, logistics, finance, transport and communication may have more scope to integrate into the manufacturing sector especially if production is carried out across borders.

The fact that India has large number of surplus labor in its agriculture sector [that should be reallocated to more productive activities such as manufacturing] as the high-tech and high-productivity services segment can only generate little employment opportunities for the growing labor force, which makes the importance of manufacturing ever more clear. In short, the tradable and skill-intensive services activities cannot generate adequate employment opportunities in countries where large portion of the labor force is still taking refuge at agriculture, and informal and vulnerable activities. This underscores the importance of manufacturing in quality job creation.

CONTRIBUTION *TO TECHNOLOGY DEVELOPMENT:* *The fact that National Innovation Systems are necessary conditions for creating the learning process that would permit structural change towards high-tech sectors, which are concentrated in manufacturing, meant that services can play a "stimulus complement" role in countries that also build a dynamic manufacturing core and rapid productivity and income growth than otherwise.*

A manufacturing firm uses natural resources, raw materials of the primary production, and services inputs to make complex and useful products such as transportation, retail, business and repair and maintenance services. The sector inherently provides human beings with vital things such as clothes to wear, cars and vehicles to get *around* in, electronic equipment to be entertained with, and information networks to learn from, etc. In contrast, most services sector components are either part of manufacturing or completely dependent on manufacturing for their existence. That is why Ryn (2000) said, an economy without manufacturing is a pre-industrial economy, not a post-industrial economy, and that a modern nation without strong manufacturing base will become a colony of other nations in fact if not in name. Here comes the pivotal role of the *production machinery* and hence, contribution of manufacturing in wealth creation. The fact that innovations in services sector almost always require new machineries and electronics equipment suggest that manufacturing is still germane for transformation and development of an economy and for every country. In other words, the economic system is highly dependent on manufacturing, as the use of "machine power" induces labor productivity far more than was possible using "muscle power." A look into the evolution of the "machine tools" industry and the use of machines in other sector corroborates this claim.

The various machines utilized in the production of goods and services are products of the "machine tools" industry. In other words, manufacturing industries use "machines tools", also called 'the mother of machines', to make other machines and produce a range of equipment and products in use by other economic sectors. These machines are key capital goods. As such, the technology level of machine tools in a given economy determines the working accuracy and the level of that country's machine and manufacturing industries (Kim 2016; Rosenberg 1963). Kim (2016) contends that interim relationship between machine tools industries and their customers contributed tremendously to the growth and expansion of manufacturing industries. He confirmed that Japanese machine tools products support the growth and strong competitiveness of various manufacturing industries in the nation. While examining the case of machine tools in Taiwan and Japan, Fransman (1986) showed the importance of technical and productivity change, the causal mechanisms underlying economic growth and the role of the state. His findings suggest that machine tools industries are the hub of manufacturing engine, confirming Rosenberg's claim. And, they are now widely utilized in manufacturing industries and other sectors that involve metals – mechanical engineering and construction, computers, automotive and aerospace, wind turbines and satellite, etc.

The machine tool industry exhibited deep transformation (i.e. remarkable technical advancement that pushes the technological frontier) during the 20th century (Arnold 2001). The machine tool industry, being a knowledge-intensive sub-sector of manufacturing industry, transfer knowhow and technology to other manufacturing industries which would induce their capacities to produce new products. Machine tools not only boosts the productivity and competitiveness of the manufacturing base of a country, but it also increasingly enables the working of complex production systems in which the traditional manufacturing tasks are intertwined with service activities and new technologies; enables the transfer of the latest technological development in ICT or material sciences into production systems that raises the efficiency of the productive process and develop new materials that are used in new fields of application comprising railway vehicles, ship building, aerospace and automobile industries (CECIMO 2011). It also facilitates the accumulation of engineering expertise that cannot be easily copied/reproduced by competitors, which may give producers with a certain competitive advantage in international markets and a 'first mover' advantage in the development of future products and processes.

Countries with long traditions in making machine tools (producing high-end machines) such as the US, Germany, Japan, Switzerland and Italy dominate the world market. China, South Korea and Taiwan follow. There is evidence that countries that saw their machine tools industries declined have reduced their capacity to make capital goods and their manufacturing output became increasingly dependent on imported machinery for making goods and as a result lost economic dynamism. In short, those mature industrialized nations that entered the phase of *de-industrialization* were the ones which gradually and steadily lost their higher shares in machine tool production worldwide. While both Asia and Europe contributed significantly to the global machine tool consumption boom from 2003 to 2008, Asia alone was largely responsible for the second boom in 2010 and 2011 (see annex III, figures 4a and 4b). By 2014, the top six major producers of machine tool were China, Japan, Germany, Italy, South Korea and the US while consumption rank of these economies was China, USA, Germany, South Korea, Japan and Italy. By that same year, 26.9 percent of world machine tools production was concentrated in China and 26.1 percent went to Germany, Italy and Switzerland in the Euro zone. Japan and Korea maintain a share of 16.2 and 6.2 percent, respectively. The US accounted for close to 6 percent, a growth by two percentage points from 2010 (The Guardian Research, 2016).

The data suggests that the largest share of global machine tool production goes to Asia; it is also the major consumer and exporter of machine tools. As a result, the US and Europe have lost global market share in machine tools as a result of the shifts of machine tools production to Asian countries over the last forty years, wherein the US lost 77 percent in machine tools production. In contrast, machine tools production in Japan and Germany was on the rising territory until 1995 reaching, respectively, at 22.5 percent and 16 percent of the global machine tools production. After the mid-1990s, the market share in global machine tools production for Germany, the UK and Italy fell from

22.6 percent to 16 percent; from 85 percent to 8 percent; and from 2.7 percent to 1.7 percent in that order. In contrast, machine tools production in China was trending upward, enabling it to become the biggest producer with 32 percent share of global production of machine tools (Rynn 2010).

The use of machines in non-manufacturing sectors/activities induces labor productivity, permitting them to move from low productivity to high productivity. As a result of using machines, labor productivity of agriculture and services sectors in some developed economies is high. This implies that the sophisticated machines produced by the manufacturing industry may enable countries to modernize their agriculture and services sectors. Modernizing or industrializing non-manufacturing sectors/activities is unthinkable without manufacturing (or the capacity to produce and services machines). The fact that developing the manufacturing industry to a certain degree is key for many developing countries to catch-up meant that services sector can only serve as *"stimulus complement" to manufacturing, not its perfect substitute.*

R&D INVESTMNET: *The close links between R&D investment expenditure and manufacturing (Berger 2011) reflects the growing importance and knowledge-intensiveness of manufacturing***.**

In contrast to the gradual shrinking in the share of manufacturing employment and value added, it accounts above two-thirds of total R&D investment during 2014 in the European Union, indicating its high innovation potential relative to other sectors (see Annex III, Figure 5). Expansion of low-cost manufacturing industries in developing and emerging markets made the competition stiff for advanced economies and, hence compelled them to increase investment in R&D. For instance, in 2011, R&D investment expenditure in manufacturing had amounted to 60.3 percent of the total R&D expenditure, far exceeding investment expenditure in services that took 35 percent. Manufacturing share of R&D was 70 percent or more in countries such as Germany, Italy and Sweden. Interestingly, the share of services sector in R&D investment has been gradually increasing within European Union; in countries such as Estonia, UK, Ireland, Portugal and Poland, the share of R&D in services is always exceeding that of manufacturing. The WTO (2013) report highlights that R&D expenditure in services activities was on the positive territory, increased on average from 6.7 percent per year of total business R&D during 1990-1995 to close to 17 percent per year during 2005-2010. This may indicate the rise in R&D investment in certain services segments, the outsourcing of R&D to specialized laboratories that fall under the domain of services sector, and better measurement of R&D in services (Lopez-Bassils and Millot 2013).

R&D intensity in manufacturing was found higher than other sectors. But, not all manufacturing activities have similar scope for technology intensity, innovation, productivity gains and sales growth. As such, chemicals (pharmaceuticals, rubber and plastics), motor vehicles and electronics equipment accounted for the lion's share of private R&D expenditure, so that they maintained the highest R&D intensity of all manufacturing activities. Pharmaceuticals have the highest R&D intensity among the two; electronics, cars and chemicals have more medium R&D intensity rates.

There also exist differences across countries in terms of R&D intensity: manufacturing in the US and Japan appeared four times more R&D intensive than the total economy. R&D intensity of the sector exceeded other sectors in Euro areas. Korea has one of the strongest innovation records, making it the driver of R&D [investment allocation to R&D in the country reached 4.3 percent of GDP in 2014 – according to OECD stat]. In electronics, the US and Japanese manufacturers stand out with the highest R&D intensity, compared to their European counterparts. According to Ezell and Atkinson (2011), nonetheless, 90 percent of all electronics R&D took place in Asia as a result, to some extent, of the scale of production required to be able to afford general R&D. They assert that US corporations have invested more than 2.65 times in overseas R&D than domestically. Pisano and Shih (2009) reported that every US brand notebook computer, but Apple, is designed in Asia now; the same is true for most cell phones and many other handheld electronic devices.

FDI INFLOWS: *Distribution of FDI by economic sector reveals the relevance of manufacturing.*

The fact that manufacturing takes the preeminent position in terms of FDI flows relative to services sector suggests its importance in the transformation and development process of an economy. Between 2003 and 2011, manufacturing attracted 42 percent of total Greenfield investment, followed by mining, construction and utilities combined (29 percent). Services accounted for 28.6 percent. Within manufacturing, 47 percent of Greenfield investment projects went to electronics, electrical equipment, machinery and motor vehicles, making manufacturing the core of technological change in the wider economy. So, differences among sectors matter (Table 5).

However, with no surprise, there exist regional differences. In Least Developed Countries (LDCs) and Other Developing Economies (ODEs), the resource intensive sectors (metals, food, furniture, textiles and paper) attract the bulk of FDI, collectively amounting to 43 percent in LDCs and 33 percent in ODEs, which is in stark contrast with Emerging Industrialize Economies (EIEs) (25 percent) and Mature Industrialized Economies (IEs) (26 percent) (Jacob and Sasso 2015). This implies that FDI projects in low-tech, natural resource-based manufacturing are largely go to non-EIE developing countries. There is no wonder here as FDI firms are often resource and market seekers. The distribution of FDI[75]projects within manufacturing industry follows similar patterns for

[75]By contrast, comparison of sectoral expenditures on R&D to number of FDI projects financed shows that the coefficient tends to be higher in manufacturing (0.85) followed by services (0.69) and mining, construction and utilities combined (0.40). Low-income countries may lack the required capabilities to effectively compete with emerging

mature and emerging industrialized economies, where almost one out of two FDI projects (i.e. 48.9 percent for EIEs and 47 percent in IEs) goes to electronics, electrical equipment, machinery and motor vehicles. In all country groupings, low-tech and medium-tech manufacturing industries (such as chemicals, rubber, plastics, fuel and minerals) are major receivers of FDI projects. By contrast, in line with the proposition of the product space and technological capabilities frameworks, the share of Greenfield FDI projects in natural resource-based activities, food, beverage and tobacco is apparently higher in LDCs and ODEs.

Table 5: Inward Greenfield FDI Projects in Manufacturing Sectors, by Group of Economies

Manufacturing industries	EIEs	IEs	LDCs	ODEs	Total
Electronics, electrical equipment, machinery, motgor vehicles	48.9	47	28.1	38	47
Chemicals, rubber, plastics, fuel and minerals	26.8	26.5	28.7	29.1	26.8
Metals	9.2	8.2	12.9	10.4	8.8
Food, beverages and tobacco	6.9	6.6	21.3	13.7	7.4
Furniture, repair and installment, other	3.9	5.6	2.4	3.1	4.7
Textiles	2.2	2.9	4.9	3.7	2.7
Paper, wood and printing	2.3	3.1	1.7	2.1	2.7
Total	100	100	100	100	100

Abbreviations are: EIEs = Emerging industrial economies; IEs = Mature industrialized economies (IEs); LDCs = Least developed countries; and ODEs = other developing economies.

Source: Reproduced from Jacob and Sasso 2015, Pp. 21

Unsurprisingly, innovation-oriented manufacturing activities are occurring almost utterly in IEs and EIEs (only 114 out of 4,266 projects in innovation activities happened in LDCs or ODEs). This has to do with the economic complexity of the country groupings, a reflection of the capabilities, competitiveness and current comparative advantage the countries have. The current capabilities of developing economies could not allow them to engage in the production and exports of high-tech manufacturing activities, which are located in the dense and central parts of the product space. Low-income and agrarian economies have capabilities today to produce primary commodities that are located in the periphery of the product space; hence, they may move easily to labor-intensive light-manufacturing activities. FDI inflows should, therefore, receive clear direction in the industrial policies of the countries. In short, FDI recipient economies need to have a solid development strategy that strategically link policy-induced direction of investment effort, state of their capabilities and competitive advantage, and prospects of climbing the ladder of the international division of labor.

economies to attract manufacturing FDI and also in modern services activities. Currently, the bulk of FDI to LDCs and ODEs goes to natural-resource intensive sectors such as oil and gas (Jacob and Sasso 2015).

PART FOUR: PATTERNS OF PRODUCTION TRANSFORMATION AND DEVELOPMENT PATH IN ASIA AND SSA

4.1 Introduction

The discussion made in the previous parts of the dissertation sends light that countries may undergo different patterns and sequences of structural change in the course of their development. Depending on the nature of their structural transformation, some countries experience growth miracles (progressive productivity gains), leapfrogging their comparative advantage while others stagnate or even lose headway (regressive productivity gains).

The center piece of part four is to explore the level of economic development of SSA and Asian sample economies[76]through the lens of production transformation [employing descriptive and empirical analysis]. It hypothesizes that the divergence development path observed in the last few decades between the regions and across countries in each region pertain to the disparity in the patterns and sequence of their structural change, in turn, attributable most notably to differences in their productive capability and commitment to industrial policy implementation and development friendly political orientation. It, thus, seeks out to see where these two regions stood in production transformation in the past five decades. The analysis examines as to whether the transformation and development journey in the two country groups is closest to the most prominent historical regularities and stylized facts of structural transformation. The development orientation and pathway of prosperity in the advanced countries and newly industrialized economies was shifting the production structure toward high-productivity, technology-intensive and tradable activities *(most notably first manufacturing and then modern services), not simply moving from one economic sector to another or from production activity to another*. The converse meant that reproducing oneself or shifting resources, typically labor, from traditional low-productivity subsistence agriculture to low-productivity traditional services cannot demonstrate rising level of sustainable growth, economic development, and poverty reduction. It also set out to examine sectoral growth patterns and their contribution to economy-wide growth in view of answering the research questions and corroborating the sector-specificity nature of growth discussed throughout the preceding parts.

[76] The comparative analysis from this part onwards shall be restricted to 31 sample countries selected from the two regions. The list of countries included are Botswana, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, Zambia, Hong Kong, South Korea, Singapore, Taiwan, China, Indonesia, India, Malaysia, the Philippines, Thailand, Sri Lanka, Bangladesh, Cambodia, Myanmar and Vietnam. The countries are mostly selected on the basis of their recent performance in addition to availability of consistent time series data. The analysis does not delve deeply to examine manufacturing activities at disaggregated level due to lack of data at industry and firm level. The period of analysis covers 1960-2015 with three sub-periods: 1960-1979, 1980-1999 and 2000-2015, unless otherwise specified depending on data availability.

The descriptive analysis thru part four is carried out in reference to the following key features or stylized facts of structural transformation observed from the experiences of advanced economies.

Change in output composition: *More successful transformers are the ones that placed due focus on the production side of the economy, imitating the frontier economies.* The most eminent patterns and sequences of structural change is the fall in the value added share of agriculture and the increase in that of nonagricultural sectors in the course of production transformation and development.[77] Andreoni and Chang (2016) joined several theorists, past and present, to strongly argue that no country has ever evolved to an industrialized and developed state without going through production transformation. In this perspective, sustainable growth and improvement in job quality can only be realized through industrialization. Historically, the feature of production transformation in today's most advanced economies is crystal clear: In the first stage of development, the production structure was dominated by agriculture with the non-agriculture sector concentrated on traditional manufacturing activities (such as handcrafts, textiles, apparel, food, footwear) and limited share of skill-intensive and high-tech manufacturing and modern services. With successive Industrial Revolutions, rapid productivity increases in manufacturing push down the price of manufactures, and consequently the share of income spent on basic necessities decreased. Overtime, with further rise in affluence, the services sector grew in importance, as enterprises demanded support services, thereby consumption patterns shifted towards services. *Whether this historical anecdote of structural change has also been observed in the growth experiences of latecomers and developing economies in Asia and SSA during the recent wave of globalization will be verified in this and subsequent parts of the dissertation.*

Change in employment pattern: Concurrently to the above fact, labor shifts from less-productive to more-productive sectors/production activities in the course of successful production transformation and development. With the advent of the Industrial Revolution in Britain and the subsequent rapid industrialization of today's advanced economies, labor was migrated from agriculture to manufacturing. Hence, the proportion of the labor force engaged in non-agricultural sectors increased while that in agriculture shrank, despite this may not imply a decline in the absolute number of workers engaged in agriculture as the decline in employment share of agriculture in the total labor force is relatively slow compared with the fall of the sector's output share in total GDP (Fisher 1939; Hayami and Ruttan 1985). Likewise, countries that successfully caught up with the then advanced Western economies after World War II had experienced similar

77 Kuznets (1966) found that in 1800-1849 and 1951-1960, the output share of agriculture in GDP sharply plummeted from 30 to 5 percent in the UK, and from 20 to 4 percent in US, respectively. In the same periods, the share of industry, inclusive of manufacturing, increased from 23 to 56 percent in the UK and increased from 33 to 43 percent in US.

shifts in employment structure.[78] In some of today's frontier economies, the employment share of services sector dominate the primary and the secondary sectors, despite the classification of manufacturing and services jobs became increasingly blurred for different reasons.

The relationship between manufacturing and affluence appears inverted U-shaped: The industrialization and deindustrialization literature documents that sustained growth of an economy is pertinent to the relative size and complexity of its manufacturing industry. This makes diversification of an economy towards that sector the quintessence of development. Therefore, s*hifting the economy from lower-productivity agriculture (where production was made on muscle power) to manufacturing (where production is made on machine power) was considered to be the seal of economic development and sustainability. The fact that modern economic growth came to being with production and application of machine power suggests that non-resource rich countries could not realize rising level of development (which is sustainable and inclusive) and catch-up with forerunners without undergoing rapid industrialization*[79] (Rodrik 2006, 2013; UNIDO 2009; Veit et al. 2011).

The existence of an inverted U-shape suggests that the share of manufacturing increases rapidly with the rise in affluence while the share of agriculture plummeted sharply. But, when the economy reaches a certain level of income per capita, the share of manufacturing begins to stabilize and then starts to decline, which follows an inverted U-shape[80] (see figure 5). The conventional path of structural change is driven typically by two mechanisms as discussed in part two: rising income elasticity of demand and productivity differential across sectors. The question one may ask here is that: Could low-income countries follow the same route and diversify their production structure towards high-productivity sectors/activities? There is no golden policy template freely available over the shelf for today's low-income economies to copy and paste. Rather, each economy needs to build its capabilities and design its targeted policies that are aimed at overcoming specific bottlenecks

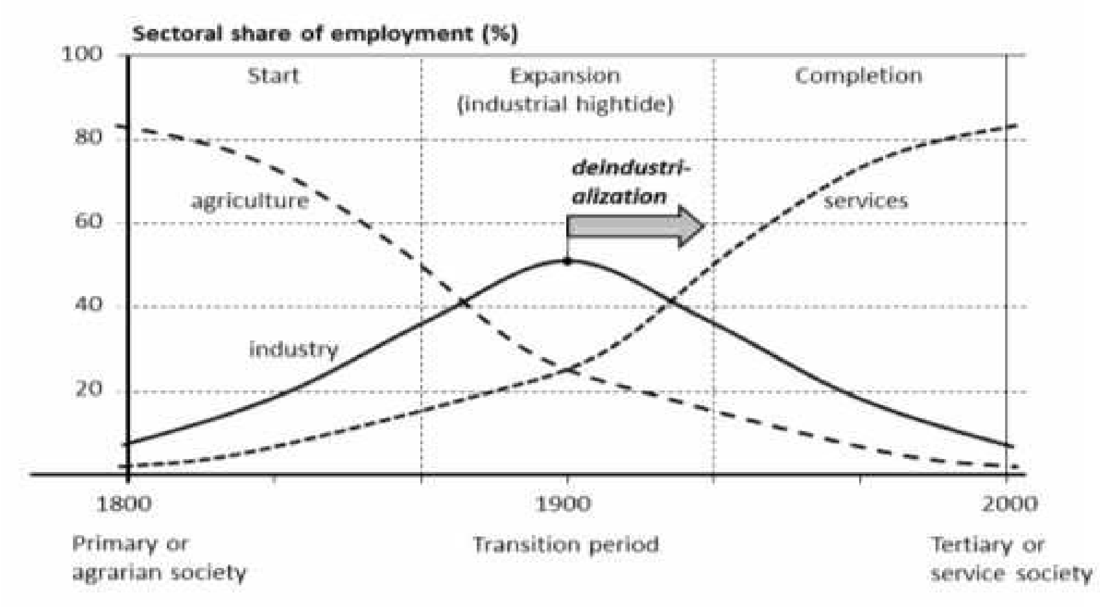
[78] Correspondingly, at the end of the 1980s, the employment share of agriculture in Japan and the first-tier newly industrialized Asian economies [Singapore, Hong Kong, South Korea and Taiwan] was close to negligible with the manufacturing and services sector maintaining dominant place.

[79] Western Europe and Western offshoots as well as Japan and other well-off East Asian economies had all seen sustained high growth at the back of machine power, building competitive high-tech manufacturing activities and rapidly penetrating in manufactures export markets (Reinert 2007; Rodrik 2013). Those countries experiencing distinct instances of growth trajectories for two decades and above were targeting diversification on the road to manufacturing. In the words of Rodrik (2012), Western Europe peripheral economies (Italy, Spain, Portugal, and Greece) saw growth episodes in the late 1970s, benefiting from post-Second World War European reconstruction and the subsequent European integration process. By contrast, the East and Southeast Asian resurgent economies are said to follow the so-called flying geese model, where the first emulator en route for industrialization was Japan followed by the first-tier newly industrialized countries, and then by the second-tier industrializers including Malaysia and Indonesia and now by China. Contrarily, Saudi Arabia, Iraq, and Botswana have seen growth episodes with sustained booms in oil and diamonds rather than through factories.

[80] According to the McKinsey report (2012), the downward slope of the inverted U-shape begins when countries reach middle-income status, reflecting shifts in consumption patterns with the rise in income.

(capabilities, competencies, etc.) so as to bring about growth-inducing structural change. It is impossible for low-income economies to skip the industrial stage and move up to wealthy nation status, a testimony of the crucial role industrialization plays for economic development and sustainability.

Figure 5: Standard Pattern of Structural Change



Source: Przywara, 2017 pp 95

There exists dualistic heterogeneity within the services sector: This indicates that not all services present unique potentials for productivity gains and tradability, thereby to serve as *stimulus complement* to manufacturing. First is the less-technology and less-skill-intensive (and more labor-intensive) traditional services that take the sheer weight in services sector (typically in most low-income and middle-income economies) but characterized as low tradable, low productivity with weak intermediate input-output linkages. These services activities usually demand individual interactions and serve as reservoir of surplus labor as agriculture does, but their capabilities for cumulative productivity increases,[81] and sustainable development is limited. Also, some services activities (e.g. education and health) are not open to market competition unlike some other services activities (such as professional and business services). Rodrik (2014) highlighted that services that are dominated by small informal enterprises/firms (such as retail trade), education, health, administrative and community services are technologically stagnant, absorbing labor released from agriculture.

[81]Some observers, however, argue that the new digital technology and automation allowed e-commerce players to penetrate in the retail services segment with operating models that redesign how the industry organizes along with the value chain. The estimates by Mckinsey Global Institute (2015) shows that online retailers are 80 percent more productive than modern retailers such as supermarkets and hypermarkets. The report further indicates that in countries with substantial e-commerce penetration (such as Brazil, India, and Indonesia), productivity in retail sector has grown by more than 5 percent per year since 2000).

Therefore, the expansion of such services could only come at the cost of lagging productivity overtime, and can generally be classified as Baumol's disease services.[82]

The second segment contain the modern services activities (e.g. finance, insurance, business services, information and communication) which are relatively highly productive, technology-intensive and skill-intensive, share some key features of manufacturing such as tradability and high-productivity (Timmer et al. 2014) whose importance would continue growing with the rise in affluence. Rodrik (2014) said that business services demand specific skills that may make them virtually inaccessible to rural workers who arrived in cities and towns while the more traditional services (such as catering, hotels and restaurants, etc.) are accessible. Also, the modern, skill-and knowledge-intensive services are derived as an offshoot of manufacturing; so, they would rely to a large extent on productivity increase in advanced (high-tech) manufacturing activities. He further argued that the highly tradable services [such as tourism, IT, finance) provide wider possibilities for (unconditional) productivity convergence with advanced countries as manufacturing does.[83] Recent studies, however, confirm that 'unconditional convergence' of productivity is not limited to manufacturing as new scale economies, international tradability and increased competition have been shared by the skill-intensive services – thus, countries starting from lower productivity in the services sector grew faster than those with higher initial labor productivity in that sector (Kinfe Michael and Morshed 2016; Enache, Ghani and O'Connell 2016).

Measurement issues: The extent of the fall in the value added share of manufacturing depends on whether value added is measured in nominal or real prices. The value added share of manufacturing shows a declining trend (increasing trend or remain stable) when it is measured in nominal prices (in constant prices). Chang (2014) and Rodrik (2016) prefer the use of constant prices for analysis. The following observations are evident with respect to patterns of global manufacturing output measured both in nominal and constant prices (see Annex IV, Table 4).

First, Measured in current prices, the value added share of manufacturing plunged to 16.5 percent in 2014 from 19.5 percent in 1995. But, the share of manufacturing at 2005 constant price increased by

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[82] Diao et al. (2017) evidenced negative correlation between labor productivity growth and employment share across countries for wholesale and retail trade, as well as personal and community services. This led them to draw a stylized fact that services having the best productivity performance typically shed labor while sectors with the worst productivity performance typically absorb labor. More specifically, SSA countries experiencing the higher rates of labor movement into services were those that had the worst productivity performance in services. This finding support the claim made in part two of this dissertation that structural change in SSA has been moving in the wrong direction during the Africa rising narrative period.

[83] Rodrik (2013) found that labor productivity in (formal) manufacturing present 'unconditional convergence' across countries – labor productivity in lagging manufacturing industries (typically those in low-income and middle-income countries) would increase and eventually converge with that in the technological frontier economies, irrespective of policy and institutional determinants. This corroborate the findings of Durate and Restuccia (2010), high-productivity growth in manufacturing explains about 50 percent of catching-up in relative aggregate productivity across countries.

more than 1.7 percentage points over the same period. While the relative share of manufacturing in the world as a whole exhibited slight reduction, the drop in the sector's value added share was marginal in the developing countries group relative to the fall observed in developed and transition economies. More specifically, the value added share for developing countries (including China) in world manufacturing total went up from 21.9 percent in 1995 to 47 percent in 2014; China alone accounted for 20 points of the total percentage points increase;

Second, when both China and the New Industrialized Economies (NIEs) are excluded, the share of other developing countries in global manufacturing went up by merely 3.6 percentage points in current prices and by 1.6 percentage points in constant prices. Significant decline in average share of manufacturing value added was observed in Africa and Latin America and the Caribbean - where the countries experienced either *stalled industrialization* or *premature deindustrialization*. In developing Asia, particularly in China, the share of manufacturing at constant prices was on the rising side. Interestingly, the largest portion of the increase in manufacturing activities in developing economies (measured both in value added and employment) was concentrated in China. This may give indication that *deindustrialization* has partly been explained by high concentration of manufacturing activities in handful of larger and richer economies in Asia;

Third, employment share of manufacturing worldwide slightly declined between 1995 and 2014, but its real value added share showed slight increment. This is more pronounced in developed countries, where the share of manufacturing in total employment fell by more than 5 percentage points. For developing countries as a group, the share of manufacturing in total employment slightly increased between 1995 and 2014. While the fall in manufacturing output was stronger than employment for both Africa, and developing countries in Latin American and the Caribbean, the reverse is true in developed and transition economies as well as Asia, supporting the recent findings of Rodrik (2016). Surprisingly, the share of manufacturing employment in total employment was trending positive in Africa during the same period.

4.2 Patterns and Evolution in Production Composition

Section 4.2 intends to examine the patterns in the production composition of the sample SSA economies in comparative perspective with their Asian counterparts over the last four decades.

4.2.1 Diversities in Contribution to GDP of Sectoral Value Added Growth

Sectoral Output Growth:

Real output growth of the economy is disaggregated by major economic sectors to explore on how big was their contribution to economic growth and transformation over the period of analysis (see Tables 6a and 6b). The following observations stand out.

First, the growth performance of the industry sector (classified in the Table with manufacturing and other industries), evidenced by its year-on-year out-turn, has not demonstrated consistent pattern across the reference periods for SSA. All sample countries excepting Mozambique, Namibia and Uganda have experienced contraction in the average growth rate of manufacturing during sub-period two (the SAP period) relative to the preceding sub-period. In fact, some of the countries exhibited relatively favorable growth: Botswana (7.5 percent), Cameroon (6.2 percent), Mauritius (6.8 percent), Mozambique (9.9 percent), and Rwanda (6.1 percent), albeit at relatively lower growth rate than in sub-period one. Strikingly, Mauritius, Mozambique, Namibia and Uganda are the only economies in the SSA sample, experiencing a decline in average growth of manufacturing real value added in sub-period three relative to sub-period two. Botswana, Cameroon and Mauritius saw persistent drop in the growth of their manufacturing output moving from sub-period one to sub-period three.

Table 6a: Sectoral Growth Rate of Value added in the Sampled Asian Economies, 1960-2012

	1960-79					1980-99					2000-15				
	Agr	Man	OI	HPS	BDS	Agr	Man	OI	HPS	BDS	Agr	Man	OI	HPS	BDS
CHN	4.5	12.9	11.6	4.7	5.0	4.8	12.9	10.4	13.2	10.5	4.1	10.5	10.0	10.2	10.9
HKG	8.7	8.7	9.4	9.1	9.0	-4.4	-1.7	6.6	6.5	7.3	-3.9	-1.7	1.4	4.4	5.3
IND	1.6	4.9	4.4	4.8	5.1	3.8	6.5	6.1	8.0	6.7	2.7	6.9	6.6	9.9	7.4
IDN	3.1	9.1	9.1	8.4	6.0	3.2	8.6	3.1	8.2	5.3	3.3	4.6	3.3	9.0	5.5
KOR	4.5	17.2	14.5	6.7	5.8	1.8	9.1	6.7	7.9	5.6	1.3	5.4	2.0	3.9	3.0
MYS	7.9	12.8	7.1	15.3	10.6	1.8	9.7	4.6	10.1	7.3	2.9	4.9	2.2	7.0	6.4
PHL	4.6	6.7	13.8	6.2	5.2	1.7	1.8	1.2	5.2	3.8	2.5	4.9	5.7	6.0	5.7
SGP	3.2	12.6	10.7	10.9	7.2	-2.9	7.1	8.0	9.5	6.8	0.4	4.0	5.9	5.7	2.4
TWN	4	16	10	12	9	0.5	6.7	4.6	8.6	8.2	-1.2	2.3	-1.3	4.5	2.8
THA	4.9	10.8	9.0	8.0	7.8	3.1	8.4	7.3	8.8	5.4	1.9	4.3	3.7	5.3	3.3
BAN	-0.1	-0.6	1.4	2.2	4.2	2.7	5.6	5.8	3.8	4.0	3.9	8.0	7.8	5.8	5.9
SLK	2.8	4.9	4.3	3.7	5.2	2.2	5.9	6.1	5.5	4.4	3.3	4.2	8.8	7.5	5.0
CAM	-6.6	-7.5	-9.0	-5.6	-7.9	5.1	7.5	6.5	5.8	5.0	3.8	12.0	12.9	8.5	8.1
MYA	3.4	4.9	9.7	3.3	5.8	3.2	3.7	13.4	3.8	2.1	3.0	7.9	15.4	6.5	4.5
VIE	4.8	4.8	4.8	4.8	4.2	4.2	6.5	11.1	7.2	5.7	3.6	10.3	6.1	6.0	7.2

Note: Country abbreviations are as before. Sector abbreviations are: Agr- agriculture; Man – manufacturing; OI – other industries; HPS – higher-productivity (and skill-intensive) services; BDS – Bamoul's diseases services.
Source: Own computation

Table 6b: Sectoral Growth Rate of Value added in the Sampled SSA Economies, 1960-2012

	1960-79					1980-99					2000-15				
	Agr	Man	OI	HPS	BDS	Agr	Man	OI	HPS	BDS	Agr	Man	OI	HPS	BDS
BWA	6.9	30.1	21.5	16.6	18.1	2.5	7.5	8.6	12.0	10.0	1.7	4.1	1.5	5.9	5.9
CMR	12.1	9.7	7.3	7.7	9.3	7.4	6.2	9.6	0.8	6.9	3.5	3.0	0.5	5.4	4.8
ETH	1.5	6.4	5.5	6.0	7.0	0.7	4.4	3.8	4.9	5.1	6.6	9.7	14.2	11.2	10.1
GHA	2.1	2.4	-0.3	1.9	2.4	2.9	2.5	2.7	5.1	4.6	4.1	3.7	11.2	7.7	6.6
KEN	2.0	10.2	3.5	5.3	4.9	2.6	3.2	2.1	4.5	3.6	4.4	3.7	7.1	4.9	4.1
MWI	2.5	5.8	5.4	10.4	5.5	5.2	2.5	1.8	1.2	1.8	3.0	4.8	7.2	6.2	4.5
MUS	18.6	12.5	9.5	6.4	10.9	-0.2	6.8	4.9	5.8	5.0	3.3	2.0	2.1	6.8	4.2
MOZ	-1.2	8.3	-10.2	-0.6	-5.1	5.9	9.9	12.1	8.7	5.9	4.9	7.2	12.2	7.9	8.8
NAM	3.4	0.1	3.8	1.2	2.6	4.0	4.4	0.1	3.2	4.9	0.5	3.4	7.1	7.6	4.8
NGA	0.0	12.2	23.9	10.8	6.3	3.6	1.9	-0.4	4.8	3.2	8.5	10.0	2.6	9.6	9.1
RWA	7.5	14.9	24.8	7.5	12.2	0.3	6.1	11.8	7.1	3.9	5.5	6.8	9.7	7.8	11.5
SEN	3.3	3.3	4.2	2.6	2.3	1.9	2.9	4.1	3.5	2.4	2.3	3.0	5.9	6.4	3.4
ZAF	3.1	6.9	2.5	5.0	4.4	2.5	1.4	0.1	3.1	2.5	2.5	2.6	1.9	5.0	3.4
TZA	2.6	8.1	4.4	5.4	5.7	3.8	1.2	5.0	3.1	1.9	5.1	8.2	10.5	10.8	8.0
UGA	3.2	4.4	7.4	1.0	1.0	3.6	11.8	14.1	7.6	6.2	2.4	5.4	7.3	10.5	5.9
ZMB	0.8	5.5	-2.4	6.0	6.1	7.2	1.9	-5.0	3.0	3.8	1.6	4.9	7.6	5.7	6.3

Note: Country abbreviations are as before. Sector abbreviations are: Agr- agriculture; Man – manufacturing; OI – other industries; HPS – higher-productivity (and skill-intensive services; BDS – Bamoul's diseases services.
Source: Own computation

Second, for the fastest growing SSA economies, real value added growth of manufacturing was relatively appealing during sub-period three: exhibiting average growth rate of 9.7 percent for Ethiopia, 7.2 percent for Mozambique, 10 percent for Nigeria, 8.2 percent for Tanzania, 6.8 percent for Rwanda and 5.4 percent for Uganda. What is worrying, however, is that the growth of manufacturing has little effect on the growth of total output growth, typically because its share in total value added remained relatively near to the ground, in turn, attributed to the failure of industrialization in these countries. The other SSA economies might have either *prematurely deindustrialized or they are typical suspect for under-industrialization or pre-industrialization or stalled industrialization*.

Third, consistent to the conventional development path, the sampled Asian economies have observed positive and high output growth in industry sector, owing mainly to expansion of manufacturing production (as a result partly of the shifts in the location and structure of manufacturing activities to the region away from the mature industrial economies as discussed in part three). This may give support to the claim that East and Southeast Asian economies have undergone successful industrial transformation over the last four decades. The average real output growth of the industry sector surpassed those of the two segments of the services sector for most sample economies during the first sub-period, which was only reversed in sub-period three. The first-tier and second-tier industrializers in Asia experienced persistent decline in manufacturing moving from sub-period one to sub-period three (Hong Kong, Indonesia, South Korea, Malaysia, Singapore and Thailand), despite the absolute amount has been rising. A comparison of China and India is alluring. China has been experiencing strong growth route in its industry sector, higher than its services and agriculture sectors, attributed to the steady growth of manufacturing industries and production. The Chinese services sector, which was comparable to India during sub-period one, has seen impressive growth in sub-periods two and three to outgrow the Indian services sector. The result might be indicative that *China has been following the conventional manufacturing-led development route and India the services-led development path, though India is not under-industrialized as SSA do*. Growth rate was low for Bangladesh, and Cambodia during sub-period one while it was lower than (other countries average) for Myanmar and Vietnam. However, in sub-period three, manufacturing growth for these economies was not only higher than the other Asian countries (except China) but also the average growth exceeded that of services growth.

Fourth, average real value added growth of agriculture was on the positive territory in sub-period three for SSA samples (except Namibia) but persistently declining for Botswana, Cameroon and South Africa. This could likely be explained by the good harvest gained due to favorable weather conditions [rather than agricultural revolution or the use of agricultural mechanization, notwithstanding the growing agricultural land grab by global agri-business firms for commercial farming], and booming prices for agricultural produces in the international market due to higher demand in emerging economies notably in China. The sector's performance in Ethiopia, Ghana, Nigeria and Tanzania over that period was faster than own yearly average growth rate during the preceding sub-periods. In short, the performance of agriculture (in terms of average growth) was relatively better over the 'Africa rising' narrative period for SSA than for the considered Asian economies. This is interesting observation, but caution is in order here and other parts of the dissertation while comparing some sector-growth performances as the absolute real output or employment number gives a different picture.

Fifth, the advanced economies in Asia (Hong Kong, Singapore, Taiwan, which are classified as city states) showed signs of *mature deindustrialization* in line to the historical empirical regularities already discussed earlier. Exception to this trend is South Korea, where the value added growth of industry sector (both manufacturing and other industries] exceeded that of services sector (both skill-intensive and Baumol's diseases services) in both sub-periods. This is part of the reason why we said that services sector can only serve as *'stimulus complement'* to manufacturing rather than perfect substitute to manufacturing.

Sectoral Contribution to GDP Growth:

It sounds interesting to examine the size of the relative contributions in GDP of each of the broad sectors and sub-sectors to overall output growth using a simple decomposition framework. Tables 7a and 7b present the results. Six observations are notable from the Tables.

First, sector-wise contribution for real output growth has mixed patterns in all sample economies, which can generally be categorized into four groups: Continually falling from sub-periods one to three; continually increasing from sub-periods one to three; decreasing in sub-period two and increasing in sub-period three; and increasing in sub-period two but decreasing in sub-period three.

Table 7a: Sectoral contribution to total output growth in Sample Asian Countries, 1960-2012

		CHN	HKG	IND	IDN	KOR	MYS	PHL	SGP	TWN	THA	BAN	SLK	CAM	MYA	VIE
1960-1979	Agr	36.8	0.9	18.2	13.1	9.2	20.5	12.6	0.2	11.4	16.6	-19.6	12.4	38.4	43.9	38.0
	Min	5.4	0.0	3.2	33.1	1.4	20.1	1.0	0.1	2.6	1.1	10.4	1.5	0.2	4.4	1.7
	Man	26.4	21.4	20.1	16.8	22.7	18.4	29.8	31.5	34.6	25.6	-93.2	19.1	9.3	7.9	11.8
	Pub	3.1	0.7	2.7	0.3	0.9	1.5	3.4	1.6	2.3	2.0	-5.3	1.2	0.3	0.1	1.8
	Con	6.0	6.9	8.4	6.8	13.4	5.5	22.1	3.1	7.3	5.8	-102.	3.1	5.9	1.1	5.0
	Trad	8.6	18.7	15.9	12.6	13.5	12.2	12.6	32.2	12.0	26.1	105.7	15.9	30.1	34.9	11.2
	Tran	4.5	7.4	7.6	4.3	6.0	4.7	5.3	9.1	4.2	4.7	34.8	8.5	1.2	6.3	4.8
	FIRE	2.4	31.8	5.0	2.1	6.3	6.8	5.9	13.0	3.0	2.1	59.1	7.7	8.1	0.1	13.3
	GPSC	6.9	12.1	18.8	10.9	26.6	10.2	7.2	9.2	22.6	15.9	110.3	30.5	6.6	1.2	12.3
1980-1999	Agr	13.1	-0.4	17.4	10.9	2.7	4.0	9.7	-0.1	0.4	7.7	15.7	6.2	42.7	43.0	20.3
	Min	3.7	0.0	3.5	8.7	0.0	12.6	0.2	0.0	0.1	3.9	2.0	1.9	0.2	22.3	15.9
	Man	37.1	-6.1	18.8	34.3	31.8	31.7	18.7	24.7	30.2	38.1	18.5	26.4	15.0	7.4	11.8
	Pub	2.9	5.2	2.7	1.3	2.7	2.8	6.3	1.4	2.4	3.6	1.7	1.8	0.5	0.4	2.8
	Con	5.9	4.5	6.4	6.9	9.8	3.5	-5.3	3.1	3.2	2.7	8.7	5.1	4.5	3.8	5.3
	Trad	10.5	25.0	17.4	16.3	14.9	16.0	24.0	29.6	22.3	20.7	14.8	18.0	11.0	11.5	10.6
	Tran	8.2	12.5	7.9	4.8	7.2	7.1	8.7	11.9	7.1	7.9	10.0	10.1	9.4	8.7	4.2
	FIRE	8.3	36.2	9.7	7.5	10.7	13.3	21.2	20.8	10.3	3.2	12.4	12.5	5.7	0.0	18.2
	GPSC	10.4	22.9	16.2	9.2	20.2	9.0	16.5	8.6	24.1	12.2	16.1	18.1	11.0	2.8	10.9
2000-2015	Agr	4.6	0.0	7.2	8.7	1.4	4.5	5.5	0.0	-0.7	4.0	11.0	5.2	16.2	17.5	10.6
	Min	2.6	0.0	1.7	1.9	-0.2	1.4	1.8	0.0	1.7	3.0	2.0	4.9	1.8	31.7	3.6
	Man	40.2	-2.0	17.5	22.7	43.4	22.0	23.7	21.4	25.6	38.3	23.2	13.9	26.6	11.2	25.7
	Pub	2.8	0.6	1.7	1.3	2.9	2.5	3.2	1.4	-2.5	4.4	1.7	1.7	0.9	0.8	6.1
	Con	7.5	1.6	8.5	10.2	4.1	4.3	7.1	7.5	-2.2	2.6	9.9	9.3	9.1	15.5	7.7
	Trad	13.3	36.8	22.0	19.0	10.6	22.2	20.4	4.7	28.4	19.6	16.8	14.5	15.9	5.6	14.7
	Tran	8.2	11.4	11.5	17.4	8.8	10.3	9.6	15.1	6.7	9.6	12.8	18.4	7.8	7.3	6.0
	FIRE	8.5	34.8	16.8	7.9	8.5	18.9	14.0	39.1	24.1	7.1	9.3	15.2	9.6	2.0	12.9
	GPSC	12.2	16.9	13.1	10.8	20.5	13.9	14.7	10.8	18.8	11.4	13.3	16.8	12.2	8.4	12.7

Note: Abbreviations are: Agr – agriculture; Min – Mining and Querying; Man – Manufacturing; Pub – Public utilities; Con – Construction; Trade – Retail and whole sale trade, hotels and restaurants; Tran – transport, storage and communication; Fire – Finance, Insurance, Real estate, and Business; GDPSC – Government, private, social and community

Table 7b: Sectoral contribution to total output growth in Sample SSA Countries, 1960-2012

		BWA	CMR	ETH	GHA	KEN	MWI	MUS	MOZ	NAM	NGA	RWA	SEN	ZAF	TZA	UGA	ZMB
1960-1979	Agr	5.8	18.3	41.8	43.8	15.3	13.1	23.9	24.3	13.5	-2.2	63.6	18.8	2.2	19.3	69.4	9
	Min	27.9	4.2	0.2	-6.8	1.1	1.0	2.0	15.7	33.2	46.4	1.1	2.1	6.3	-1.1	1.9	-542
	Man	12.3	18.3	6.7	18.6	25.3	10.1	17.5	-10.2	-0.5	13.7	4.0	18.8	27.1	15.9	5.7	103
	Pub	1.4	0.4	2.7	4.0	7.2	1.2	0.9	-0.3	-0.1	0.1	0.2	2.5	2.2	2.5	2.2	52
	Con	10.5	3.1	5.3	-5.4	-1.0	4.8	5.4	-0.9	10.7	4.8	2.7	4.6	4.7	8.1	4.4	-66
	Trad	19.8	12.0	23.1	3.2	9.8	28.0	14.9	68.1	-0.2	10.4	19.1	10.4	13.2	13.4	-13.7	132
	Tran	0.5	10.5	4.9	14.3	8.1	7.5	7.9	-6.7	3.5	3.1	0.7	4.3	8.1	9.5	-3.0	36
	FIRE	8.9	24.3	7.4	4.2	17.6	25.5	5.9	11.5	4.2	13.8	5.6	11.1	15.8	10.3	6.4	148
	GPSC	12.9	8.9	7.9	24.0	16.6	8.8	21.6	-1.7	35.8	10.0	3.1	27.4	20.3	22.2	26.7	229
1980-1999	Agr	0.8	25.6	7.4	27.3	21.7	53.7	1.6	31.0	15.3	32.7	-74.3	17.4	2.0	44.1	24.8	103.7
	Min	27.8	25.9	1.3	3.1	0.4	0.9	1.5	-0.1	-0.6	-3.9	-2.6	1.3	-2.0	3.4	1.0	-343.2
	Man	7.9	18.2	8.7	7.4	13.2	9.8	27.0	11.6	12.2	0.6	19.2	17.5	10.8	4.4	12.5	35.0
	Pub	1.8	0.8	4.0	2.2	1.1	2.4	2.2	3.9	1.8	0.1	13.9	2.0	4.4	2.7	14.6	1.4
	Con	7.0	1.9	4.0	1.8	3.6	1.1	5.6	1.8	-3.1	-2.1	19.4	6.8	-2.2	6.7	5.1	-12.7
	Trad	13.1	21.1	20.6	13.6	9.2	5.0	22.0	8.8	15.2	17.0	4.5	23.6	15.5	15.5	14.6	177.5
	Tran	5.7	-6.1	8.2	21.0	5.9	4.4	11.6	18.3	5.7	2.9	18.0	7.7	12.8	3.6	5.2	35.9
	FIRE	13.4	5.0	13.9	8.6	27.5	4.5	13.8	11.4	9.2	37.7	82.0	15.2	28.3	15.2	7.6	64.0
	GPSC	22.4	7.5	31.9	15.0	17.4	18.3	14.7	13.3	44.2	15.0	19.9	8.4	30.5	4.4	14.6	38.4
2000-2015	Agr	1.0	22.7	27.8	17.5	23.2	18.0	1.6	17.4	-0.8	22.7	25.8	7.1	1.8	17.4	10.1	2.4
	Min	-7.5	-4.0	0.4	11.2	1.1	4.6	-1.7	5.0	7.2	-0.6	0.5	0.5	0.4	3.0	2.6	11.7
	Man	7.0	11.8	5.9	4.8	10.1	9.9	8.1	8.1	6.6	12.4	5.0	10.7	10.9	8.7	8.6	8.0
	Pub	-1.9	1.0	1.6	1.5	4.6	1.9	1.9	4.0	0.2	0.6	0.1	3.7	0.1	1.6	9.2	1.5
	Con	11.7	5.7	13.9	11.0	8.5	5.5	2.9	2.4	15.7	3.1	10.2	8.5	6.2	14.3	9.6	9.4
	Trad	33.7	24.9	22.1	12.1	11.8	21.9	19.3	15.1	23.6	23.4	20.4	18.0	15.1	13.5	15.9	27.9
	Tran	8.6	14.0	6.5	20.6	18.9	14.1	23.6	14.9	12.6	17.3	9.6	24.3	14.7	15.2	22.3	14.4
	FIRE	20.6	12.6	11.1	8.8	11.2	14.2	24.6	16.3	14.2	12.8	11.8	13.6	30.5	14.2	8.2	6.6
	GPSC	26.7	11.3	10.7	12.6	10.5	10.1	19.7	16.8	20.7	8.5	16.7	13.5	20.3	12.0	13.4	17.9

Note: Abbreviations are as previously given.
Source: Own Computation

Second, the contribution of agriculture to overall output growth has precipitously declined for all Asian sample economies, but Bangladesh, and Cambodia - each of which exhibited slight increase during sub-period two relative to sub-period one. The decline in value added share of agriculture from the first to the second and then to the third sub-periods is worth admiring for China and Vietnam, and from sub-period two to sub-period three for Cambodia and Myanmar. Its contribution in Asia was either negative or well below 10 percent; exception to this trend was Bangladesh (11 percent), Cambodia (16.2 percent), Myanmar (17.5 percent) and Vietnam (10.6 percent). The contribution of agriculture to overall output growth was relatively higher in SSA than Asian sampled economies during 2000-2015; particularly, its contribution was higher in Rwanda (25.8

percent), Ethiopia (27.8 percent), Kenya (23.2 percent), Cameroon and Nigeria (each 22.7 percent) as well as Ghana, Mozambique and Tanzania, each (17.4 percent). The sector's contribution was consistently falling for Ghana, Mauritius, Senegal, South Africa, and Uganda and increasing for Kenya. This may give clue to the pattern of industrialization or deindustrialization in the two regions.

Third, interestingly and beyond expectation, the value added share of the services sector witnessed upward trending in both regions [despite the existence of diversity within sectors]. This sector has also been the biggest contributor to aggregate output growth for most countries included in the sample, contributing more than half of overall value added growth even in low-income SSA countries. In Asia, the contribution to overall output growth of the services sector has shown a clear rise and was predominant in at least the two sub-periods for some countries. Specifically, its contribution was considerably high for the high-income countries such as Hong Kong (102 percent), Singapore (69.1 percent) and Taiwan (82.1 percent) in sub-period two; as expected, the contribution of agriculture in these economies was rather minuscule.

Fourth, in four Asian economies – Hong Kong, India, Singapore, Taiwan – the contribution of the industry sector to economy-wide real output growth was falling phenomenally from the first to the second and then to the third sub-periods, owing to the persistent contraction of the contribution of manufacturing [for the first four countries] and mining and quarrying [for Indonesia]. Industry took the lead in driving above one-half of the overall growth in aggregate output for China, South Korea, and Thailand due to higher contribution of manufacturing, though the services sector has also been expanded. The contribution of manufacturing increased for Cambodia, Malaysia and Vietnam. A comparison of China and India is again interesting. In the case of China, the industry sector, driven by manufacturing, contributed to 53.5 percent during sub-period two, followed by the services sector (37.4 percent or 13.8 percentage points less to India). During the same period, the Indian manufacturing sector contributed to 18.8 percent of overall output growth, or 18.3 percentage points below that of China. In fact, the relative position of the services sector has been increasing for China, but at a slower pace compared to the industrial sector, making it one of the world manufacturing powerhouses. In both China and India, the contribution of agriculture sector output growth showed a persistent descending trend during the entire period of comparison to reach 4.6 percent and 7.2 percent, respectively, in sub-period three. However, this does not mean that the two countries are mature industrialized - large numbers of their people are still residing in the countryside engaged in agriculture. *This may give indication for the presence of complementarity between agriculture and manufacturing in emerging economies. It may also give support for the existence of symbiotic* *relationship between manufacturing and services, enabling the latter to serve as 'stimulus complement' to the former.*

Fifth, no clear pattern emerges with respect to contribution of agriculture and industry sectors to overall output growth in SSA, which contrasts with Asia, for which the two sectors showed either a clear upward or downward trend. A look into specific country figures may make this statement unblemished and credible. For instance, the contribution of industry sector in sub-period three was -25.8 percent for Zambia and -27.7 percent for Nigeria, owing chiefly to negative contribution from mining and quarrying [-30 percent and -25.9 percent, respectively]; and 11.9 percent for South Africa, owing to the drop in the contribution of manufacturing and mining. The lower contribution of industry [and more so manufacturing] to overall output growth in most SSA economies relative to Asia resulted in a slower growth of GDP. The countries might have experienced either *earlier deindustrialization or stalled industrialization*.

Sixth, the experience observed in SSA is in stark contrast with Asia, wherein the contribution of industry to output growth in the latter was increasing or remain stable. These economies have undergone learning-based industrialization, as exemplified by the persistent high contribution of industry sector to aggregate output growth. For most of the countries in SSA, the biggest contribution to the recent growth episode came from the services sector.[84] As expected, the share of the skill- and knowledge-intensive services in the economy of Asian economies was relatively higher than that in SSA samples. Therefore, these services segments can serve as *"stimulus complement"* to manufacturing in economic development and sustainability.

The data suggest the need for SSA economies to transform their production structure and create good employment for the growing young people. This, in the words of Andreoni and Chang (2016), is the only route for "inclusive and sustainable development".

4.2.2 The Extent of Structural Change by Value Added

An economy can be considered as moving in the right direction when the drop in the value added and employment share of agricultural sector is accompanied by the rise in the share of non-agricultural sectors, typically manufacturing. This section seeks to verify the claim that the divergence development journey observed in between Asia and SSA has to do with the difference in the extent of structural change and production composition. Tables 8a and 8b give the dynamics

[84] Within the services sector, the biggest contribution was sourced from the more traditional wholesale and retail trade, hotels and restaurants for most economies. This was followed by the personal and government services branch in some countries and the business segment in few others.

of value added shares for agriculture, industry (with sub-sectors) and services (with sub-sectors). Two caveats are worth noting: (i) sectoral value added data are available since 1960 for some countries and since 1970 in others, by then the high-income and industrialized Asian economies had managed to meaningfully decrease the share of agriculture and increase the share of industry in GDP[85]; and (ii) micro- or firm-level data is not available for manufacturing (especially for SSA) to examine the pattern of structural change within manufacturing activities.

Table 8a: Sectoral Real Value Added Share (%) in the Sample Asian Economies, 1960-2015

Country	Year	**Agr**	**Ind**	Min	**Man**	Pub	Con	**Serv**	Trad	Tran	Bus	GPS
CHN	1960	**54.6**	**13.4**	1.6	**7.9**	0.9	3.0	**32.0**	12.0	6.3	4.2	9.5
	2015	**7.6**	**51.8**	3.0	**38.8**	2.8	7.1	**40.6**	12.6	8.1	8.2	11.7
HKG	1970	**0.9**	**29.6**	0.0	**22.4**	0.4	6.8	**69.5**	19.1	7.4	31.2	11.9
	2015	**0.0**	**7.2**	0.0	**1.8**	2.1	3.3	**92.8**	30.0	11.4	33.7	17.6
IND	1960	**52.7**	**21.4**	2.4	**11.6**	0.5	6.8	**25.9**	10.3	3.4	4.0	8.2
	2015	**13.3**	**29.7**	2.3	**17.5**	1.9	8.0	**57.1**	19.8	10.0	13.5	13.8
IDN	1960	**37.2**	**32.6**	21.0	**9.2**	0.1	2.3	**30.2**	11.0	3.1	1.1	14.9
	2015	**11.4**	**43.4**	8.7	**25.2**	1.1	8.4	**45.3**	16.9	11.2	6.6	10.5
KOR	1960	**20.8**	**7.2**	1.3	**3.3**	0.1	2.4	**72.1**	8.4	1.2	12.8	49.7
	2015	**3.3**	**45.0**	0.2	**35.4**	2.5	6.9	**51.7**	12.7	7.8	9.3	21.9
MYS	1970	**25.5**	**50.9**	34.7	**11.2**	1.0	4.0	**23.6**	9.5	2.9	2.5	8.7
	2015	**6.9**	**40.4**	8.3	**25.6**	2.5	4.0	**52.8**	18.3	8.3	14.8	11.3
PHL	1970	**20.1**	**40.6**	1.3	**31.3**	2.0	5.9	**39.3**	15.2	4.1	8.6	11.4
	2015	**9.5**	**36.6**	1.3	**24.9**	3.7	6.8	**53.8**	19.3	8.0	13.1	13.5
SGP	1960	**1.3**	**19.3**	0.1	**15.9**	1.2	2.1	**79.4**	43.1	6.4	8.8	21.1
	2015	**0.0**	**30.6**	0.0	**24.6**	1.4	4.6	**69.4**	20.8	12.6	26.3	9.7
TWN	1960	**0.0**	**30.6**	0.0	**24.6**	1.4	4.6	**69.4**	20.8	12.6	26.3	9.7
	2015	**1.5**	**32.8**	0.9	**29.1**	0.8	2.0	**65.7**	22.9	6.8	13.9	22.1
THA	1960	**34.2**	**19.5**	0.8	**12.7**	0.2	5.7	**46.3**	25.2	6.0	0.2	14.8
	2015	**8.7**	**45.0**	3.0	**35.4**	3.6	3.0	**46.3**	21.2	8.2	4.3	12.5
BAN	1970	**29.6**	**26.9**	2.4	**15.6**	0.7	8.2	**43.5**	7.4	7.4	13.2	15.5
	2015	**15.5**	**31.5**	1.8	**19.6**	1.5	8.6	**53.0**	15.3	11.4	11.1	15.2
SLK	1970	**20.1**	**23.7**	0.3	**17.4**	0.7	5.3	**56.2**	9.4	11.0	8.4	27.3
	2015	**7.5**	**30.5**	3.4	**18.0**	1.6	7.5	**62.0**	15.0	14.9	13.2	18.9
CAM	1970	**40.5**	**14.4**	0.2	**9.0**	0.3	4.9	**45.1**	27.4	2.9	8.2	6.6
	2015	**24.1**	**32.5**	1.2	**22.7**	0.7	7.8	**43.4**	15.8	7.7	8.6	11.3
MYA	1970	**56.9**	**9.0**	1.7	**6.8**	0.0	0.4	**34.1**	22.9	9.2	0.0	2.0
	2015	**30.4**	**44.0**	25.1	**9.3**	0.5	9.2	**25.6**	11.4	7.8	1.1	5.4
VIE	1970	**36.7**	**19.7**	1.7	**11.4**	1.8	4.8	**43.6**	10.8	4.7	12.8	15.3
	2015	**16.1**	**38.8**	6.8	**20.5**	4.8	6.7	**45.0**	13.1	5.3	14.2	12.3

Note: Abbreviations are as previously given.

[85] For instance, in 1950, agriculture accounted for higher share of GDP in most of the Asian sampled economies: Bangladesh (61 percent), China (51 percent), India (55 percent), Indonesia (58 percent), South Korea (47 percent), Malaysia (40 percent), Philippines (42 percent), Sri Lanka (46 percent) and Thailand (48 percent). But, the share of manufacturing ranged between 4 percent for Sri Lanka and 14 percent for China (see Szimai 2009).

Table 8b: Sectoral Real Value Added Share (%) in the Sampled SSA Economies, 1960-2015

	Year	**Agr**	**Ind**	Min	**Man**	Pub	Con	**Serv**	Trad	Tran	Bus	GPS
BWA	1968	**27.4**	**33.0**	11.7	**3.6**	0.7	16.9	**39.6**	18.1	3.0	7.3	11.2
	2015	**1.8**	**29.9**	13.9	**7.1**	0.0	8.9	**68.4**	22.6	6.3	16.6	22.8
CMR	1965	**9.8**	**27.6**	0.7	**15.2**	2.9	8.9	**62.6**	11.5	34.9	9.1	7.1
	2015	**21.3**	**28.4**	7.1	**16.2**	1.0	4.1	**50.3**	20.8	8.5	11.5	9.6
ETH	1961	**82.9**	**5.3**	0.1	**2.0**	0.4	2.8	**11.9**	5.5	0.9	2.9	2.6
	2015	**32.9**	**19.2**	0.4	**5.8**	1.7	11.2	**47.9**	20.1	5.9	10.1	11.8
GHA	1960	**35.3**	**31.8**	5.8	**13.1**	0.3	12.7	**32.9**	11.2	8.9	6.7	6.0
	2015	**23.2**	**25.4**	7.9	**7.1**	1.6	8.8	**51.3**	11.7	18.5	8.3	12.8
KEN	1969	**37.1**	**19.2**	0.6	**8.4**	1.4	8.9	**43.7**	8.6	6.7	13.6	14.7
	2015	**24.1**	**22.8**	0.9	**12.0**	3.4	6.5	**53.1**	10.5	13.2	15.9	13.6
MWI	1966	**37.2**	**15.6**	0.5	**8.3**	0.6	6.2	**47.1**	13.2	6.1	7.6	20.2
	2015	**27.3**	**18.6**	2.6	**9.5**	1.8	4.7	**54.1**	18.5	9.9	13.2	12.6
MUS	1970	**11.0**	**25.4**	2.6	**14.7**	1.5	6.7	**63.6**	19.1	8.4	20.2	15.8
	2015	**4.7**	**22.9**	0.2	**16.4**	1.9	4.4	**72.4**	19.3	16.5	18.6	18.0
MOZ	1970	**40.1**	**6.7**	4.5	**2.0**	0.1	0.2	**53.2**	29.9	1.4	15.8	6.0
	2015	**20.4**	**18.6**	3.6	**9.3**	3.6	2.2	**61.0**	14.3	14.9	16.0	15.8
NAM	1965	**10.4**	**40.1**	17.8	**13.4**	6.2	2.7	**49.6**	13.2	4.4	11.9	20.1
	2015	**6.0**	**28.1**	8.1	**8.9**	1.8	9.4	**65.9**	18.8	8.9	11.8	26.5
NGA	1960	**60.1**	**9.6**	2.6	**4.2**	0.0	2.8	**30.3**	19.5	4.1	3.3	3.5
	2015	**22.6**	**19.8**	5.3	**11.1**	0.5	2.9	**57.6**	20.8	13.1	14.6	9.0
RWA	1970	**77.4**	**3.5**	0.5	**1.7**	0.1	1.1	**19.1**	7.0	0.2	6.5	5.4
	2015	**32.2**	**14.6**	0.5	**5.2**	0.6	8.4	**53.1**	17.5	7.6	13.6	14.5
SEN	1970	**27.1**	**18.4**	1.5	**13.7**	1.8	1.4	**54.5**	21.3	7.5	8.5	17.3
	2015	**14.1**	**23.3**	1.0	**13.4**	2.9	6.0	**62.5**	20.2	15.0	12.8	14.6
ZAF	1960	**4.6**	**42.1**	24.5	**13.6**	1.1	2.9	**53.3**	10.6	5.3	14.5	23.0
	2015	**2.5**	**26.9**	5.4	**16.1**	1.5	3.9	**71.8**	14.6	11.3	23.7	22.1
TZA	1960	**41.9**	**17.4**	3.5	**6.4**	0.8	6.7	**40.7**	16.4	5.8	9.4	9.1
	2015	**23.0**	**25.2**	2.7	**8.6**	1.8	12.0	**51.9**	13.9	12.5	13.6	11.9
UGA	1960	**47.9**	**3.8**	0.8	**2.3**	0.3	0.3	**48.3**	21.7	4.3	7.4	15.0
	2015	**20.1**	**27.9**	1.9	**9.0**	9.8	7.2	**52.0**	14.8	14.6	7.9	14.7
ZMB	1965	**4.2**	**79.0**	67.4	**4.0**	0.2	7.4	**16.8**	6.2	4.8	1.8	3.9
	2015	**6.9**	**28.2**	10.7	**8.9**	1.9	6.7	**64.9**	27.3	12.1	9.7	15.7

Note: Abbreviations are as previously given
Source: Own Computation

The key observations to be drawn from the Tables are given below.

First, over the study period, the countries in the Asia sample have exhibited industrial transformation that stunned the world. In line with the stylized facts of production transformation, the share of agriculture consistently plummeted to stand at between 0.03 percent for Hong Kong and Singapore and 30.4 percent for Myanmar in 2015 while that of manufacturing ranged between 1.8 percent for Hong Kong and 38.8 percent for China, testifying the remarkable shifts in production or economic activities from agriculture to manufacturing for the successful emerging economies and to services sector for the advanced ones, as well as to manufacturing and services in others. Myanmar, Cambodia, Vietnam and Bangladesh have experienced relatively higher agricultural value added share in 2015.

Second, the majority of SSA economies have failed to exhibit a similar change in their production structure and industrial upgrading, wherein the composition of the economic activities shifted, if any, from agriculture to traditional and non-tradable services (and to a lesser extent towards the non-manufacturing or extractive industries). Put differently, the fall in the value added share of agriculture in SSA has not been taken over by the expansion of manufacturing industries and manufacturing production. Yet, the relatively modest performance of manufacturing industry in South Africa and Mauritius witnessed that SSA could have seen industrial transformation as their Asian counterparts did. Surprisingly, Cameroon and Zambia were exhibiting increase in the value added share of agriculture moving from 1965 to 2015, which made them outliers, although one may still question the data quality. Other interesting cases are Ethiopia and Ghana, where the decline in agriculture value added share was not overtaken by the increase in the share of manufacturing in any meaningful magnitude; the share of manufacturing remains low, merely showing a very slight upward move, from 2 percent in 1961 to 5.8 percent in 2015 for Ethiopia and falling from 13.1 percent in 1960 to 7.1 percent in 2015 for Ghana. Botswana, Ghana and Namibia exhibited deceleration in their industry (and more so in manufacturing) sector. The very slight improvement observed recently in the performance of the industry sector has been attributed to the growth of the non-manufacturing industries, such as mining and construction. A surprise observation to this trend again is Zambia that experienced a sharp deceleration in the value added share of non-manufacturing industries caused essentially by the plunge in the value added share of mining; thus, the share of industry sector in GDP plummeted moving from 1965 to 2015. The fall in the share of mining was responsible for the decline in the share of industry sector in Nigeria and South Africa.

Third, services sector value added share increased everywhere in Asia (except South Korea, Thailand, Cambodia and Malaysia); was above 40 percent to most countries in 1970 (69.5 percent in Hong Kong), but China, India, Indonesia, Malaysia and Philippines which ranged between 20-39 percent. In 2015, it stood at 45-70 percent (92 percent in Hong Kong), exceptions were China (40.6 percent), Cambodia (43.4 percent) and Myanmar (25.6 percent). In SSA too, services sector value added share increased everywhere, suggesting that the sample economies (irrespective of their income level) have followed the non-conventional pattern of structural change with the fall in the share of agriculture sector was overtaken by the services sector with very little increase in manufacturing (and construction). Most notably, the share of services value added was in the range of 40-60 (or more) percent everywhere in 1970, exceptions were Ethiopia (19.5 percent), Ghana

(30.7 percent), Nigeria (30.5 percent), Rwanda (19.1 percent) and Zambia (25.8 percent). In 2015, it stood in the range of 50-70 percent (or more), exception was Ethiopia at 47.9 percent. *The value added share trend in SSA may generally reflect both premature teritiarization, stagnant industrialization and lack of diversification and structural change on the road to manufacturing.*

4.3 The Extent of Employment Dynamics by Sector

4.3.1 Evolution of Employment Share and Growth by Sector

The preceding discussion may motivate one to ask *why the faster and steadier growth record in SSA failed to generate adequate quality jobs, and why a large number of informal-low productivity jobs still persist in that region.* Part of the explanations to these and related questions is predicted to rest on the trajectory of structural transformation is sectoral allocation and composition of employment. Tables 9a and 9b report the share of employment share by major sectors for the sample economies.

The following observations come out from the Tables.

First, the share of salaried and wage workers in total employment for SSA countries, excepting South Africa and Mauritius, remains meager. This means that agriculture, predominantly characterized by subsistence smallholder farming, remains the prime employer and refuge of the growing young workforce in most countries. This is only one face of the story though. The other face of the story speaks that, all SSA economies (excepting Zambia) have seen a continual fall in the sector's employment share, albeit the absolute number is still high and in eight countries the employment share of agriculutre stood at above 60 percent. It dropped, in percentage points, by 22 to 43 in 11 countries during 1970 to 2015. Overall, despite the falling share, majority of the workforce in the representative SSA economies are employed in agriculture, with the exception of Mauritius (6.8 percent) and South Africa (19 percent).

Second, the employment composition for the economy of the representative Asian countries seems more diverse than those of the representative SSA countries. For the first-tier industrializers (such as Hong Kong, Taiwan, South Korea and Singapore), salaried and wage earners make up the largest parts of the employment composition with agriculture's share accounts for less than 5 percent of total employment. Agriculture absorbed large fraction of the workforces in the emerging morning stars such as India (48 percent), Bangladesh (42.7 percent), Cambodia (43 percent), Myanmar (54.7 percent), and Vietnam(44 percent) in 2015, as large numbers of population reside in the country side. Indeed, agriculture still absorbs relatively commendable portion of the labor force in the other sample economies such as Thailand (32.3 percent), Philippines and China (28 percent each).

Third, the share of employment in industry (and more so, manufacturing) remains negligible in SSA as compared to the dramatic demographic transition, despite the adoption of structural adjustment and liberal policies prescribed by the World Bank and IMF, the relatively higher share in the region is observed in Mauritius (17.8 percent), Kenya (13.8 percent), Ethiopia (10.8 percent), and Senegal (10.5 percent) in 2015. This indicates, against the historical anecdote, the continuous flocking of workers out of rural areas - and in some rare cases even from manufacturing [perhaps caused by the already *premature de-industrialization or stalled industrialization*][86]- has been ending up in the thriving but more traditional and non-tradable Baumol's disease services and informal activities [characterized by relatively lower cumulative productivity increases, low earnings/wages], despite there is some indication of employment (re)industrialization in some countries since recently. Workers moved into this part of the economy away from subsistence agriculture largely because they could not find paid employment in the manufacturing sector. By contrast, the extent of the services sector appears to be inconclusive in representative Asian economies. During the initial year, it was only in the city states of Hong Kong and Singapore that the services sector had absorbed good portion of the workforce. But, during the last year (2015), services sector has absorbed a good share of the labor force in Indonesia, Korea, Malaysia, Philippines, and Taiwan too. It increased in percentage points of 32.7 in China (due to expansion of Baumol's diseases services), 40.4 in Hong Kong, and 36 in South Korea due mainly to expansion of the two broad segments of services in between 1970 and 2015. In 6 countries, it increased by 20 to 28 percentage points; in 6 countries by 6 to 15 percentage points mainly due to expansion of Baumol's diseases services activities – exception was Singapore where the share of these services activities decreased by 7.2 percentage points.

Fourth, the lack of capability in SSA to diversify and transform the production structure in the direction of dynamic and higher-productivity sectors or production activities with higher potential for employment creation and improvement in job quality for the growing young people was the main factor contributing to the insufficient change in the employment pattern. By contrast, the successful industrializers and rapidly growing economies in Asia underwent rapid industrialization, which is inclusive and sustainable, with high potential in improvement of job quality and employment creation. This gives evidence to the growth escalator role manufacturing could play to the economy of these countries. The share of industry sector in total employment has increased

[86] A study by the ILO (2013) shows that the industry sector absorbs less than 10 percent of the labor-force in SSA and more than 30 percent in Asia. The share of workers engaged in paid employment ass estimated at 13.7 percent for SSA, a testimony of the inability for the recent growth acceleration to bring about quality jobs. The existence of large and thriving informal economy suggests the ardent need for rapid industrialization so as to translate the large pool of unemployed labor force into economic opportunities so that most SSA economies may build a vibrant economy.

almost everywhere in the Asia sample economies, though far less than the fall in agriculture, by percentage points, in the range of 3 (Bangladesh) to 20.1 (China) during 1970 to 2015. It dropped in percentage points of 39.2 in Hong Kong, 3.6 in Singaproe, amd 1.8 in Philippines cheifly expaliend by the fall in the employment share of manufacturing by 41.3, 6.4 and 4.3 percentage points respectively.

Table 9a: Share of Sectoral Employment (%) for Asia Samples, 1960-2015

Country	Year	**Agr**	**Ind**	Min	**Man**	Pub	Con	**Serv**	Trad	Tran	Fire	GPS
CHN	1960	**65.1**	**15.6**	1.6	**11.9**	0.2	1.9	**19.2**	5.0	3.3	1.4	9.6
	2015	**28.0**	**30.3**	0.8	**19.5**	0.5	9.6	**41.7**	12.7	4.5	1.4	23.1
HKG	1970	**1.5**	**51.0**	0.1	**44.3**	0.4	6.2	**47.5**	19.6	7.1	3.9	16.9
	2015	**0.2**	**11.9**	0.0	**3.0**	0.4	8.4	**87.9**	29.3	12.0	19.8	26.7
IND	1960	**71.9**	**11.7**	0.5	**9.6**	0.1	1.5	**16.4**	4.7	1.7	0.2	9.7
	2015	**48.1**	**22.2**	0.5	**12.9**	0.3	8.4	**29.7**	13.2	5.7	2.9	7.9
IDN	1970	**72.9**	**6.3**	0.6	**4.7**	0.1	1.0	**20.8**	8.8	1.6	0.3	10.1
	2015	**32.5**	**21.1**	1.1	**12.8**	0.2	7.0	**46.4**	23.1	4.4	2.8	16.2
KOR	1963	**61.9**	**11.8**	0.7	**8.3**	0.2	2.6	**26.3**	12.2	2.9	1.0	10.2
	2015	**5.2**	**26.0**	0.0	**18.3**	0.3	7.4	**68.8**	23.4	7.6	14.2	23.7
MYS	1970	**40.0**	**19.8**	1.6	**12.4**	0.6	5.3	**40.2**	15.8	2.7	2.8	18.9
	2015	**12.1**	**27.3**	0.8	**16.2**	0.7	9.5	**60.6**	25.6	5.6	9.8	19.6
PHL	1970	**52.1**	**17.4**	0.4	**12.2**	0.5	4.3	**30.5**	7.5	5.5	3.2	14.4
	2015	**28.1**	**15.6**	0.5	**7.9**	0.3	6.9	**56.3**	22.4	8.0	5.6	20.3
SGP	1970	**3.0**	**31.9**	0.3	**21.0**	1.0	9.5	**65.1**	21.2	10.8	2.4	30.8
	2015	**0.4**	**28.3**	0.0	**14.6**	0.4	13.2	**71.4**	22.5	11.7	14.9	22.3
TWN	1963	**48.9**	**18.7**	2.0	**13.5**	0.5	2.6	**32.4**	11.0	4.7	1.1	15.6
	2015	**5.0**	**35.8**	0.0	**27.0**	0.7	8.0	**59.3**	24.7	5.5	9.0	20.1
THA	1960	**81.3**	**5.1**	0.1	**4.3**	0.1	0.5	**13.6**	8.4	1.2	0.6	3.4
	2015	**32.3**	**23.7**	0.2	**17.1**	0.5	6.0	**44.0**	23.3	3.8	3.6	13.3
BAN	1970	**60.9**	**17.5**	0.5	**12.1**	0.9	3.9	**21.6**	7.5	3.3	0.2	10.6
	2015	**42.7**	**20.5**	0.2	**14.4**	0.3	5.6	**36.9**	15.3	7.7	1.9	11.9
SLK	1970	**55.6**	**12.9**	0.4	**10.0**	0.3	2.2	**31.4**	10.3	5.5	0.7	14.9
	2015	**28.7**	**25.8**	0.8	**18.0**	0.3	6.8	**45.6**	16.1	6.8	2.7	20.0
CAM	1970	**80.5**	**4.5**	0.1	**3.7**	0.0	0.6	**15.0**	10.8	0.5	0.2	3.4
	2015	**43.0**	**15.3**	0.4	**9.2**	0.4	5.4	**41.7**	22.1	4.1	1.0	14.5
MYA	1970	**72.4**	**8.7**	0.4	**7.0**	0.1	1.2	**19.0**	8.2	3.9	2.0	4.9
	2015	**54.7**	**15.3**	1.2	**10.5**	0.2	3.4	**30.0**	13.7	4.2	5.9	6.2
VIE	1970	**71.2**	**11.5**	0.2	**8.3**	0.2	2.8	**17.3**	6.9	2.9	0.2	7.3
	2015	**44.0**	**22.7**	0.4	**15.3**	0.5	6.5	**33.2**	17.3	3.7	1.0	11.3

Note: Abbreviations are as previously given

Table 9b: Share of Sectoral Employment (%) for SSA Samples, 1960-2015

Country	Year	**Agr**	**Ind**	Min	**Man**	Pub	Con	**Serv**	Trad	Tran	Fire	GPS
BWA	1968	**85.9**	**2.1**	0.4	**0.6**	0.1	0.9	**12.0**	1.4	1.3	1.0	8.4
	2015	**38.0**	**10.4**	0.7	**8.2**	0.0	1.6	**51.6**	24.1	3.1	8.8	15.5
CMR	1965	**79.4**	**6.7**	0.0	**4.8**	0.1	1.8	**13.9**	4.2	1.4	0.2	8.0
	2015	**65.9**	**9.8**	0.3	**7.3**	0.5	1.8	**24.3**	16.0	2.8	0.3	5.2
ETH	1961	**96.2**	**1.5**	0.0	**1.3**	0.0	0.2	**2.3**	0.8	0.2	0.1	1.2
	2015	**61.3**	**18.4**	0.5	**10.8**	0.1	7.0	**20.2**	14.9	0.6	0.8	4.0
GHA	1960	**60.7**	**16.7**	1.9	**10.9**	0.5	3.4	**22.6**	14.2	2.6	0.3	5.5
	2015	**34.4**	**13.2**	2.2	**8.0**	0.3	2.7	**52.4**	33.3	3.0	2.8	13.3
KEN	1969	**80.6**	**4.6**	0.1	**3.6**	0.1	0.8	**14.7**	5.5	1.5	0.9	6.8
	2015	**43.7**	**18.2**	0.8	**13.8**	0.2	3.3	**38.0**	18.1	3.6	1.3	15.1
MWI	1966	**84.4**	**5.9**	0.2	**2.8**	0.2	2.7	**9.7**	1.7	1.3	0.2	6.4
	2015	**53.4**	**15.1**	0.1	**2.9**	1.1	11.0	**31.4**	16.6	2.3	0.5	12.0
MUS	1970	**37.3**	**20.1**	0.1	**10.6**	1.6	7.8	**42.6**	7.7	5.8	1.1	27.9
	2015	**6.8**	**28.1**	0.2	**17.8**	1.0	9.1	**65.1**	22.0	8.6	10.4	24.0
MOZ	1970	**80.1**	**6.6**	0.3	**3.2**	0.1	3.1	**13.3**	3.1	2.4	0.2	7.6
	2015	**78.3**	**4.1**	0.7	**0.9**	0.2	2.4	**17.5**	9.8	1.1	0.9	5.7
NAM	1965	**55.1**	**17.0**	5.9	**4.7**	0.6	5.7	**27.9**	5.8	2.9	1.2	17.9
	2015	**24.6**	**17.1**	2.1	**5.2**	1.0	8.7	**58.3**	17.4	4.0	9.1	27.8
NGA	1960	**78.2**	**5.3**	0.3	**3.4**	0.1	1.5	**16.5**	13.0	1.8	0.3	1.5
	2015	**63.9**	**7.4**	0.4	**5.0**	0.3	1.7	**28.7**	8.7	2.7	6.1	11.2
RWA	1970	**93.2**	**2.6**	0.2	**1.4**	0.0	0.9	**4.2**	1.0	0.2	0.0	2.9
	2015	**66.1**	**9.5**	0.7	**3.1**	0.3	5.4	**24.4**	10.8	2.5	1.4	9.8
SEN	1970	**73.3**	**7.4**	0.2	**5.6**	0.3	1.3	**19.3**	7.3	1.8	0.2	10.0
	2015	**48.2**	**15.2**	0.2	**10.5**	0.0	4.5	**36.6**	23.4	3.2	0.6	9.5
ZAF	1960	**48.8**	**22.6**	8.9	**9.3**	0.4	4.0	**28.7**	10.9	3.0	1.7	13.1
	2015	**19.0**	**20.5**	2.5	**9.3**	0.7	8.0	**60.6**	17.8	4.7	12.2	25.8
TZA	1960	**91.7**	**1.4**	0.1	**1.1**	0.0	0.2	**6.9**	1.0	0.2	0.1	5.6
	2015	**69.0**	**6.6**	0.4	**3.8**	0.9	1.5	**24.4**	10.6	2.7	0.6	10.5
UGA	1960	**93.6**	**2.1**	0.2	**0.9**	0.0	1.0	**4.3**	0.4	0.4	0.4	3.2
	2015	**61.7**	**9.5**	0.4	**6.4**	0.2	2.5	**28.8**	12.6	2.9	1.4	12.0
ZMB	1965	**63.3**	**12.8**	5.5	**1.7**	0.5	5.1	**23.9**	3.8	2.8	0.9	16.4
	2015	**68.2**	**7.2**	2.2	**4.0**	0.2	0.8	**24.6**	17.5	1.5	1.1	4.5

Abbreviations are as previously given
Source: Own Computation

4.3.2 The Extent of Sectoral Contributions to Total Employment Growth

The relative contribution of the considered sectors to economy-wide employment growth is presented in Tables 10a and 10b for the SSA and Asian sample economies, respectively. Much the same as the sectors contribution to GDP growth, their contributions to employment growth in Asia is in stark contrast with SSA, and three observations stand out.

First, the contribution of agriculture in employment growth for majority of the SSA sample economies was strong, outpacing those of industry and services sectors' contributions in either sub-periods one and two or both. Surprisingly, the sector's contribution to employment growth increased for Botswana and South Africa consistently, from sub-period one to sup-period three, and for Cameroon from sub-period two to sub-period three. By contrast, among the considered Asian economies, the contribution of agriculture to employment growth exceeded that of industry and services in eight countries during sub-period one. The sector's contribution to employment growth was still relatively strong during sub-periods two for Cambodia, Myanmar and Vietnam; and in sub-period three for Cambodia. The contribution of agriculture in overall employment growth was either negative or close to zero for Hong Kong, Singapore and Taiwan in all sub-periods; this became the rule for nine countries in sub-period three. One final note is worth noting: *agriculture was shedding labor, and in that way contributing to economy-wide productivity growth in well-off Asian economies while it was still absorbing labor in most SSA economies*.

Second, country level data for SSA shows that the employment growth contribution from industry sector was extremely weak. Exceptions were Mauritius, South Africa and Botswana that have experienced, respectively, a share of 82.3 percent, 75.4 percent and 27.6 percent during sub-period one, owing to the relatively big contribution from manufacturing industry for the first two amounting respectively to 46.7 percent and 53 percent, and mining and construction for the latter. The contribution of the industry sector [and more so manufacturing] exhibited a clear decline for Mauritius and South Africa in subsequent sub-periods, and a persistent increase for Ethiopia, Kenya and Senegal, albeit at a slower magnitude.

Third, contribution of industry sector was positive, albeit less than that of the services sector, in most countries during sub-periods two and three. However, there were marked differences as to whether manufacturing, mining, public utilities or construction was responsible to this result. For instance, the weak contribution of industry to employment growth in Hong Kong and Mauritius was caused in part by the weak contribution of manufacturing while the strong contribution of the sector in these economies was due to strong contribution of manufacturing. More recently, the contribution of construction to employment growth became more important than that of manufacturing for the majority of SSA economies, with the reverse held true for the rest few.

Table 10a: Sectoral contribution to aggregate employment growth in Asia (%)

		CHN	HKG	IND	IDN	KOR	MYS	PHL	SGP	TWN	THA	BAN	SLK	CAM	MYA	VIE
1960-1979	Agr	76.9	2.0	60.2	26.0	4.2	30.8	48.2	-0.7	-14.9	42.9	85.5	18.5	69.6	47.7	72.6
	Min	1.8	-0.1	0.4	1.4	1.0	0.6	0.5	0.0	-0.6	0.6	-2.3	7.1	0.3	1.0	0.2
	Man	15.4	35.4	13.2	23.6	39.3	21.3	9.7	40.6	55.0	17.7	-18.4	28.6	-3.2	9.2	8.5
	Pub	0.6	0.7	0.7	0.1	0.5	1.3	0.2	1.1	1.0	0.8	-4.8	1.1	0.2	0.3	0.2
	Con	2.7	7.4	3.2	7.7	10.4	5.7	1.8	6.8	14.4	5.2	-18.4	20.0	-0.7	2.6	2.8
	Trad	0.4	17.4	9.6	19.8	23.7	13.2	25.8	20.7	23.3	12.9	33.2	13.0	12.0	14.7	7.1
	Tran	0.1	6.8	4.8	6.5	7.3	6.5	1.5	10.0	6.7	4.0	3.7	-1.9	9.2	1.3	3.0
	FIRE	-0.3	4.3	1.6	1.6	3.6	6.6	0.5	9.9	3.2	1.1	3.1	3.8	0.7	20.7	0.2
	GPSC	2.3	26.2	6.3	13.3	10.1	13.8	11.9	11.5	12.1	14.9	18.4	9.7	11.9	2.5	5.4
1980-1999	Agr	17.9	-4.3	37.6	25.2	-34.	-3.2	20.1	-1.1	-18.6	1.2	25.8	7.8	67.0	49.8	59.0
	Min	0.5	-0.1	1.0	1.0	-1.6	-0.4	-0.2	-0.1	-1.5	0.2	0.2	1.1	0.2	4.0	0.9
	Man	16.9	-85.9	16.8	17.8	15.3	33.7	7.8	13.6	16.5	23.9	11.8	22.7	8.7	13.1	7.0
	Pub	0.8	0.6	0.5	0.3	0.3	1.0	0.8	-0.1	0.5	0.9	0.5	0.8	0.1	0.2	0.2
	Con	13.0	16.4	8.2	5.3	9.5	10.6	8.0	18.8	10.7	9.0	5.4	7.4	1.6	3.5	2.9
	Trad	15.3	68.0	16.5	26.2	45.1	22.4	28.8	18.5	38.9	37.0	25.9	17.6	8.0	11.0	17.6
	Tran	5.5	27.1	5.7	7.0	9.9	6.5	10.4	10.3	6.4	5.3	11.1	7.5	3.4	0.1	4.5
	FIRE	1.3	49.8	3.2	1.1	23.9	8.8	3.8	14.9	17.7	4.6	1.5	3.0	0.5	-1.2	0.5
	GPSC	28.6	28.5	10.4	16.1	32.0	20.6	20.4	25.2	29.5	18.0	17.7	31.9	10.5	19.5	7.3
2000-2015	Agr	-268.9	0.0	-3.3	-8.6	-18.7	3.2	4.7	0.6	-11.9	-77.	18.2	-47.7	-7.4	34.2	-10.8
	Min	-4.6	0.0	0.0	1.8	-0.1	1.8	0.9	0.0	-0.4	0.8	-0.2	-2.1	0.6	-4.2	0.3
	Man	86.8	-33.5	13.3	12.7	11.1	1.1	2.1	5.4	22.4	38.7	28.7	25.8	12.5	12.7	33.4
	Pub	0.1	-0.1	-0.3	0.2	0.3	0.5	0.0	0.3	1.2	0.2	0.1	-2.0	0.8	0.6	1.3
	Con	53.6	3.2	31.3	16.9	6.9	11.9	10.8	12.8	3.8	18.6	13.4	16.3	12.2	8.6	15.9
	Trad	80.4	22.1	32.4	34.9	6.4	37.0	28.4	26.8	32.6	54.0	14.3	43.0	42.7	25.4	32.0
	Tran	20.9	12.6	15.6	1.9	11.1	6.5	10.2	13.4	3.4	9.7	12.3	22.6	7.5	10.6	3.5
	FIRE	7.2	46.5	10.2	8.5	32.9	17.6	13.0	21.9	22.3	16.3	4.9	7.5	1.9	14.9	2.8
	GPSC	124.6	49.2	0.9	31.6	50.2	20.4	29.8	18.7	26.6	38.8	8.3	36.7	29.1	-2.8	21.7

Notes: Abbreviations are as previously given
Source: Own Computation

Table 10b: Sectoral contribution to aggregate employment growth in SSA (%)

		BWA	CMR	ETH	GHA	KEN	MWI	MUS	MOZ	NAM	NGA	RWA	SEN	ZAF	TZA	UGA	ZMB
1960-1979	Agr	12.9	78.5	80.2	49.9	74.5	88.6	-13.2	97.9	25.9	7.4	92.0	65.4	-93.4	82.5	79.4	79.2
	Min	10.3	0.1	0.1	-1.1	0.6	0.0	0.0	0.5	-4.7	0.9	1.1	0.0	10.5	1.4	0.1	-0.5
	Man	3.7	4.9	2.2	17.7	2.7	5.4	46.7	-0.7	7.3	12.0	1.2	6.2	53.0	2.3	3.4	8.6
	Pub	2.0	0.2	0.1	0.2	0.4	0.2	3.1	0.0	1.2	1.3	0.1	0.8	3.7	0.2	0.2	0.8
	Con	11.6	1.9	0.3	-0.1	1.4	2.5	32.5	-2.7	-0.1	3.6	1.1	2.0	8.2	1.3	2.1	-4.5
	Trad	5.2	4.4	7.3	16.4	2.4	4.8	16.9	1.9	23.6	28.5	1.3	11.5	41.6	8.6	1.9	7.5
	Tran	0.0	1.4	0.8	2.2	4.8	0.3	5.7	0.9	3.3	5.2	0.4	1.9	14.4	1.3	0.8	3.0
	FIRE	2.0	0.2	0.0	0.5	0.4	0.8	4.2	0.7	5.4	0.7	0.1	0.2	10.5	0.3	1.6	2.1
	GPSC	52.2	8.3	9.0	14.1	12.8	-2.5	4.0	1.5	38.1	40.4	2.8	12.1	51.5	2.0	10.4	3.8
1980-1999	Agr	19.6	48.6	80.6	50.0	36.4	75.7	-6.7	79.2	-9.1	94.5	74.8	47.8	7.4	79.0	49.4	79.9
	Min	1.3	0.5	0.5	3.7	0.8	-0.1	0.7	0.7	-3.5	-1.1	-0.4	0.1	-5.4	0.3	0.3	-3.1
	Man	10.6	11.0	4.7	4.2	15.7	1.7	41.9	-0.7	6.8	-5.2	0.8	10.1	7.3	1.7	8.9	1.1
	Pub	0.7	0.9	0.1	0.2	0.4	0.1	-0.8	0.3	1.7	-0.3	0.1	-0.1	0.3	0.4	0.3	0.2
	Con	13.4	1.8	0.8	4.1	3.6	1.2	5.0	3.8	7.7	-3.8	1.7	4.0	4.7	1.0	1.5	-0.2
	Trad	16.6	30.9	6.2	22.0	18.3	11.5	27.1	14.1	14.8	19.1	9.0	26.8	30.1	9.9	20.0	8.4
	Tran	3.7	4.8	0.3	4.2	5.2	0.7	7.8	-0.2	4.4	-0.5	2.0	2.2	6.0	0.7	2.7	0.4
	FIRE	7.2	0.4	0.2	3.0	2.6	1.1	7.1	0.8	23.9	0.9	1.1	0.5	14.9	0.2	2.1	0.6
	GPSC	26.9	1.1	6.6	8.7	17.0	8.1	17.8	2.1	53.4	-3.6	10.9	8.6	34.6	6.8	14.7	12.7
2000-2015	Agr	36.3	64.9	34.8	12.8	24.3	23.1	-15.1	64.8	21.0	64.6	-10.4	32.8	20.0	48.8	48.6	62.6
	Min	-8.7	0.3	0.8	2.7	1.4	0.2	0.0	1.2	3.8	1.5	2.3	0.4	-1.0	0.3	0.7	3.7
	Man	17.4	7.4	19.5	5.0	19.8	3.2	-33.9	1.1	4.5	11.6	9.5	14.2	-5.5	6.8	8.3	6.0
	Pub	-3.7	0.5	0.2	0.3	0.2	2.1	1.9	0.3	1.1	0.3	1.2	-0.2	1.3	1.7	0.2	-0.1
	Con	-38.2	1.8	14.3	2.4	4.9	20.4	7.7	3.1	13.4	5.4	20.0	7.1	18.1	2.4	4.1	-0.1
	Trad	94.4	16.9	26.3	51.7	27.3	27.7	42.8	17.1	25.8	-26.5	37.6	31.2	7.7	15.9	16.0	35.2
	Tran	6.4	2.9	0.8	3.2	3.6	4.0	17.5	1.1	4.6	4.7	8.3	4.9	2.7	5.5	4.9	1.0
	FIRE	29.7	0.3	1.5	4.2	0.6	0.3	37.9	1.9	6.5	25.0	5.0	0.9	28.3	1.1	1.5	1.1
	GPSC	-33.6	5.1	2.0	17.7	17.9	18.9	41.2	9.3	19.2	13.5	26.6	8.7	28.5	17.5	15.8	-9.3

Note: Abbreviations are as previously given
Source: Author's computation

Fourth, the contribution of the services sector to economy-wide employment growth was relatively large for SSA countries (e.g. Botswana and South Africa) in both sub-periods. In the Asian sample, the contribution of the services sector to economy-wide employment growth was more important than that of agriculture and industry for most economies during the second and third sub-periods. More precisely, industry sector loses its biggest contribution to employment growth for the Asian Tiger economies, owing to the negative or weak contribution spawned by manufacturing, and was replaced by the services sector during sub-period three. Within services, contributions of transport, storage and communication components was much less important than wholesale and retail trade, hotels and restaurants, business services and government and personal services for both regions.

4.4 Changing Relationship between Production Structure and Per Capita GDP

With a view to trace the divergence development path that exists between the representative SSA and Asian economies, and hence, to draw observations from successes and failures in the trajectories of industrialization, this section examines the production transformation process through empirically relating employment and value added patterns against per capita GDP. *It is anticipated that most of the Asian economies in the sample followed the path of industrial catch-up that today's wealthy countries in the West followed. At higher-income level, a natural process of deindustrialization may follow, a situation where the shift in demand patterns towards services occurs with productivity in manufacturing continues to grow faster than in other sectors.* The experience of South Korea is stellar example of industrial transformation and catch-up, where learning-based industrialization paved the avenue for it to join the club of high-income economies in the 1990s, starting from an underdeveloped economy with low manufacturing base and low productive and technological capabilities in the 1950s. Some of the sample economies in Asia (such as Bangladesh, China, India and Vietnam) are clear examples of growing developing economies, generally characterized as emerging giants. The experience in SSA are presumed to be opposite to this classical path, wherein the sample economies might have either seen *premature de-industrialization* as defined earlier or *stalled industrialization* or *pre-industrialization/under-industrialization* (a situation where the share of manufacturing in GDP and employment remain very low throughout). Figures 6 to 8 convey the extent of industrial transformation path in SSA and Asian sample economies against log of GDP per capita for the three sub-periods defined earlier. SSA lagged behind Southeast and East-Asian economies in diversifying the production structure towards a more dynamic sectors/activities.

Sub-period one (1960-1979):

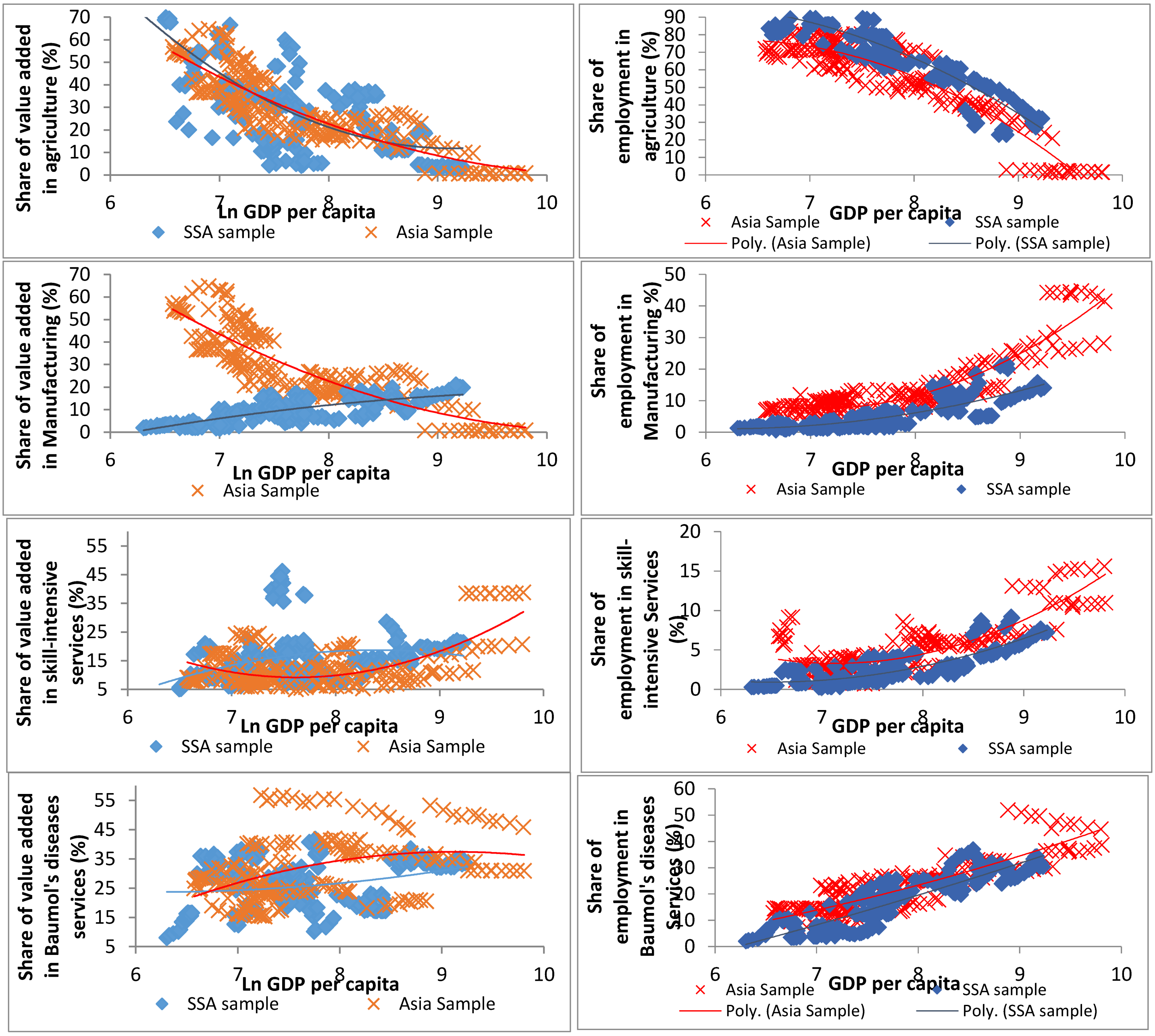
This sub-period is generally classified as the planning period where various countries had bidden to expand manufacturing at lower level of per capita income following the structuralist tradition, introduced import substitution industrialization strategies similar to other developing economies. Figure 6 plots value added share (at 2005 constant prices) and employment share for agriculture, manufacturing and two broad segments of the services sector against GDP per capita for the analyzed countries. SSA started relatively from a much lower industrial base, with slow expansion of manufacturing industries.

The value added share of agriculture was substantially lower than its employment share; hitherto the share of agriculture both in real value added and employment showed a modest but steady decline, if not for all economies. This was accompanied by the rise in the share of manufacturing, despite variation across countries. *Surprisingly, the shape of the trend line for the two segments of* *the services sector is somehow on the growing territory, suggesting that the sector's contribution to the economy both in GDP and employment share had already begun at an early stage of production transformation and development.* This further gives some indication that the considered economies in the region saw *some sort of structural change, shifting resources in the direction of the Baumol's diseases services* which present lower potential for cumulative productivity increases. This was not healthy any ways. Because, the share of manufacturing (confined to the more traditional and extractive activities) both in GDP and employment was relatively low while the share of skilled- and knowledge-intensive services were relatively low.

The situation in the Asian sample countries has opposite face. The share of agriculture both in value added and employment was steeper than those in SSA, suggesting different patterns of structural change in the two regions. Governments of the developmental states of Asia were convinced that employment creation based on rapid and learning-based industrialization is the viable route to realize catch-up growth and sustainable development *a la* structuralism. So, some of them showed political commitment to the extent of defying the counties comparative advantage to underwent successful industrial transformation (e.g. South Korea). The targeted industrial policies they implemented helped them build their productive capabilities and competitive manufacturing industries and became industrial powerhouses. As already shown in parts two and three, the first-tier and ASEAN industrializers followed the so-called flying geese approach to industrial transformation. The newly emerging stars have followed their route.

Seeing in comparative perspective with Asian comparator economies, majority of SSA failed to undergo industrial transformation in any meaningful way, despite the implementation of import substitution industrialization strategy. The envisioned production transformation and catch-up growth targets for these economies was stifled by the lack of learning-based industrial foundation. As a result, contribution of manufacturing to escalate growth of the economy and to meet the growing domestic demand was very trifling. This meant that the engine of growth potential of manufacturing was not realized as envisioned in vast majority of the countries under consideration.

Figure 6: Patterns of sectoral value added and employment shares vs. per capita income: Comparing SSA and Asia, 1960-1979



Sub-period two (1980-1999):

This sub-period belongs to the pre-SAP, the SAP and post-SAP years; SSA had implemented structural adjustment program (SAP) with the reform orientation of the World Bank and IMF. Over this sub-period, globalization was intensified and the service-led development path proponents claimed that the world has entered to the era of "services transformation". Figure 7 depicts the level of structural composition of production against per capita GDP for the sample economies. The infant industrialization drive was *disrupted* with deleterious repercussions on manufacturing production in most countries. As a result, majority of the countries continued to rely on small-scale subsistence agriculture and resource extraction, unable to change the landscape for their dire poverty. Governments of the respective countries lacked political commitment to build productive and technological capabilities and change the production structure. Local firms were unable both to generate the required resources to kick-start investment in the increasing return sectors/production activities and to subsist competition from foreign firms. Sadly, the share of the industrial sector in value added was on the sliding territory while its employment share has showed any perceptible change or stagnated at about 10 percent or far below that.

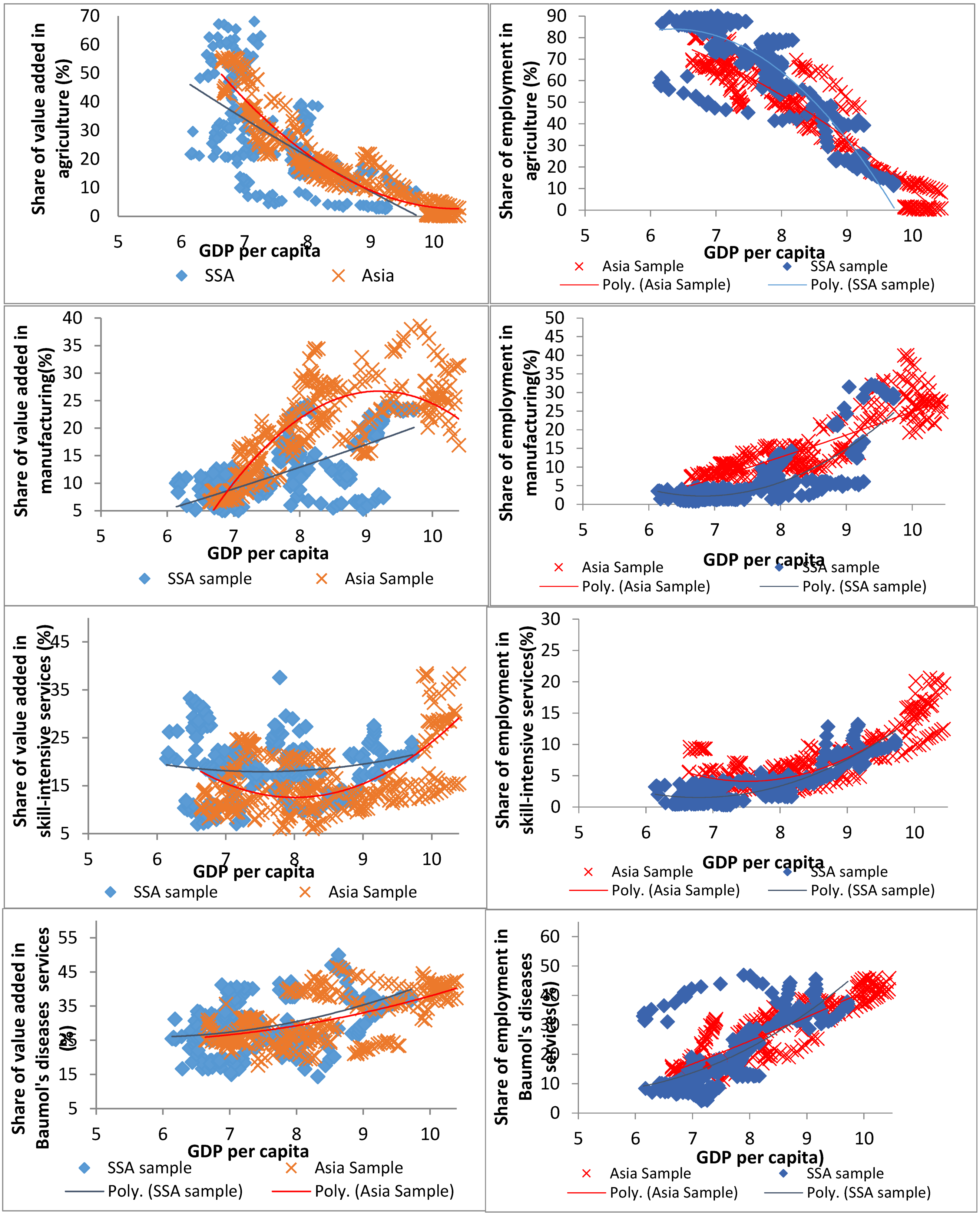
A comparison of SSA with the experience of the Asian forerunners shows clear divergence paths of industrial transformation. The crucial question should, thus, be *why such malaise happened in SSA if really manufacturing had performed well during the enactment of the import substitution strategy or pre-SAP period?* Part of the answer lies at the inadequate level of capabilities and sophistication of manufacturing production. The industry sector was in its embryonic stage or the manufacturing base was in many cases very low. As a result, cumulative productivity increases in the increasing returns sectors/activities were not captured, export capacity subdued, and technological diffusion and linkages to other sectors of the economy remained limited. This situation worsened over the subsequent sub-period. Surprisingly, few of the countries exhibiting commendable performance of manufacturing for fairly long periods have failed to maintain their position. A case in point is Botswana, where its manufacturing industry recorded annual average real growth of about 30.1 percent over the first sub-period. However, the share of manufacturing in GDP and in total employment remains at single digit, accounting respectively for 7.1 percent and 8.2 percent in 2015. The fact that their manufacturing base remains low meant that the sector had weak forward and backward production linkages and spillover effects to the rest of the economy, on top of its inability to generate adequate jobs for the growing young people. Also, the linkages between agriculture and manufacturing became fragmented over time, indicating that *the industrialization process remains far below the scale needed to ensure the forces of cumulative causation to work.*

By contrast, the Asian forerunner economies have managed to build their domestic capabilities, and thereby moved out resources towards manufacturing imitating the leading goose. The successful industrial transformation and industrial upgrading enabled them caught up the frontier economies. The emerging morning stars have also imitated them to see shifts in their economic activity from lower-productivity to higher-productivity sectors/activities, and thereby exhibited sustained catch-up growth. Their manufacturing firms became competitive in the international market. So, the industrial policies can be considered as successful. South Korea is a typical example. The country moved up the quality ladder, diversifying its manufacturing activities towards more sophisticated and high-tech industries away from low-tech and light-manufacturing industries in the 1960s with strong state support in various ways. According to Lee et al. (1988), **imitation** in South Korea was followed by internalization of technological change and the development of new products and processes in different competitive segments, enabling local firms enter into the global markets. Regional integration following the flying geese model was part of the key driving forces for rapid industrialization in the respective Asian countries. The figure supports these arguments.

The shape of the curves for manufacturing value added and employment against level of per capita income is somehow different for Asia panel: the former inverted U-shape and the latter upward linear. By contrast, *the shape of the curve for SSA is almost linear for value added and upward convex for employment (perhaps the Mauritius and South Africa effect), corroborating the observation in previous section in that the expansion of manufacturing structure/technological composition was slow*. Another interesting observation from the figure is that *the decline or stagnation of manufacturing in most of the SSA sample economies was accompanied by a fall in per capita GDP, which Palma calls 'reverse de-industrialization.'* This was in stark contrast with the experience of Southeast Asia that demonstrated robust per capita GDP growth over this period.

The value added share of agriculture for SSA economies followed similar pattern with their Asian counterparts, but with different magnitude and outcome. With the rise in per capita GDP, the share of agriculture in total value added had plummeted. The share of that sector in the Asia panel continued to exhibit a precipitous and gradual decline in both value added and employment. By contrast, in SSA the shape of the curve, especially for agriculture's share in employment, suggests the lack of sufficient good structural change and the continued importance of agriculture as refuge for the growing labor force. When it comes to services, the value added and employment share for the skill-intensive services segment can be labeled as somehow U-shaped or upward convex while increasingly linear for the Baumol's diseases services segment.

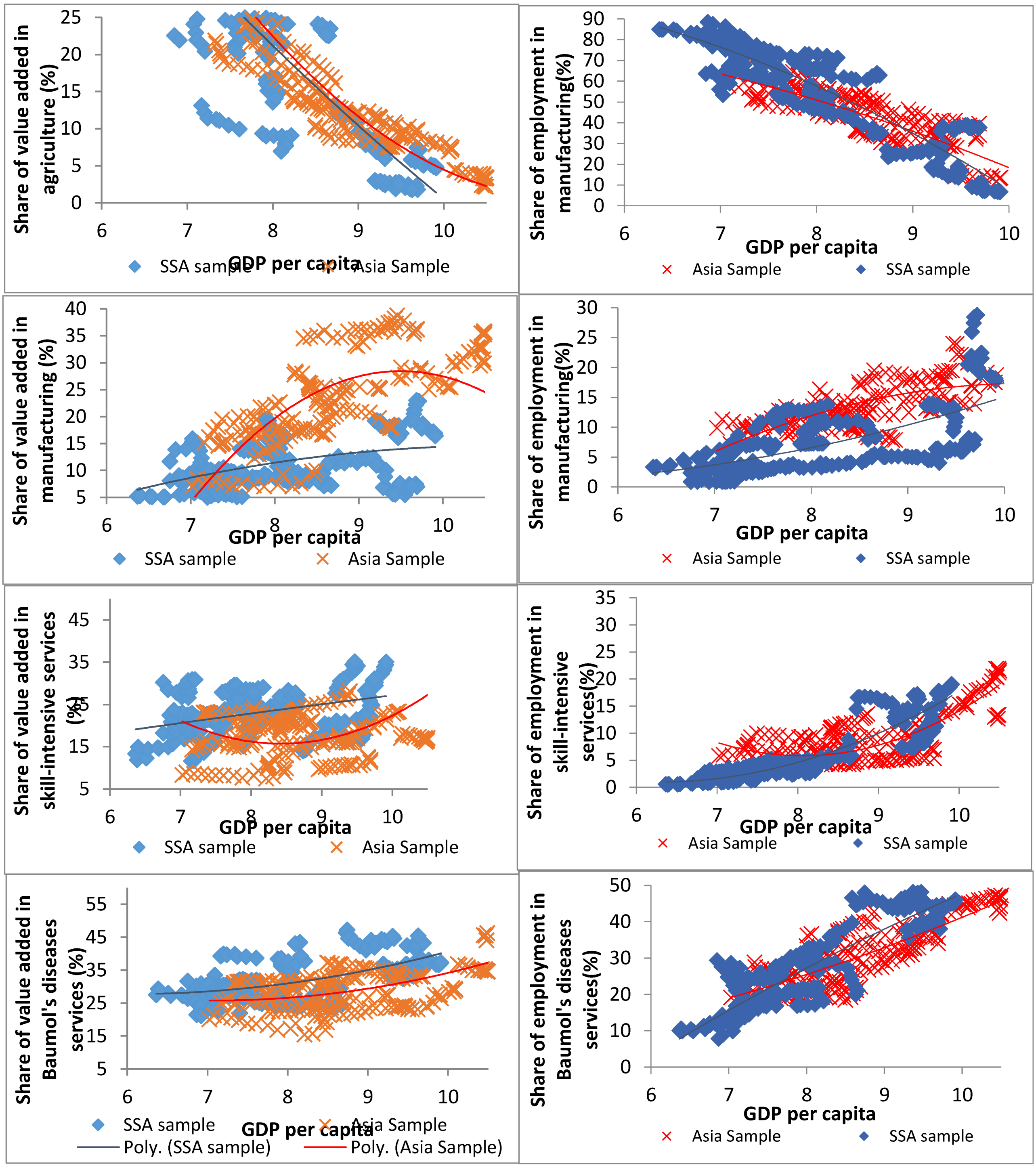
Figure 7: Patterns of sectoral value added and employment shares vs. per capital income: Comparing SSA and Asian Countries, 1980-1999



Sub-period two (2000-2015): The "Africa Rising" Narrative Period

This sub-period is the contemporary period where various SSA economies saw growth accelerations and the 'Africa rising' narrative received attention from various corners. Figure 8 depicts value added and employment shares of the three sectors against per capita income level.

Figure 8: Patterns of sectoral value added and employment shares vs. per capita income: Comparing SSA and Asian Countries, 2000-2015



The shape of the figure may offer some insights about the quality of the growth acceleration and whether structural change has been moving in the right route or encountered *premature deindustrialization*, though full insight is anticipated to be offered later in part five by the econometric analysis.

Over this sub-period, the patterns of relative manufacturing real value added share followed a skewed inverted U-shape (similar to the period 1980-1999) for Asia and linear for SSA economies. Again, the contribution of manufacturing to the production transformation process in SSA has continued to be limited relative to the Asian samples, despite the widely pronounced 'Africa Rising' narratives and the employment pattern suggests signs of reindustrialization. In contrast, the relative value added share of the services sector has been steadily trending upward, against the historical anecdote and stylized facts of production transformation discussed earlier. Part of the explanations to such trend might be pertinent to the layoffs due to privatization of public enterprises, during SAP regime, increased the share of employment in agriculture and of value added in services. The slowdown or stagnation of industrialization during this sub-period might have been sharper in some countries while it was resilient in others. This may accord to the literature which claims that some commentators suggest, some of the SSA economies underwent *stalled industrialization* (although some economies might have experienced *premature de-industrialization*) starting from the early 1980s is more pronounced after 1990s while still others remain *under-industrialized*. This means that no adequate reversal seems to have been happening amidst the impressive growth momentum during the 'Africa rising' narrative periods. Overall, manufacturing, on average, absorbs merely 7.3 percent of the labor force while its share in value added remains at 10.3 percent in 2015 for the sample economies. The industrialization pattern led several researchers to speak of *'the paradox of growth'* in SSA. The message is precise: SSA failed to build strong and globally competitive manufacturing base while several countries exhibited growth rebound starting from the mid- to-late-1990s and early 2000s.

For some Asian countries, the fall in the employment share of agriculture was accompanied by the rise in the employment share of manufacturing and eventually, the employment share of the latter start stagnating in some of them, leading to the bloating of employment share of the services sector. In fact, a detailed exploration of the services sector is required to see which services segments play pivotal role. However, the value added shares follow a rather different pattern. The share of agriculture continuously dropped; the value added share of manufacturing increased more rapidly than that of the services sector, but subsequently the former starts to stagnate and the latter rises rapidly. However, this is not universally the case for each of the sample countries. In any case, the figure may lend support for the *'stimulus complement'* role of services. The shape of the trend line appears to be increasing U-shape (upward convex shape) for both value added and employment share for both services segments for Asia and increasing linear for both services segments for SSA sample. Caution is in order here.

The magnitude in the importance of the services sector has been unequivocally different between sample Asian economies. As a testimony to this, the sector's share grew more quickly in countries that had large manufacturing bases in the 1960s (e.g. China and South Korea) and grew more slowly in countries where the share of manufacturing was relatively smaller than those countries (e.g. Indonesia and Malaysia). In Hong Kong, South Korea, Singapore and Taiwan, the value added share of services exceeded that of manufacturing, in turn outpaced the share of agriculture in 2015, but with a different magnitude. Conversely, in other countries (e.g. Malaysia), the share of manufacturing in value added exceeded that of the services sector. By contrast, the considered SSA economies experienced a decrease in the share of agricultural employment in the 2000s while the employment shares for manufacturing and services sectors picked up, again at different magnitude. Also, the share of agriculture in value added has continued falling while those of industry and services have continued rising. Paradoxically, the increase in employment opportunities in manufacturing was slower during sub-period three than the first sub-period, though it was faster than the one observed during the second sub-period. The growth acceleration since 2000 might have thus been driven by accelerated industrial growth in very few countries and public investment on infrastructure development in others; but, the growth and share of manufacturing both in GDP and employment remain low to make the countries industrial/manufacturing hubs.

In a nutshell, the reference Asian countries have realized growth-enhancing structural transformation as exhibited by their remarkable shifts of the economy to higher productive activities. The share of agriculture shows negatively sloped regression line for the whole sample in line to the stylized facts of structural transformation; a very remarkable decline has observed in China and India (as the sector share was large in the preceding sub-period). In most of the considered Asian economies, the growth trajectory was robust for industry and services sectors. The path of structural transformation in the countries is archetypal of the developed countries in that the shares of output and employment in industry sector increases with the rise in per capita GDP until a certain threshold level, beyond which both began declining. They also have exhibited predictable rise in the services sector. Comparatively, the share of manufacturing valued added in GDP increased substantially for the Asia panel over the reference period.

*One can draw a stylized fact that most SSA economies are under-industrialized at all income levels compared with Asi*an sample economies while others encountered *failed industrialization*. But, this does not mean that the Asian forerunners are destined for industrial transformation and SSA economies for agriculture and traditional services. *Also, there is indication that few SSA economies might have experienced premature deindustrialization; but, this need to be confirmed through empirical works applying appropriate econometric models [empirical exercise], which is carried out in the subsequent part of the dissertation*.

4.5 Employment Elasticity

Economic growth and employment, intrinsically linked, are taken as the twin objectives of macroeconomic policy agenda in both developed and developing countries. An increase in economic growth may bring changes in employment growth, in turn brings new areas and better opportunities of earning income (Boltho and Glyn, 1995). Kapsos, (2005) predicts that employment growth and productivity growth *must be jointly pursued* in order to optimize the potential for realizing economic development objectives such as poverty reduction and rising living standards. Economic growth creates new jobs, but its intensity differs in different countries and different time (Kapsos, 2005; Döpke, 2001). During economic growth labor market responds differently. This makes empirical exploration of employment intensity of growth important. Therefore, this section intends to look into employment elasticity at economy-wide and sector level.

4.5.1 Concepts, analytical framework and previous research findings

Employment elasticity is defined as the relative response of employment with respect to a percentage change in value added. The empirical literature gives two methodologies to estimate employment elasticity: *Arc elasticity and point elasticity. Arc-elasticity* defines employment elasticity as the ratio of the percentage change in employment (E) to percentage change in output or value added (Y) during a given period. The estimated result may give insights on the employment creation capacity of the economy or an economic sector in the economy. The arithmetic measure of employment intensity of growth (or Arc-elasticity) is expressed as follows:

$$\varepsilon = \frac{\%\Delta E}{\%\Delta Y} \qquad (1)$$

Where, ε represents employment intensity of growth; $\%\Delta E$ denotes percentage change in employment (E), and $\%\Delta Y$ is percentage change in output (Y). Though this method is simple to compute, the estimate might tend to be instable, not robust and biased in inter-country comparisons (Islam 2004).

Therefore, many researchers prefer to employ *point-elasticity* to measure the employment intensity of growth, which is given by the following log-linear regression form:

$$lnE_t = \alpha + \beta lnY_t + \varepsilon_t \qquad (2)$$

Where, E and Y are as defined above; α is an intercept term; β represents employment intensity/elasticity in relation to economic growth, ε denotes an error term, and t is an index of time. The estimated value of the employment elasticity (β) measures the response of employment to changes in economic growth. Nonetheless, Islam (2004) contends that economic growth is affected both by the increase in employment and in productivity; hence, caution is required to interpret the relationship between employment elasticity, employment growth and productivity growth.

Kapsos (2005) suggests a 'fundamental identity' between employment intensity of growth and labour productivity intensity of growth as depicted in equation (3) below:

$$Y_i = E_i * P_i \qquad (3)$$

Where, P refers output per worker $(\frac{Y}{E})$. For small changes in output, equation (3) can be rewritten as follows:

$$\Delta Y_i = \Delta E_i + \Delta P_i \qquad (3a)$$

Equation (3a) suggests that for a given amount of output growth, changes in the rate of employment growth should be associated with equal and opposite fall in labor productivity growth. Differentiating both sides of (3a) with time variable t yields:

$$\frac{d(lnY)}{dY}\frac{dY}{dt} = \frac{d(lnE)}{dE}\frac{dE}{dt} + \frac{d(lnP)}{dP}\frac{dP}{dt} \qquad (3b)$$

Taking discrete time instead of continuous time, (3b) becomes:

$$\frac{\Delta Y}{Y} = \frac{\Delta E}{E} + \frac{\Delta P}{P} \qquad (3c)$$

Dividing both sides of (3c) by output growth ($\frac{\Delta Y}{Y}$) and defining employment intensity of growth as $\frac{\Delta E/E}{\Delta Y/Y}$ gives the following:

$$\varepsilon = 1 - \frac{\Delta P/_P}{\Delta Y/Y} \qquad (3d)$$

Where, $\frac{\Delta P/_P}{\Delta Y/Y}$ denotes the productivity intensity of growth. In words, employment elasticity of output is given as 1 minus the elasticity of labor productivity.[87]

[87] The relationship between employment elasticity with employment and productivity growth may appear different with different output growth scenarios. First is $\varepsilon < 0$, employment growth would be positive and productivity growth would be positive with

A look into changes in output along with employment elasticity may give some light as to whether growth in a country occurs with the gains in employment or in productivity or both. Employment elasticity estimated coefficient close to unity is interpreted as economic growth causes increase in employment while the value of employment elasticity coefficient close to zero indicates a low association between economic growth and employment. In the latter case, the phenomenon of jobless economic growth occurs.

Various studies estimated employment intensity of growth at economy-wide and sector-level in a specific country or at regional/country group; few of which are reviewed here for reference purpose. Islam and Nazara (2000) estimated the average long-term intensity in Indonesia over the period of 1977-1996 and found an employment intensity that range between 0.49 and 0.66. Nonetheless, their econometric estimates suggest the existence of unstable short-run linkage between growth and employment over the sub-periods. Seyfried (2005) examined employment generation and economic growth potential of the US economy, placing focus on the ten largest states over the period 1990-2003. The estimates show that employment intensity of growth varies in between 0.31 to 0.61 across sates, which was around 0.47 for the overall sample. The findings suggest that employment responded immediately to economic growth and this effect continued for several quarters.

Applying pooled regression model with country dummy, Kapsos (2005) estimated employment intensity of growth over the period 1991-2003 and found that employment elasticities in the sampled countries varied globally between 0.3 and 0.38, which were explained mainly by the size of the countries' service sector. The finding links the ability of national job creation to sectoral composition of economic growth. Crivelli, Furceri and Toujas-Bernaté (2012) estimated the long-run employment intensity of growth employing time-series and panel data regression [the estimates from the two methods come up with slight differences for sampled economies] using data from 167 countries for the period 1991-2009. The results suggest that long-term employment intensities varied considerably across regions; the highest estimates were observed for South Asia (0.99) followed by North America (0.81) and Western Europe (0.64). The long-term employment intensities of growth for other country groupings come out to be relatively lower: Eastern Europe (0.23), Middle East and North Africa (MENA) (0.1), and SSA (-0.02). When it comes to employment intensities at sector level, their findings evidenced that agriculture, industry and

positive output growth and the reverse would be true when output growth is negative. Second is $\varepsilon > 1$, employment growth and productivity growth would become positive and negative respectively with positive output growth and the reverse could come out true with negative output growth. Third is $0 \leq \varepsilon \leq 1$, employment and output growth become positive with positive output growth and negative with negative output growth.

services sectors contributed significantly in employment generation and were more labor-intensive in advanced economies.

4.5.2. Discussion of Estimation Results

Estimation of employment elasticity is carried out at economy-wide and sector level with the overarching objective of understanding whether manufacturing or the two broad segments of the services sector or both come out inclusive. Specifically, the empirical estimation seeks to address the question: Is manufacturing more inclusive than services in SSA and Asia? A positive value indicates that the growth of the sector in question creates jobs. A value that exceeds the overall economy's elasticity indicates that the sector is more inclusive, and vice versa. Employment elasticity coefficients and labor productivity intensity coefficients obtained from the estimate of the regression equation for the two panels covering the period 1970-2015 are reported in Tables 11 and 13. Whereas, labor-productivity intensity of growth is computed as a residual using equation (3d).

The Tables show that most of the sample economies in the two regions saw employment enhancing growth during the reference period with differing employment intensity of growth in the various sectors of the economy. In terms of the total real value added growth of the economy, the employment elasticity coefficient averaged 0.29 for SSA and 0.30 for Asia, implying that everything else being equal, a 1 percentage growth in gross value added in the economy causes employment growth by 0.29 and 0.30 percentage points. The productivity intensity of growth averaged 0.71 for SSA and 0.70 for Asia. Despite both the employment elasticity and productivity intensity of growth come out similar in the two regional averages, the coefficients turned out to be diverse across countries in each region. Employment intensity of growth ranges between 0.19 (for Mozambique) and 0.94 (for Senegal) in SSA and between 0.11 (for Taiwan) and 0.55 (for Philippines and Vietnam) in Asia. At country level, employment elasticity in SSA, on average, modestly exceeds that in Asia. According to Khan (2001), developing countries should achieve, on average, an employment elasticity of 0.70 until they manage to graduate to upper-middle income economies. In his view, there appears tradeoff between a high output elasticity of employment and a rapid growth in labor productivity; a healthy balance between the two depends on specific situation of the country in question. As a general rule, economies characterized by a high prevalence of poverty and a higher number of workforce may place more focus on employment intensity of growth than higher labor productivity growth.

Likewise, there has been variation across economic sectors in terms of employment intensity of growth and hence, intensity of labor productivity growth. Employment intensity of growth for some sectors in some countries exceed 1 while it appears well below 0.7 for others. This is relatively more evident in SSA than in Asia samples. For instance, employment intensity of growth in the real estate, finance and business segment of the services sector appears in excess of one for 10 SSA sample economies, but merely for 3 Asia sample economies. Also, employment intensity of growth appears in excess of one in several sectors (including mining; manufacturing; trade; finance, real estate and business; construction), for some SSA countries (e.g. Ethiopia, Kenya, Malawi, Senegal, and Tanzania) than others. This implies that a one percentage growth in the value added of these sectors was associated with above one percentage point growth in employment. By contrast, productivity intensity of growth (elasticity of labor) appears negative in these sectors. Such outcome, according to Khan (2001), is not healthy that should be avoided. It should be noted that there are cases where the elasticity coefficient turns out to be statistically insignificant at the conventional level of significance, which may indicate that job creation in those sectors was not substantial over the reference period.

Overall, the Tables evidenced that for all sample economies the value of the employment and labour productivity intensity of growth was positive at economy-wide level and in majority of the economic sectors. The general assertion is that when the employment elasticity lies between zero and one, an economy with positive GDP will experience positive employment and productivity growth. But, this should be understood as exceptional case for any economy that experience an increase in employment together with productivity gains. Employment elasticity growth gives the quantitative aspect of employment growth while productivity growth renders the qualitative feature of employment growth; hence, one of which should not be emphasized more than the other.

Table 11a: Employment Intensity of Growth, SSA, 1970-2015

	GVA	Ag	Min	Man	Pub	Con	Trad	Tran	Fire	GPS	HPS	BDS
BWA	0.40	0.45	0.39	0.92	0.50	0.46	0.90	0.57	0.88	0.41	0.66	0.72
CMR	0.53	0.28	0.63	0.54	1.56	0.52	0.82	0.46	0.59	0.38	0.78	0.64
ETH	0.80	0.19	1.48	1.03	0.92	1.41	1.14	0.60	0.95	0.54	0.77	0.88
GHA	0.40	0.26	0.91	0.40	0.46	0.64	0.68	0.46	1.54	0.64	0.86	0.79
KEN	0.66	0.57	1.39	1.53	0.62	1.22	1.44	0.78	0.59	1.00	1.29	1.49
MWI	0.63	0.31	0.22	1.03	0.85	1.58	1.64	0.87	1.24	1.27	0.82	1.62
MUS	0.20	-0.11	0.71	0.71	0.00	0.39	0.83	0.41	1.07	0.52	0.79	0.62
MOZ	0.19	0.40	0.24	-0.04	0.36	0.27	0.96	0.17	1.08	0.18	0.16	0.47
NAM	0.30	0.16	0.02	0.10	0.71	0.35	0.85	0.46	1.17	0.55	1.37	0.77
NGA	0.49	0.10	-0.54	0.39	0.08	0.45	0.07	0.18	1.11	0.45	0.61	0.36
RWA	0.27	0.25	0.28	0.35	0.47	0.54	0.99	0.50	1.28	0.58	1.04	0.74
SEN	0.94	0.50	0.82	1.07	-0.65	0.90	1.47	0.86	1.25	0.41	1.06	1.32
ZAF	0.59	0.14	0.63	0.45	0.83	0.51	0.58	0.62	1.35	0.41	1.30	0.69
TZA	0.54	0.47	0.48	0.96	1.29	0.94	1.35	0.87	1.04	1.19	0.90	0.90
UGA	0.51	0.52	0.87	0.86	0.39	0.49	1.63	0.78	0.74	1.03	0.73	1.22
ZMB	0.35	0.67	0.18	0.57	0.00	0.03	1.17	0.05	0.50	-0.05	0.35	0.30
SSA	0.29	0.37	0.21	0.29	0.17	0.20	0.31	0.32	0.20	0.22	0.26	0.27

Note: Abbreviations are as previously given
Source: Author's Computation

Table 11b: Labor Productivity Intensity of Growth, SSA, 1970-2015

	GVA	Ag	Min	Man	Pub	Con	Trad	Tran	Fire	GPS	HPS	BDS
BWA	0.60	0.55	0.61	0.08	0.50	0.54	0.10	0.43	0.12	0.59	0.34	0.28
CMR	0.47	0.72	0.37	0.46	-0.56	0.48	0.18	0.54	0.41	0.62	0.22	0.36
ETH	0.20	0.81	-0.48	-0.03	0.08	-0.41	-0.14	0.40	0.05	0.46	0.23	0.12
GHA	0.60	0.74	0.09	0.60	0.54	0.36	0.32	0.54	-0.54	0.36	0.14	0.21
KEN	0.34	0.43	-0.39	-0.53	0.38	-0.22	-0.44	0.22	0.41	0.00	-0.29	-0.49
MWI	0.37	0.69	0.78	-0.03	0.15	-0.58	-0.64	0.13	-0.24	-0.27	0.18	-0.62
MUS	0.80	1.11	0.29	0.29	1.00	0.61	0.17	0.59	-0.07	0.48	0.21	0.38
MOZ	0.81	0.60	0.76	1.04	0.64	0.73	0.04	0.83	-0.08	0.82	0.84	0.53
NAM	0.70	0.84	0.98	0.90	0.29	0.65	0.15	0.54	-0.17	0.45	-0.37	0.23
NGA	0.51	0.90	1.54	0.61	0.92	0.55	0.93	0.82	-0.11	0.55	0.39	0.64
RWA	0.73	0.75	0.72	0.65	0.53	0.46	0.01	0.50	-0.28	0.42	-0.04	0.26
SEN	0.06	0.50	0.18	-0.07	1.65	0.10	-0.47	0.14	-0.25	0.59	-0.06	-0.32
ZAF	0.41	0.86	0.37	0.55	0.17	0.49	0.42	0.38	-0.35	0.59	-0.30	0.31
TZA	0.46	0.53	0.52	0.04	-0.29	0.06	-0.35	0.13	-0.04	-0.19	0.10	0.10
UGA	0.49	0.48	0.13	0.14	0.61	0.51	-0.63	0.22	0.26	-0.03	0.27	-0.22
ZMB	0.65	0.33	0.82	0.43	1.00	0.97	-0.17	0.95	0.50	1.05	0.65	0.70
SSA	0.71	0.63	0.79	0.71	0.83	0.80	0.69	0.68	0.80	0.78	0.74	0.73

Note: Abbreviations are as previously given
Source: Author's Computation

Table 12a: Employment Intensity of Growth, Asia, 1970-2015

	GVA	Ag	Min	Man	Pub	Con	Trad	Tran	Fire	GPS	HPS	BDS
CHN	0.36	-0.12	0.09	0.32	0.22	0.58	0.59	0.29	0.27	0.53	0.40	0.54
HKG	0.22	0.95	-0.22	0.87	0.19	0.51	0.43	0.44	1.18	0.38	0.73	0.47
IND	0.15	0.67	0.48	0.42	0.02	1.04	0.53	0.37	0.54	0.50	0.50	0.36
IDN	0.48	0.60	0.96	0.57	0.45	0.71	0.73	0.66	0.62	0.70	0.58	0.71
KOR	0.26	-0.93	0.36	0.20	0.10	0.72	0.53	0.47	1.25	0.87	0.69	0.62
MYS	0.48	-0.49	-0.03	0.58	0.46	0.86	0.54	0.48	0.51	0.49	0.54	0.53
PHL	0.55	0.10	0.41	0.50	0.45	0.64	0.88	0.91	0.74	0.63	0.68	0.81
SGP	0.46	0.43	0.36	0.21	0.11	0.72	0.64	0.41	0.83	0.40	0.57	0.64
TWN	0.11	0.96	-1.26	0.32	0.11	0.56	0.38	0.15	0.81	0.50	0.33	0.38
THA	0.49	2.36	-0.06	0.62	0.35	0.96	0.90	0.47	0.57	0.68	0.61	0.78
BAN	0.51	0.36	0.33	0.46	0.24	0.69	0.43	0.47	1.24	0.49	0.99	0.78
SLK	0.21	-0.01	0.33	0.39	0.03	0.38	0.52	0.12	0.83	0.30	0.48	0.55
CAM	0.52	0.19	0.65	0.71	0.95	1.07	0.69	0.86	0.94	0.96	0.88	1.01
MYA	0.39	0.32	0.57	0.59	0.39	0.46	0.44	0.26	0.21	0.70	0.38	0.70
VIE	0.55	0.17	0.56	0.55	0.60	0.69	0.70	0.50	0.92	0.60	0.57	0.56
Asia	0.30	0.58	0.43	0.29	0.26	0.28	0.29	0.26	0.10	0.24	0.23	0.25

Note: Abbreviations are as previously given
Source: Author's Computation

Table 12b: Labor Productivity Intensity of Growth, Asia, 1970-2015

	GVA	Ag	Min	Man	Pub	Con	Trad	Tran	Fire	GPS	HPS	BDS
CHN	0.64	1.12	0.91	0.68	0.78	0.42	0.41	0.71	0.73	0.47	0.60	0.46
HKG	0.78	0.05	1.22	0.13	0.81	0.49	0.57	0.56	-0.18	0.62	0.27	0.53
IND	0.85	0.33	0.52	0.58	0.98	-0.04	0.47	0.63	0.46	0.50	0.50	0.64
IDN	0.52	0.40	0.04	0.43	0.56	0.29	0.27	0.34	0.38	0.30	0.42	0.29
KOR	0.74	1.93	0.64	0.80	0.90	0.28	0.47	0.53	-0.25	0.13	0.31	0.38
MYS	0.52	1.49	1.03	0.42	0.54	0.14	0.46	0.52	0.49	0.51	0.46	0.47
PHL	0.45	0.90	0.59	0.50	0.55	0.36	0.12	0.09	0.26	0.37	0.32	0.19
SGP	0.54	0.57	0.64	0.79	0.89	0.28	0.36	0.59	0.17	0.60	0.43	0.36
TWN	0.89	0.04	2.26	0.68	0.89	0.44	0.62	0.85	0.19	0.50	0.67	0.62
THA	0.51	-1.36	1.06	0.38	0.65	0.04	0.10	0.53	0.43	0.32	0.39	0.22
BAN	0.49	0.64	0.67	0.54	0.76	0.31	0.57	0.53	-0.24	0.51	0.01	0.22
SLK	0.79	1.01	0.67	0.61	0.97	0.62	0.48	0.88	0.17	0.70	0.52	0.45
CAM	0.48	0.81	0.35	0.29	0.05	-0.07	0.31	0.14	0.06	0.04	0.12	-0.01
MYA	0.61	0.68	0.43	0.41	0.61	0.54	0.56	0.74	0.79	0.30	0.62	0.30
VIE	0.45	0.83	0.44	0.45	0.40	0.31	0.30	0.50	0.08	0.40	0.43	0.44
Asia	0.70	0.42	0.57	0.71	0.74	0.72	0.71	0.74	0.90	0.76	0.77	0.75

Note: Abbreviations are as previously given
Source: Author's Computation

4.6 The Patterns of Productivity Increases by Sector

4.6.1 Productivity Growth at Economy-wide and Sector Level

A related interesting research area to look into is the trend in average labor productivity growth and the way it interacts with employment growth and structural change. Tables 13a and 13b depict average productivity growth for the economy as a whole, and for agriculture, industry (also manufacturing) and services sectors. Five general observations are notable from the Tables.

First, in spite of some country differences, the output growth of each of the considered broad sector's appears to have been driven in most cases by employment growth in SSA (with no consideration of job quality) and by productivity growth in Asia. This reflects that the growth of labor productivity was relatively higher in Asia than in SSA.

Second, over the first two sub-periods, agriculture was, on average, less productive in SSA than in Asia, despite variations exist across countries. Exceptionally, labor productivity growth in Botswana (6.2 percent), Cameroon (9.9 percent) and Mauritius (20.7 percent) during sub-period one, which sharply decelerated in the subsequent two sub-periods. But, the sector's productivity growth for SSA was not either too far from or was comparable to Asian sample economies in sub-period three, especially when comparison is made with certain laggard ones.

Table 13a: Annual Average productivity growth, for Asia, 1960-2015 (%)

	1960-79					1980-1999					2000-2015				
	Agr	**Man**	**Ind**	**Serv**	**Tot**	**Agr**	**Man**	**Ind**	**Serv**	**Tot**	**Agr**	**Man**	**Ind**	**Serv**	**Tot**
CHN	1.4	8.3	8.0	4.3	3.1	4.0	9.5	7.9	4.7	7.0	7.4	8.2	7.9	7.1	9.1
HKG	4.2	5.0	5.0	4.0	4.5	3.3	3.2	4.3	2.7	3.9	-2.9	5.6	2.7	2.8	3.0
IND	-0.3	2.0	1.6	2.1	1.1	2.5	3.5	2.8	3.5	3.7	2.7	5.5	4.0	5.6	5.5
IDN	2.3	2.2	-1.3	2.2	4.4	2.0	3.9	0.6	0.7	2.0	3.4	3.0	1.4	3.9	3.3
KOR	4.1	6.8	5.7	0.6	3.6	5.7	7.7	6.5	1.2	4.4	4.8	4.1	3.1	1.0	2.1
MYS	5.1	7.0	3.6	8.1	5.5	2.7	3.8	1.4	3.8	3.2	2.5	4.2	2.0	2.4	2.0
PHL	0.5	2.9	5.3	0.4	2.2	0.5	-0.1	-1.2	-0.1	-0.1	2.5	4.3	3.3	2.5	3.1
SGP	4.4	2.4	2.9	3.9	3.5	5.2	4.9	3.9	3.8	3.9	-4.9	3.1	2.4	-0.1	0.6
TWN	5.7	6.1	4.5	4.8	6.2	3.5	5.5	4.8	4.5	5.1	0.9	1.4	1.0	1.6	1.5
THA	3.4	4.1	2.9	2.9	4.9	2.6	4.0	3.4	1.0	3.7	3.3	1.9	1.6	1.4	2.7
BAN	-1.7	-0.5	1.2	0.1	-0.5	1.5	2.4	2.0	-0.4	1.5	2.9	3.5	3.0	3.9	4.0
SLK	2.3	1.0	-0.8	3.5	2.7	2.1	3.1	3.1	1.7	2.9	4.3	2.4	4.0	4.2	4.7
CAM	-7.0	-7.0	-7.6	-8.4	-7.6	2.7	1.9	1.5	1.5	2.4	4.2	5.3	3.1	-0.1	4.2
MYA	1.6	1.4	2.1	0.2	1.6	1.4	0.1	3.4	-0.1	1.3	2.0	5.4	9.7	2.4	4.6
VIE	1.1	1.1	1.1	1.2	1.0	1.7	3.8	5.8	1.9	3.3	4.2	3.7	1.4	2.3	4.4

Table 13b: Annual Average productivity growth, for SSA, 1960-2015 (%)

	1960-79					1980-1999					2000-2015				
	Agr	Man	Ind	Serv	Tot	Agr	Man	Ind	Serv	Tot	Agr	Man	Ind	Serv	Tot
BWA	6.2	15.0	3.2	5.2	13.0	1.1	-2.8	1.5	3.7	4.1	0.6	0.8	4.4	3.2	2.9
CMR	9.9	7.4	6.1	6.2	6.5	5.7	1.8	3.2	-1.4	2.6	-1.7	-2.5	-3.7	-1.1	-1.8
ETH	-0.8	2.0	1.3	-3.5	-0.1	-1.9	-1.8	-2.4	0.3	-0.6	4.4	-3.1	-2.5	1.8	4.7
GHA	-0.5	-2.1	-2.3	-2.1	-1.5	0.7	1.0	0.2	1.4	0.9	2.9	1.4	4.6	-0.5	2.2
KEN	-1.2	8.0	3.5	-0.4	0.7	0.5	-5.7	-5.7	-2.8	-0.4	2.7	-1.8	-0.5	-0.5	1.1
MWI	-0.4	0.8	1.5	5.9	2.5	2.3	1.4	0.8	-4.4	-1.1	1.4	-0.3	-5.7	-4.9	0.2
MUS	20.7	0.5	-0.1	5.3	6.0	0.7	2.1	2.9	1.0	1.8	5.2	4.2	3.1	2.2	3.1
MOZ	-6.4	9.8	1.3	-5.3	-6.9	3.4	11.4	7.1	3.4	3.8	3.2	4.5	5.7	3.7	5.2
NAM	2.5	-2.4	2.4	-1.8	0.5	4.5	1.8	-0.5	-0.5	0.8	-1.5	0.9	0.4	1.8	1.4
NGA	-0.3	5.4	11.2	0.8	4.4	0.5	2.9	2.3	2.8	0.4	6.6	5.0	0.2	8.0	6.1
RWA	4.7	12.2	12.8	7.1	5.5	-0.8	5.2	6.3	-0.7	0.5	5.6	-0.6	-1.4	1.0	6.0
SEN	-1.1	-2.2	-2.3	-4.1	-2.6	-0.8	-2.2	-2.0	-2.6	-1.1	0.3	-2.2	-1.5	-0.2	0.6
ZAF	5.4	3.0	1.7	1.5	3.4	2.0	-0.1	-0.1	-1.3	-0.4	1.5	3.0	1.2	2.1	1.8
TZA	-0.2	2.4	-1.5	1.1	1.3	1.3	-1.6	-0.4	-1.6	0.3	2.8	-0.9	1.1	0.8	4.2
UGA	1.6	-0.7	1.7	-3.4	0.5	1.9	3.3	6.2	-1.8	3.2	-0.2	-0.2	0.5	1.6	2.1
ZMB	-2.4	-3.3	-3.0	4.2	-2.3	4.3	0.8	-3.1	0.5	-1.8	-1.1	-0.6	1.7	2.1	2.5

Note: Abbreviations are as previously given
Source: Author's computation

Three, growth rate of labor productivity in agriculture was higher than the growth in economy-wide productivity for the vast majority of countires in both regions (e.g. in both sub-periods for Cameroon; in sub-periods one and two for Namibia and South Africa; in sub-periods one and three for Ghana; in sub-periods two and three for Malawi; in sub-periods one and three for Mauritius). Exceptions were Botswana and Ethiopia, where economy-wide productivity growth persistently exceeded productiivty growth for agriculture sector in both sub-periods, and the same is true for China, India, Bangladesh, and Vietnam.[88]

Fourth, the gap in productivity growth between SSA and Asian sample economies was more visible in the industry sector than the gap observed in other economic sectors. This may not be surprising given the fact that most of the considered Asian economies have strong manufacturing base. Most importantly, the average labor productivity growth for manufacturing surpassed economy-wide productivity growth for 11 of the sampled SSA economies and for all Asian sample economies except Hong Kong, Indonesia, Cambodia and Vietnam during sub-period one. In sub-period three, the pattern in the productivity growth of manufacturing was typically on the brink of the whole

[88] A corollary is the gap observed in terms of land productivity, wherein the productivity gap in agriculture between the countries in both regions is more pronounced in this respect. A study by Briones and Felipe (2013, pp. 5-6) shows that land productivity grew, on average, by 2.3 percent per year for Asia relative to 1.5 percent per year for SSA between 1970 and 2009 while growth of agricultural land area averaged 0.49 percent for Asia and 0.89 percent for SSA, implying that cultivable land scarcity is less severe in SSA than in Asia. Within the Asian sample economies, Indonesia and Malaysia have benefited from the expansion of the land frontier over the entire period of comparison. The contribution of land productivity to agricultural output growth constituted 82 percent in Asia and 62 percent in SSA.

economy, but positive for only seven SSA economies. By contrast, only Philippines had experienced a very low average growth rate for labor producitivity in manufacturing from the Asia sample in this sub-period.

Fifth, divergence trends were observed between the two country groups with respect to services' sector productivity growth: Exhibiting a persistent downward trend from the early sub-period to the last sub-period in three SSA economies – Botswana, Cameroon and Malawi – and three Asian economies - Malaysia, Singapore, and Taiwan. Conversely, in some countries including China, India, and Vietnam from the Asia sample; and Ethiopia, Mozambique, Nigeria and Uganda from the SSA sample, average labor productivity in the services sector witnessed an increasing trend, although the share of skill-intensive services in say Ethiopia is far lower than that in China.

Finally, except in few cases, average labor productivity growth in manufacturing industries is faster than that in the services sector in Asia which is more evident in sub-periods one and two, regardless of the fact that the share of services in GDP was increasing. This is probably attributed to the structural composition of the services sector: The predominance of more traditional services activities (such as wholesale and retail trade, hotels and restaurants, transport, personal services, and public administration) compared to the skill-intensive services, despite the presence of variations across countries. The same is true in SSA.

4.6.2 The Extent of Productivity Gaps

Not only does a substantial difference in productivity growth appear across countries, but the productivity gaps between sectors within the sample economies is also very diverse. Tables 14a and 14b present the ratio of each sector's labor productivity to manufacturing labor productivity in 2015. By 2015, in the Asia samples labor productivity in the service sector was relatively at par or relatively higher than that in manufacturing for Bangladesh, Hong Kong, India, Sri Lanka, Taiwan and Vietnam, but far lower for Korea, Singapore, the Philippines and Thailand. In contrast, in majority of the sample SSA economies, labor productivity in the services sector (especially TRAN and FIRE services) was at par or outstepped that of manufacturing. This does not mean that the high-productivity skill-intensive services are widely available in the region. Neither does it mean that the Baumol's diseases services have unlimited potential for productivity increases. But rather, the countries have experienced stagnant industrialization or *premature deindustrialization* or they are *under-industrialized*. For most economies, the levels of labor productivity across the services sector branches are quite diverse: *Labor productivity was relatively higher in the knowledge- and skill-based services (such as transport and communications as well as in the finance, insurance, real* *estate and business services activities) than in the other relatively less skill-intensive Baumol's diseases services both in SSA and Asia*.

The other important observation notable from the Tables is that average labor productivity in agriculture and allied activities is the lowest in all economies; yet, the sector is the largest employer in most of the SSA and some Asian economies. This may give clue to the plausibility of the claim that agriculture cannot have superior qualities to become growth escalator sector in SSA. In fact, the productivity disadvantage of that sector does not seem to be larger in the low-income economies in the sample. Additionally, for sample SSA economies (except Mauritius and South Africa), lower-productivity activities account for the largest proportion of employment within the services sector. This confirms the stylized fact identified in section 4.1; that not all sectors (especially within services sector) have comparable potential to absorb labor and contribute to cumulative productivity increases. Thus, it may not seem sensible to compare productivity levels across sectors with differential potential to employment generation. However, the gaps can be immense comparing sectors with more or less similar potential; inter-sectoral productivity gaps are clearly a feature of underdevelopment that tend to diminish when economies achieved sustained growth (McMillan and Rodrik 2011). One caveat is worth noting here. Labor productivity in the present analysis is simply value added per person employed or average labor productivity, which may not by itself suggest greater efficiency or wider room for higher wages or profits.

Table 14a: Ratio of labor productivity of each sector to Manufacturing, Asia economies, 2015

	Agr	Min	Man	Pub	Con	Trad	Tran	Fire	GSP	Sum
CHN	0.1	2.0	1.0	2.8	0.4	0.5	0.9	3.0	0.3	0.5
HKG	0.2	1.1	1.0	8.6	0.7	1.8	1.6	2.9	1.1	1.7
IND	0.2	3.2	1.0	4.9	0.7	1.1	1.3	3.4	1.3	0.7
IDN	0.2	4.0	1.0	2.8	0.6	0.4	1.3	1.2	0.3	0.5
KOR	0.3	1.6	1.0	4.4	0.5	0.3	0.5	0.3	0.5	0.5
MYS	0.4	6.6	1.0	2.2	0.3	0.5	1.0	1.0	0.4	0.6
PHL	0.1	0.8	1.0	3.3	0.3	0.3	0.3	0.7	0.2	0.3
SGP	0.0	0.1	1.0	2.1	0.2	0.5	0.6	1.0	0.3	0.6
TWN	0.3	23.4	1.0	1.0	0.2	0.9	1.2	1.4	1.0	0.9
THA	0.1	7.0	1.0	3.8	0.2	0.4	1.1	0.6	0.5	0.5
BAN	0.3	8.6	1.0	3.9	1.1	0.7	1.1	4.2	0.9	0.7
SLK	0.3	4.4	1.0	6.3	1.1	0.9	2.2	4.9	0.9	1.0
CAM	0.2	1.4	1.0	0.8	0.6	0.3	0.8	3.6	0.3	0.4
MYA	0.6	23.8	1.0	2.4	3.0	0.9	2.1	0.2	1.0	1.1
VIE	0.3	11.3	1.0	7.1	0.8	0.6	1.1	10.6	0.8	0.7

Note: Abbreviations are as previously given
Source: Author's computation

Table 14b: Ratio of labor productivity of each sector to Manufacturing, SSA economies, 2015

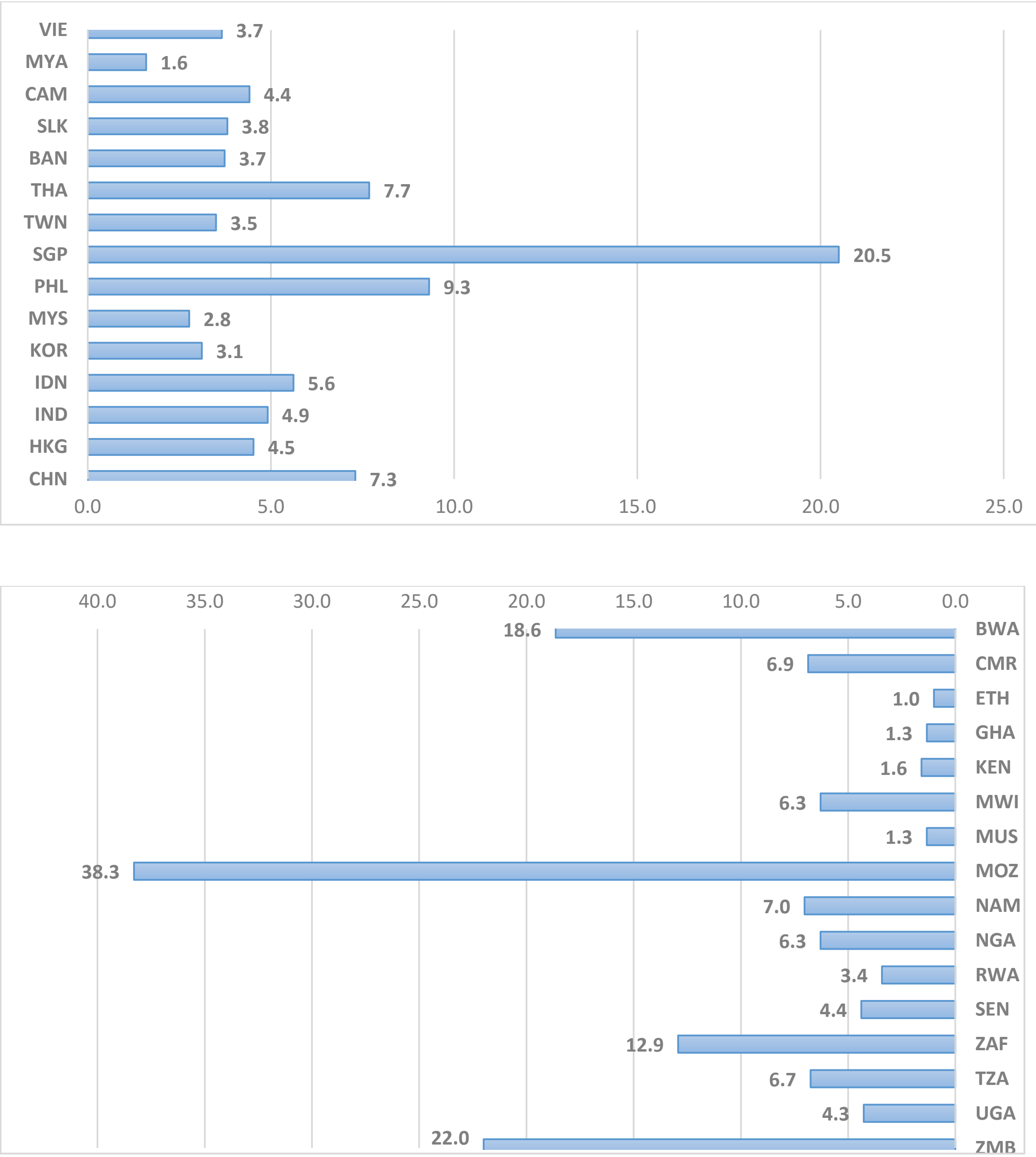
	Agr	Min	Man	Pub	Con	Trad	Tran	Fire	GSP	Sum
BWA	0.05	24.67	1.00	4.53	6.55	1.08	2.39	2.18	1.70	1.16
CMR	0.15	12.55	1.00	0.96	1.02	0.59	1.35	18.54	0.82	0.45
ETH	1.00	1.56	1.00	27.32	3.01	2.52	19.09	24.62	5.47	1.87
GHA	0.75	4.04	1.00	5.63	3.63	0.39	6.81	3.37	1.08	1.12
KEN	0.63	1.18	1.00	16.70	2.25	0.67	4.20	14.60	1.04	1.15
MWI	0.16	7.78	1.00	0.48	0.13	0.35	1.31	7.86	0.33	0.31
MUS	0.75	0.89	1.00	2.07	0.52	0.95	2.08	1.93	0.81	1.08
MOZ	0.03	0.52	1.00	2.03	0.09	0.15	1.36	1.69	0.28	0.10
NAM	0.14	2.22	1.00	0.99	0.63	0.63	1.31	0.75	0.56	0.59
NGA	0.16	6.31	1.00	0.72	0.74	1.07	2.16	1.08	0.36	0.45
RWA	0.29	0.41	1.00	1.21	0.93	0.97	1.85	6.01	0.89	0.60
SEN	0.23	3.31	1.00	117.94	1.04	0.67	3.69	16.84	1.20	0.78
ZAF	0.08	1.26	1.00	1.23	0.28	0.47	1.38	1.12	0.50	0.58
TZA	0.15	2.96	1.00	0.96	3.62	0.58	2.05	10.32	0.50	0.45
UGA	0.23	3.25	1.00	41.65	2.08	0.84	3.66	4.06	0.88	0.72
ZMB	0.05	2.18	1.00	3.78	3.80	0.70	3.48	4.10	1.57	0.45

Note: Abbreviations are as previously given
Source: Author's computation

Figure 9 portrays the average ratio of manufacturing labor productivity to agriculture in sample SSA and Asian economies during 2015. In all economies, average labor productivity in manufacturing exceeded that in agriculture even in SSA. This may not seem surprising given the fact that the bulk of the labor force in most SSA economies is engaged in agriculture. By contrast, the share of manufacturing employment in Asia is far larger than that in SSA, despite wide variations across countries. Thus, given the huge labor productivity disparity between the two sectors and the higher potential of manufacturing in employment creation, structural change and diversification towards that sector is imperative. This is particularly important because workers engaged in agriculture in most SSA economies are earning subsistence incomes that may not even enable them sustaining their basic requirements. Although the extractive industries may have undeniable contribution to value added growth, their potential for employment creation and improvement in job quality is limited. This is why agriculture continues to absorb the bulk of the labor force in SSA. For instance, the employment share of agriculture in the oil-dominated Nigerian economy was 63.9 percent in 2015, 17.8 percentages points higher than that in industry and services sectors that together accounted for 36.1 percent. In the copper-enclave Zambian economy, 68.2 percent of the labor force was engaged in agriculture while industry and services sectors jointly absorbed 31.8 percent. This is in stark contrast, say with China and Indonesia, in which the share of industry and services sectors reached respectively 72 per cent and 67.5 percent with the remaining 28 percent and 32.5 percent went to agriculture in the same reference period. The relative ratio of manufacturing labor productivity to agriculture was 6.3 for Nigeria, 22 for Zambia, 7.3

percent for China and 5.6 percent for Indonesia. The relative ratio of manufacturing labor productivity to agriculture was exceptionally higher for Mozambique (38.3 percent), perhaps attributed to the larger gap between the share of agriculture and manufacturing employment was respectively 78.3 percent and 0.9 percent.

Figure 9: The ratio of manufacturing to agriculture labor productivity in 2015



Note: Abbreviations are as previously given
Source: own Computation

4.7 Tracing the Relationship between Structural Change and Labor Productivity Growth

4.7.1 Background

This section seeks to scrutinize the contribution of structural change to overall productivity growth [or the relative size of within-sector effect and structural change (reallocation effect) to economy-wide productivity gains for SSA and Asian sample economies], employing a simple decomposition framework. This will be complemented by the Granger non-causality tests. The aim is to grasp insights if structural change moved in the right direction. A large body of research works employed variety of different techniques to address a similar objective: Looking into the productivity growth hailing from resource reallocation - that is, employment shifts from lower-productivity to higher-productivity sectors, both within and between sectors. The potential for shifting employment and economy-wide productivity increase is predicted to be higher in technologically backward and agrarian economies since the largest part of their labor force is employed in the low-productivity primary sector. An increase (decrease) in the employment share in higher (lower) productivity sectors induce (reduce) economy-wide labor productivity gains.

It can be said that productivity increases within the different sectors pushed up aggregate productivity; it was notably high in manufacturing and knowledge- and skill-intensive services, but relatively low in agriculture and other services categories. This meant that shifting employment from agriculture to other sectors has boosted economy-wide productivity in the considered Asian economies. In East Asia, structural transformation continued even after they achieved a certain level of industrialization. This was associated with the continuous industrial and technology upgrading, and the emergence of strong within and between sectors linkages that favored the expansion of different services segments. Likewise, Southeast Asian economies registered higher productivity growth in industry sector, as a result partly of the rise in the sector's value added share in GDP, leading to faster aggregate productivity growth compared with other regions. Contrarily, industrialization in South Asia has continued to be dominated by labor-intensive manufacturing activities, reducing the potential for productivity catching-up with developed economies.

4.7.2. Shift-share Analysis: Decomposing Labor Productivity Growth to Constituent Parts

The commonly used shift share analysis is employed in this section to decompose labor productivity growth to within-sector and reallocation effect. In this approach, average labor productivity is defined as value added per worker (that is, number of employment due to unavailability of data on total hours worked per sector in the considered economies); hence, economy-wide labor productivity is given as the weighted average of labor productivity of economic sectors.

Additionally, on account of the lack of consistent and long-term data at firm level for the considered countries, the decomposition framework is applied merely in ten sectors classification.

The decomposition exercise is carried out for the three sub-periods, discussed earlier, in order to see the dynamism of structural change in the sample economies. The findings may offer important insights for the Granger non-causality test to be carried out in the subsequent section for which two structural change indices will be used. The decomposition framework (which is used by Pender 2003, Timmer 2000; Vries et al. 2013 and many other researchers] is given below. It decomposes growth of economy-wide labor productivity between time 0 and t into three components.

Let P represents economy-wide labor productivity, defined as $P = \sum_i \varepsilon_i p_i$, where ε_i *denote* employment share of sector i in total employment and p_i denotes labor productivity in sector i, which is given as $p_i = {}^{VA_i}/_{L_i}$ [where VA_i and L_i are value added and employment in sector i respectively]. Therefore, economy-wide productivity growth is given by the productivity level of sectors weighted by their employment shares as follows:

$$P = \frac{P_1 - P_0}{P_0} = \sum_{i=1}^{n} \frac{s_0^i(p_1^i - p_0^i)}{P_0} + \sum_{i=1}^{n} \frac{p_0^i(s_1^i - s_0^i)}{P_0} + \sum_{i=1}^{n} \frac{(p_1^i - p_0^i)(s_1^i - s_0^i)}{P_0} \qquad (4)$$

⇓ Within-effect ⇓ Between-static effect ⇓ Dynamic effect

Where, s_0^i and s_1^i are employment share of sector i at year 0 (base year) and year 1 (current year) respectively; p_0^i and p_1^i represent labor productivity of sector i at year 0 (base year) and 1 (current year) respectively; P_1 and P_0 denote economy-wide productivity at year 1 and year 0 respectively.

The first term in the right hand side of equation (4) is called the weighted *within-effect or intra-sectoral productivity growth [or simply productivity improvement component]* representing the contribution of productivity within each sector to economy-wide labor productivity growth; thus, it captures productivity growth not explained by the movement of workers. This component is computed keeping employment shares constant, as in the base year, under the assumption that no structural shifts have ever taken place, but allowing productivity levels to change due to the introduction of new technology, changes in the organizational structure, downsizing and increased competition. The estimate is usually positive as labor productivity tends to increase over time.

The second term is commonly called *the pure or the between-static effect [or the static structural effect or net-shift effect]*, constituting the contribution to economy-wide productivity growth of the movement of labor from the lower-productivity sectors to the higher-productivity ones (changes in sectoral composition of employment). The weight are the sectoral productivity levels at the beginning of the period. This component is caused by a one-time productivity jump or an immediate increase in productivity resulting from labor reallocation from a relatively low-productivity sector to a relatively high-productivity sector. Conventionally, this is recognized as movement from agriculture to non-agriculture sectors. This term is estimated by setting the productivity growth rate in each sector constant as in the base year and shifting employment shares. It is related to Baumol's *structural bonus hypothesis* in that the component has positive effect on economy-wide labor productivity growth. It would be positive when high-productivity sectors/activities absorb more labor, and hence increase their share to total employment; but, the reverse would happen if industries with higher productivity growth absorb less labor and thus decrease their share in total employment. It is expected to be greater than 0, per the *structural bonus hypothesis.*

The third component is called the *dynamic shift effect or the amplification effect or the interaction effect* and captures the joint effect of changes in employment shares and growth in productivity. It captures the contribution of changes in the allocation of labor across sectors and changes in productivity of individual sectors to economy-wide productivity growth. It is the growth attributed to labor reallocated to a sector that has a larger productivity increase, compared to the labor-releasing sector. It is computed as the difference between the total reallocation effect and the pure reallocation effect or by the sum of interactions of changes in employment shares multiplied by changes in sectoral labor productivity. *If* sectors/production activities *increase both labor productivity and their share of total employment, the combined impact will positively contribute to overall productivity growth* [of course, the same applies if sectors/production activities are characterized by a simultaneous fall in labor productivity and employment shares]. Put in other words, this term becomes larger, the more labor resources shift towards sectors/production activities with fast and higher productivity growth (Timmer et al. 2015). This effect is often small as, in most cases, sectors with rapid productivity growth show an offsetting decline in employment shares. Further, this component can be positive even when the growth rates in the agriculture and non-agricultural sectors are the same, providing the initial average labor productivity of the non-agricultural sectors is greater than the initial agricultural labor productivity. This is because the sector with larger initial labor productivity needs larger changes in labor productivity to obtain the same growth rate as the sector with smaller initial labor productivity. This term is expected to capture the prediction of Baumol's *structural burden or cost disease hypothesis*, predicting that employment shares will shift away from progressive sectors/production activities towards those with lower labor productivity growth. In other words, the shift of employment into services - a sector with (in general though not always true) lower productivity growth - reduce the overall productivity growth of the economy. Thus, it is expected to be less than 0.

The latter two effects together represent *structural change effect or total reallocation or between-effect*. As Timmer (2000) said, distinguishing between these two effects may help distinguish between the *structural bonus and structural burden* effects of employment reallocation and to explain as to why labor reallocation in Asia has generated greater economy-wide labor productivity growth than SSA. Overall, countries with a large agriculture sector have a lot to gain from the bonus of disguised labor in low-productivity activities. However, if the growth of employment is predominant in sectors with lower scope for productivity growth, there is a burden effect. Indeed, in Kaldor's interpretation, employment reallocation is "induced" by growth of the leading sector. Although this hypothesis cannot be examined directly by shift-share analysis, it may be anticipated that the growing sectors are the ones that will draw resources from those contracting. The drawback of this index is that it assumes *productivity growth within each sector is independent of structural change*.

Results of the decomposition analysis [with employment shares being used as the weight for the aggregation] are given on Tables 15a and 15b below. The structural change effect is decomposed into the pure or static reallocation effect [the impact of moving across sectors with different productivity growth rates] and the dynamic reallocation effect [the impact of moving across sectors with varying productivity levels] for the three sub-periods.

Table 15a: Decomposition of Productivity Growth (employment share)

	1960-1979				1980-1999				2000-2015			
		Structural Change effect				Structural Change effect				Structural Change effect		
	Within	Stat	Dyn	Tot	Within	Stat	Dyn	Tot	Within	Stat	Dyn	Tot
CHN	0.870	-0.055	-0.084	0.730	2.159	0.266	0.300	2.725	2.070	0.239	0.441	2.749
HKG	0.461	0.015	0.001	0.476	0.534	0.770	-0.211	1.094	0.455	0.088	-0.011	0.531
IND	0.096	0.150	-0.042	0.204	0.662	0.188	0.104	0.953	1.031	0.154	0.138	1.323
IDN	0.151	0.293	0.026	0.470	0.180	0.153	0.041	0.374	0.466	0.176	-0.044	0.598
KOR	0.443	0.209	0.111	0.763	1.173	0.451	-0.244	1.380	0.340	0.057	-0.053	0.344
MYS	0.649	-0.035	-0.007	0.608	1.122	-0.093	-0.218	0.811	0.306	0.264	-0.241	0.329
PHL	0.249	0.036	-0.086	0.199	-0.138	0.122	-0.061	-0.077	0.501	0.093	-0.056	0.538
SGP	0.240	0.168	-0.043	0.365	1.076	0.030	-0.071	1.035	-0.003	0.050	-0.045	0.002
TWN	1.237	0.130	0.231	1.598	1.406	0.126	-0.005	1.527	0.214	0.029	-0.010	0.234
THA	0.736	0.589	0.138	1.462	0.462	0.527	0.084	1.072	0.297	0.185	0.027	0.509
BAN	-0.075	0.155	-0.151	-0.071	0.134	0.256	-0.039	0.352	0.577	0.249	-0.028	0.798
SLK	0.215	0.102	-0.044	0.273	0.420	0.192	0.062	0.674	0.874	0.108	0.052	1.035
CAM	-0.531	0.027	-0.016	-0.520	0.442	0.163	0.031	0.636	0.471	0.600	-0.240	0.831
MYA	0.157	-0.007	-0.001	0.149	0.166	0.032	0.008	0.206	1.123	-0.008	-0.429	0.686
VIE	0.091	-0.006	-0.001	0.084	0.686	0.156	0.165	1.007	0.413	0.534	-0.071	0.876
Ave.	0.333	0.118	0.002	0.453	0.699	0.223	-0.004	0.918	0.609	0.188	-0.038	0.759

Table 15b: SSA: Decomposition of Productivity Growth (employment share)

	1960-1979				1980-1999				2000-2015			
		Structural Change effect				Structural Change effect				Structural Change effect		
	Within	Stat	Dyn	Tot	Within	Stat	Dyn	Tot	Within	Stat	Dyn	Tot
BWA	0.647	1.939	0.084	2.669	0.616	0.792	-0.508	0.900	1.755	-0.085	-1.088	0.581
CMR	1.392	0.013	-0.011	1.395	0.137	0.539	-0.174	0.502	-0.264	0.028	-0.013	-0.249
ETH	-0.124	0.261	-0.155	-0.018	-0.242	0.123	-0.031	-0.150	0.655	1.058	-0.693	1.019
GHA	-0.222	0.014	-0.053	-0.261	0.125	0.215	-0.113	0.228	0.380	0.101	-0.097	0.384
KEN	0.067	0.072	-0.040	0.100	-0.325	0.688	-0.433	-0.071	0.248	0.040	-0.054	0.234
MWI	0.420	0.042	-0.099	0.362	-0.234	0.513	-0.397	-0.118	-0.142	0.722	-0.560	0.020
MUS	0.658	0.265	-0.274	0.650	0.402	0.263	-0.091	0.575	0.368	0.170	-0.054	0.484
MOZ	-0.454	0.052	-0.073	-0.475	1.525	0.300	-0.591	1.234	0.904	0.199	0.154	1.258
NAM	0.067	0.177	-0.183	0.061	0.125	0.342	-0.389	0.078	0.137	0.104	-0.036	0.206
NGA	0.357	0.522	0.183	1.062	1.837	-0.315	-1.398	0.123	1.374	2.169	-2.099	1.444
RWA	0.528	0.017	0.009	0.554	-0.289	0.442	-0.203	-0.051	0.494	1.298	-0.439	1.353
SEN	-0.258	0.062	-0.024	-0.220	-0.250	0.263	-0.151	-0.138	0.166	0.187	-0.278	0.075
ZAF	0.369	0.393	0.128	0.891	-0.151	0.198	-0.178	-0.130	0.313	0.028	-0.049	0.292
TZA	-0.013	1.055	-0.770	0.271	-0.036	0.134	-0.054	0.044	0.191	0.756	-0.105	0.842
UGA	-0.120	0.452	-0.263	0.069	0.260	1.120	-0.611	0.769	0.168	0.140	0.084	0.392
ZMB	-0.136	-0.198	0.045	-0.288	-0.141	-0.328	0.147	-0.323	0.743	0.372	-0.655	0.459
Ave.	0.199	0.321	-0.094	0.426	0.210	0.330	-0.323	0.217	0.468	0.455	-0.374	0.550

Note: country abbreviations are as before; Prod = aggregate productivity growth; Stat = Between-static reallocation effect (structural bonus); Dyn = Dynamic reallocation effect (structural burden); Aver. = Un-weighted simple averages for sampled SSA and Asia economies.

First, as expected, economy-wide productivity growth in SSA was slower than that in Asia, and in some periods regressing contrary to the sustained increase in Asian samples for the entire period of analysis, on account of the relatively large values for both the within-sector and reallocation effects. This may not be surprising given the notable differences in the production structure composition, or the pattern of structural transformation across the two regions. Exception to this trend was Botswana (which appears outlier in various aspects) where economy-wide labor productivity during the first sub-period has been relatively higher than other SSA economies and comparable in most cases to the Asian well-healed sample economies attributed to higher value of reallocation effects. Of course, it has exhibited lower growth of economy-wide productivity in 2000-2015, wherein structural change effect was negative.

Second, the average contribution of each component over sub-period one amounted to 0.199 [or 46.71 percent] for the within-sector productivity growth effect, and 0.227 [or 53.29 percent] for the structural change effect in SSA. This implies that strucutral change, hence the static reallocation gains made the largest contribution while labor moved out of agriculture towards other sectors. Likewise, for Asian sample economies, the contribution of each component averaged respectivly, 0.333 [or 73.51 percent] and 0.12 [or 26.49 percent]. Over this sub-period, structural change contributed positively and substantially to average labor productivity growth of the economy in 7 out of 16 SSA economies, and modestley to 9 out of 15 Asian sample economies. In fact, the structural change effect was very high in two resource-rich SSA economies – Botswana and Nigeria. So, the result may give some indication that structural change was growth inducing for most of the sampled SSA economies during this sub-period where Import Substitution strategy was implemented. In most of the Asian samples except Bangladesh, India, Indoneisa, and Myanmar, the within effect accounted for the largest contribution to total labor productivity growth. In Indonesia,Taiwan and Thailand, the contribution of structural change was both positive and relatively substantial when compared to the other economies. *In sum, the within produtivity gain was responsible for the commendable economy-wide labor productivity growth in the same period for Asian economies. In SSA, only few economies (Botswana, Cameroon, Malawi, Mauritius, Nigeria, Rwanda and South Africa) saw remarkable within-sector productivity growth which was at par to the Asian boomers.*

Third, during the SAP era (1980-1999), which were designated as lost decades to SSA, average growth of labor productivity was negative or close to zero for 8 SSA economies with significant implications on regional averge labor productivity growth compared with the preceding sub-period. The within-sector productivity gain was negatively affected over this sub-period by the slowdown both in GDP growth and investment. Of course, this was also compounded by the lack of gains in employment reallocation across sectors owing to the lack of labor shifting to the modern sector out of agriculture. The within productivity component decelerated from sub-period one except for Ghana, Mozambique, Namibia, Nigeria and Uganda. This was in strak contrast with Asian average, where within-sector effect contribtution amounts to 0.699 [or 76.14 percent] while the static and dynamic reallocation gains stood resepctively at 0.223 [or 24.29 percent] and -0.004 [or -0.43 percent]. Structural change was contributing positively to economy-wide labor productivity growth for all sample Asian economies (excepting Maylasia and Singapore) and all SSA economies (except Nigeria and Zambia), albiet at different magnitudes. However, the within-sector effect on economy-wide labor productivity growth was more pronounced in Asia; in only one country (the Philippines) was the contribution of the within-sector effect come out negative. In SSA, only Ghana, Mauritius, Mozambique and Nigeria demonstrated higher within effect than reallocation effect. So, SSA witnessed a lot of heterogeneity with regard to the contribution of structural change to economy-wide labor productivity gowth in this sub-period.

The result may give indication that, unlike the case of the Asian forerunners, labor moved out of agriculture was not ended up in manufacturing industries in SSA. This meant that the SAP period had imposed restrictions on diverisfying the production structure to high-productivity activities; structural change was moved in the wrong direction. Perhaps the countries were advised by the

Washington consensus to abandon their industrial policy and insist on trading pri]mary products follow their comparative advantage while the Asian developmental states were defying their comaprative advantage toward building their productive and technological capabilities, so that they became comeptitive in the global market. While the Asian tigers imitated the frontier economies to reorient their policies and development programs towards learning-based industrialization that enabled them to expereince catch-up growth, majority of the countries in SSA were in honeymoon with SAP and continued to stay in the periphery.

Any how, the static gains that arise from the movement of employment from agriculture to non-agriculture sectors, mainly services in SSA and manufacturing and services in Asia, has explained one-third of the economy-wide productivity growth. However, the average figures may mask large differences across countries. In sub-period two, within-sector productivity growth largely drove productivity growth in Asia and to some of the countries in SSA. The negative impact of the dynamic structural reallcoation effect was relatively large in at least 7 countries. The static effect was lower than the within-sector effect for merely 4 countries (Mauritius, Mozambique, Nigeria and Zambia) in the SSA sample and in two countries in Asia sample (i.e. Hong Kong and Thailand). The dynmaic structural reallocation effect was negative for all countire except Zambia. In both regions, the static effect in this sub-period was relatively higher than the one observed during sub-period one.

Fourth, over the last sub-period (2000-2015), structural change effect in Asia was slightly higher than that of SSA average. The contribution of within effect was negative for Singapore (in Asia) and for Cameroon and Malawi (in SSA). It is worth noting that, within-sector productivity growth has been the major driver of economy-wide productivity growth in some economies that retain the largest share of employment in agriculture (such as Bangladesh, Cambodia, China, India, Malyasia and Sri Lanka). The contribution of within-sector effect to economy-wide labor productivity growth has been the main driver of productivity growth in Hong Kong, Taiwan and South Korea on account of their level of development and small employment share in agriculture. In the majority of countries in both regions (except Singapore and Vietnam in Asia and Cameroon, Malawi, Rwanda, Tanzania and Uganda in SSA) within-sector effect exceeds structural change effect. Static structural reallocation effect was the main driver of productivity growth in Ethiopia, Malawi, Nigeria, Rwanda, Senegal, Tanzania, Cambodia and Vietnam. Moreover, the dynamic effect was negative in countries, but China, India, Thailand and Sri Lank in Asia, and Mozambique and Uganda (due to positie growth of employment and productiivty).

In sum, structural change was, on average, growth-reducing during the SAP period for SSA and during the earlier sub-period for Asian sample economies. The results suggest that changes in aggregate productivity necessitate both within-sector productivity growth and between-sector employment shift towards higher productivity activities. This cannot be achieved without investment, which was challenging to uphold in SSA. In Asia, within sector productivity made substantial positive contributions to productivity growth and was dominant throughout the different sub-periods. The improvement in productivity in all sectors observed over the 1990s and 2000s was driven by high investment levels in the region. The negative values for the dynamic effect indicates employment shares have shifted to the slower growing sector in terms of productivity away from the fastest growing sectors. One final note is in order. *The decomposition exercise only gives indications for the impact of structural change on labor productivity growth. However, it could not give causal inferences, which need to be supplemented by empirical analysis. So, a Granger non-causality test is employed in the subsequent section with the view to draw some insights on the relation of structural change with productivity growth.*

4.7.3 Granger Causality Test

A. Overview

In a broader context, structural change could be growth-reducing when labor moves to the lower-productivity sectors/activities most notably to the Baumol's diseases services, and growth-enhancing when workers moved out of agriculture into the higher-productivity sectors/production activities such as manufacturing. The descriptive analysis gives indication about which sectors were labor absorbing and which other sectors labor shedding, and which sectors might have contributed the largest portion to economy-wide productivity growth in the considered countries. As the shift share analysis does not give full insights as to whether structural change Granger cause productivity growth, this section seeks to fill that gap, and uses Granger causality tests to examine the relationship between the variables of interest. Such tests can give important insights as to whether structural change Granger causes productivity growth, or is itself a manifestation of growth. The test can help understand the type of structural change (changes in output or employment composition) that had greater contribution to economy-wide productivity growth for the two country groupings over the period of investigation.

B. Hypothesis

Various studies conducted on structural change and growth confirmed that economic growth Granger causes changes in the production structure of the economy driven by both demand and supply side factors. On one hand, the growth of the economy through the growth in income may Granger cause changes in the value added share of economic sectors – that is, with the rise in income, the demand for agricultural commodities (which have lower income elasticity) shrinks, leaving room for the rise in demand for industry sector, and then for the services sector. When it comes to the supply side, there is heterogeneity in levels of productivity across and within economic sectors or production activities attributed to different levels of technical progress. Basically, the increasing returns sector is predicted to deliver products and services at lower prices and pays higher wages, which may make it play propulsive role in the economy. Therefore, higher growth of the economy results in higher income and thereby greater structural change in the next periods. That is, economic growth Granger causes structural change. There also exist reverse causality running from structural change to productivity growth or output growth. In short, *it is hypothesized here that there could be bidirectional causality relationship between total productivity growth and structural change in a Granger sense - that is, Granger causality running from structural change to productivity growth and from productivity growth to structural change.*

C. Measuring Structural Change

Apart from the commonly used shift share decomposition method discussed earlier, the literature documents various structural change indices. Among which, two indices that are considered as suitable proxies for structural change are used for the Granger causality analysis in this section. They are suitable because both are computed by taking the value added and employment shares of economic sectors into account.

The first and most widely used measure for comparing structural change between countries and over time is the norm of absolute value (NAV) index, given as follows:

$$\mathrm{NAV}_{st} = \tfrac{1}{2}\sum_{i=1}^{n}|x_{it} - x_{is}| \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where, x_{it} constitutes the value added share of sector i in the economy [or the share of number of persons employed in sector i in total employment] while n represents the number of sectors. The NAV index is computed by taking the difference of each sector shares x_i between two points in time s and t, and then summing up the absolute values of these differences. As all changes are counted twice by employing this technique, standardization is usually done through a division by two (Schiavo-Campo 1978).

Although the NAV index is simple to construct, it may be influenced with the level of data aggregation, price changes, and the selection of periods used for comparison; where, a high-level of data aggregation causes a higher index value and the reverse could be true with low level of data aggregation. According to Dietrich (2009 pp. 13) ‘If the structure remains unchanged, the indicator is equal to zero, and if all sectors change its most, which means the whole economy has a total change – then the index is equal to unity.’ Additionally, this method fails to explain whether the reallocation happens to higher-productivity or lower-productivity sectors/economic activities. So, this method may fail to explain the effect of structure change on economic growth. The other key disadvantage of the NAV, often mentioned, is that huge movements of a few sectors would have the same impact on the index value as fewer changes of many sectors and therefore are underestimated. Therefore, the index is complemented with another index called the Modified Lilien Index (MLI) based on Lilien[89] (1982) to capture the degree of structural change.

The MLI index is constructed as below:

$$MLI_{st} = \sqrt{\sum_{i=1}^{n} x_{is} * x_{it} * \left(\ln \frac{x_{it}}{x_{is}}\right)^2} \qquad x_{is} > 0; x_{it} > 0 \qquad (6)$$

The MLI index ideally meets the following characteristics: (i) the index has to be equal to zero if the economic structure composition is stagnated or unchanged; (ii) the structural change between two periods should be independent at the time sequence; the index depends merely on the amount of changes and it is the same regardless of whether it is measured from s to t or from t to s (i.e. SCIs,t =SCIt,s); (iii) the structural change in one period should be smaller or equal to that between two sub-periods (i.e. Ss,t ≤ Ss,q + Sq,t for s<q<1); (iv) the index should be a dispersion measure; and (v) the index should consider the weight (size) of the sectors. The NAV violates condition (iv) as it is a metric while the MLI satisfies all the necessary conditions (Ansari et al. 2013). The fact that the MLI is low meant that the pace of structural change in the economy is slow and a high MLI implies that the pace of structural change is high.

D. Granger Causality for Panel Data Models

The Granger (1969) causality test helps to analyze the causal relationship between time series. The test is defined as follows: 'A variable X is said to cause a variable Y if and only if the current value of Y is predicted better by including the history of variable X.' Put in other words, the test gives insights on how much of the current value of Y can be explained by past values of Y and then whether adding lagged values of X can improve the explanation. When Granger causality [causality hereafter for simplicity] exists between the two variables ($X \rightarrow Y$), the current value of Y can be predicted better using lagged values of X and Y than using past values of Y alone.[90] Nonetheless, saying that "X Grange causes Y" does not imply that Y is the effect of X. So, Granger causality does not by itself imply causality in the more common use of the term, but it measures precedence and information content.

[89] The Lilien Index was introduced to measure the standard deviation of the sectoral growth rate of demand for labor from period s to period t and employed to measure the degree of liquidity of factor reallocation.

[90] The conditional distribution lagged values of variable X give additional information to explain variable Y:

$$E(y|y_{y-k}, x_{t-k}) \neq E(y|y_{t-k})$$

The study uses two Granger non-causality tests that are efficient to correlation in cross-section and heterogeneity issues, with the intention of either refuting the existence of Granger causal relationship between the variables of interest or validating Granger causal relationship holds for at least one country. Meaning, considering the y and x as the dependent and explanatory variables, the two tests allow to assess whether variable x Granger cause variable y or if x Granger-cause variable y for at least one country. The most widely used approach of Granger causality tests is the generalized methods of moment (GMM) (Holtz-Eakin et al (1988), which is most appropriate only for homogenous panels with a small number of time series observation (T). This approach is not implemented in the present study as the likelihood of heterogeneity between individuals in panel data models is high for two reasons: (i) the likely incidence of natural permanent cross-sectional differences between individuals; and (ii) there may be heterogeneous coefficients associated with the exogenous variable X. Besides, two sub-groups may exist within the whole group of individuals: A sub-group where causality between X and Y holds, and a sub-group where such relationship does not hold. Therefore, the Dumitrescu and Hurlin (2012) and the Juodis et al. (2021) Granger non-causality tests are used in this study. A brief overview of the two tests is given below.

Dumitrescu and Hurlin (2012) Granger non-causality test:

The Dumitrescu and Hurlin (2012) Granger non-causality test was developed to tackle potential heterogeneity issues. The test is mainly suitable for heterogeneous, large T panels, and it has been widely used. Consider the following model to test whether two stationary series, x and y, have one-way or two-way Granger causal relationship:

$$y_t = \alpha + \sum_{k=1}^{K} \gamma_k y_{t-k} + \sum_{k=1}^{K} \beta_k x_{t-k} + \varepsilon_t \text{ , for, t = 1,…,T.} \quad (7)$$

If past values of x predicts significantly the current values of y even when past values of y have been included in the model, the x can exert causal influence on y. One can use this equation to examine this causality based on an F test with the null hypothesis: Ho:$\beta_1 = \cdots = \beta_k = 0$. If the null hypothesis is rejected, causality goes from x to y. In fact, the possibility for the existence of bidirectional causality (feedback) is high.

Dumitrescu and Hurlin (2012) introduced an extension of (7) that helps detect Granger causality in panel data with the following regression equation:

$$y_{i,t} = \alpha_i + \sum_{k=1}^{K} \gamma_{ik} y_{i,t-k} + \sum_{k=1}^{K} \beta_{ik} x_{i,t-k} + \varepsilon_{i,t} \quad (8)$$

Where, i= 1,…,N and t = 1,…,T; and $x_{i,t}$ and $y_{i,t}$ are the observation of two stationary variables for individual i in period t. Coefficients are allowed to differ across individuals (that is why the i subscripts are attached to coefficients), but are assumed to be time invariant. The lag order K is assumed to be identical for all individuals and the panel must be balanced (Lopez and Weber, 2017, pp 973). The procedure to detect the existence of causality (as in Granger 1969) is to test for significant effects of past values of x on the current value of y. The null hypothesis, which corresponds to the absence of causality for all individuals in the panel, is defined as follows:

$$Ho: \beta_{i1} = \cdots = \beta_{ik} = 0 \quad \forall_i = 1, \ldots, N \qquad \text{(8a)}$$

This test assumes there can be causality for some individuals, but not necessarily for all. Thus, the alternative hypothesis is given below:

$$H_1: \beta_{i1} = \cdots = \beta_{ik} = 0 \quad \forall_i = 1, \ldots, N1 \qquad \text{(8b)}$$

$$\beta_{i1} \neq 0 \; or \ldots or \; \beta_{ik} \neq 0 \qquad \forall_i = N_1 + 1, \ldots, N,$$

where, $N_1 \in [0, N-1]$ is unknown. If N_1= 0, there is causality for all individuals in the panel. N_1 should be strictly smaller than N; otherwise, there is no causality for all individuals, and H_1 reduces to Ho. Rejection of the null hypothesis does not exclude non-causality for some individuals. Using Monte Carlo estimation, the authors have shown that the test exhibits good finite sample properties, even when both N and T are small (Lopez and Weber 2017 pp 973).

The Juodis, Karavias and Sarafidis (2021) Granger non-Causality Test:

Judias et al. (2021) have recently introduced a bias-corrected test for Granger non-causality test which can be appropriate in both heterogeneous and homogenous panels, considering the following dynamic panel data model:

$$y_{i,t} = \varphi_{0,i} + \sum_{p=1}^{P} \varphi_{p,i} y_{i,t-p} + \sum_{p=1}^{P} \beta_{p,i} x_{i,t-p} + \varepsilon_{i,t} \qquad \text{(9)}$$

with, i=1,..,N and t=1,..,T. Without loss of generality and for ease of exposition, $x_{i,t}$ is assumed to be a scalar. The parameters $\varphi_{0,i}$ denote the individual specific effects, $\varepsilon_{i,t}$ represent the errors, $\varphi_{p,i}$ denote the heterogeneous autoregressive coefficients, p=1,…P and $\beta_{p,i}$ are the heterogeneous feedback coefficients or Granger causality parameters. The restriction that the number of lags of

$y_{i,t}$ is the same as that of $x_{i,t}$ has the benefit of a minimal computational cost when it comes to lag length selection (also, such restrictions is imposed by xtgcause[91]).

The null hypothesis that $x_{i,t}$ does not Granger-cause $y_{i,t}$ can be formulated as a set of linear restrictions on the parameter in equation (9):

$$Ho\colon \beta_{ip,i} = 0 \quad for\ all\ i\ and\ p \qquad (9a)$$

The alternative hypothesis is:

$$H1\colon \beta_{p,i} \neq 0\ for\ all\ i\ and\ p \qquad (9b)$$

Failure to reject the null can be interpreted as $x_{i,t}$ does not Granger causes $y_{i,t}$. The same applies when $x_{i,t}$ is k x 1 vector of regressors (Xiao et al. 2021).

The novelty of this approach, in the authors view, is that under the null hypothesis, the Granger-causality parameters equal zero and thus they are homogenous and which can be used in a multivariate system. This allows the use of a pooled fixed effect type estimator for these parameters only, which guarantees a $\sqrt{NT}$ convergence rate, where N denotes the number of cross-sectional units in the panel. The autoregressive parameters and intercepts (FEs) are still allowed to be heterogeneous (Xiao et al. 2021). Also, the approach is valid "under circumstances that are empirically relevant: moderate time dimension, heterogeneous nuisance parameters and high persistence." This method is advantageous compared to the Dumitrescu and Hurlin (2012) test in that the test statistic of Dumitrescu and Hurlin, albeit accommodates heterogeneous slopes under both the null and alternative hypothesis, is theoretically justified only for sequences where $N/T^2 \rightarrow 0$. What this implies is that when T is sufficiently smaller than N (that is, T<<N), the Dumitrescu and Hurlin approach can suffer from substantial size distortion (Xiao 2021).

For this study, y represents growth of labor productivity and x denote structural change measured both in value added and employment (according to the NAV and MLI indices). In this respect, the null and alternative hypotheses are:

$H0$: Structural change does not Granger-cause Productivity Growth

$H1$: Structural change does Granger-cause Productivity Growth for at least one panelvar (country)

[91] The Dumitrescu and Hurlin (2012) Granger non-causality test can be carried out in STATA command *xtgcause* following Lopez and Weber (2017). Xiao et al. (2021) have introduced the *xtgranger* command in STATA to implement the Granger non-causality test of Judis et al (2021).

When the null is rejected, then structural change Granger-cause labor productivity growth for at least one country, suggesting that past values of structural change contains information that helps to predict labor productivity growth over and above the information contained in past values of labor productivity growth. So, the alternative hypothesis does not allow to conjecture for which country or countries do the causal relationship holds [which calls for running country specific regressions to identify the country or countries for which the causal relationship shall be confirmed].

Equally important is optimal lag selection, which is required for balancing “the marginal benefit of including more lags against the marginal cost of increased uncertainty of estimation” for two reasons. On one hand, when sufficient lags are not included, the risk of omitting potentially significant information contained in more distant lags is a concern. In contrast, when too many lags are included more coefficients are estimated than required. To deal with these challenges, the study employed the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) as they attempt to balance the information gained by adding additional lags against the increase in the complexity of the model that these lags cause.

E. Presentation and Discussion of Results

The two Granger non-causality tests are carried out with a balanced panel data for 31 countries covering 16 SSA and 15 Asian economies. The variables are entered to the regression either in annual growth rates or indices. Specifically, annual growth rate of output per worker (labor productivity) is taken as dependent variable, and structural change indices [variants of the absolute norm of value added and employment (NAV-VA and NAV-EMPT), and the modified Lilien indices for both value added and employment (MLI-VA and MLI-EMPT)] as independent variables and vice versa. The Granger non-causality tests are carried out for SSA and Asia Panel separately for the whole study period (1971-2015) and for two sub-periods: 1980-1999 (pre-SAP, SAP and post-SAP period), and 2000-2015 (the contemporary or Africa rising period), in view of looking into the dynamism over the Africa rising chronicle period against the lost-decades for SSA in comparative perspective with Asia. The results may give important insights as to whether structural change measured in value added (NAV-VA and MLI-VA) and employment (NAV-EMPT and MLI-EMPT) Granger causes growth rate of productivity, or whether reverse Granger causality runs from productivity growth to structural change in value added and employment, or whether there exists bidirectional causal relationship between the variables. They are presented for the full sample and the two sub-periods, respectively, here below.

Granger non-Causality test Results for the Full Sample: 1971-2015

The results for the panel Granger causal relationship between structural change in value added and employment [NAV-VA, NAV-EMP, MLI-VA, and MLI-EMP] and productivity growth [P] for 1971-2015 are given in Tables 16 and 17 with the two Granger non-causality tests respectively.

Table 16:Results for the Dumitrescu and Hurlin (2012) Granger non-Causality Test

Country Group	***Structural change in value added does not Granger cause Productivity***				***Productivity growth does not Granger cause Structural change in value added***			
	NAV-VA	***P-value***	***MLI-VA***	***P-value***	***NAV-VA***	***P-value***	***MLI-VA***	***P-value***
Asia	*4.542*	*0.000*	*0.949*	*0.342*	*12.660*	*0.000*	*13.235*	*0.000*
SSA	*1.913*	*0.000*	*2.589*	*0.009*	*4.814*	*0.000*	*4.008*	*0.000*
	Structural change in employment does not Granger cause Productivity				***Productivity growth does not Granger cause Structural change employment***			
	NAV-EMPT	***P-value***	***MLI-EMPT***	***P-value***	***NAV-EMPT***	***P-value***	***MLI-EMPT***	***P-value***
Asia	*11.586*	*0.000*	*1.695*	*0.000*	*4.896*	*0.000*	*4.591*	*0.000*
SSA	*2.682*	*0.007*	*2.929*	*0.003*	*1.685*	*0.09*	*0.723*	*0.470*

Source: Own Computation

Table 17: Results for the Juodis, Karavias and Sarafidis (2021) Granger non-Causality Test

Country Group	***Structural change in value added does not Granger cause Productivity***				***Productivity growth does not Granger cause Structural change in value added***			
	NAV-VA	***P-value***	***MLI-VA***	***P-value***	***NAV-VA***	***P-value***	***MLI-VA***	***P-value***
Asia	*4.766*	*0.029*	*2.207*	*0.137*	*1.366*	*0.242*	*1.298*	*0.254*
SSA	*13.270*	*0.000*	*15.221*	*0.000*	*2.779*	*0.095*	*1.895*	*0.169*
	Structural change in employment does not Granger cause Productivity				***Productivity growth does not Granger cause Structural change employment***			
	NAV-EMPT	***P-value***	***MLI-EMPT***	***P-value***	***NAV-EMPT***	***P-value***	***MLI-EMPT***	***P-value***
Asia	*13.754*	*0.000*	*17.329*	*0.000*	*18.178*	*0.000*	*14.436*	*0.000*
SSA	*2.980*	*0.084*	*3.236*	*0.072*	*3.237*	*0.072*	*-0.911*	*0.362*

Source: Own Computation

Three observations come out from the two Tables. First, when structural change is measured in value added with the Dumitrescu and Hurlin test, the test statistic reject the null of no Granger causality for SSA panel with both the NAV and MLI indices and for Asia panel with the NAV index. Interestingly, productivity growth Granger cause structural change measured in value added with both the NAV and MLI indices for both Asia and SSA panels. On the other hand, with the use of the Juodis, Karavias and Sarafidis (2021) Granger non-Causality Test, the null of no Granger causality with respect to value added is rejected with the NAV index for Asia and with both the

NAV and MLI indices for SSA. Besides, the null hypothesis of productivity growth does not Granger causes structural change measured in value added is rejected with the NAV index for SSA, suggesting the possibility of bi-directional causality. Second, when structural change indices are measured in employment (NAV-EMP and MLI-EMP), the significance level of the coefficients differs between the two panels. In the Asia panel, the null hypothesis is rejected in both the NAV and MLI indices with both the Dumitrescu and Hurlin (2012), and the Juodis, Karavias and Sarafidis (2021) Granger non-Causality tests approach, suggesting that structural change measured in employment causes productivity growth. Likewise, the test result shows that productivity growth Granger causes structural change in employment with both Granger non-causality test approaches. For the SSA panel, structural change measured in employment (with both NAV and MLI indices) Granger causes productivity growth with both test approaches, while productivity growth Granger causes structural change measured in employment with both test approaches. Finally, there is clear indication that structural changes measured by value added and employment Granger causes productivity growth and vice versa, which is more pronounced for the Asia panel. So, the likelihood for the occurrence of a two-way causal relationship between the variables is higher for at least one country in both panels.

Granger non-Causality test Results for sub-period one: 1980-1999

The results for the Granger causal relationship between the structural change indices and productivity growth during the sub-period are given in Tables 18 and 19 for the two panels. The results show some disparities with the previous results, irrespective of the indices and lag lengths chosen. More specifically, in the Asia panel, there exists two-way Granger causality running from structural change measured in value added and employment to productivity growth and vice versa with both indices with the Dumitrescu and Hurlin (2012) Granger non-Causality test with lag length chosen through AIC. This means that structural change measured either by value added or employment Granger cause economy-wide productivity growth and vice versa. However, in the SSA panel, causal relationship holds for structural change measured in value added with both NAV and MLI indices. Likewise, two-way Granger causality relationship is evidenced between structural change measured in employment with the NAV index and one-way causality running from structural change measured in employment with the MLI index to productivity growth. By contrast, applying the Juodis et al. Granger non-Causality Test, structural change in value added measured with the MLI index Granger causes economy-wide productivity growth in SSA panel with the null hypothesis being rejected at 0.05 percent. Likewise, structural change in employment measured both in NAV and MLI indices Grange causes economy-wide productivity growth in SSA panel with the test statistic turn out to be significant at the 0.05 level. And, productivity growth Granger causes structural change measured in employment with the MLI index. On the other hand, applying the same approach in the Asia panel, a two-way causal relationship is observed between structural changes measured in employment in both the NAV and MLI indices and economy-wide productivity growth.

Table 18: Results for the Dumitrescu and Hurlin (2012) Granger non-Causality Test

Country Group	Structural change in value added does not Granger cause Productivity				Productivity growth does not Granger cause Structural change in value added			
	NAV-VA	P-value	MLI-VA	P-value	NAV-VA	P-value	MLI-VA	P-value
Asia	17.492	0.000	11.629	0.000	15.453	0.000	14.832	0.000
SSA	9.597	0.000	7.035	0.000	6.416	0.000	6.702	0.000
	Structural change in employment does not Granger cause Productivity				Productivity growth does not Granger cause Structural change employment			
	NAV-EMPT	P-value	MLI-EMPT	P-value	NAV-EMPT	P-value	MLI-EMPT	P-value
Asia	4.753	0.000	8.867	0.000	13.048	0.000	8.302	0.000
SSA	8.144	0.000	13.482	0.000	11.272	0.000	10.345	0.466

Table 19: Results for the Juodis, Karavias and Sarafidis (2021) Granger non-Causality Test

Country Group	Structural change in value added does not Granger cause Productivity				Productivity growth does not Granger cause Structural change in value added			
	NAV-VA	P-value	MLI-VA	P-value	NAV-VA	P-value	MLI-VA	P-value
Asia	0.997	0.318	0.429	0.512	2.068	0.150	1.355	0.240
SSA	1.521	0.217	4.212	0.040	2.697	0.100	1.948	0.163
	Structural change in employment does not Granger cause Productivity				Productivity growth does not Granger cause Structural change employment			
	NAV-EMPT	P-value	MLI-EMPT	P-value	NAV-EMPT	P-value	MLI-EMPT	P-value
Asia	13.399	0.000	12.801	0.000	4.239	0.000	30.291	0.000
SSA	5.755	0.016	5.863	0.015	0.232	0.630	0.059	0.809

Source: Own Calculation

Granger non-Causality test Results for sub-period two: 2000-2015

The results for the causal relationship between the structural change indices and productivity growth for the period 2000-2015 are given in Tables 20 and 21 for both SSA and Asia panels. The observation come out from the Tables appears ambiguous, as the results turn out to be relatively diverse. Tables 20 suggests the existence of bidirectional causal relationship between structural changes measured in value added with both the NAV and MLI indices, and productivity growth for SSA panel and with the NAV for Asia panel with the Dumitrescu and Hurlin Granger non-causality test. However, productivity growth Granger causes structural change with the MLI index in Asia panel. Surprisingly, when structural change is measured in employment, the null of no-Granger causality is accepted in both indices for Asia and rejected in both indices for SSA, where there is evidence for two-way Granger causal relationship. Applying the Juodis et al. (2021) Granger non-causality test gives different results. For Asia panel, productivity growth Granger causes structural change measured in value added with the NAV and MLI indices. The null of no-Granger causality is accepted in SSA, however. So, the conclusion differs across panels with the structural change index used and Granger non-causality test applied.

Table 20: Results for the Dumitrescu and Hurlin (2012) Granger non-Causality Test

Country Group	***Structural change in value added → P***				***P → Structural change in value added***			
	NAV-VA	***P-value***	***MLI-VA***	***P-value***	***NAV-VA***	***P-value***	***MLI-VA***	***P-value***
Asia	*8.331*	*0.000*	*1.441*	*0.149*	*8.591*	*0.000*	*9.633*	*0.000*
SSA	*5.049*	*0.000*	*4.033*	*0.000*	*5.541*	*0.000*	*8.645*	*0.000*
	Structural change in employment does not Granger cause Productivity				***Productivity growth does not Granger cause Structural change employment***			
	NAV-EMPT	***P-value***	***MLI-EMPT***	***P-value***	***NAV-EMPT***	***P-value***	***MLI-EMPT***	***P-value***
Asia	*-0.823*	*0.410*	*-0.837*	*0.403*	*-0.456*	*0.648*	*-0.652*	*0.514*
SSA	*5.124*	*0.000*	*5.593*	*0.000*	*6.498*	*0.000*	*7.977*	*0.000*

Source: Own Calculation

Table 21: Results for the Juodis, Karavias and Sarafidis (2021) Granger non-Causality Test

Country Group	***Structural change in value added → P***				***P → Structural change in value added***			
	NAV-VA	***P-value***	***MLI-VA***	***P-value***	***NAV-VA***	***P-value***	***MLI-VA***	***P-value***
Asia	*0.196*	*0.658*	*0.329*	*0.566*	*7.206*	*0.007*	*7.778*	*0.005*
SSA	*2.276*	*0.131*	*1.992*	*0.158*	*0.084*	*0.773*	*0.008*	*0.779*
	Structural change in employment does not Granger cause Productivity				***Productivity growth does not Granger cause Structural change employment***			
	NAV-EMPT	***P-value***	***MLI-EMPT***	***P-value***	***NAV-EMPT***	***P-value***	***MLI-EMPT***	***P-value***
Asia	*0.377*	*0.539*	*0.579*	*0.447*	*0.755*	*0.385*	*0.363*	*0.547*
SSA	*0.128*	*0.726*	*0.035*	*0.851*	*7.414*	*0.006*	*11.358*	*0.001*

Source: Own Calculation

When structural change is measured in employment instead, the Granger causality relationship turns out to be bidirectional with structural change measured in value added with both NAV and MLI indices with the Dumitrescu and Hurlin approach. In contrast, the null of non-Granger causality is accepted in the Asia panel with structural change in employment measured with both NAV and

MLI indices. However, applying the Juodis et al. approach, productivity growth Granger causes structural change measured in employment irrespective of the indices used for SSA and structural change Granger causes productivity growth with MLI index. However, the null hypothesis of Granger non-causality test is accepted in the Asia panel irrespective of the indices used.

4.8 Summary

Part four set out to examine and compare the extent and pattern of production transformation in sample SSA and Asian economies covering the period 1960-2015. The analysis placed focus on sectoral structural transformation followed by the relationship between sectoral share and per capita GDP as well as between output, productivity and employment. The structuralist perspective gives more weights for manufacturing in terms of its contribution to cumulative productivity increases, employment generation potential, linkages and spillover effects, technological change and innovation, etc. The descriptive and empirical analysis of part four render several observations with important insights for policy implications.

As expected, in both regions, vast majority of the sample countries have experienced falling share of agriculture both in GDP and in employment. Interestingly, the drop in the value added share of that sector seems to have been faster than the drop in its employment share, though in both cases variation among regions and across countries is not rare. Most notably, the drop in the share of the sector both in GDP and in employment is substantial for advanced Asia relative to developing Asia and SSA. Zambia came out to be unique in this respect, experiencing the rise in its agricultural employment share in 2015 (68.2 percent) when compared to 1965 (63.3 percent). One suspect for such record (apart from data problem) was the privatization program that “led to a steep decline in employment” in the extractive industries, wherein the share of industry plunged to 7.5 percent over the reference period (due to steady fall in mining and quarrying). Also, Mozambique saw slight decrease from 80.1 percent in 1970 to 78.3 percent in 2015. Developing Asian economies have experienced faster reduction in employment share of agriculture compared to those of SSA. The same is true with respect to the drop in the sector’s value added share.

The other surprise point worth noting here is that agriculture has not only released workers to the rest of the economy, but it was also absorbing a great part of the new entrants to the labor force. This being the reason that the labor force engaged in agriculture continued to surge for most of the economies in SSA and South Asia, albeit in different magnitude and at a slower rate to economy-wide employment growth. In majority of SSA economies, agriculture remains the most important sector fetching a significant share of employment in 2015. Similar observations can also be drawn with respect to the speed and patterns of reduction in value added share of agriculture. In majority of SSA economies, agriculture has been contributing to a good share of aggregate output, which might have been the reason why some scholars tempted to claim that agriculture is the only productive sector that Governments of SSA economies should put focus to see catch-up growth.

The development route followed by the successful Asian economies [and Mauritius] seems to have been similar to the one carved out by those wealthy countries – manufacturing-led development path. In general, the growth disparities between the two regions and across counties in each region seem to have been reflection of the cross-country differences in the trajectory of manufacturing. The findings give insights to claim that the secret recipe for the success of the forerunner Asian economies could have been their strong manufacturing base. Some of the considered Asian economies (e.g. China, South Korea, Vietnam and Bangladesh) were managed to increase the share of manufacturing in GDP and in employment. China is a new mega economy, successfully transforming its production composition in the conventional development and production transformation path (industrialization). There is also evidence that the share of industry in total employment and in aggregate output dropped moving from sub-period one to sub-period three, despite difference in the pace of decline (e.g. Hong Kong, Singapore, Taiwan and the Philippines, where the first two are high-income countries). This may not seem surprising. The value added share of manufacturing in advanced Asia remained on the rising side, albeit employment share showed downward trend.

For SSA economies the value added share of manufacturing dropped or stagnated at lower level while its employment share showed a slight increment, albeit manufacturing activities in the region is generally far lower than Asia. The different pattern in the two regions is associated with differential productivity gains in manufacturing relative to the whole economy, which is higher in the Asian forerunners and below average for SSA. There is indication of employment industrialization in some countries and premature tertiarization in few others. Some SSA economies witnessed a drop in both the value added and employment shares of industry and manufacturing, which are typical suspects for encountering *premature deindustrialization*. A case in point is South Africa where the share of its manufacturing industry in GDP plummeted in the 1980s (from its high level in 1970) and has continued to fall. Ghana is another example, wherein the share of industry dropped moving from (1960-1979) to (2000-2015). In most other SSA economies, the share of manufacturing in the economy remains meager. One can thus conclude that the vast majority of SSA economies run out of industrialization process caused partly by externally imposed liberalization and reform programs, relegating industry policy by the time they needed most. There is also *stalled industrialization*, where some countries (e.g. Kenya, Malawi) experienced limited share of industry sector in GDP, on average, to about 19 to 20 percent since the SAP period. So, the evolution in the speed and patterns of structural change in SSA was lethargic and aberrant, where the movement of workers out of agriculture unduly ended up especially in the traditional Baumol's diseases services rather than in manufacturing.

In countries such as Ethiopia, the services sector pushed agriculture to second place recently in terms of value added share. Indeed, Mauritius is unique. It saw structural change patterns similar to the developed economies, where employment in manufacturing industry increased, reached its peak level and then started to fall in favor of the services sector. India and Mauritius experienced notable rise in the share of the service sector in their GDP while still avoiding the fall in the share of industry sector (and manufacturing). In this sense, the services sector has been serving as *"stimulus complement"* to manufacturing. A comparison of India and Thailand may also give some interesting insights: India has managed to increase the share of services sector value added in GDP along with increasing the share of its industry sector while Thailand increased the share of agriculture and industry sectors in GDP. Another interesting observation can be drawn from the evolution of sectoral employment share in China and the city state of Hong Kong. The former saw commendable rise in the share of manufacturing in its total employment, largely realized by shifting workforce from agriculture. In contrast, the share of manufacturing employment in total employment plummeted drastically in the latter wherein majority of the displaced labor force ended up in the services sector.

The findings show the existence of regional divergence in terms of structural change and production composition. The growth trajectory in the Asian sample can be said to have been driven mainly by rapid industrialization, without relegating the role of the agrarian reform that preceded the rapid industrialization, corroborating the key features of structural transformation and growth reviewed in this dissertation. The services sector has been growing in importance to serve as *"stimulus complement"* to manufacturing. The poor economic progress or growth stagnation in SSA was mainly explained by their inability to follow the classical pattern of structural transformation, and hence by their weak performance of manufacturing. They have demonstrated an erroneous sort of structural transformation, wherein economic activities and resources (including labor) moved into low-productivity traditional services and informal activities. The weak performance of manufacturing in the region might be explained chiefly by the absence of political commitment and lack of policy support for manufacturing especially during the SAP regime. Therefore, industrial policy intervention is needed and the industrial policy should gear towards expansion and diversification of manufacturing industries, despite the global economic setup exposes them for both opportunities and challenges (as industrial production is becoming increasingly fragmented in the

GVCs). Shifting resources towards modern industrial activities would help the countries benefit from industrialization if they really take industrial stagnation or premature deindustrialization as exigent policy agenda in their policy menu.

Nevertheless, many of these economies lack the required capabilities and may find it difficult to be competitive in the global market and to increase the share of manufacturing in their GDP. As already indicated throughout the preceding parts of the dissertation, sustainability of the growth spurts in SSA became an interesting discussion point, essentially because cyclical swings of economic growth is not exception in the region. This cannot be abated without production diversification across- and within-sectors; without which they may find it difficult to make the economy buoyant to trade cycles. This further suggests that raising the share of manufacturing value added in GDP is not enough for these economies to achieve sustainable development. They need to build their capabilities in a way to increase their economic complexity, moving from low-tech and low-value added products to high-value added products through diversification within manufacturing industries, and technological upgrading. The critical questions one may raise at this juncture are: Should SSA economies follow a manufacturing-led growth path having services to be *stimulus complement* to it? If so, which manufacturing activities should they place prior focus on, [in that they are not too far from their present pattern of specialization and capabilities, but also offer good prospects in terms of productivity growth]? Which service activities may have a high growth potential for SSA countries [as for instance, tourism is growing in importance in few countries], or which may positively interact with the ‘target’ manufacturing activities in order they become *“stimulus complement”* to manufacturing? What factors determine structural change? These questions open avenue for future research. Part six shall attempt to give important insights on some of these questions employing up-to-date econometric approach. It should also be noted that future research may examine the causal links between structural change and productivity growth through the use of appropriate econometric techniques.

PART FIVE: IDENTIFYING THE KEY DRIVING FORCES FOR INDUSTRIAL DEVELOPMENT

5.1 Backdrop

The home take message from the preceding parts for this part are three-fold; (i) there exists divergence between the developed and developing countries (which in Lewis view refers to divergence between those that imitate the frontier economies and those that insist on trading primary commodities following the principle of comparative advantage) and among the developing blocks; (ii) there exists large heterogeneity in terms of industrialization pattern and degree among regions and across countries, even among countries at similar level of development; and (iii) based on Engel's law, the share of household budget spent on manufactures increases during the initial stages of development, then stabilizes, and finally falls beyond a certain level of income per-capita. Also, empirical studies evidenced the existence of an inverted U-shape (a hump-shape) relationship between per capita income and manufacturing share in GDP and in total employment. Much of the worry now is the occurrence of *deindustrialization* prematurely, where developing countries are said to experience *deindustrialization* at lower levels of income per capita and lower shares of manufacturing in the economy than was the historical norm. This may, according to some scholars, make manufacturing-led development path more difficult to development and sustainability for today's developing economies than was previously the case. The debate on manufacturing-led and service-led development path is live. So, do the debates on *premature deindustrialization* and on the hump-shape curve.

Apart from per-capita income level, other likely internal and external determinants of industrial development should be included as explanatory variables to understand why some countries have higher share of manufacturing than others and why some countries underwent industrialization while others might have experienced either industrial stagnation or deindustrialization. The present dissertation contributes to the debate employing recent panel data econometric models to evaluate the likely determinants for manufacturing development across sample economies from Asia and SSA. To this effect, it includes to the right hand side of the regression equation relevant covariates that could likely affect output and employment share of manufacturing (hence, the level of industrial development) besides per-capita GDP.

The causes and determinants of (*de)industrialization* and its effect on economic growth in developing countries did not receive adequate focus in past researches. Empirical studies, albeit numerous, dwell on advanced economies perhaps because the process of *deindustrialization* in developing countries occurs prematurely. But, recently Rodrik (2016) constructed a model to examine the extent of *premature deindustrialization* for developing countries. However, further studies that tend to empirically diagnose the causes of *premature deindustrialization* need to be carried out. The present study is an attempt to contribute to the industrialization and deindustrialization literature, examining the underlying driving forces for *(de)industrialization* in SSA in comparative context with Asian sample economies. More specifically, the main intent of part five is to see the relative contribution to (*de)industrialization* of each of the internal and external factors identified in past researches along with additional explanatory variables based on the theoretical and qualitative discussion in part three. Part five also gives statistical evidence to the pattern of premature deindustrialization (premature tertiarization) in the considered countries, although Rodrik asserts that Asian economies have been immune from such problem. The descriptive analysis showed that the share of manufacturing in the economy of SSA remains low; even recently the services sector has been growing in importance against the traditional path of structural transformation.

The next section gives brief review of theoretical and empirical literature on (*de)industrialization* and its driving causes followed by the econometric approach in section 5.3. Section 5.4 discusses estimation results followed by summary of finding in section 5.5.

5.2 Deindustrialization/Industrial Stagnation/Industrialization

5.2.1 Conceptual Synopsis

For the purpose of this study, *deindustrialization* is conceptualized as the gradual and steady drop both in the value added and employment share of manufacturing in GDP and in economy-wide employment, respectively (Tregenna 2009, 2013, 2015a, 2016a). The intuition behind this premise, according to Tregenna, is that manufacturing plays engine of growth role through both output and employment channels. Her findings show a turning point of USD 16,582 (in 2005 international PPP USD) for sample of 103 countries, corresponding to a 14 percent employment share in employment. Also, Rodrik (2016) conceptualized *deindustrialization* in terms of incessant decline in the share of manufacturing both in total output and in economy-wide employment. For a sample of 42 developed and developing countries, he finds a turning point of USD 7,455 with manufacturing employment share used as dependent variable. When nominal and real value added share of manufacturing used as dependent variables, the turning points become USD 6,947 and USD 83,561 respectively.

Rowthorn and Wells (1987) distinguish between “positive” *deindustrialization* [that stem from industrial dynamism in an already mature industrialized economies] and “negative” *deindustrialization* [which refers to poor performance of an economy as a result of serious impediments observed in manufacturing]. This viewpoint gives indication that *deindustrialization* might have different patterns with inclusion of different factors to the right hand side of the regression equation on both the mature industrialized and developing economies. In the former case, *deindustrialization* is a natural consequence of growth and development. It may stem either from labor-substituting technological progress in the manufacturing industry *à la* Baumol (1967) or from faster and high productivity growth of manufacturing owing to technological development and innovation *à la* Rowthorn and Ramaswamy (1997, 1999). Either way, labor displaced from manufacturing to other sectors (mainly services without raising unemployment rate), even when the manufacturing industry exhibited output growth; but, this could happen merely in countries with full employment where economic growth is sustained (typically, in advanced economies). By contrast, "negative" *deindustrialization* emanates from economic failure, more specifically from feeble performance of industry sector. Indeed, such *deindustrializatio*n may happen independent of the development status of the country in question when manufacturing employment share falls either for lower output or lower productivity levels. This pattern may cause unemployment as employment displaced from manufacturing may not end up in the services sector. In short, *deindustrialization* in their view might be both an effect and cause of poor economic performance. It may also arise from relocation of manufacturing industries and production from the North to the South (Kollmeyer 2009) and from expansion of services or industries without smokestacks (Newfarmer et al. 2018) that share the underlying features of manufacturing.

5.2.2 Determinants of Manufacturing Development

The debate on *deindustrialization or patterns of industrial development* centered partly on its causes/determinants. Put differently, there is knowledge gap on the underlying factors that plausibly explain the falling or increasing share of manufacturing employment and value added in total employment and in GDP. There is also debate on whether low-income countries are increasingly exposed to *premature deindustrialization or industrial stagnation*. Several explanations were discussed in part three, which can generally be boiled down into two groups: internal causes and external causes.

The first internal factor is **shifts in consumer demand**, which pertains to the probable strong relationship between the extents of economic maturity or state of development and the structure of employment or value added of a sector, typically manufacturing share *à la* Clark (1940, 1957). As already indicated in part two, Clark made the first attempt to identify the causes of transition from the primary to the secondary and then to the tertiary sectors. He theorized that an economy will see shifts in consumer demand from basic needs to manufactured goods and then to services with the rise in affluence. In this hypothesis, the income elasticity of demand for manufactured goods is assumed to be high at lower GDP per capita level and then starts to diminish with further increase in per capita income and eventually, the share of income spent on services will outpace those on manufactured goods. Nevertheless, this does not necessarily mean that individual expenditure on manufactured goods will shrink.

The second prime internal factor is **technological progress or the difference of productivity growth** among economic sectors – the so called Baumol effect. Productivity gains in manufacturing are believed to be higher than those in services sector (Clark 1940; Baumol 1967; Baumol et al. 1985; Rowthorn and Ramaswamy 1997). Therefore, the relatively faster and high productivity growth in manufacturing leads to labor saving production and thereby displaces excess workforce to the services sector as few workers are required to maintain the same level of output. The technology argument, which links *employment deindustrialization* with faster productivity growth of manufacturing over services sector, has been supported by empirical works in advanced economies (see Rowthorn and Wells 1987; Rowthorn and Ramaswamy 1997, 1999; Krugman and Larence 1993; Rowthorn and Coutts 2004; Kollmeyer 2009; Tregenna 2009, 2013, 2016). For instance, Rowthorn and Ramaswamy (1997) evidenced that faster growth of productivity of manufacturing, on average, accounted for 60 percent of the fall in the share of employment in industry sector.[92] By this logic, therefore, *deindustrialization* is natural for advanced economies, a salient feature of structural transformation and sustainable development, despite it may have unfavorable effect if some shocks accompany it.

Could this be true for developing economies which are experiencing *premature deindustrialization*? For Rodrik, (2016), the answer to this question is big No – the technology argument could not apply the same way in developing countries as the type of technology progress of the unskilled labor saving type is responsible for the bulk of the labor displacement from manufacturing. He said that such mechanism depends on domestic relative prices adjustment; wherein technological progress has the effect of depressing the relative prices of manufactures. Developing countries, being small in the world markets, are price takers. "In the limit, when relative prices are fully determined by global (rather than domestic) supply-demand conditions, manufacturing at home actually produces industrialization, not deindustrialization – in terms of both employment and output." (ibid, pp 4). In his view, the "culprit for deindustrialization in developing countries might be found elsewhere."

[92] However, in a similar study (1999), the authors contend that the relatively higher productivity growth in manufacturing is ambiguous in two senses: (i) lower workforce is required to maintain the same level of output; and (ii) the price of manufactured goods become relatively lower which would stimulate the demand for them, in turn should lead to more workers being employed in manufacturing. Hence, *deindustrialization* will occur if the former effect is stronger than the latter, owing to the demand for manufactured goods not increasing.

Therefore, the sign of the coefficient is equivocal, given that SSA and Asian economies are expected to encounter a different path of deindustrialization/industrialization.

The third and alternative explanation lies at **shifts in trade patterns (i.e. growth in trade between advanced and developing countries, North and South) or increasing globalization**. Several factors may be considered in this respect. As discussed in part three, there has been shifts in manufacturing industries and manufacturing production/activities from the North to the South over the last few decades. On one hand, developing countries (because they have comparative advantage in lower labor cost) specialized in labor-intensive manufacturing activities which produces and supplies less sophisticated products to the world market. By contrast, the mature industrialized economies (North), facing these cheap imports, specialized in the production of more complex and sophisticated manufactured goods that demand automation and small number of highly skilled-labor. Therefore, labor-intensive manufacturing industries in advanced economies have relocated to developing countries, but the workers thrown away from manufacturing may not be fully absorbed by the skill-intensive manufacturing industries attributed to their low labor demand.

The present study includes openness and net FDI as the explanatory variables to account for the influence of foreign trade and globalization in a country's relative manufacturing output and employment. The signs of the coefficients are expected to be mixed in the two country groupings. Several studies conducted in the most advanced – OECD – countries confirmed that increasing globalization and trade expansion with developing countries are prime factors leading to *deindustrialization*, resulting in loss of manufacturing jobs in the countries included in their sample. Rowthorn and Wells (1987) confirmed that a given economy's trade specialization explained the differences in the employment structure of advanced economies which gives to the claims of international trade theory in that specialization patterns induced by trade directly affect the economic structure of a country. Alderson (1999) confirmed that North-South trade drove job loss in the North. By this logic, imports from developing countries played detrimental part in the process of *deindustrialization* in the advanced North. Nonetheless, the findings suggest that the internal factors were quantitatively more important for *deindustrialization* than the external factors.

Matsuyama (2009) examined the effects of international trade on structural change, and hence the decline in relative manufacturing share in the economy. The author, considering the global perspective of structural change through a rigorous modelling of interdependencies across countries, found that an economy with comparatively higher productivity growth in manufacturing can temporarily know an increase in the share of labor employed in manufacturing and delay its process of *deindustrialization*. Generally speaking, various studies documented that global integration of rich countries with poor countries is prime cause for the relative decline in manufacturing observed in advanced countries. Most importantly, international specialization in manufacturing has been associated with a rise in the share of imports in domestic final demand for manufactures in advanced economies, which may partially reflect the rising dependence of domestic manufacturing on trade and exports.

Similarly, Bradly and Dennitson (2006) constructed a differentiation-saturation model that theorizes economic globalization to have a non-linear relationship with manufacturing employment. They proposed and examined 12 globalization measures for their analysis. Their findings reveal that some of the globalization measures have linear effects on manufacturing employment. They argued that including globalization in the model weakened the evidence of the Rowthorn model, with per capita GDP and its square do not have robust effects. Kollmeyer (2009) evidenced that global trade exerts both direct and indirect effects on employment patterns in the economically advanced (18 OECD) countries. *Yet, all authors concluded that the internal factors explains much of the deindustrialization in the most advanced economies*.

In addition to the preceding factors, the present dissertation discusses several factors that would likely influence the share of manufacturing in GDP and in employment. **Government expenditure** is one such factors. Dalziel (1996) highlighted that government spending stimulates the demand for manufactures produced by domestic firms through the Keynesian multiplier effect. Government spending may also induce manufacturing development if it goes to effective industrial policy. The contending view is that government spending may reduce the share of manufacturing when it tends to foster the growth of non-manufacturing activities (most notably public and private services activities). Typically, government spending may relatively induce faster growth in non-manufacturing activities in economies where the services sector is large. If the largest share of government spending goes to the establishment and expansion of public services activities, it would have dual effects: Bloating its size measured in terms of its share in the whole economy and increasing the share of the services sector in the economy with the impact of reducing the share of manufacturing. In short, government spending may increase or decrease the share of manufacturing in the economy. Therefore, it is difficult to predict the sign of the coefficient for government expenditure as the magnitude and level of significance of the estimates might vary across countries.

Industrial density is another factor influencing industrialization (Arbache 2016). The index of industrial density is computed as the value of manufacturing value added divided by total population. It, thus, shows the 'availability of resources and factors that contribute to add value, including human capital, science, technology and market-friendly institutions and infrastructure.' The size of a country's population can contribute to its manufacturing growth and hence, to its industrial development. As already indicated previously, high population growth in some developing regions (such as those in SSA) can be considered as demographic dividend if structural change moves in the right direction (that is, towards high-productivity sectors/activities such as manufacturing). The impact of population growth in manufacturing development (industrial development) is predicted to be explained indirectly through the industrial density index and hence, it is only included in the baseline regression as control variable to examine the pattern of deindustrialization or premature tertiarization.

Economic complexity index (ECI) can also be important determinant of manufacturing (industrial development). Huasmann and Hidalgo (2011), formulated an economic complexity index (ECI) or Atlas of Economic Complexity, which links product sophistication to economic development and ranks countries according to their levels of complexity. They posit that the process of economic development involves the accumulation of capabilities or productive knowledge (non-tradable networks of collective know-how, such as logistics networks, finance networks, supply networks and knowledge networks). These capabilities allow countries to produce wide variety of increasingly complex products. So, difference in the level of economic development among regions and countries is fundamentally, in this perspective, explained by differences on their capabilities. This is in line with the structural transformation thesis, where productive sophistication and diversification towards manufacturing and modern services would ensure sustainable and higher growth of an economy. ECI predicts that the complexity of a country's exports [an increase in the number of activities and the increasing complexity emanating from the interactions of these activities] can induce growth and development of the economy. Hidalgo and Hausman (2009) posit that knowledge is embedded in products; and knowledge scattered among the people of the world can be accessed through markets (Hausman et al. 2014). Therefore, the impact of human capital in manufacturing development and its growth propelling effect is presumed to be reflected with the effect of the ECI. By this logic human capital index was excluded from the regression.

Agriculture sector's employment/value added share in total employment/GDP is another factor influencing a country's manufacturing growth. Bradly and Dennitson (2006) confirmed that agricultural employment is one of the prominent determinants of *deindustrialization*. Agriculture is generally considered as the least productive sector, but the sector offers manufacturing with inputs, and sheds labor both for manufacturing and non-manufacturing sectors. In agrarian economies, growing agricultural production and exports generate profits that can be invested in manufacturing. So, a small agriculture sector may impede manufacturing growth at the early stages of transformation and development. The decline in agricultural employment/output is expected to have negative effect on *deindustrialization*.

Outsourcing of services (statistical illusion) may reduce the share of manufacturing. The literature states that the outsourcing of employment from the in-house manufacturing activities to specialized external providers that are classified as being in the services sector (such as business, information and communication, etc.) would lead to understated share of manufacturing. This study uses the value added and employment share of transport and communication, as well as financial intermediary, real estate and business services activities as covariates to manufacturing performance. The effect of the rise in these services activities employment/value added is expected to be positive or negative depending on the level of development of the country.

Real exchange rate, being the relative price of tradable and non-tradable products, may stimulate or hamper industrialization depending on whether it is overvalued or undervalued. The change in the real exchange rate influences the change in the size and productivity of economic sectors including manufacturing. More specifically, depreciation of the exchange rate is expected to improve the price competitiveness of manufacturing in foreign markets; hence, increase the profitability and size of the industry sector (Rodrik 2008).[93] Given that undervalued exchange rate increases the profitability of the tradable sector relative to the non-tradable sector, it could result in productivity-enhancing structural change (as the reallocation of resources from low-productivity to high-productivity sectors stimulates the export of manufactures and creates a new economic structure) (McMillan et al. 2014; Rodrik 2008). Rajan and Subramanian (2011) and Berg et al. (2012) also confirmed the positive effect real exchange rate depreciation has on the industry sector.

By contrast, other scholars (e.g. Edwards 1989) contend that devaluation has contractionary effect, benefiting cheaper imports. The contrasting views on the effect of real exchange on export and industrial production reflects the different levels of economic complexity and development as well as the extent of the country's exposure to international trade. If the country relies to a large extent on imports of intermediate inputs, then real exchange rate depreciation will improve the competitiveness of only the domestic part of the final export value-added. In that case, appreciation of the exchange rate can be more beneficial for export and industry development by lowering the cost of imported products.

In short, undervalued exchange rate causes domestic goods to be more competitive in foreign markets. Consequently, the higher competitiveness in global markets, stimulates investment and

[93] Likewise, Hausmann et al. (2005) confirmed that real exchange rate depreciation accelerates growth through its effect on structural changes in industry sector, and the reallocation of capital and other factors of production.

industrial production. However, if the economy largely depends on imported capital goods, strengthening of the domestic currency leads to an increase in investment and industrial production. By contrast, an overvalued exchange rate contributes to *deindustrialization* and a large expansion of the more tradable sector.

The relationship between real exchange rate and industrial development is scanty in past researches. Therefore, this study intends to contribute through filling knowledge gap proposing real exchange rate as one of the explanatory variables and examining the relationship between this variable and relative manufacturing output and employment. However, **the expected sign of the coefficient might be ambiguous**. As the exchange rate is linked to macroeconomic stability, it may contribute to the performance of manufacturing especially in developing countries as its effects can be exacerbated by the degree of openness of foreign economies. Some scholars (e.g. Rodrik 2008; Skott and Razmi 2012) confirmed the decisive role of real exchange rate policy or the exchange rate as an instrument to induce structural change toward more technologically sophisticated productive sectors, and consequently toward a diversified and dynamic exports. Their findings render two empirical regularities: (i) a devaluation of the exchange rate has a direct positive effect on the relative size of the tradable goods sector, especially those related to industrial activities; and (ii) the effects of the real exchange rate on growth operate, at least in part, through changes associated with the relative size of the tradable goods sector. In other words, countries in which devaluation induces as resource allocation to the tradable goods sector – especially to industrial activities – grow faster.

5.2.3 Premature deindustrialization: Sources, Causes and Implications

In the words of Tregenna (2016a), *premature deindustrialization* characterize a country which began deindustrializing at a lower level of income than would be typical by international standards. In a similar way, Rodrik (2016) defined "*premature deindustrialization*" as the tendency of turning of developing countries into services economies without having gone through a proper experience of industrialization. The question is why does *premature deindustrialization* occur in low-income and middle-income economies? Different scholars may answer such intriguing question differently – so, the causes may become diverse that may arise from the supply or demand side.

According to Rodrik, *premature deindustrialization* arises from globalization. In his view, the shrinking pattern of manufacturing both in real value added and employment in low-income and middle-income countries is considered premature in two premises: (i) the countries exhibited *deindustrialization* much earlier than the historical averages. Late industrializers could not manage to build strong manufacturing base, and are starting to deindustrialize at substantially lower income levels compared to early industrializers; and (ii) *premature deindustrialization* may have detrimental effects on growth of the economy of developing countries. He posits that the underlying causes of *early deindustrialization* differ across country groups. On one hand, advanced economies as a group have avoided *deindustrialization* in output unlike the majority of developing countries. On other hand, merely Asian economies (among the developing world block) saw no output or employment deindustrialization, after controlling for income and demographic trends. He argued that combinations of technology and trade shocks accounted for the observed heterogeneity.

While high productivity growth played pivotal role in the advanced economies, globalization appeared to have prominently explained the observed *industrialization/deindustrialization* patterns within the developing countries block. In his view, as developing economies opened up to foreign trade, their manufacturing industry was harmfully impeded in two ways: (i) those countries that entered in trading without a strong comparative advantage in manufacturing became net-importers of manufacturing goods, reversing their long process of import-substitution; and (ii) they 'imported deindustrialization' from advanced economies as they became exposed to the relative price trends built in advanced economies. The decline in the relative price of manufacturing in the advanced economies put a restraint on manufacturing everywhere including those countries that have not seen much technological progress. This hypothesis is consistent with the sharp reduction in both employment and output shares in developing countries – especially in those that do not specialize in manufactures. In short, *increasing globalization and trade may likely play bigger role in developing countries while technological progress indubitably explains employment deindustrialization in advanced countries*.

Tregenna (2016a) claims that shifts in public policy also drives *premature deindustrialization* in developing countries. More specifically, she highlighted that the neoliberal economic policies of trade liberalization, product markets liberalization, financial sector liberalization, and austere monetary policies have been the causes of *premature deindustrialization* in the developing countries.

The other question is why worry about *premature deindustrialization*? *Premature deindustrialization* may pose phenomenal negative implications on the economy of the countries deindustrializing earlier than expected. Some of the economic impacts of *premature deindustrialization* is associated with the conventional role manufacturing plays. Therefore, one of the effects of *premature deindustrialization* is reduction of the economic growth potential and catching up with the advanced economies. Rodrik (2016) posits that *deindustrialization* disconnects the main channel through which developed countries achieved rapid growth in the past; it blocks off the shift of workers from the rural area to urban factories where their productivity tends to be much higher. The fact that manufacturing creates employment opportunities for both skilled and unskilled workers meant that the sector plays important part to equal income distribution relative to other sectors. So, *deindustrialization* will likely result in income inequality and abject poverty.

Additionally, Tregenna (2016b) asserts that *premature deindustrialization* may result in loss of manufacturing employment with consequential unfavorable welfare effects. She said that welfare effects of job loss depend in part on whether there is simply a change in the sectoral composition of employment or a net loss in manufacturing jobs without these being replaced by new jobs in other sectors. In her view, the welfare effects of job-losers in the manufacturing sector is determined by various factors, including: (i) the possibility of finding alternative employment; (ii) the difference in wages and non-wages benefits between the lost manufacturing job and an alternative; (iii) other differences or changes between a lost manufacturing jobs and alternative job such as spatial arrangement that may be required; and (iv) in the case of people displaced from the manufacturing sector but unable to find other employment, the change in their income and other circumstances.

Hallward-Driemeier and Nayyar (2017) point out that *premature deindustrialization* might have different patterns across manufacturing industries among regions that experienced falling share of manufacturing in GDP. For instance, in low-income and lower-middle-income SSA economies, the share of commodity-based processing manufactures such as food, beverages, and tobacco has been relatively expanded during 1994-2015 - Tanzania is one example. Among upper-middle-income countries in Latin America, Peru and Ecuador saw an increase in the GDP share of commodity-based processing manufactures. Brazil, Colombia, Mexico, and Uruguay experienced an increase in the share of high-skill global innovators in GDP over the same period, albeit from a low base. The authors further highlighted that defining *deindustrialization* as declining shares does not necessarily mean that manufacturing employment or value added has dwindled in absolute terms over time. When it comes to value added, relative declines in absolute terms have been observed in very few instances among a large cross-sections of countries.[94] As for employment, a somewhat larger share of countries experienced an absolute decline in number of jobs; seven countries lost close to 1 million manufacturing jobs or more in between 1994 and 2011.

[94] 12 countries experienced an absolute decline in real manufacturing value added over the past two decades, many of which had conflict situations; some advanced economies (such as Italy, the United Kingdom, and the United States) saw marginal increases; many countries have experienced substantial growth, more than doubling and tripling their real manufacturing value added.

5.3 Estimation Model

The causal links between the various factors and manufacturing share both in total output and in employment need to be tested through the use of appropriate estimation method. The dependent variable measures the share of manufacturing in employment and GDP, which may capture the extent to which *(de)industrialization* has taken place in the sampled Asian and SSA countries during the period 1970-2015. As a result of close economic and trade relations among the sample countries, it is logical to expect cross sectional dependence for most of the variables. Not only do the countries comprise an economically heterogeneous group, but also they are integrated to the global market in some way; where, global economic changes and shocks would have some impact on their industrial development.

5.3.1 Baseline Regression: Testing for Deindustrialization/Premature Tertiarization

Before examining the likely key driving forces for industrial development (measured in manufacturing value added and employment share), it sounds interesting to evaluate the presence of *premature deindustrialization* in the considered sample economies following Rodrik (2016). The model is extended to two segments of services sector to see if the country groupings have experienced *tertiarization prematurely* with *stagnant industrialization* rather than *premature deindustrialization*. The model controls income effect and population effect, in that with the rise in income and population, the share of manufacturing in GDP and in total employment would have an inverted U-shape relationship with per capita GDP. The square of per capita GDP and of population are included in the baseline regression as shown in equation (10) below. For a given level of income, the increase in population is expected to boost the demand for manufactured goods. Hence, a positive relationship is predicted to exist between population growth and manufacturing value added and employment. Nonetheless, after a certain threshold population, growth may impede manufacturing growth; hence, the estimated parameter for the square of population could be negative.

$$LnMshare_{it} = \beta_0 + \beta_1 LnY_{it} + \beta_2 (LnY)^2_{it} + \beta_3 LnPop_{it} + \beta_4 (LnPop)^2_{it} + \gamma PD_t + \alpha_i + \varepsilon_{it} \qquad (10)$$

Where LnMshare represent the natural logarithm of value added (both in nominal and in constant prices) and employment share of manufacturing in GDP and in total employment of country i at time t; β_0 is the intercept term; LnY_{it} *and* LnY^2_{it} are the natural logarithm of per capita GDP and its square; $LnPop_{it}$ *and* $LnPop^2_{it}$ represent the natural logarithm of population and its square; and α_i are country fixed effects that take into account any time invariant country-specific features that may generate a varying degree of individualization across different countries relative to baseline conditions. Industrialization patterns over time are captured using decadal dummies (PD_t) for the 1970s through the 2010s after controlling for income, population and country-specific fixed effects. The estimated coefficients of the period dummies show the degree of (*de)industrialization* or *premature tertiarization* of each decade relative to the control decade. The regression equation is estimated through fixed-effects regression model with Driscoll and Kraay (1998) standard errors. Dirscoll and Kraay (1998) propose a non-parametric covariance matrix estimator that produces heteroscedasticity and autocorrelation consistent standard errors that are robust to general forms of spatial and temporal dependence. The authors showed that the standard errors according to their approach have considerably better small-sample properties than those of commonly applied alternative techniques for estimating standard errors when cross-sectional dependence is present (Hoechle 2007).

The result is complemented by the Lind and Mehlum (2010) U-test, which gives sufficient conditions to see the existence of an inverted U shape relationship. Most previous researches used to confirm the existence of an inverted U-shaped relationship once the coefficient on per capita GDP comes out positive and statistically significant and the coefficient of its squared term is negative and significant. Lind and Mehlum (2010) argued, however, that the conventional econometric model is not suitable for testing the composite null-hypothesis that at the left side of the interval the relationship is decreasing, and at the right side of the interval the relationship is increasing, or vice-versa. They point out that when the true relationship is non-monotone over a small range of data, but monotone over most of the data range, imposing a quadratic specification will yield an extremum point. So, to confirm the existence of an inverted U shaped relationship, the Lind and Mehlum (2010) test is implemented for equation (10).

5.3.2 Identifying Potential Driving Forces for Industrial Development

Consider the following equation:

$$y_{it} = \alpha_i + \beta_i x_{it} + \mu_{it} \qquad (11)$$

for i = 1,…,N; t = 1,…, T; where, y_{it} is the dependent variable; x_{it} denote a vector of observed explanatory variables; and μ_{it} denote the error terms; α_i *and* β_i represent the intercepts and slope coefficients that may vary across panel members.

Several researchers used pooled ordinary least squares (pooled OLS), which is based on conventional least squares regression by polling all observations, imposing the constraints that β_i = β and α_i = α, and assuming that μ_{it} are independent random variables. As this estimator does not consider any country-specific effects, the estimates could be biased. Others use fixed effects (FE) model as an alternative to the pooled OLS, which considers time-invariant country-specific effects (α_i varying across countries) and treated as fixed in the regression. However, the error terms are still assumed to be independent random variables. In short, traditional panel data models (such as fixed effect (FE) are based on three assumptions: (i) unobserved individual time-constant effects; (ii) parameter homogeneity across countries (no slope variation or heterogeneity across countries); and (iii) section units are independent (i.e., independent errors with zero mean and constant variance). However, if the cross-section units are dependent, the traditional panel data models produce inconsistent estimates. Likewise, the presence of heterogeneity across countries (for instance, in terms of disparity in structural change and growth) may suggest that the estimation techniques that assume slope homogeneity may produce inconsistent and misleading estimates. This calls for the use of other econometric estimators that are robust to both slope heterogeneity and cross-sectional dependence.

Pesaran and Smith (1995) confirmed that the assumption of slope homogeneity is violated in cross-country macro panel data (attributed to economic and institutional differences), necessitating the implementation of slope heterogeneity and cross-section dependence tests in macro panels. To this effect, the study employs common correlated effects mean group (CCEMG) and the augmented mean group (AMG) estimators simply because the estimation techniques can be employed irrespective of the order of integration (allows for possible heterogeneity and non-stationarity in observables and unobservable); hence, they can handle country fixed effects and endogeneity bias.

The baseline specification is constructed as follows for estimating the heterogeneous coefficients with multifactor error terms taking into account cross-sectional dependence (see Eberhardt 2012; and Bond and Eberhardt 2013):

$$y_{it} = \alpha_i + \beta_i' x_{it} + \mu_{it} \qquad (12)$$

$$\mu_{it} = \alpha_{1i} + \delta_i' f_t + \varepsilon_{it} \qquad (12a)$$

$$x_{it} = \alpha_{2i} + \delta_i' f_t + \gamma_i' g_t + v_{it} \qquad (12b)$$

for i =1,…,N and t =1,…,T. Where, y_{it} is real value added and employment share of manufacturing; x_{it} is vector of explanatory variables which constitute the observable process captured in the model discussed in section 5.2.2; α_{1i} *and* α_{2i} represent country-specific fixed-effects that capture time-invariant heterogeneity across countries; β_i denote country-specific slope coefficients based on observable explanatory variables; the vectors f_t *and* g_t contain unobserved common factors; δ_i' and γ_i' are heterogeneous country-specific factor loadings; ε_{it} and v_{it} are assumed independent and identically-distributed error terms. Common factors could be a combination of 'strong' factors representing global shocks and 'weak' factors representing spatial spillovers (Chudik and Pesaran 2015a). Examples of 'strong' factors include climate change, global financial crises, worldwide wars, global technological progress (and the associated discovery of medical knowledge), and global epidemics. Examples of the 'weak' factors comprise the spread of diseases and cross-border pollution between (a limited numbers of countries). These common factors may induce cross-sectional dependence of the error terms and hence, may yield inconsistent estimates if they are correlated with the explanatory variables. Although the presence of 'weak' factors may not affect the consistency of the conventional panel data estimators, the standard errors could be biased in the presence of 'weak' factors (Chidk and Pesaran 2015a).

The variable μ_{it} in equation (12) contains unobservable inputs and the error terms. The unobservable are made up of: (i) group fixed effects (α_{1i}), which capture time-invariant heterogeneity across groups; (ii) $\delta_i f_t$, unobservable common factors (f_t) with heterogeneous factor loadings (δ_i), which captures time-invariant heterogeneity and cross-sectional dependence; and (iii) a white nose error term (ε_{it}).

Each observed independent variable (x_{it}) is modeled as a function of an individual fixed-effect term (α_{2i}), time-invariant heterogeneity (f_t), cross-sectional dependence (g_t) and a white noise error term (v_t). The unobserved common factors, f_t *and* g_t, are not limited to linear evolution overtime; they could be non-linear and non-stationary. g_t highlights that the observables with x_{it} may also be driven by factors other than f_t. The common factor (f_t) influence both errors and regressors; the inclusion of f_t in equations (12a) and (12b) may induce endogeneity in the estimation equation. Observable input variables can be modelled as linear functions of the unobserved common factors with country-specific factor loadings respectively. Additionally, given that the vector of explanatory variables x_{it} and the error term μ_{it} share a set of common factors , f_t, the explanatory variables and that error term could be correlated if the factor loading terms are non-zero on average; so, the typical panel estimators may lead to biased and inconsistent estimates (Bond and Eberhardt 2013).

The above model can be estimated by common correlated effects mean group (CCEMG) estimator (Pesaran 2006) and the augmented mean group (AMG) estimator (Eberhardt 2012; Eberhardt and Bond, 2009; Eberhardt and Teal 2010). The CCEMG estimator treats the unobservable common factors, f_t, as a nuisance, something to be accounted for that is not a particular interest of the empirical analysis and tackle the issue of cross-sectional dependence by including cross-sectional averages of the dependent and independent variables as additional variable in the regression equation (Eberhardt 2012). Pesaran proved that these averages can account for the unobserved common factors f_t. The issue regarding the differentiated impact of common factors is solved by estimating individual equations and then computing the average of the factor loadings. Given that this is in fact the MG procedure, slope heterogeneity is also assumed by construction. Having satisfactory small-sample properties and being a robust estimator of short-run dynamics, the CCEMG estimator is also robust to structural breaks, non-stationarity, cointegration breaks and serial correlations (Pesaran 2006; Kapetanios et al., 2011). Additionally, Pesaran and Tosetti (2011) and Ouattara and Zhang (2019) state that CCEMG is performing well in small samples and can account for autocorrelation in the residuals and unit roots in the common factors.

To allow for cross-sectionally dependent errors, equation (2) can be written as follows:

$$y_{it} = \alpha_i + \beta_i' x_{it} + \omega_i \bar{y}_t + \omega_i' \bar{x}_t + \mu_{it} \qquad (13)$$

Where $\bar{y}$ and $\bar{x}$ represent the cross-section averages of the dependent and the independent variables as additional covariates to account for the unobserved common factor, f_t. These averages for all observable variables in the model would manage the unobserved common factor (f_t) (Pesarna 2006). They are computed (using the data for the entire panel) and then added as explanatory variables in each of the N regression equations (Eberhardt 2012). In this procedure, the regression is estimated separately for each group to get consistent estimates of parameters related to observable variables. One limitation of CCEMG is that it does not take into account the nature of common unobserved factors or their factor loadings, and hence, it does not attain an explicit estimate of unobservable factors f_t or factor loadings δ_i' (common dynamic process). Yet, it remains unbiased asymptotically as N → ∞ for both T fixed and T→ ∞. Coakley et al. (2006) found that the static CCEMG estimator yields robust standard errors and consistent estimates of the average coefficients when the variables are non-stationary and non-co-integrated (that is the residuals are non-stationary). On the other hand, Kapetanios et al. (2011) evidenced that the static CCE (pooled and mean group) estimators are consistent and robust to non-stationary common factors.

Eberhardt (2012) pointed out that, in empirical application of the CCEMG, the estimated slope coefficients on the cross-section average variables and their average estimates have not any meaningful interpretation (they are simply present as blend out the biasing effect of the unobservable common factor). Hence, the augmented mean group (AMG) estimator is proposed as an alternative to the CCEMG (Eberhardt and teal, 2010; Bond and Eberhardt 2013). This estimator produces an explicit estimate of f_t. In the AMG estimator, the set of unobservable common factors are treated as a common dynamic process (CDP), which can be estimated and separately analyzed rather than being treated as a nuisance as in CCEMG. So, compared with CCEMG estimator, AMG obtains a simple but economically meaningful construct from the AMG setting; the common dynamic process signifies evolution of unobserved common factors across countries. AMG estimation is carried out in three stages:

In the first stage, a pooled regression with year dummies is estimated by the first-order difference OLS, and coefficients on year dummies are collected. These coefficients present estimates of the unobservable common dynamic process, which would have useful interpretation. In the present study, the common dynamic process may represent an average of the country-specific non-stationary process omitted from the estimation model and/or on account of some common factors to all countries manufacturing development. Algebraically, the following equation is estimated:

$$\Delta y_{it} = \varphi' \Delta x_{it} + \sum_{t=2}^{T} \mu_t \Delta D_t + \epsilon_{it} \qquad (14)$$

Where, Δ is first difference operator; D_t denotes the year dummy for year t (there are T-1 year dummies); φ *and* μ_t are constants; and ϵ_{it} is the error term. Estimates of the coefficients for the year dummies are collected to form a new variable ($\widehat{\mu_t} = \widehat{\rho^\circ}_t$) to represent estimates of the unobservable common dynamic process and an average estimate of the common factors. "This process is extracted from the pooled regress in first difference as non-stationary variables and unobservable are believed to bias the estimates in the pooled level regression" (Eberhardt and Teal 2010).

In the second stage, the country-specific regression model is augmented with the estimated common dynamic process as an explicit regressor. That is, $\widehat{\rho^\circ}_t$ is used as an additional regressor in each of the N standard country regression model which also include a linear trend term apart from an intercept to capture time-invariant fixed effects. Alternatively, $\widehat{\rho^\circ}_t$ can be subtracted from the dependent variable, implying that the common process is imposed on each country with unit coefficient. In both cases, however, the estimates are averaged across countries following Pesaran and Smith (1999) mean group approach. Hence, the following equation is estimated:

$$y_{it} = \alpha_i + \beta'_i x_{it} + \mu_t + \theta_i \widehat{\rho^\circ}_t + e_{it} \qquad (15)$$

With, θ_i *and* e_{it} are respectively a constant parameter and the error terms.

Finally, as for the CCEMG estimator, the averages of the country-specific parameters is estimated across panel members. That is, $\hat{\beta}_{AMG} = N^{-1} \sum_i \widehat{\beta_i}$.

While the AMG estimator provides consistent estimates in cointegrated and small panels, incorporates endogeneity and cross-sectional dependence and is appropriate for use in panels with a mixture of panel members with nonstationary and stationary variables, both estimators are broadly similar in terms of small sample performance and account for slope heterogeneity and cross-sectional dependence (Bond and Eberhardt 2009). But, the AMG approach is likely to outperform the CCEMG approach in small-sample estimations involving a relatively large number of regressors. Bond and Eberhardt (2013) show through Monte Carlo simulations that the AMG estimator is unbiased and is often a more efficient estimator compared to the CCEMG estimator for different combinations of N and T. However, they found that the bias of the MG estimator increases in T and decreases in N, suggesting that this estimator may be more suitable for a panel where N>T.

The study contrasts these new models against the fixed effects (within) model with Driscoll and Kraay (1998) standard errors that corrects cross-sectional dependence, heteroscedasticity and serial correlation in the error term. Most researches used either or both ordinary least square (OLS) estimation and fixed effects techniques (e.g. Brady and Denniston 2006; Alderson 1999; Rowthorn and Coutts 2004; Rowthorn and Ramaswamy 1997, 1999) while some recent studies employed instrumental variable estimation (e.g. Haraguchi and Rezonja 2013) and generalized method of moments (GMM) (e.g. Mensah et al. 2016). This dissertation contributes to the empirical literature employing more recent CCEMG and AMG panel data estimators.

Description of the explanatory variables are given below:

- Ln GDPpc represent the natural logarithm of GDP per capita (in constant price);
- Ln GDP^2pc represent the natural logarithm of the square of GDP per capita (in constant price);
- LnUPD measures the natural logarithm of unbalanced productivity growth where the subscripts hps and bds refer the difference of manufacturing productivity growth over higher-productivity (and skill-intensive) services and Baumol's diseases services productivity growth;
- LnOpen measures the natural logarithm of total trade or export plus imports as percentage share of GDP;
- LnRxr measures the natural logarithm of real exchange rate;
- NFDI is net foreign direct investment as percentage share;
- LnAgr and LnEagr are the natural logarithm of output and employment share of agriculture sector in GDP and total workforce employed;
- LnTran and LnETran are the natural logarithm of value added and employment share of transport and communication services to GDP and total employment;
- LnBus and LnEBus are the natural logarithm of value added and employment share of the natural logarithm of value added and employment share of financial, real estate and business services to GDP and total employment;

- ❖ LnGCY is the natural logarithm of government consumption expenditure as share of GDP;
- ❖ LnInd is a proxy for industrial density; and
- ❖ ECI is economic complexity index.

5.4 Discussion of Estimation Results

5.4.1 Estimates of the Baseline Regression

Equation (10) is estimated for the full sample and regional country groups with the intent of testing for both output and employment *(de)industrialization* (and tertiarization) using fixed effect model with Dirscoll and Kraay (1998) standard errors that corrects cross-sectional dependence, heteroscedasticity, and serial correlation in the error term. The descriptive analysis in previous parts of the dissertation placed focus on real value added share of manufacturing and other sectors. Nonetheless, following Rodrik (2016) and other previous researchers, who use both manufacturing share in constant price and in current price, the estimation of the baseline regression is made for both real and nominal value added share of manufacturing as well as employment share. The model is extended to the skill-intensive and Baumol's diseases services segments to test tertiarization overtime.

A. Deindustrialization overtime?

The results are reported in Tables 22a to 22c. The first column in each of the Tables gives results for the full sample. For the full sample, the estimated value for real per capita GDP and its squared term lend support for the widely acknowledged inverted U-shaped relationship between manufacturing share (output and employment) and per capita GDP. The stylized fact conceives the existence of a positive relationship between the level of per capita GDP and the relative share of manufacturing value added and employment at initial stage and after a certain threshold level, the relationship will turn out to be negative with the rise in affluence and the change in elasticities of demand – indicating the process of *deindustrialization*. The data for the Asia and SSA country groupings corroborates this finding for employment share. Surprisingly, the inverted U-shaped relationship is not supported for SSA when the dependent variable is value added (measured both in real and nominal prices). Likewise, the estimated value for population shows an inverted U-shape relationship with manufacturing shares for the full sample and country groups (which is not the case with value added share of the sector). However, the focus of this section is to evaluate the patterns of *deindustrialization* overtime.

Employment Share:

Interestingly, the estimated coefficients of the decadal time dummies for the employment share of manufacturing [after controlling for income, population and country effects] turn out to be negative and statistically significant at 0.01 level for the full sample, for the Asia complete sample, for the advanced Asia as well as for SSA (both including and excluding Mauritius), larger for advanced Asia followed by SSA. The values became negative and significant in advanced Asia meant that employment *deindustrialization* continued in the countries (perhaps with the exception of South Korea where the share of the manufacturing sector is still higher). Surprisingly, however, they appear positive (except for the 1980s), though insignificant (even at 0.10 level), for developing Asia. The value of the dummy for the 2010s is positive meant that the countries have been experiencing employment industrialization (though the magnitude of the coefficient is lower than that for 1990s and 2000s). By contrast, the sizable negative and significant value for the full sample and other country groupings relative to the preceding decadal values may suggest the likely occurrence of continuous *deindustrialization* (perhaps *premature tertiarization* for SSA) with respect to employment share. This finding is in stark contrast to Rodrik, who found that in the SSA sample (that excludes Mauritius) all the three measures of industrialization shows a decreasing trend. In the present estimation, it appears increasing with respect to the nominal value added share and employment share, but decreasing with respect to real value added share.

To test the existence of an inverted U-shape relationship between per capita GDP and the relative share of manufacturing employment, the Lind and Mehlum (2010) test was used and the results are reported in the last rows of each Tables. The U-test (the test for the presence of inverted U-shape) result shows that the true relationship between manufacturing share of employment and per capita GDP is inverted U-shape for the full sample, Asia complete sample and SSA (excluding Mauritius), but monotonic for SSA excluding Mauritius [with confidence intervals suggesting a wide range of possible extremum points] and increasing monotone for advanced Asia, developing Asia and SSA complete sample [that is, the relationship in these country groups is increasing at lower and higher values of per capita GDP within the relative data range]. So, the inverted U-shape relationship is inconclusive.

Real value added share:

The results for the real value added share reveal that the coefficients of the period dummies are positive and statistically significant overtime for the full sample – the value of the estimates (in absolute value) increased from the 1980s to 2000s, but decreased in the 2010s. They are also positive for SSA sample economies (albeit statistically significant merely in 1980s), with the values persistently decreasing overtime until it becomes close to zero in 2010s. However, when Mauritius is excluded from the SSA country grouping, the coefficients of the period dummies became negative in the 2000s and 2010s (though, statistically insignificant). With the exclusion of Botswana, Mauritius and South Africa from the SSA sample, the coefficient of the period dummies become positive (but insignificant in the last three decades). By contrast, the coefficients of the period dummies turn out to be negative for Asia (both for complete sample, advanced Asia and developing Asia) – yet, they appeared to be statistically insignificant for developing Asia for the last three decades. The other observation is that the values of the coefficients (in absolute value) has always been increasing overtime, again larger for advanced Asia than the complete sample and developing Asia.

The Lind and Mehlum test suggests that the relationship between real value added share of manufacturing and per capita GDP is inverted U-shape for the full sample and Asia full sample; but an increasing monotone for advanced Asia, developing Asia, SSA whole sample, and SSA excluding Mauritius.

Nominal value added share:

When it comes to nominal value added share of manufacturing, the coefficients of the period dummies become positive and statistically significant for the full sample merely in 1980s and 1990s. Likewise, the period dummies come out negative overtime for SSA excluding Mauritius as well as in 2000s and 2010s for the complete SSA sample [but significant in both decades for the latter case and in 1980s and 2010s for the full sample; in 2000s and 2010s for SSA excluding Mauritius and in 2010s for other groups]. In contrast, they became negative and significant as well as increasing overtime for the Asian full sample (and for advanced Asia and developing Asia).

The Lind and Mehlum test suggests that the relationship between nominal value added share of manufacturing and per capita GDP is inverted U-shape for the full sample and Asia full sample; monotonic for developing Asia and increasing monotone for advanced Asia, SSA complete sample, and SSA excluding Mauritius.

B. Premature Tertiarization overtime?

The findings above suggest that developing Asia (despite variation across countries) have demonstrated industrialization in the considered period of analysis. The outcome for SSA also come out diverse; for most of the countries saw more of *industrial stagnation* or *under-industrialization* than *premature deindustrialization*. However, Botswana is a typical case of failed industrialization while South Africa could be classified as one deindustrializing prematurely. What is worrying though is that some countries exhibited shifts of employment from agriculture to traditional low-productivity services and informal activities and other economies encountered stagnation in manufacturing share. The question is should these economies rely on service-led growth to achieve development and end poverty? The analysis in part four suggests that structural transformation in SSA can generally be classified as one moved in the wrong direction – wrong direction because it took a shift from agriculture to traditional services and informal activities with important policy implications. The absence of employment generation in manufacturing for the growing young labor force is becoming an urgent policy agenda for governments in SSA. Some commentators explicate that the expansion of services in SSA could be a mere consequence of growth momentum driven chiefly by increasing per capita GDP, wherein growth of the productive sector induces demand for services. In this sense, growth in services can better be categorized as 'service-biased' and in turn, expansion of services can stand as "stimulus complement" to manufacturing rather than perfect substitute to manufacturing.

This section seeks out to examine whether the sample economies, especially in SSA, experienced *tertiarization* with industrial stagnation at lower level of affluence. *Tertiarization* is characterized as the drop in manufacturing value added and employment share (or stagnation of the sector's share) accompanied by the rise in the value added and employment share of services. This seems appealing in that employment deindustrialization if not accompanied by output deindustrialization may hardly be considered as deindustrialization.

The empirical estimation in this section and in the next part of the study splits the services sector [as it is broad and heterogeneous] into two broad segments: Higher-productivity services and the traditional and relatively lower-productivity Baumol's diseases services, as defined earlier.

The results for the higher-productivity services activities are reported in Tables 23a and 23b, with real value added share and employment share of the sub-sector taken as dependent variable, for the full sample and different country groupings. Interestingly, the relationship between the relative value added share of the sub-sector and GDP per capita come out linear, suggesting that with the rise in affluence the share of these services activities in GDP increases. Surprisingly, the size of the coefficient for the squared term of per capita GDP is higher in SSA (both excluding and including Mauritius) than the full sample and the Asia country groupings. Another surprise is that the coefficients of the decadal time dummies are positive and significant for the full sample and SSA (both including and excluding Mauritius), increasing trend overtime and always larger for SSA. Indeed, the size of the coefficient increased by 3.3 percentage points in 2010s from 1990s for the full sample and by 14 percentage points for SSA excluding Mauritius. By contrast, the coefficient of the time dummies turn out to be negative for the Asia full sample and the two country groupings (but never significant for advanced Asia, significant in 2000s and 2010s for the full sample and in 1990s and 2000s for developing Asia. In short, the results suggest that the Asian economies are following manufacturing-led development path while SSA economies seem to have expanded skill-intensive services activities without manufacturing core and at lower per capita GDP. However, the employment generating capacity of these services activities is limited.

The results for employment share of these services activities, reported in Table 23b, show a different story, especially for the Asian country groupings. The sign of the coefficient of per capita GDP and its squared term become positive and negative respectively [but most of the times insignificant] for the full sample, advanced Asia and SSA (both including and excluding Mauritius) suggesting inverted U-shape. In fact, the U-test shows increasing monotone in both cases. However, the sign of the coefficient remains intact for developing Asia, suggesting upward trending. Interestingly, the value of the decadal time dummies come out positive, increasing trend overtime, for the full sample and all country groupings – exceptions were 1980s and 1990s for developing Asia and 1980s for SSA. Relative to 1990s, the value of the coefficient increased over the 2010s by 8.5 percentage points (full sample); 1.9 percentage points (Asia complete sample); 6.6 percentage points (advanced Asia); 7.4 percentage points (developing Asia); 35 percentage points (SSA) and 34.6 percentage points (SSA excluding Mauritius). The results suggest that tertiarization or shifts of economic activities towards skill-intensive services activities has been more pronounced in SSA (though starting from lower-base) than Asia in the recent decades.

Turning to the results for the value added share of Baumol's diseases services in Table 24a indicate linear trend (increasing U-shape) where the signs of the coefficient for per capita GDP is negative and its squared term positive for the full sample and all country groupings – with the U-test shows it is increasing monotone. The sign and level of significance of the decadal time dummies show varying patterns. For the full sample, the value of the time dummies come out positive in 1980s and negative otherwise (though significant only in 2000s). For advanced Asia, the coefficient become positive and significant trend overtime, larger than other country groupings and the full sample and that of employment share (Table 24a). For developing Asia, the value of the coefficients turn out negative, and significant trend overtime. For SSA (both including and excluding Mauritius), the decadal time dummies are positive (decreasing overtime for SSA including Mauritius and fluctuating trend excluding Mauritius), but significant only in 1980s.

When it comes to the employment share of the services activities under analysis (Table 24b), the sign of the per capita GDP become positive and its squared term negative, contrarily to the value added share. The U-test shows inverted U-shape for the full sample and SSA country groupings, but increasing monotone for country groupings in Asia. The decadal dummies appear positive and significant for the full sample, and Asia country groupings. In contrast, the coefficient become positive and significant in the last few decades for SSA. The size of the value is larger either in the full sample or Asia and SSA country groupings (except advanced Asia) with employment share than the value added share of same. When comparison is made between the 2010s and 1990s, the value in 2010s has increased, on average, by 21.6 percentage points (full sample); 12.1 percentage points (Asia full sample); 15.6 percentage points (advanced Asia) and 5.8 percentage points (developing Asia). For the SSA whole sample, the value in 2010s was higher than that of 1990s by 25.4 percentage points. In short, the results suggest that developing Asia can generally be characterized as manufacturing-led development path in line with the stylized facts while SSA can best be characterized as industrial stagnation with *premature tertiarization* (the existence of disparity across countries is expected though, as the share of manufacturing and the two segments in GDP and in employment witnessed).

In sum, the results are inconclusive to draw stylized facts. Further research is in order to use appropriate technique to identify different types of deindustrialization or premature trertiarization in the considered countries. It is important if future research delve deep to identify which sector (sub-sectors) expand and which other sector (sub-sectors) contract; which country groups encounter chronic deindustrialization (or premature tertiarization) and which other countries experience transient deindustrialization or premature tertiarization; which countries experience deindustrialization or premature tertiarization in value added or employment or both and in which sectors (sub-sectors). It may also be important if future research inquire the relationship between deindustrialization and premature tertiarization with technological advancement, Global Value Chains; how automation and the Fourth Industrial Revolution impact the various deindustrialization or premature tertiarization.

Table 22a: Baseline Regression of Relative Manufacturing Output (constant price) for Full Sample and Split by Country Groups, 1970-2015 with FE-DK

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excl. Mauritius)
LN GDDPC	0.931* (0.187)	3.466* (0.171)	9.759* (3.106)	0.797** (0.356)	-1.333** (0.593)	-1.109** (0.552)
LN GDPPC SQ	-0.054* (0.009)	-0.166* (0.0071)	-0.420* (0.159)	-0.019 (0.021)	0.0067** (0.034)	0.050 (0.031)
LN Pop	-0.735* (0.138)	0.010 (0.338)	6.714 (4.043)	1.411* (0.497)	0.268 (0.208)	0.390*** (0.244)
LP Pop SQ	0.040* (0.027)	0.010* (0.013)	-0.463*** (0.265)	-0.058** (0.024)	0.002 (0.010)	-0.001 (0.011)
1980S	0.150* (0.041)	-0.185* (0.055)	-0.763* (0.294)	-0.072* (0.0271)	0.124* (0.036)	0.101** (0.043)
1990S	0.191* (0.051)	-0.381* (0.092)	-1.645* (0.451)	-0.087 (0.053)	0.068 (0.054)	0.014 (0.074)
2000S	0.194* (0.067)	-0.590* (0.145)	-2.079* (0.571)	-0.135 (0.084)	0.053 (0.056)	-0.002 (0.075)
2010S	0.153* (0.084)	-0.769* (0.160)	-2.254* (0.652)	-0.276 (0.109)	0.002 (0.069)	-0.040 (0.086)
Constant	1.719 (1.388)	-16.094* (2.334)	-72.777** (29.641)	-10.719* (3.641)	5.815** (2.379)	4.129** (2.192)
Lind and Mehlum U test						
Slope at LB of income (Ln)	0.224* (3.217)	1.254* (13.587)	2.969	0.548	-0.459	-0.452
Slope at UB of income (Ln)	-2.607* (-5.903)	-0.212 (63.178)	0.4405	0.422	-0.024	-0.144
U TEST	3.22*	3.22*				
EXTREMUM POINT	8.620	10.449	11.614	21.320	9.998	11.059
95% CI, Fieller Method	(7.626, 9.311)	(10.031, 10.856)	(10.693, 17.715)	(∝-12.149) u (-1.700, ∝)	(∝,-9.16) u (-66.97, ∝)	(-∝,9.49) U (0.102,∝)
CD	1.094 [0.274]	4.085 [0.000]	3.260 [0.001]	1.110 [0.267)	-0.729 [0.466]	-0.710 [0.478]

Notes: * p < 0.01; ** p < 0.05; *** p < 0.10. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.

Source: Own Computation

Table 22b: Baseline Regression of Relative Manufacturing Output (nominal price) for Full Sample and Split by Country Groups, 1970-2015

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excl. Mauritius)
LN GDDPC	0.671* (0.221)	2.145* (0.215)	7.736* (2.977)	-0.751** (0.367)	-0.925 (0.788)	-0.423 (0.6631)
LN GDPPC SQ	-0.041* (0.011)	-0.106* (0.012)	-0.304** (0.156)	0.056* (0.022)	0.041 (0.046)	0.005 0.038
LN Pop	0.284** (0.119)	0.372 (0.251)	13.005* (3.595)	1.524* (0.253)	1.799* (0.248)	2.002* (0.252)
LP Pop SQ	-0.015** (0.007)	0.011 (0.013)	-0.900* (0.223)	-0.046* (0.014)	-0.087* (0.015)	-0.090* (0.014)
1980S	0.105* (0.037)	-0.193* (0.053)	-0.631* (0.258)	-0.086* (0.032)	0.076** (0.033)	0.023 (0.038)
1990S	0.084* (0.052)	-0.488* (0.085)	-1.474* (0.409)	-0.237* (0.055)	0.024 (0.063)	-0.079 (0.086)
2000S	0.057 (0.068)	-0.657* (0.123)	-1.854* (0.526)	-0.228* (0.079)	-0.047 (0.068)	-0.167*** (0.094)
2010S	-0.078 (0.090)	-0.910* (0.145)	-2.141* (0.612)	-0.433* (0.116)	-0.165** (0.088)	-0.291* (0.113)
Constant	-1.378 (1.310)	-12.563* (2.143)	-84.499* (28.28)	-5.769 (2.198)	-1.955 (3.554)	-5.377*** (2.862)
Lind and Mehlum U test						
Slope at LB of income	0.135**	0.738*	2.826	-0.0079	-0.393	-0.357
Slope at UB of income	-0.236*	-0.195**	0.998	0.365*	-0.128	-0.326
U TEST	1.74**	2.60*		0.09		
EXTREMUM POINT	8.201	10.167	12.732	6.741	11.401	41.613
95% CI, Fieller Method	(6.026, 9.126)	(9.604, 10.849)	(-∝,10.98) U (-87.34, ∝)	(0.452, 7.849)	(-∝,9.34) U (6.585, ∝)	(-∝,10.639) U (6.644, ∝)
CD	0.798 [0.425]	4.391 [0.00u]	3.416 [0.001]	0.566 [0.572]	0.535 [0.593]	0.413 [0.679]

Notes: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.
Source: Own Computation

Table 22c: Baseline Regression of Relative Manufacturing Employment for Full Sample and Split by Country Groups, 1970-2015

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excluding Mauritius)
LN GDDPC	3.793* (0.151)	4.663* (0.144)	8.311* (2.302)	1.633* (0.339)	2.478* (0.646)	2.723* (0.596)
LN GDPPC SQ	-0.206* (0.0081)	-0.244 (0.006)	-0.349* (0.122)	-0.074* (0.020)	-0.126* (0.044)	-0.145* (0.038)
LN POP	1.416* (0.143)	1.569 (0.336)	11.079* (2.868)	2.729* (0.527)	1.108* (0.132)	1.299* (0.126)
LP POD SQ	-0.042* (0.024)	-0.072* (0.014)	-0.781* (0.181)	-0.132* (0.024)	-0.014** (0.007)	-0.017* (0.007)
1980S	-0.142* (0.024)	-0.119* (0.037)	-0.516** (0.212)	-0.009 (0.024)	-0.218* (0.049)	-0.279* (0.072)
1990S	-0.234* (0.033)	-0.238* (0.060)	-1.195* (0.344)	0.021 (0.049)	-0.344* (0.076)	-0.448* (0.103)
2000S	-0.336* (0.044)	-0.359* (0.099)	-1.574* (0.454)	0.074 (0.070)	-0.487* (0.094)	-0.592* (0.126)
2010S	-0.448* (0.054)	-0.486* (0112)	-1.827* (0.537)	0.006 (0.094)	-0.649* (0.114)	-0.749* (0.149)
Constant	-24.604* (1.067)	-27.341* (2.034)	-78.445* (21.754)	-19.751* (3.126)	-18.863* (2.749)	-21.206* (2.494)
Lind and Mehlum U test						
Slope at LB of income	1.092*	1.407*	2.674	0.648	0.828	0.821*
Slope at UB of income	-0.780*	-0.750*	0.574	0.154	0.005	-0.072
U TEST	16.03*	10.66*				0.45
EXTREMUM POINT	9.198	9.553	11.913	11.066	9.839	9.374
95% CI, Fieller Method	(9.034, 9.366)	(9.265, 9.838)	(10.693, 18.148)	(9.884, 14.714)	(8.896, 14.293)	(8.703 11.362)
CD	0.609 [0.543]	1.266 [0.206]	3.948 [0.000]	1.636 [0.102]	0.715 [0.474]	0.842 [0.400]

Notes: * p < 0.01; ** p < 0.05; *** p < 0.10. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.

Source: Own Computation

Table 23a: Baseline Regression of Relatively Higher Productivity Services Output (constant price) for Full Sample and Split by Country Groups, 1970-2015 with FE-DK

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excl. Mauritius)
LN GDDPC	-1.034* (0.096)	-1.603* (0.220)	-0.173 (0.157)	-1.656* (0.212)	-1.934* (0.468)	-2.298* (0.729)
LN GDPPC SQ	0.006 (0.006)*	0.098* (0.011)	0.024** (0.09)	0.116* (0.011)	0.123* (0.028)	0.149* (0.044)
LN Pop	-0.811* (0.115)	-2.285* (0.234)	0.089 (0.242)	-0.679* (0.153)	-0.513* (0.151)	-0.684* (0.208)
LP Pop SQ	0.062* (0.006)	0.143* (0.013)	-0.005 (0.015)	0.066* (0.009)	0.042* (0.011)	0.046* (0.012)
1980s	0.045* (0.012)	-0.005 (0.014)	-0.031 (0.029)	-0.014 (0.019)	0.068* 0.011	0.107* (0.025)
1990s	0.061* (0.024)	-0.007 (0.023)	-0.045 (0.058)	-0.051*** (0.029)	0.678* (0.045)	0.135* (0.045)
2000s	0.073** (0.032)	-0.066* (0.26)	-0.013 (0.077)	-0.178* (0.042)	0.131** (0.065)	0.199* (0.063)
2010s	0.094** (0.039)	-0.119* (0.032)	-0.067 (0.093)	-0.295 (0.52)	0.207* (0.071)	0.275* (0.073)
Constant	8.508* (0.870)	16.796* (1.917)	2.129 (1.370)	7.607* (1.268)	11.420* (2.09)	13.80* (3.472)
Lind and Mehlum U test						
Slope at LB of income (Ln)	-0.168*	-0.288*	0.211	-0.102*	-0.318*	-0.344*
Slope at UB of income (Ln)	0.431*	0.583*	0.353	0.663*	0.489*	0.573*
U TEST	6.68*	3.72*		1.35***	2.95*	2.45*
EXTREMUM POINT	7.824	8.132	3.654	7.141	7.839	7.701
95% CI, Fieller Method	(7.591 8.009)	(7.526 8.525)	(15.577 5.979)	(6.444 7.682)	(7.272 8.091)	(7.051 7.883)
CD	-2.719 (0.007)	-3.045 (0.002)	-4.307 (0.000)	-1.565 (0.118)	-2.325 (0.020)	-1.704 (0.088)

Notes: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.

Source: Own Computation

Table 23b: Baseline Regression of Relative Relatively Higher Productivity Services Employment for Full Sample and Split by Country Groups, 1970-2015

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excluding Mauritius)
LN GDDPC	0.219 (0.152)	-0.264 (0.213)	0.451** (0.203)	-0.071 (0.195)	0.432 (0.509)	0.505 (0.599)
LN GDPPC SQ	-0.001 (0.008)	-0.229 0.011	-0.011 (0.011)	0.015*** (0.009)	-0.017 (0.030)	-0.021 (0.036)
LN POP	1.009* (0.204)	-0.229* (0.144)	-0.743* (0.242)	0.404* (0.149)	1.534* (0.445)	1.496* (0.475)
LP POD SQ	-0.030* (0.009)	0.030* (0.009)	0.032** (0.015)	0.017 (0.010)	-0.061* (0.020)	-0.060* (0.021)
1980s	0.013 (0.018)	0.036 (0.027)	0.119* (0.038)	-0.017 (0.022)	-0.015 (0.042)	0.002 (0.047)
1990s	0.078** (0.036)	0.087 (0.053)	0.362* (0.102)	-0.052 (0.045)	0.054 (0.078)	0.083 (0.087)
2000s	0.224* (0.068)	0.180** (0.075)	0.526* (0.112)	0.008 (0.069)	0.253** (0.124)	0.282* (0.133)
2010s	0.309* (0.072)	0.199** (0.091)	0.592* (0.133)	0.022 (0.086)	0.404* (0.126)	0.429* (0.137)
Constant	-7.342* (2.181)	0.849 (1.462)	3.158*** (1.844)	-5.448* (1.267)	-10.32* (2.334)	-10.518* (2.945)
Lind and Mehlum U test						
Slope at LB of income	0.205	0.118	0.269	0.132	0.208	0.234
Slope at UB of income	0.195	0.371	0.201	0.233	0.096	0.107
U TEST						
EXTREMUM POINT	101.66	4.617	20.033	2.346	12.648	12.203
95% CI, Fieller Method	(-∝,13.96) U (2.932, ∝)	(-11.375, 7.098)	(-∝,11.85) U (-1.86, ∝)	(-∝,52.50) U (7.15,+ ∝)	(-∝,9.102) U (7.069, +∝)	(-∝,8.75) U (6.97,+ ∝)
CD	2.837 (0.005)	-1.196 (0.232)	-2.013 (0.044)	-2.670 (0.008)	1.289 (0.197)	0.184 (0.854)

Notes: * p < 0.01; ** p < 0.05; *** p < 0.10. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.

Source: Own Computation

Table 24a: Baseline Regression of Relative Baumol's Diseases Services Output (constant price) for Full Sample and Split by Country Groups, 1970-2015 with FE-DK

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excluding Mauritius)
LN GDDPC	-0.196** (0.086)	-1.215* (0.127)	-0.342 (0.292)	-0.672* (0.107)	-0.585 (0.354)	-0.875** (0.429)
LN GDPPC SQ	0.008** (0.005)	0.063* (0.007)	0.007 (0.015)	0.039* (0.007)	0.039*** (0.022)	0.058** (0.027)
LN POP	0.019 (0.011)	-2.026* (0.115)	0.032 (0.431)	-0.687* (0.108)	0.193** (0.091)	0.091 (0.099)
LP POD SQ	0.011* (0.003)	0.108* (0.006)	-0.039 (0.031)	0.058* (0.0071)	0.000 (0.005)	0.002 (0.005)
1980s	0.017 (0.004)	0.034* (0.0071)	0.208* (0.068)	-0.043** (0.019)	0.038** (0.017)	0.060* (0.023)
1990s	-0.011 (0.011)	0.015 (0.011)	0.466* (0.127)	-0.181* (0.043)	0.022 (0.032)	0.064 (0.039)
2000s	-0.025** (0.011)	0.016 (0.016)	0.618* (0.152)	-0.261* (0.057)	0.006 (0.042)	0.061 (0.059)
2010s	-0.015 (0.017)	0.033 (0.021)	0.688* (0.173)	-0.294* (0.072)	0.001 (0.051)	0.064 (0.059)
Constant	3.085* (0.542)	18.147* (1.060)	9.225* (2.408)	6.621* (0.655)	3.708* (1.254)	5.498* (1.637)
Lind and Mehlum U test						
Slope at LB of income	-0.083	-0.378*	-0.227	-0.150*	-0.076*	0.108***
Slope at UB of income	-0.005	0.176*	-0.185	0.107**	0.178*	0.251*
U TEST						
EXTREMUM POINT	11.403	9.687	24.141	8.628	7.529	7.475
95% CI, Fieller Method	(-∝,9.72) (-13.47, ∝)	(9.405, 10.059)	(-∝,10.92) (5.77, ∝)	(7.955, 9.735)	(-∝,∝)	(1.245, 8.103)
CD	-2.632 (0.008)	-3.374 (0.001)	-1.511 (0.131)	0.706 (0.480)	0.588 (0.556)	-1.041 (0.298)

Notes: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.

Source: Own Computation

Table 24b: Baseline Regression of Relative Baumol's Diseases Services Employment for Full Sample and Split by Country Groups, 1970-2015

Variable	All Sample	Asia Total	Advanced Asia	Developing Asia	SSA	SSA (Excl. Mauritius)
LN GDDPC	0.691* (0.121)	0.759* (0.081)	0.456* (0.139)	0.238 (0.143)	1.936* (0.546)	2.442* (0.490)
LN GDPPC SQ	-0.042* (0.008)	-0.031* (0.005)	-0.016** (0.007)	0.004 (0.008)	-0.131* (0.036)	-0.166* (0.033)
LN Pop	0.486* (0.132)	-1.098* (0.339)	-0.493** (0.235)	-0.264 (0.239)	1.727* (0.341)	1.906* (0.355)
LP Pop SQ	-0.009 (0.009)	0.041** (0.016)	-0.009 (0.014)	0.006 (0.012)	-0.062* (0.019)	-0.064* (0.019)
1980s	0.064* (0.021)	0.084* (0.024)	0.124* (0.038)	0.072* (0.023)	-0.012 (0.025)	-0.055** (0.029)
1990s	0.159* (0.046)	0.201* (0.046)	0.291* (0.077)	0.159* (0.040)	0.021 (0.054)	-0.065 (0.049)
2000s	0.299* (0.074)	0.292* (0.058)	0.421* (0.089)	0.218* (0.053)	0.176* (0.086)	0.061 (0.083)
2010s	0.375* (0.86)	0.322 (0.066)	0.447* (0.104)	0.217* (0.062)	0.275** (0.106)	0.146 (0.104)
Constant	-3.844* (0.781)	5.951* (1.943)	6.021* (1.47)	2.997** (1.179)	-14.802* (2.969)	-18.243* (2.948)
Lind and Mehlum U test						
Slope at LB of income (Ln)	0.146*	0.342	0.189	0.295	0.216*	0.269*
Slope at UB of income (Ln)	-0.231*	0.065	0.091	0.322	-0.643*	-0.749*
U TEST	3.79*				2.39*	3.35*
EXTREMUM POINT	8.312	12.129	13.871	-28.309	7.371	7.361
95% CI, Fieller Method	(7.505, 9.305)	(10.962, 14.201)	10.77, 58.398)	(-∝,22.38) U (1.31,+ ∝)	(6.771, 7.813)	(6.983, 7.699)
CD	7.290 (0.000)	2.660 (0.008)	0.641 (0.522)	-1.314 (0.189)	-0.575 (0.565)	-2.024 (0.043)

Notes: * p < 0.01; ** p < 0.05; *** p < 0.10. Standard errors are given in parenthesis. CD refers cross-sectional dependence with p values are in square brackets. FE and DK denote respectively Fixed Effects and Drisoll and Kraay (1998) estimator. LU and UB refer lower-boundary and upper-boundary respectively. The Fieller method follows an inverse test to construct confidence intervals (CI) for the ratio of normally distributed statistics. And, this test is said to be better for the U-test.

Source: Own Computation

5.4.2 Findings on the Key Drivers of (de)industrialization

i. Preliminary Tests

Chudik et al. (2011) proposed four types of cross-sectional dependence, namely: (i) weak ($\alpha < 0$); (ii) semi-weak ($0 < \alpha < 0.5$); (ii) semi-strong ($0.5 \leq \alpha < 1$); and (iv) strong (α =1). Strong cross-sectional dependence implies that the sum of the effect of the common factors becomes stronger with an increase in the number of cross-sectional units while in the case of (semi-) weak cross-sectional dependence, the sum of the effect of the common factors remains constant even if the number of cross-sectional units increases to infinity. Bailey et al. (2016) developed a method to estimate the exponent of a variable under semi-strong and strong cross-sectional dependence. They derive a bias-adjusted estimator for alpha and its standard error based on auxiliary regressions using principle components and cross-sectional averages. Pesaran (2015) proposed a method for (semi-) weak cross-sectional dependence[95]; hence the cross-sectional dependence (CD) test indirectly tests for $\alpha < 0$. The exponent of CD and Pesaran (2015) test for weak cross-section dependence are examined in a panel for each variable and the results are summarized in Annex IV Table 6. The CD tests rejects the null of weak cross-sectional dependence for all variables while the estimated exponent of cross-sectional dependence (alpha) is well above 0.5. This necessitate the use of appropriate estimation method that can take into account cross-sectional dependence.

It is also important to check stationarity of the variables and slope heterogeneity/homogeneity to choose appropriate model. Most macroeconomic variables are usually non-stationary at level and stationary at first difference. The second generation panel unit tests such as a covariate augmented Dicky-Fuller (CADF) and cross-sectionally augmented panel unit root test (CIPS) by Pesaran (2007) are used and the results come out mixed (non-stationarity cannot be ruled out).

Annex IV Table 7 reports test results for parameter heterogeneity across countries (Swamy S test for parameter consistency, and heterogeneity test according to Pesaran and Yamagata 2008, and

[95] The test is based on the average of the correlations between the residuals from a regression on each individual separately. Practically, consider the variable yi pertaining to individual i. The variable is regressed on its first lag and the residuals are collected to compute pij which is the correlation coefficient between the residuals from individual i and j regressions. The statistic is given below:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \widehat{p_{ij}}$$

The static has a N(0,1) distribution under the null hypothesis of independence, where N denotes the number of individuals, and T represent the number of years. The null hypothesis refers to the case when $0 \leq \alpha < 0.5$, which corresponds to different degrees of weak cross-sectional dependence, in contrast with the case when $0.5 < \alpha \leq 1$, which refers to different degrees of strong cross-sectional dependence (Bailey et al. 2016). It remains valid in the presence of dynamic panels that include lagged dependent and independent variables (Chudik et al. 2017).

Blomquist and Westerlund 2013) are estimated and both tests confirmed the presence of heterogeneity in the sample.

Therefore, as already indicated earlier, the common correlated effects mean group (CCEMG) estimator (Pesarana 2006) and the augmented mean group (AMG) estimator (Bond and Eberhardt 2009; Eberhardt and Teal 2010) are applied to account for cross-sectional dependence, slope heterogeneity and common shocks. Additionally, the fixed effect model with Dirscoll and Kray 91998) standard error is employed as a complement**.**

ii. Estimation Results

The results of the regression models are reported in Tables 25 and 26 where the dependent variables are respectively manufacturing share of value added in constant price and of employment share. In all model specifications, the two principal internal factors (GDPpc and UPG) that are generally believed to cause *(de)industrialization* especially in advanced economies simultaneously with other factors entered in the regression.

Income effect: The first explanatory variable is shifts in consumer demand due to increase in income – measured by the log of GDP per capita and its squared term. Clark (1957) pioneered to argue that the share of income spent on manufactured goods should increase over the first stage of economic transformation and development, then stabilize and finally fall beyond a certain threshold of per capita income on account of expansion of the demand for services. In this respect, therefore, industrial development is driven by changes in the pattern of final demand owing to changes in income, which makes the variable as the main variable of interest in advanced economies.

Annex Figures 6a-c present the dependent variables graphed against time for the full sample along with the Asia and SSA country groupings in that order. The figures indicate an inverted U-shaped curves path for manufacturing output share (both current and constant prices though the former is slightly steeper than the latter) in the full sample and SSA country group. The lowess curve for the Asia panel for all measures and the employment curve for both the full sample and the two country groupings appear more or less upward sloping indicating that the variable is increasing over time. This observation calls for graphing the variables against GDP per capita (Annex figures 7 a-c). Three observations come out from the figure: (i) the inverted U-shaped relationship between the relative manufacturing value added (both in current and constant prices) and employment share and per capita GDP for the full sample and SSA; (ii) the continuous downward slope of the inverted U-curve for SSA; and (iii) the continuous upward sloping curve for Asia. So, there is indication, according to the lowess regression, of the likely incidence of *premature deindustrialization* or tertiarization with industrial stagnation in SSA and *industrialization* in Asia (notwithstanding the presence of diversity across countries). Therefore, in view of allowing a non-linear impact of per capita GDP on manufacturing share in output and in employment, and thereby to test the inverted U-curve suggested by past studies already reviewed earlier, a squared term of the variable is included in the different model specifications. *According to past research findings carried out mostly in advanced economies, per capita GDP should come with positive sign and its square should come with negative sign and it should be statistically significant.* The present study compares the result with the LM test carried out in the baseline regression to draw stylized fact.

As can be evident from Tables 25 and 26, the coefficient for per capita GDP and its squared term consistently bear the expected signs and are statistically significant for the full sample and SSA panel. More specifically, the coefficient for GDP per capita is positive while its squared term is always negative. The positive sign suggests that, across countries, a percentage change in per capita GDP leads to changes in real value added and employment share of manufacturing. But, the positive relationship between the dependent variables and the explanatory variable reversed when the countries reach a certain threshold for GDP per capita, after which tertiarization sets in whereby incremental income per capita may make relative manufacturing output and employment to contract than to expand. This observation is consistent with Clark's (1957) claims and the empirical regularities observed in advanced countries – in that consumers in these economies tend to spend large portion of their incremental income on services. The difference between the observations drawn from advanced economies and the findings reported in this study is that the output and employment share of manufacturing rises and falls back (or stagnated) at an earlier stage of development and at low levels of GDP per capita than the norm in the past, especially in SSA. As a result, some of these economies might have moving into tertiarization *prematurely* while others seeing industrial stagnation and still others have never been industrialized at all given the fact that the share of their manufacturing output and employment remain far below 10 percent.

The magnitude of the coefficient differs between the two country groupings. Typically, the signs of the coefficient for per capita GDP and its squared term are in line with the recent empirical findings for SSA in both manufacturing real value added share and employment share with all estimation techniques and are highly statistically significant. However, as discussed earlier, it is difficult to confirm that an average country in SSA has experienced *premature tertiarization with* industrial stagnation A one percentage change in GDP per capita leads to an average drop of manufacturing output in the range of 0.084 percent (with FEDK model) to 0.691 percent (with CCEMG) for SSA and of 0.036 percent (with FEDK) to 0.087 percent (CCEMG) for the full sample at constant price, and in the range of 0.204 percent (FEDK) to 0.729 percent (CCEMG) for SSA and of 0.032 percent (with FEDK) to 0.90 percent (with AMG) for the full sample in employment. This gives indication that the income effect is more pronounced in relative manufacturing employment change than in relative manufacturing real output change especially in SSA. Additionally, the magnitude of the coefficients prevailed to be higher in SSA than Asia meant that premature *deindustrialization* or industrial stagnation has been more pronounced and severe in SSA than in Asia which may corroborate the findings of Rodrik and other scholars. The fact that the coefficient for the manufacturing output at constant price come out close only to 0.01 percent in all model specifications for Asia further indicate that the countries remain industrial powerhouses.

In general, the result is not consistent with findings of past research works with respect to SSA than to Asia as there is indication of a hump-shape relationship between GDP per capita and relative manufacturing output and employment in SSA. Based on the empirical findings, one may conclude that the sample countries in SSA (with the exception of Mauritius) have experienced *deindustrialization* earlier than the experience of today's advanced economies and at low levels of per capita GDP. But, country specificity matter; some of the sample economies have never experienced industrialization of its kind observed in East and Southeast Asian economies. On the basis of the full sample result, one may cautiously argue that additional increases of per capita GDP would cause relative manufacturing output and employment to go down *prematurely* in today's developing countries. However, the results for the developing Asia countries (with the squared term turned out to be positive) suggest industrialization, wherein manufacturing continues to be positively correlated with per capita GDP as the latter exhibited increasing trend (controlling for other covariates) rather than inverted U-shape relationship and hence, the pronounced *premature deindustrialization*, if there be any, is limited in certain regions and countries across the developing world block. Generally, the coefficients for per capita GDP and its squared term appear to be inconclusive, which gives avenue for future research. This may be explained by the fact that general model (instead of specific models that retain merely statistically significant covariates in each case) is used for the full sample and the two country groups alike with the intent of respecting comparability between the two country groups suggests that the estimation outcome may not give precise predictions when insignificant variables are retained.

Technological progress or productivity growth. This variable captures the contribution of cross-sector heterogeneity in labor productivity growth on the extent of the relative share of manufacturing employment and output. It measures the magnitude by which the growth of labor productivity in manufacturing outpaces the growth of labor productivity in services. Unlike previous studies (such as Kollmeyer 2009), the *unbalanced productivity growth* term is computed in the present study by grouping the services sector into two segments: higher-productivity (and mostly skill-intensive) producer services (UPhps hereafter) and the lower-productivity services or the so-called Baumol's diseases services, which are classified generally as stagnant or non-progressive services (UPbds hereafter).

The effect of the unbalanced productivity growth turned out to be mixed – as the coefficient bear positive and negative signs for value added and employment shares of manufacturing respectively, but statistically significant in all models. For the full sample and Asia country groupings, there exists a positive and significant relationship between technological progress in manufacturing relative to the skill-intensive (UPhps) and Baumol's diseases services (UPbds) and manufacturing employment share in both estimation techniques. This suggests that relatively faster productivity growth in manufacturing expands output and employment in the sector. The result further suggest that the diffusion of skill-biased technologies and the relative price reduction for manufacturing goods in the world market have positive repercussions on manufacturing in East, Southeast and South Asian economies. This may not seem surprising given that there has been concentration of manufacturing production in few large developing economies (Asia) than others.

With no surprise, there is negative and statistically significant relationship between technological progress in manufacturing relative to the higher-productivity and Baumol's diseases services and manufacturing employment share in SSA panel. This may confirm the Baumol's cost diseases hypothesis in that relatively faster growth of productivity in manufacturing relative to services shrinks manufacturing employment in the region. This could be explained, as Rodrik (2018) posits, by the diffusion of skill-biased technology in developing countries through trading manufactures in the global value chains, which affects manufacturing employment in developing countries by replacing less-skilled workers. This is notwithstanding that labor-intensive manufacturing industries prevail in SSA and that there was indication of employment industrialization in few SSA since recently. As already indicated earlier, most SSA economies have liberalized their trade regimes whilst implementing the structural adjustment programs. This might have resulted in substantial increase in trade flows and therefore, being price takers in the international market, these economies might have imported the negative effects of technological progress from abroad. On top of that technological progress reduces the relative prices of manufactured goods on the global market; hence, contributing to the drop in manufacturing employment.

The results further shows the existence of positive relationship between technological progress in manufacturing relative to the two services segments and real value added share of manufacturing in SSA. Likewise, the relationship between the variables of interest turns out to be positive for both the higher-productivity (and skill-intensive) producer services and Baumol's diseases services across the three models for Asia, which is in line with Rodrik's claim that "the difference in productivity in manufacturing industry" could further stimulate the demand for manufactured goods, feeding the sector.

The findings may support the claim that higher-productivity (and skill-intensive) services can stand to serve as *stimulus complement* to manufacturing, and that unbalanced productivity growth could never *deindustrialize* a country both in SSA and Asian panels. So, Clark's effect seems to be stronger than Baumol's effect for SSA economies in that change in GDP per capita seems to have stronger effects on the pattern of industrial development observed in the countries under investigation than rising productivity. However, what remains puzzling is why SSA countries are said to be experienced *tertiarization* (*deindustrialization)* or experienced *stalled industrialization* at much lower income level. The descriptive analysis showed that some of the considered countries can generally be labeled as *under-industrialized* as their manufacturing share both in total output and in employment remains, on average, at 10 percent. What is worrying also is that there has been a tendency for these economies to move directly from agriculture to low-productivity services activities (such as retail, distribution and other trading services) without a parallel expansion of core manufacturing. Seeing in the lens of the discussion made in earlier parts of the study, such structural change pattern poses a severe problem for the countries because lacking manufacturing is lacking the unique cardinal elements that facilitate the transition from a traditional to a modern economy. The occurrence of employment reindustrialization in some countries in SSA during the 2010s seem good news.

Trade openness and production relocation: The econometric studies that examined the relative importance of globalization and trade on deindustrialization in advanced economies found a significant negative effect of globalization and trade on relative manufacturing employment. Trade openness and net FDI constituting expansion of foreign trade and globalization are included in the regression. As can be evident from Tables 25 and 26, the results come out with different effects with respect to the contribution of the increase in trade and globalization measures on manufacturing development observed in the considered SSA and Asian economies. The specifics of the relationship between these variables and relative manufacturing output and employment could be clear when looking at the individual coefficients for the variables. The result for the full sample shows that the degree of openness is positive and significant with estimates of the three models for both of manufacturing value added and employment share. In the case of Asian country groups too, the degree of openness has significantly positively impacted on the relative manufacturing employment and on the relative share of manufacturing value added share. The findings generally move away from earlier studies which claim that international trade has linear negative effects on manufacturing employment, though the present study considered both relative output and employment of manufacturing and used openness rather than North-South trade data. Mensah et al. (2016) confirmed that trade openness has positive effect on manufacturing share. Nonetheless, many other theoretical and empirical studies documented that trade openness may reduce the share of manufacturing in the economy of a given country if it lacks competitiveness in its manufacturing exports. It should be noted that the countries are heterogeneous in terms of their level of development, and production and export compositions.

It may sound surprising that the coefficients for openness come out with positive signs with both models in SSA panel [similar to the Asia panel], suggesting that the change in export and import trade have been contributing to changes in relative manufacturing output and employment for the countries included in the sample (though country heterogeneity is expected). The results for SSA are in stark contrast with Asia though. The coefficients for trade as share of GDP (openness) showed that a percentage change in openness result in an increase in the change of relative real manufacturing output by 0.104 percent and 0.034 percent for Asia and SSA respectively with the AMG model, and by 0.130 percent and 0.069 percent with the CCEMG model; the magnitude of the effect being larger in Asia than in SSA. Likewise, a percentage change in openness leads to a rise to manufacturing employment change by 0.119 percent (for Asia) and by 0.096 percent (for SSA) with the AMG estimator and by 0.097 percent (for Asia) and 0.115 percent (for SSA) with the CCEMG estimator. The employment effect is marginally higher than the real output effect in some cases.

Another observation is that the coefficient for the proxy variable for production relocation (net FDI) has consistently negative effect on relative manufacturing employment in both Asia and SSA country groupings; but, it is only statistically significant for SSA under the fixed effect and CCEMG models. This may suggest that net FDI flow could be one of the key plausible explanations for industrial stagnation (with premature tertiarization) in these country groupings. It should be noted, nonetheless, that not all FDI inflows have gone to manufacturing industries. Of course, at least in large numbers of Asian economies, an important volume of these investment flows is associated with this sector. In the full sample, the coefficient of net FDI has negative sign (and statistically significant) on relative manufacturing employment with CCEMG estimator. The result is in stark contrast with Alderson (1999), who pioneered in testing the relationship between globalization (measured in FDI and North-South trade) and *deindustrialization* in 18 OECD countries found that:

(i) FDI led to the displacement of labor in industry sector; (ii) FDI may stimulate the required marginal rate of return on domestic investments, shift investments from industry to services sector and reorient investments away from real investments towards financial investments; and (iii) FDI may move an economy into a 'wealth-trap' in the long-run.

When it comes to the effect on value added share, the coefficient has consistently positive sign for Asia panel and consistently negative sign for SSA with the three model estimation techniques (but significant only with AMG model in both panels and with FE-DK model for SSA). The results for the SSA panel contrast with the findings of Gui-Diby and Renard (2015) who found that FDI inflows did not have a significant impact on industrialization in Africa - FDI in extractive activities is less likely to encourage manufacturing growth. Another observation is that the magnitude of the coefficient has always been higher for the Asia panel than that of SSA panel. This may perhaps be associated with the magnitude of FDI inflow which is predicted to be far lower in SSA than in Asia.

Real exchange rate: As already discussed, real exchange rate could positively induce successful industrial development chiefly for emerging and developing countries. Specifically, a devaluation of the exchange rate induces faster growth of an economy through its direct impact on the relative size of the tradable sector (typically manufacturing). The results show that the real exchange rate influence real manufacturing output change negatively and employment positively in both panels with both models, though it comes out significant in some cases only. In the Asia and SSA panels, the real exchange rate has come out with positive sign for manufacturing employment, but it is statistically significant in FEDK and AMG models for Asia and FEDK model for SSA. However, the sign of the coefficient come out negative with respect to its effect on manufacturing output share across the three models, albeit significant for Asia only. In the full sample case, the real exchange rate is positive with both estimators (but significant merely in FEDK and AMG estimators) with respect to manufacturing employment share. By contrast, the real exchange rate is negatively related with manufacturing value added share in both estimators, albeit insignificant.

The results might suggest that a devalued (overvalued) exchange rate positively (negatively) impacted the share of manufacturing sector of the two country groups. Surprisingly, the real exchange rate coefficient is not statistically significant for SSA. Overall, the result may give indication that real exchange rate cane be considered as one of the determinants of industrial development. The result come out robust (or showed little variation) with the use of undervaluation index computed following Rodrik's approach (2008) instead of the real exchange as can be evidenced from Annex IV Table 8 and 9: negative (positive) for the full sample and Asia (SSA) with AMG and positive with CCEMG for both panels on manufacturing employment, but insignificant; negative effect on manufacturing output in both AMG and CCEMG estimators for both panels, but significant for Asia only. The results are inconclusive to draw stylized.

Government consumption expenditure: The impact of government expenditure on the share of manufacturing in GDP and in total employment come out to be inconclusive and mixed. Government expenditure is expected to be heterogeneous across countries depending on the nature and composition of the expenditure outlay. Many agree that government expenditure that goes to high-productivity activities (notably manufacturing) could be relatively more growth-inducing than that allocated to public services wages. The results shows that the coefficients of government expenditure on employment share of manufacturing is consistently positive for SSA with the three models, but insignificant; negative throughout for the full sample (significant with the AMG and CCEMG models); and positive with the fixed effect model and negative with the AMG and CCEMG models (significant only for the AMG model) in Asia panel. The signs of the coefficient with respect to manufacturing value added is mixed and most of the time insignificant. This makes the effect of government expenditure on *industrialization* inconclusive.

Relative agricultural output/employment as share of GDP/total employment: The decline in the share of agriculture in GDP and in employment is predicted to have substantial impact on manufacturing value added and employment share depending on the nature of the structural change. The results in Table 26 indicate that the change in relative agricultural employment has always significant positive effect (and negative effect) on manufacturing employment in full sample (in Asia and SSA) in all models. This implies that, as a share of total workforce, the change of agricultural employment has been coincided with an expansion of manufacturing in the full sample and a contraction of same in Asia and SSA. This may further indicate that majority of the countries in SSA have experienced *delayed industrialization or stalled industrialization* on account of persistence of agriculture. In fact, in Asia the rise of manufacturing was partly influenced by the decline of agricultural employment, where labor shifting from agriculture ended up in manufacturing.

By contrast, the coefficient for value added share of agriculture has different effects on manufacturing value added share (Table 25). Typically, the coefficient come out to be positive and statistically significant for Asia. However, the coefficient has negative and significant sign with both models for the full sample and SSA panel.

Economic Complexity Index (ECI): ECI is a composite index which can measure (proxy) the level of development (including higher economic potential, strong institutions, and higher level of embedded knowledge) and product sophistication and hence, it can successfully explain cross-country differences in economic growth and productivity gains (Hausman et al. 2014). The estimation result show that ECI impacted negatively and significantly the share of manufacturing employment in SSA across the three models (Table 26). By contrast, the coefficient turns out to be consistently positive for the Asia country groups, albeit it is statistically significant merely with the FE-DK and AMG models. In the full sample, the coefficient appears positive in all the three estimators, but statistically significant with the FE-DK and the CCEMG estimators.

Table 25 shows that ECI is negatively related with manufacturing value added share in the full sample and the two country groups with both estimators. The magnitude of the coefficient (in absolute value) is slightly higher for the Asia panel than those of SSA country groupings. Basically, the value of the ECI is higher and better for the Asia sample economies compared with those of SSA, though there could be diverse cases across countries.

Industrial density: As can be evident from Tables 25 and 26, the coefficient for industrial density has significant positive sign in all models for the full sample and for the Asian and SSA panels. More specifically, a one percent increase in industrial density would induce manufacturing employment share with a range of 0.443 percent to 0.778 percent, and manufacturing value added with a range of 0.76 percent to 0.780 percent. There is no surprise as the index is computed as a ratio of manufacturing value added to total population.

Relative value added and employment shares of services: As already discussed in part three, outsourcing of certain services activities (such as business services) out of manufacturing firms and the expansion of other services (such as tourism, ICT) are among the plausible explanations for (*de)industrialization*. Accordingly, the value added and employment share of transport, storage, and information communication (TRAN) as well as finance, real estate and business services (FIRE) are included as additional covariates to the determinants of industrial development. For the full sample in Table 26, the coefficient of relative employment share of transport and communication services appears consistently negative and statistically significant in both models. Likewise, the relative employment share of the finance, real estate and business services come out to be negative, but statistically significant with FE-DK and CCEMG estimation techniques. In the SSA panel, both services activities have positive effect on manufacturing employment across the three models, but statistically significant for the former (FIRE). For the Asia panel, the coefficients for the relative employment share of the two services activities turn out to be negative with all estimators.

By contrast, the effect of the services activities on the value added share of manufacturing shows some difference with the employment effect presented above. For the full sample, transport, storage and information communication value added share has negative and significant effect with AMG (positive and significant effect with FEDK) on manufacturing value added share; the results with respect to finance, real estate and business services activities negative and significant across the three models. For SSA, the signs of both services activities come out to be negative for the former and negative for the latter services activities. The reverse is true for Asia.

Common dynamic factors (CDF): The AMG model accounts for the common dynamic process (CDP) which refers to the development and level of country-specific weighted common factors that affect the relative share of manufacturing (industrial development) for all countries in the panel. Generally, these common factors drive the share of manufacturing in GDP and employment. The sizable and significant coefficients for the CDF indicates an important role of unobservable inputs, such as common global shocks and price of manufactured goods, explaining the increasing impact of external factors on changes in manufacturing share in value added and employment in all observed countries, albeit with different importance for each country. Hence, CDF may also serve as proxy for openness and financial and economic integration of the sample economies.

Table 25: Estimates of Relative Manufacturing Value Added for the Full Sample and Country groups

Abbreviations are as previously given. * Level of significance: * p < 0.01; ** p < 0.05; *** p < 0.10
Source: Own Computation

Var	FEDK			AMG			CCEMG		
	All	Asia	SSA	All	Asia	SSA	All	Asia	SSA
Ln GDPPC	0.806* (0.136)	-0.711* (0.108)	0.946* (0.282)	0.807** (0.353)	-0.022 (0.043)	4.393*** (2.822)	1.373** (0.577)	0.032 (0.047)	10.618* (8.817)
Ln GDPPC SQ	-0.036* (0.008)	0.028* (0.008)	-0.084* (0.017)	-0.05** (0.023)	0.006 (0.009)	-0.318** (0.185)	-0.087* (0.35)	0.027* (0.005)	-0.691* (0.269)
LUPD_HPS	0.559* (0.198)	1.560* (0.844)	2.252* (0.542)	1.998* (0.519)	1.129* (0.836)	3.159* (0.829)	1.834* (0.577)	0.933** (1.007)	2.641* (0.925)
LUPD_BDS	0.468* (0.243)	5.892* (0.296)	0.942* (0.173)	1.568* (0.318)	2.113* (0.658)	1.769* (0.572)	1.830* (0.423)	1.873* (0.723)	1.875* (0.6051)
LRXR	-0.011 (0.131)	-0.058* (0.022)	0.033** (0.016)	-0.009 (0.022)	-0.068* (0.029)	0.004 (0.031)	-0.005 (0.017)	-0.063* (0.029)	0.011 (0.023)
LOPEN	0.071* (0.015)	0.003 (0.012)	0.144* (0.022)	0.56* (0.019)	0.104* (0.037)	0.034* (0.028)	0.076* (0.040)	0.130* (0.064)	0.069** (0.032)
LAGR	-0.297* (0.021)	0.414* (0.033)	-0.132* (0.032)	-0.322* (0.088)	0.162* (0.141)	-0.441* (0.121)	-0282* (0.097)	0.206* (0.085)	-0.438* (0.123)
LTRAN	0.072* (0.028)	0.043 (0.058)	-0.136* (0.031)	-0.111* (0.060)	0.222* (0.129)	-0.055 (0.066)	-0.006 (0.086)	0.039 (0.155)	-0.047 (0.078)
LFIRE	-0.043* (0.006)	-0.003** (0.014)	0.261* (0.026)	-0.111* (0.069)	-0.117 (0.126)	0.122 (0.8771)	-0.136* (0.082)	-0.094 (0.105)	0.068 (0.056)
NFDI	-0.767* (0.220)	0.104 (0.178)	-1.027* (0.284)	-0.025 (0.910)	0.373* (0.210)	-0.308** (0.135)	-0.039 (0.259)	0.162 (0.290)	-0.338 (0.363)
ECI	-0.072* (0.015)	-0.090* (0.018)	-0.07** (0.029)	-0.022 (0.016)	-0.058* (0.024)	-0.03*** (0.022)	-0.031* (0.017)	-0.026 (0.029)	-0.04*** (0.022)
LIND	0.654* (0.012)	0.677* (0.1960)	0.576* (0.026)	0.780* (0.039)	0.748* (0.065)	0.699* (0.061)	0.719* (0.051)	0.731* (0.069)	0.673* (0.086)
LGCY	0.107* (0.031)	0.252* (0.081)	0.021 (0.030)	0.053 (0.044)	-0.048 (0.074)	-0.023 (0.024)	-0.068 (0.045)	-0.14** (0.086)	0.007 (0.062)
CDP				0.714 (0.166)	0.757* (0.155)	0.405* (0.16)			
TREND				0.001 (0.004)	-0.004 (0.005)	-0.003 (0.004)			
C	-1.129* (0.657)	-1.604* (0.351)	-6.066* (1.236)	-0.214 (1.463)	0.132 (1.094)	-19.85** (9.742)	- 4.762** (2.248)	4.380* (0.868)	-41.854* (13.227)

Table 26: Estimates of Relative Manufacturing Employment for the Full Sample and Country Groups

Var	FEDK			AMG			CCEMG		
	All	Asia	SSA	All	Asia	SSA	All	Asia	SSA
Ln GDPPC	0.053 (0.146)	-0.193 (0.284)	3.096* (0.423)	1.120*** (0.660)	-0163 (0.133)	4.935* (1.463)	1.712** (0.836)	-0.136 (0.116)	11.122* (2.706)
Ln GDPPC SQ	-0.032* (0.007)	0.019 (0.021)	-0.204* (0.027)	-0.045* (0.040)	0.017*** (0.009)	-0.317* (0.089)	-0.09** (0.052)	0.012 (0.007)	-0.729* (0.191)
LUPD_HPS	0.152 (0.509)	3.15*** (1.456)	-5.316* (0.267)	2.272* (0.693)	1.031 (1.199)	-2.588* (0.549)	2.750* (0.090)	0.876 (0.115)	-1.19*** (0.683)
LUPD_BDS	2.967* (0.466)	3.048** (1.456)	-2.702* (0.267)	0.459 (0.523)	1.118* (0.670)	-2.346* (0.549)	0.118* (0.569)	0.531 (1.497)	-3.008* (0.939)
LRXR	0.067* (0.024)	0.092** (0.039)	0.092* (0.022)	0.459** (0.024)	0.081** (0.040)	0.012 (0.029)	0.034 (0.038)	0.035 (0.039)	0.001 (0.027)
LOPEN	0.077* (0.037)	0.008* (0.064)	0.108* (0.029)	0.107* (0.032)	0.119* (0.040)	0.096* (0.028)	0.025 (0.078)	0.097* (0.048)	0.115 (0.029)
LAGR	0.340* (0.069)	-0.556* (0.067)	-0.457* (0.108)	0.353* (0.1771)	-0.316* (0.181)	-1.287* (0.297)	0.049* (0.461)	-0.531* (0.294)	-0.948* (0.254)
LTRAN	-0.268* (0.015)	-0.216* (0.067)	0.393* (0.022)	-0.281* (0.088)	-0.2.33* (0.108)	0.132*** (0.0751)	-0.33** (0.142)	-0.181 (0.168)	0.173* (0.101)
LFIRE	-0.103* (0.017)	-0.129 (0.084)	0.0014 (0.017)	-0.046 (0.049)	-0.027 (0.057)	0.022 (0.078)	-0.12** (0.064)	-0.126* (0.068)	0.0135 (0.076)
NFDI	0.116 (0.676)	-0.447 (0.479)	-0.543* (0.197)	0.055 (0.248)	-0.156 (0.149)	-0.099 (0.129)	-0.762* (0.444)	-0.404 (0.322)	-0.572** (0.260)
ECI	0.170* (0.039)	0.219* (0.058)	-0.062* (0.026)	0.029 (0.292)	0.047* (0.039)	-0.159* (0.011)	0.068** (0.034)	0.013 (0.046)	-0.06*** (0.034)
LIND	0.578* (0.018)	0.778* (0.037)	0.443* (0.029)	0.518* (0.082)	0.618* (0.1051)	0.592* (0.0391)	0.486* (0.084)	0.501* (0.114)	0.565* (0.089)
LGCY	-0.041 (0.057)	-0.210* (0.083)	0.071*** (0.039)	-0.071** (0.039)	-0269* (0.106)	0.055 (0.039)	-0.14** (0.068)	-0.174 (0.128)	0.016 (0.0571)
CDP				0.784 (0.132)	0.779* (0.290)	0.369*** (0.210)			
TREND				-0.001 (0.004)	-0.012 (0.007)	0.017** (0.005)			
C	1.598* (0.902)	4.735* (0.851)	-4.165* (1.402)	-3.432* (3.089)	-36.627* (11.317)	-4.338* (1.599)	- 7.842** (3.821)	-0.916 (3.133)	-30.378 (9.4651)

Abbreviations are as previously given. * Level of significance: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$
Source: Own Computation

5.5 Summary

Lewis and other scholars in the classical development and structuralist school proposed that the ways of imitation and trading were the underlying reasons for the dividing lines between the world rich (North) and the world poor (South) blocks. In this proposition, global poverty could only be halted and the poverty landscape in low-income countries changed through following the conventional development journey and production transformation (industrialization). However, contemporary literatures of industrialization and deindustrialization contend that the traditional manufacturing-led development route is becoming harder to start and sustain for low-income (even middle-income) countries to achieve development and end poverty for couple of reasons. On one hand, a good deal of SSA exhibited stalled industrialization (industrial stagnation), albeit few others encountered either premature deindustrialization (e.g. South Africa) or failed industrialization (e.g. Botswana). The vast majority of the countries exhibited structural transformation towards services sector (most notably, informal and traditional services activities), and hence, moved into tertiarization prematurely. On the other hand, the increasing fragmentation of industrial production in the GVCs and technological advancement (automation) in manufacturing could phenomenally affect the countries competitive advantage (in terms of, for instance, low-cost of labor) in light-manufacturing industries whilst the intensification of globalization might intensify existing competitive pressure in global manufacturing hub mega economies such as China and other emerging economies in Asia. Additionally, the skill-intensive services activities are increasingly congregate to manufacturing with respect to growth-inducing features that were conventionally confined to manufacturing, amplifying the blurring lines between manufacturing and services sector.

With this debate in mind, part five sought to explore the extent of industrialization and services transformation trends overtime in the different country groupings in Asia and SSA, and to identify key determinants of industrial development (taking manufacturing share in GDP and in employment as suitable proxies) employing up-to-date econometric techniques that corrects cross-sectional dependence, slope heterogeneity, serial correlation, global common shocks, and the like for the study period covering 1970-2015. In so doing, it set to answer three key questions: (i) have the sample economies in SSA and developing Asia exhibited significant downward trend (or stagnation) in manufacturing share overtime most notably accompanied by the expansion of services? If so, what are the key forces driving industrial development (be it industrialization, reindustrialization or deindustrialization) in the analyzed countries? Do the countries under investigation still experience expansion in their services sector employment and value added share bypassing manufacturing core?

If so, which segments of the services sector follow this patter and trend, and which of the two resembles manufacturing in terms of size, sign and significance level of decadal time dummies? In answering these questions, the dissertation contributes to the premature deindustrialization and services transformation debate in two aspects: (i) extending Rodrik's (2016) baseline regression model to the services sector by splitting it into skill-intensive and less-skill intensive Baumol's diseases services activities to test whether structural transformation in SSA has taken the form of a shift from agriculture to services (hence encountered industrial stagnation and tertiarization at a lower level of development); and (ii) identifying the key driving causes for industrial development employing recent econometric approaches, which, to the best of the researcher's knowledge, were not employed in past research works on the same research topic. Additionally, this study includes explanatory variables, which were scarce in previous researches (such as Economic complexity index, industrial development index, etc.).

With respect to the debate on the inverted U-shape curve and premature deindustrialization, the results suggest to draw less pessimistic picture on the development journey and production transformation process of the countries (especially those in SSA) than findings of past researches on the area. The countries in SSA exhibited premature tertiarization perhaps because of the advancement of information technology and outsourcing of higher-productivity services as well as expansion of certain services activities (industries without smokestacks) such as tourism. However, the result do not give any indication on the irrelevance of manufacturing-led development path. The fact that the countries saw structural change towards services without factories do not mean that the era of industrialization is ended. Although the current fragmented GVCs (where many countries compete over a place) may make it difficult for these countries to follow the manufacturing-led development route (industrialization), advising them to place more focus on services (or less focus on manufacturing) of their development path does not seem plausible. The possibility for achieving development and poverty reduction through industrialization (having services activities still serving stimulus complement to manufacturing) is not as thin as a needle. Notwithstanding premature tertiarization (or industrial stagnation) continues to hold, there is no way to conclude that the economic activities pertinent to economic development and production transformation (industrialization) in the past are annihilated.

As discussed in part three, the activities traditionally belonged to manufacturing are classified today with cervices activities attributed to outsourcing of these activities out of manufacturing firms. This may suggest that services activities are increasingly standing as "stimulus complement" or supplement to manufacturing, giving supportive evidence for the synergetic relationship between the two sectors, as discussed in part three. The traditional distinction between manufacturing and modern services activities is narrowed as these services activities increasingly maintain the unique characteristics limited to manufacturing in the past to play pivotal role in development and sustainability – a testimony for the unavoidability of the synergetic relationship between the two.

The second part of the empirical work has important insights, exploring the various determinants of industrial development taking country level manufacturing share in GDP and in employment as dependent variable. Without relegating the synergetic relationship between economic sectors, governments of countries in SSA need to put with their policy menu a clear direction on how to improve the countries integration with the GVCs in a way to secure a place there and benefit from the opportunities as well to identify which manufacturing activities and production would generate more important economic benefits than others given their current competitive advantage and capabilities/competencies. Gerefil and Fernandez-Stark (2011) argued that the ability of low-income countries to effectively secure a place in GVCs is necessary for their development in terms of capturing gains "that contribute to development, capability building and employment." Further research is required to explore if the various determinants included in the study could impact differently on the various manufacturing activities (e.g. categorized by their technology intensity: low-tech, medium-tech and high-tech) through employing different approach (e.g. GVCs approach).

The regression results for the full sample and SSA groupings give indication of an inverted U-shape relationship between per capita GDP and manufacturing share (both value added at constant price and employment) consistent with previous studies findings. However, the U-test result does not support the existence of such a hump-shape. Interestingly, the result for Asia panel suggests a linear (increasing) relationship for both output and employment share, suggesting that structural transformation in the region is very closest to the stylized facts and empirical regularities for advanced countries. This implies that the countries in Asia, on average (diversity across countries is being respected), still maintain strong manufacturing base even with rising per capita GDP and growing importance of services in the economy. The evidence puts strong punch over the implicit advice to developing countries in recent studies to abandon manufacturing-led development path, as the world entered to the era of digitalization and robotics, hence services transformation.

The estimation results of the other explanatory variables may also give important insights. To the full sample and the two country groupings, technological progress in manufacturing relative to skill-intensive and Baumol's diseases services come out statistically significant, positively related to manufacturing value added (typically with the AMG and CCEMG estimators). Nonetheless, the two variables are positively (negatively) related to manufacturing employment share for the full sample and Asia (SSA). This is in line with Rodrik's (2016) prediction in that developing countries, being price takers in the international market, import negative effects of technological progress (the diffusion of skill-biased technology) from abroad with implication of shrinking manufacturing employment. However, manufacturing employment in SSA showed mixed patterns: increasing, shrinking and stagnating at lower level.

Focusing on AMG and CCEMG estimation approaches, the results for the proxy variables for international trade and globalization (trade openness and net FDI) come out with mixed signs and significant levels. The result contrasts with Krishna (2009) who found that openness could cause deindustrialization in developing countries depending on the extent of economic distortions associated with corruption and technology, legal constraints, constrained incentive structures, feeble infrastructure, high transport costs and interaction between these effects could put the fairness of international trade in question. On one hand, trade openness impacted positively (and mostly statistically significantly at 0.01 level) on the share of manufacturing value added and employment. On other hand, net FDI maintains positive (negative) relationship with manufacturing value added share for Asia (SSA) and negative relationship with employment share for both Asia and SSA [which come out with mixed coefficients for the full sample in both shares depending on the model applied].

Another interesting finding is that agricultural value added share impacted negatively and significantly on manufacturing value added share for the full sample and the two country groupings with AMG and CCEMG models, but positively with FE-DK model. By contrast, the sector's employment share has negative (positive) relationship with manufacturing employment share for SSA and Asia (full sample) whose magnitude is commendable. The other observation is that the rise in employment share of the transport and business services activities causes manufacturing employment share to go up for SSA and to go down for Asia, suggesting the divergence development and production transformation patterns between the two regions. The result for the full sample is mixed (inconclusive) depending on the model used. The value added share of these services activities maintain most of the time negative relationship with manufacturing value added share with manufacturing for both Asia and SSA.

Another interesting finding is that the effect of ECI on manufacturing employment share become positive for the full sample and negative for SSA. By contrast, ECI impacted manufacturing output share negatively (mostly significantly) in both the full sample and the two country groupings with the AMG and CCEMG estimators. Also, industrial density has significant positive effect on manufacturing development (both in value added and employment share) for the full sample and the two country groupings, the magnitude of the coefficient is larger for Asia than SSA. The coefficient for real exchange rate (and devaluation as alternative proxy) come out with positive and negative values across models and country groups. The negative sign gives indication for the negative impact of real exchange rate on manufacturing development, supporting a strand of literature that documents that the rise in real exchange rate causes deindustrialization on average. In short, the negative sign suggests that the relative size of manufacturing relates negatively (positively) to the degree of real exchange appreciation (depreciation). It gives indication that decreasing appreciation or increasing depreciation of the real exchange rate can stimulate economic activities and shifts resources in the direction of manufacturing.

All said, the findings suggest that the determinants of industrial development in Asian countries, which have mostly followed a manufacturing-led development path, differs from SSA, if not always from the full sample. In fact, certain results come out similar. Nonetheless, as already indicated previously, the Asian sample economies demonstrate linear and positive relationship between manufacturing and per capita GDP. The findings for SSA give indication for the occurrence of services expansion with industrial stagnation at least for the largest portion of the countries included in the sample.

If one determines to draw general pictures from Tables 22 and 23, he/she may find mixed results (with respect to signs and significance of the coefficients) moving from one model to another [typically from FE-DK to the more preferable AMG and CCEMG models) and across country groupings. Some variables, which were expected to be steadily significant (and positive/negative) turn out to be insignificant (and negative/positive) in both the full sample and one country group and significant for another. The second observation he/she may pick is that the driving forces for manufacturing development across country groupings and overtime may appear rather more complex and heterogeneous than the theoretical discussions render. This implies that repercussion of the various explanatory factors on manufacturing development differs between regions and across countries in each region. The findings suggest the need to institute concerted efforts by governments of SSA economies to use industrial policy to guide manufacturing firms compete in the fragmented GVCs and benefit from the opportunities created with the Fourth Industrial Revolution. Future research may dwell on identifying varieties of deindustrialization or premature tertiarization in developing countries employing appropriate method. It would give important insights if future research extends the estimation to different manufacturing activities by level of development (low-income, middle-income and high-income; by regions; by manufacturing export level (manufacturing exporters and non-manufacturing exporter's); by population dynamics and size, and by sub-period (e.g. pre-1990 and post-1990). It may also sound important if future research includes additional variables to draw much wider insights on the determinants of industrial development.

PART SIX: ECONOMETRIC ESTIMATES ON SECTORAL-LED DEVELOPMENT PATH

6.1 Introduction

Part six seeks out verifying the conclusions drawn from the theoretical discussion and the descriptive analysis made in the preceding parts – that is, *to empirically confirm or refute the claim that productive structure [and aggregate demand elements] play pivotal part in economic growth of nations, explaining the divergence growth trajectories and catching-up experience across regions and countries*. In particular, it intends to see whether manufacturing plays engine of growth role in the considered SSA and Asian economies, evidencing the existence of a dynamic long-term causal relationship between growth rate in that sector and economic growth in line with Kaldorian and Structuralist traditions. To this effect, recent panel-data estimation approach is employed to tackle pertinent issues such as endogeneity and reverse causality, cross-sectional dependence and slope heterogeneity with the original Kaldor's growth equations, in a way to address the following questions: (i) *Does manufacturing still wear its premised cardinal potentials that could enable it serve as engine of growth? Especially, does manufacturing demonstrate powerful growth engine effects relative to services and agriculture in SSA and Asian sample economies? (ii) Can skill-intensive services present special properties that enable them replace manufacturing or to play a mere stimulus complement role to manufacturing? (iii) Could agriculture have the capacity to be growth escalator in SSA economies?* Therefore, the estimation not only examines the validity of Kaldor's three growth laws across the sampled countries as they stand, but also extends them to the Baumol's disease services and the skill- and knowledge-intensive services as well as to agriculture.

As thoroughly discussed in part three, the conventional discourse pertains to the role of manufacturing in development and sustainability of an economy encountered severe challenge from proponents of the services-led development route since the 1980s. In such discourses, the empirical regularities and stylized facts drawn based on the paths of production transformation in advanced capitalist economies is kept aside as a mere historical tales. Even some proponents of the manufacturing-led development path point out that only the high-tech manufacturing industries can present growth-enhancing potentials in the economy, not all manufacturing activities and production. However, the experience of emerging morning stars in Asia evidenced that light-manufacturing industries can still maintains vital place in the development and transformation process in developing economies, where production and labor costs are found to be relatively low.

Based on the development discourses discussed in part three and on previous empirical works carried out on Kaldor's growth Laws, the present dissertation hypothesized that manufacturing does not loss its many special elements that make it pace-setter in the economy, where skill-intensive services (Information Communication; Financial, Insurance and Real Estate activities; Professional Business Services) stand as *"stimulus complement"* to manufacturing. *The contribution of part six is mainly empirical, exploring whether manufacturing has still maintained stronger positive effect on economic growth than services and agriculture sectors through applying up-to-date dynamic panel estimation techniques that account for cross-sectional dependence, slope heterogeneity and non-stationarity. To the best of the researcher's knowledge, this is a first attempt [or one of a very scanty attempts] of treating these issues in empirical works pertinent to the sectoral engine of growth analysis.*

6.2 Analytical Framework

The analytical framework and empirical model here rests on Kaldor's insight on the role of production structure and demand for long-term growth of an economy.[96] As such, the empirical exercises seek to test the theoretical foundation, propositions, claims and descriptive analysis presented in parts one to four and therefore, to identify a leading sector, if there be any, which has the potential to play unique role in pulling the rest of the economy than other sectors. Additionally, aggregate demand elements such as investment, government consumption and export are included with Kaldor's original equations as robustness check to the consistency of the estimates on one hand, and to evaluate the impact of these variables on economic growth of the considered SSA and Asian economies on the other. The dissertation contributes to the literature in this aspect too.

The Frist Law: Manufacturing industry as growth escalator

The First Law postulates a positive relationship between the rates of growth of manufacturing value added and total output. It states that the faster the value added growth of manufacturing, the faster and the higher will be the growth rate of GDP (Thirlwall 2013). However, this relationship is not in the *definitional sense, as manufacturing output is part of total value added, but in the causal sense running from manufacturing growth to the growth rate of total output* (Wells and Thirlwall 2003). Manufacturing maintains this role on account of its strong forward and backward linkages with the rest of the economy (Tregenna 2008), generating additional demand for goods and services offered by the non-manufacturing sectors. Additionally, diversified manufacturing production induces export growth, in turn propel economic growth more than any other sector does.

[96] This contrasts to the orthodox neoclassical view "that deals with a one-good economy in which structure and demand do not matter, and in which supplies of factors of production and technical progress are exogenously given" (Thirlwal 2017, Pp 4). According to the Solow growth model, growth of GDP is explained by population growth and technical progress. The heterodox wing maintains a different theoretical strand, arguing that "long-term growth depends on aggregate demand and particularly on the growth of its autonomous component" (Deleidi et al 2018 pp 1).

Algebraically, the first growth law can be estimated using the following regression equation:

$$Y_{it} = \alpha_1 + \beta_1 Q_{mit} + \varepsilon_{it,} \qquad \beta_1 > 0 \qquad\qquad (16)$$

Where, Y_{it} and Q_{mit} represent real GDP growth and real value added growth of manufacturing respectively [the model is extended to Baumol's diseases services ($Q_{bds,it}$), high-productivity services ($Q_{hps,it}$) and agriculture ($Q_{ag,it}$) in the present study]; t stands for time period, i denotes country, and ε_{sit} denotes the error terms. In equation (16), the coefficient (β_1) captures the magnitude for the effects of manufacturing output growth on the growth of the economy, which is expected to be positive, but less than one *à la* Kaldor. For the 12 developed countries included in Kaldor's original study [over the period covering between 1953/4 and 1963/4], the coefficient (β_1) was 0.61. The estimate was far higher than the sector's value added share in GDP (which was in the range of 25 to 40 percent), in part because the sampled economies had already built strong manufacturing base. *Whether this empirical regularity still holds for different samples (mainly from developing and emerging economies) and period of analysis is a matter of empirical estimation, and the present study may contribute also in this respect.*

Many empirical works that employed cross-section, panel and time-series econometric techniques have lent strong support for Kaldor's engine of growth hypothesis, confirming the existence of strong positive correlation between manufacturing value added growth and GDP growth (e.g. Wells and Thirlwall 2003; Dasgupta and Singh 2006; Libanio 2006). *The perverse is that a strong positive correlation between the growth rates in agriculture and services sectors value added and GDP does not exist in the same magnitude.*[97] Rodrik (2006) confirmed that the economic growth records of developing countries observed since 1960 was strongly connected with the expansion of manufacturing activities and manufacturing production. Szirmai (2012), taking a sample of 67 developing countries, found supportive evidence for the engine of growth role manufacturing has played in the countries included in his sample. The findings of Fagerberg and Verspagen (1999) likewise revealed the pivotal role have the most dynamic manufacturing industries played in economic growth. Rodrik, Szirmai, Fagerberg and Verspagen and many other researchers all argue that *shifting resources towards the increasing returns manufacturing sector is the secret recipe that enabled rich countries rich and stayed that way. Whether this message holds for the countries included in the present study will be verified in the next sections.*

[97] Even, some econometric findings evidenced the absence of correlation between the growth of agriculture and GDP growth in a causal sense. Also, the coefficient for services was lower than the coefficient for manufacturing in most of the country specific and cross-sectional studies (Thirlwall 2013).

It should, however, be worth noting that the analytical framework of the First Growth Law is not immune from flaws. The first concern pertains to spuriousness problem as the growth of manufacturing value added [or output growth of other sectors] is part of the overall output growth of the economy (share effect). As a response to the critics and to remove the share effect, hence to tackle the spuriousness correlation that may present in equation (16), two additional tests were formulated. One is regressing the growth rate of GDP on the excess of the growth rate of manufacturing value added over the growth rate of non-manufacturing value added (Thirlwall, 1983; Drakopoulos and Theodossiou, 1991) as specified in equation (16a) below.

$$Y_{it} = \alpha_2 + \beta_2(Q_{mit} - Q_{nmit}) + \varepsilon_{it,} \qquad \beta_2 > 0 \qquad (16a)$$

The second (and for some researchers, the most preferred formulation) is given by the relation between the growth rates of non-manufacturing sectors' output on the growth rate of manufacturing output, as specified below:

$$Q_{nmit} = \alpha_3 + \beta_3 Q_{mit} + \varepsilon_{it,} \qquad \beta_3 > 0 \qquad (16b)$$

In equation (16b), the regression coefficient (β_3) indicates the power and magnitude of the impact of the growth rate of manufacturing output on the growth rate of non-manufacturing sectors. The coefficient can thus be taken as the main indicator for the engine of growth role of the sector.

The fact that the empirical regularity observed with respect to equation (16) rests solely on the magnitude of the coefficient (β_1), disregarding the remarkable share effect of the sector (25 percent to 40 percent of GDP) may suggest that the estimation results might have been spurious and misleading. In fact, some observers cast doubt on the intuition behind the analytical framework as Kaldor himself confirmed that the proposition that links the size of a sector (in relation to the whole economy) and economic growth is "factually incorrect." Essentially because, higher correlation may not necessarily confirm unidirectional causality while the analytical framework may fail to capture the idea of increasing/decreasing returns per se.

The second concern pertains to labor movement. Kaldor (1967) posits that countries whose labor force is largely engaged in agriculture can relatively catching-up and forging-ahead than countries that have no surplus labor to be moved to manufacturing industries. The intuition behind this view is that the shifting of labor away from agriculture to manufacturing and other urban sectors would have growth propelling effects both in manufacturing and the rest of the economy. In view of defending this proposition, proponents cite the experience of emerging industrializers that saw larger movements of their workforce to manufacturing over the last few decades. China and other

Asian morning stars such as Vietnam are cases in point. However, other commentators contend that the shift of resources away from subsistence agriculture and other traditional activities may not always happen in today's low-income and populous economies (such as Ethiopia) as these economies lack the capabilities for undergoing rapid industrialization.

Finally, as discussed earlier, the services sector has exhibited growth acceleration outpacing manufacturing even in poor countries that are characterized by lower level of per capita income and weak manufacturing base. Therefore, it may not be surprising to see strong positive correlations between the growth rates of services output and GDP. Even in Kaldor's original regression, the value of the slope coefficient for services sector was close to unity. While interpreting the results, nonetheless, he said that the direction of causation went from the growth of overall output to services output rather than the other way around. Such strong conclusion could be debatable. However, in support of Kaldor's interpretation, Drakopoulos and Theodossiou (1991) posit that the strong positive correlation between services output growth and GDP growth should be explained through reciprocal demand where the demand for services arises from the demand for manufacturing output itself.

Szirami (2013) asserts that advanced economies have larger share of services attributed to higher income elasticity for services than for manufacturing. In that case, the share of services sector would not necessarily exhibit weak correlation with per capita income level. This corroborates Baumol's hypothesis, which states that an economy holds increasing demand for domestic services while its income per capita keeps growing. This may not seem contradicting with the relatively higher growth enhancing properties manufacturing has. Basically, the larger share of services in the economy in this analytical framework is simply a manifestation of a maturing economy.

Deleidi et al. (2018) highlight that the substantial increase in the value added and employment share of services sector in advanced economies during the last decade "might feature not only lower value added per labor unit, but also less scope for labor productivity increases to be achieved through economies of scale stimulated by aggregate demand growth, in contrast to what occurs in manufacturing."

However, some recent studies (e.g. Timmer et al. 2015) confirmed that growth acceleration in developing economies has been driven by productivity increases in the services sector rather than in manufacturing. This finding blasphemes the empirical regularities observed in today's advanced economies and emerging ones, wherein the faster growth of manufacturing output triggers cumulative productivity increases through enhancing productivity of both manufacturing and non-manufacturing sectors. This leads to the Second and Third Growth Laws, where the latter receives little place in recent structural change and growth literature (Andreoni and Chang 2016).

Pacheco-López and Thirlwall (2013) tested Kaldor's first law in an open economy set up with a new interpretation. The model discussed above is closed economy with no foreign trade and no balance of payment or foreign exchange constraint. Kaldor himself argued that the major source of demand for manufacturing output comes from agriculture in the early stages of transformation and development process, and from export in the later stage of development. As already discussed in part three, manufacturing plays pivotal role to the economy through its contribution in international trade and a country's balance of payment as manufactures account for the largest share of foreign trade. The product space framework suggests the existence of strong relation between manufacturing output growth and export growth one hand, and between export growth and GDP growth on other hand. So, Pacheco-López and Thirlwall (2013) posit that the first growth Law of Kaldor is a reduced form of two structural equations.

The first of the structural equation is expressed as:

$$Y_{it} = \alpha_4 + \beta_4 X_{it} + \varepsilon_{1it} \qquad (17)$$

Where, Y_{it} is growth of GDP, and X_{it} represent the growth of total exports.

The second of the structural equation is expressed as follows:

$$X_{it} = \alpha_5 + \beta_5 Q_{mit} + \varepsilon_{2it} \qquad (18)$$

Where, definition of variables is as previously given. Now, substituting equation (17) into equation (18) gives:

$$Y_{it} = \alpha_4 + \alpha_5\beta_4 + \beta_4\beta_5(Q)_{mit} + \beta_4\varepsilon_{2it} + \varepsilon_{1it} \qquad (19)$$

or

$$Y_{it} = a + b(Q)_{mit} + \varepsilon_{3it} \qquad (20)$$

Where, a = $(\alpha_4 + \alpha_5\beta_4)$;

b= $\beta_4\beta_5$;

$\varepsilon_{3it} = \beta_4\varepsilon_{2it} + \varepsilon_{1it}$

In such open economy model setup, the effect of manufacturing output growth on GDP growth depends on the impact of the sector's output growth on total export growth (β_5) and the extent to which export growth impacts on GDP growth (β_4), which is sometimes called the dynamic Harrod trade multiplier result (Pacheco-López and Thirlwall 2013).

The reduced form coefficient in equation (20) is decomposed into two structural components ($\beta_4\beta_5$) by first estimating equation (17) as a first stage (as Q is exogenous) and them estimate equation (18) as a second stage (as X is endogenous) using the predicted X ($\widehat{X}$) from equation (17).

The Second Law: Manufacturing as the main source of productivity growth

The Second Law[98] states that the rate of growth of manufacturing output induces the rate of growth of labor productivity in that sector, owing to increasing returns to scale which are not shared by other sectors. Kaldor applied the Second Law in two different and equivalent analytical frameworks: The left hand side of the regression equations could either be growth rates in manufacturing productivity (PQ_m) or manufacturing employment (EQm), constructed as below:

$$PQ_{mit} = \alpha_6 + \beta_6 Q_{mi} + \varepsilon_{it,} \qquad \beta_6 > 0 \qquad (21)$$

$$EQ_{mit} = \alpha_7 + \beta_7 Q_{mit} + \varepsilon_{it,} \qquad 1 > \beta_7 > 0 \qquad (22)$$

Where β_6 denotes the Verdoorn's coefficient (a positive parameter) which in empirical studies take the value of around 0.5. Equation (21) is specified to avoid the likely spurious correlation as productivity growth is the difference of output growth to employment growth of the sector (i.e. PQm≡Qm - EQm). β_7 is predicted to be less than unity, reflecting the existence of dynamic increasing returns in manufacturing; the sufficient condition for there be increasing returns to scale is $\beta_7 = 1 - \beta_6 < 1$. Verdoorn's Law is often written as equation (22), but Kaldor preferred to write it in equation (21) as he thought this equation is applicable in situation where the growth rate of manufacturing employment was either zero or a constant, resulting in a perfect correlation between productivity growth and output growth of the sector - that is, where output and productivity grew at the same rate.

Various research works have tested the causal relation between output growth and productivity growth of manufacturing for both developed and developing countries over different time periods (e.g. Deleidi et al. 2018; Magacho and McCombie 2017; Magacho 2016; Millemaci and Ofria 2014; Wells and Thirlwall 2003; Pieper 2003). The findings evidenced the existence of dynamic returns to scale in manufacturing, interestingly though some estimation results also confirmed the presence of dynamic returns in services too, if not for all country groupings. However, in most of the studies

[98] The Second Law is often referred to as Verdoorn's Law after the Dutch economist Verdoorn (1949) who examined the productivity-output nexus for a sample of European countries between the first and second World Wars. The coefficient for Kaldor's estimation had turned out positive, leading him to conclude that growth in manufacturing productivity or employment were explained mainly by faster growth in manufacturing output.

undertaken for samples of developing economies, no evidence of increasing returns was observed in agriculture and services sectors. Kaldor himself highlighted that the Verdoorn's Law may not be restricted to manufacturing or to all manufacturing activities alike. He also argued that the growth rate for manufacturing (also utilities and construction) has higher potential to push output growth on account of its direct impact on productivity increases within manufacturing and its indirect effect on non-manufacturing sectors. When the scale economies of the sector is higher, employment elasticity with respect to output would be lower as productivity increases due to output expansion, suggesting that output expansion induces a less than proportional employment creation that results in productivity gains.

According to Libânio and Moro (2011), Kaldor's interpretation of Verdoorn's law is a technical relation, evidencing increasing returns to scale in manufacturing. His interpretation of Verdoorn's Law might be connected with his hypothesis on the source of economic growth, which in his view is demand-driven. In their opinion, employment and output growth variables in equations 21 and 22 can likely be determined jointly. When one considers Verdoorn Law a production relations, he/she may generalize that the rate of growth of employment causes the rate of growth of output in a technological sense, making the estimation tricky as the dependent and explanatory variables are auto-correlated in both equations. In view of addressing such problem, various studies included in their samples countries with the same productivity growth rates or use regions within a country's territory, assuming intra-border productivity is endogenously provided.

Other studies prefer to include control variables in their estimations, based on Kaldor who posited that the interplay of several variables that fall within the demand and supply side may explain differences in manufacturing output growth rates. According to Kaldor, domestic investment, consumption and net exports (demand side) are major sources of growth, investment being the most crucial variable. [99] Generally speaking, the evolution of productivity in Kaldor's technical production function framework is a positive function of the rate of growth of capital per worker, wherein the circular process of investment demand leads to innovation and stimulates further investment. Developed economies have better consolidated capital goods industry, generating demand for their own goods during the process of increasing supply through investment. That is, expansion of the productive capacity in the investment goods sector feeds into the demand for the

[99] For Keynes aggregate demand, particularly investment and government expenditures play pivotal role in determining the level of employment, income and production; but, technical progress was not his main concern. By contrast, most of the works based on endogenous growth models (e.g. Romer 1990) as well as evolutionary models (e.g. Nelson and Winter 1992) have been driven by Schumpeterian characteristics with endogenous innovation, but do not take into account demand dynamics and the interaction between innovation and aggregate demand.

sector's own products, establishing a feedback cycle. Ultimately, the capital assets industry[100] accelerates the output growth rate until it hits a technological threshold. When it comes to consumption, a high income elasticity for manufactured goods is typical of an intermediate income zone, to ensure that growth tends to be greater because the expansion of manufacturing industry shall leverage the growth rate of real income; this raises the demand for manufactured goods (Marconi et al. 2016).

Deleidi et al. (2018) estimate the Kaldor-Verdoorn law with a novel approach of using autonomous components of demand (public spending and export) as a proxy for output growth as explanatory variable. They found that higher growth of autonomous components of demand strongly induces labor productivity growth in manufacturing industry, which is more pronounced in countries where the share of the secondary sector in the economy is large. However, their findings evidenced mixed results and lower effects in services and construction sectors, indicating that increasing returns to scale are higher in manufacturing than in other sectors. The authors strongly claim that the shift of the economy towards services sector in advanced economies signifies an overall lower responsiveness of productivity growth to aggregate demand growth and less scope for scale economies. Nevertheless, given the heterogeneity of services sector, "sensitivity to increasing returns and embodied technical change may differ across industries within the sector, and more disaggregated future empirical enquires may be needed" (pp 23).

The Third Law: Manufacturing induces productivity in non-manufacturing sectors

The Third Growth Law states that manufacturing output growth induces productivity growth outside of manufacturing. It holds that the faster the growth of manufacturing output, the greater the rate of labor transfer from other sectors [where productivity is lower or the marginal product of labor is below average product of labor] to manufacturing industries [where productivity is higher]. In the process, average labor productivity in non-manufacturing increases, leading to the rise in economy-wide labor productivity and GDP growth as well (Wells and Thirlwall 2003). This is why Kaldor states that manufacturing presents special elements, which trigger spillover effects in agriculture and services sectors. *On one side, the expansion of manufacturing production is predicted to boost economy-wide productivity through absorbing underemployed and surplus labor*

[100] Kaldor highlights four development stages of industrial structure and exports. The first stage is light industrialization, involving imports of capital goods and exports of commodities and low value-added manufactured goods. The industrialization process merely evolves if the country becomes a net-exporter of sophisticated manufactured goods (second stage), until it is able to form a domestic capital goods industry (by means of import substitution industrialization that would function as the third stage, sometimes simultaneous to the second stage) and then export these products (fourth stage). In all cases, when investment, consumption and net-manufactured goods exports have reached maturity, demand growth tends to slow.

from subsistence agriculture, offering more productive capital goods, spreading technological knowhow, and creating markets for new modern services. On other side, the shifting of surplus labor to manufacturing[101] *away from agriculture and other sectors would enhance productivity in these sectors partly because of improvement in the productivity of the remainder of the labor forces in these sectors.*

These propositions are supported by empirical findings. For instance, the findings of Szirmai (2012) revealed that inter-sectoral spillover effects in modern economies arise from manufacturing and spread to other sectors, such as the services sector. Referring to Cornwall (1977), Verspagen (2012) wrote that manufacturing contributes substantially to productivity improvement in all economic sectors, through technological interdependence and/or input-output linkages between sectors.

In general, the Third Law predicts that the faster the growth of employment in non-manufacturing sectors, the slower will be economy-wide productivity growth.[102] To test for the relationship between the labor transfer and the growth of economy-wide labor productivity, the following specifications were employed[103]:

$$P_{it} = \alpha_8 + \beta_8 Q_{mit} + \beta_9 E_{nmit} + \varepsilon_{it} \qquad \beta_8 > 0 \, , \beta_9 < 0 \qquad (23)$$

$$P_{it} = \alpha_9 + \beta_{10} Q_{it} + \beta_{11} E_{nmit} + \varepsilon_{it} \qquad \beta_{10} > 0 \, , \beta_{11} < 0 \qquad (24)$$

Where Enm and P capture the growth of employment in non-manufacturing sectors and economy-wide productivity growth, respectively; Em denotes the growth of employment in manufacturing [which would be extended to other sectors, in which case "m" will be replaced by ag, hps, and bds for agriculture, higher-productivity services, and Baumol's disease services respectively]. Equations 23 and 24 estimates the effect of growth in employment in non-manufacturing sectors on economy-wide productivity growth, controlling for the effect of manufacturing value added and

[101] The Kaldorian framework predicts that when the surplus of labor becomes exhausted, and productivity level tends to equalize across sectors, the magnitude of economy-wide productivity growth induced by the growth of manufacturing output tends to slow down. Yet, Thirlwall (2013) counter argued that "manufacturing output growth is never constrained by a generalized shortage of labor, because labor is a very elastic factor of production in terms of hours worked, participation rates of males and females, and the possibility of international migration." Kaldor stresses that this process is characteristic of economies in transition from 'immaturity' to 'maturity' where an 'immature' economy is defined by amount of labor available to be transferred to industry (Thirlwall, 2013). So, growth rate is likely faster during the initial stage of development, which would then decelerate as economies mature and become more service-oriented.

[102] If that is the case, productivity growth in the economy will be positively correlated to the value added growth of output in manufacturing. However, it is not easy to test the relationship between the shifting of labor and the growth of economy-wide productivity directly, owing to the difficulty in measuring productivity growth in many activities outside manufacturing.

[103] Thirlwall (1983) estimated the Third Law using equation (23) while Hansen and Zhang (1996) and Drakopoulos and Theodsiu (1991) used equation (24).

employment growth [the same is true with other sectors]. In equation (24), the growth of manufacturing output may reflect net-increment in resources rather than a mere reallocation of resources from one use to another. Thus, this may make it a more preferable specification.

Several empirical works have tested Kaldor's Third Law, albeit the difficulties in measuring labor productivity growth in services type activities and public goods (such as education and health). Some of them (e.g. Hansen and Zhang 1996) found a strong negative relation between economy-wide productivity growth and employment growth in non-manufacturing sectors, validating Kaldor's proposition. However, other recent observations suggest that the estimate may not be confined to manufacturing output alone; skill-intensive and knowledge-based services can also contribute to economy-wide productivity growth with the same magnitude to manufacturing. In defense of this claim, they argue that manufacturing has become more sophisticated, high-tech and skill-intensive with the advance of technology and therefore, the demand for specialized services increased substantially.

Be it so, could services sector become propulsive sector, substituting manufacturing to play central role in the transformation and development process of poor countries? The answer to such question could be debatable. The discussion in part three indicates that manufacturing has a far greater backward production and employment linkages than services while services depend unduly on manufacturing (as a source of demand) than vice versa. In addition, the share of skill-intensive services in the economy of low-income economies is expected to be less available compared to other sectors. This makes estimation of Kaldor's Third Law, controlling for the growth of manufacturing and higher-productivity producer services, interesting in view of exploring whether these sectors are complementary or adversative.

6.3 The Econometric Approach

As already indicated, endogeneity problems in equations similar to equation (16) might arise from correlation of the independent variable with the error terms, omitted variables in the regression, reverse causality, etc. Although the additional regressions to tackle the problem of spurious correlation (such as equations 16a and 16b) are employed, it may be far away from a satisfactory solution partly because the growth rates of GDP and the sector's output could be correlated reciprocally. Addressing such problem could be possible with the use of appropriate dynamic estimation technique. The present dissertation contributes to the structural change and growth literature in this regard.

Kaldor and several other researchers run pooled ordinary least square (OLS) or fixed effects (FE) regressions, according to the static specification. Expecting unidirectional causation that goes from the value added growth of the sector in question (e.g. manufacturing) to GDP growth may not be always true; in reality, a bi-directional causality may possibly exist. Additionally, OLS estimation may suffer from simultaneity bias in finite samples (often reflected in correlation between the independent parameter and the error term), which would happen when there is reverse causation – that is, when the dependent variable causes the independent variable. Also, OLS imposes common intercept and slope coefficients for all cross sections, disregarding individual heterogeneity. A look into an alternative econometric technique is, therefore, mandatory if one seeks to tackle the endogeneity problem. Fixed effects estimator is one such commonly used alternative model, which assumes homogenous slopes and variance of the estimator, but country-specific intercepts. In particular, in two-way fixed effect models, cross sectional and time effects can be observed through the inclusion of dummy variables to the regression. However, it encounters severe problems that stem from the loss of degree of freedom; even for T=30, it can present a significant bias (Baltagi, 2008). The parameter estimates produced by fixed effects model would be biased when some of the independent variables are endogenous and correlated with the error terms (Campos and Kinposhita 2008 cited in Samargandi et al. 2015).

Such static models impose homogeneity in the model's slope coefficients across countries even when there exists substantial variations between them, which may lead to serious bias when in fact the dynamics are heterogeneous across cross-section units (Holly and Raissai 2009). Thus, the use of other efficient estimation techniques is beyond question to address the problems. Here comes the importance of dynamic panel data models. Baltagi (2008) argues that dynamic panel data models capture the dynamic feature of economic relationships and they are characterized by two sources of persistence over time: Autocorrelation due to the lagged dependent variable and individual effects capturing country heterogeneity. With the presumption that differences in the productive structure resulted in the divergence between the economies of SSA with those in Asia, the long-run and time-series properties of the variables may appear important for the empirical analysis. Also, short-run analysis may be required to deal with business cycles. This endorses the importance of employing up-to-date estimation approach that takes both long-term and short-term issues on board, such as panel ARDL technique.[104]

[104] The ARDL model was introduced by Pesaran and Shin (1995; 1999) and Pesaran et al, (1995, 1997). This technique is contrasted with the widely used GMM-difference estimator proposed by Arellano and Bond (1991) to correct endogeneity. The main advantages of GMM estimators relate to their perceived robustness to heteroscedasticity and non-normality of the disturbance terms. Moreover, the use of instrumental variables helps address biases arising from reverse causality. Nonetheless, the violation of moment conditions (e.g. non-stationarity of the data) will yield

The error correction form of ARDL model can be estimated through three estimators, which are computed by maximum likelihood method, namely: the mean group (MG) estimator (Pesaran and Smith 1995); the pooled mean group (PMG) estimator (Pesaran et al. 1999); and the dynamic fixed effects (DFE) estimator. The assumption made about the homogeneity/heterogeneity of the slope coefficient decides on the choice among these estimators.

The MG estimator requires estimating separate regressions for each country and calculating the long-run coefficients as un-weighted mean of the estimated coefficients for each cross-section units, allows for heterogeneity.[105] However, the consistency of the estimates of this approach is conditional on having a sufficiently large time-series dimension of the data (Samargandi et al. 2013; Pesaran 2015). The MG estimator does not impose restrictions on the cross-sectional parameters and ignores any possibility for some parameters to be the same across countries. It affords the maximum degree of heterogeneity give that all intercepts and coefficients differ freely (Pesaran and Smith 1995). However, the estimator is not immune from flaws: (i) the estimator, albeit consistent, might be inefficient in small cross-country dimension (N); and (ii) the estimator is sensitive to any country outliers which may affect the averages of the country coefficients severely (Samargandi et al. 2015). The DFE estimator restricts the speed of adjustment and the short-run coefficients to be equal and also is subject to a simultaneous equation bias due to endogeneity between the error term and the lagged dependent variable in case of small sample size (see Baltagi et al. 2000; Samargandi et al. 2013).

The PMG estimator assumes homogenous slope coefficient. It also allows short-run coefficients, including the intercepts, the adjustment terms, and error variances to be heterogeneous across countries. The use of this estimator meant that the panel has similar pattern and its macroeconomic environment is affected in a similar way. It also assumes that the resulting residual of the error-correction model be serially uncorrelated and the explanatory variables to be treated as exogenous. The selection between MG and PMG estimators rests on whether slope homogeneity is imposed for the estimated long-run parameters. Basically, choosing between the two estimators entail a trade-off between consistency and efficiency. When the long-run coefficients are not equal across

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inconsistent estimates. This estimator, however, captures only the short-run dynamics (wherein the stationarity of the variables used tends to be ignored). Some scholars (e.g. Samargandi et al. 2013 and the reference cited there) argued that estimated results may not represent a structural long–run equilibrium relationship or could be spurious and that the imposition of homogeneity assumptions on the slope coefficients of the lagged dependent variable could lead to serious biases, and is likely to produce inconsistent and misleading long-run coefficients. In contrast, ARDL not only address these issues but also it has the ability to provide consistent coefficients despite the possible presence of endogeneity. This is because it includes lags of the dependent and independent variables as regressors in the model (ibid).

[105] Basically, the estimation may suit the econometric model at hand as the time series data for each country is moderately large (i.e. 45 years).

countries, the MG estimates are consistent, but the PMG estimates of the mean of long-run coefficient are inconsistent. By contrast, if the homogeneity restrictions hold, estimators that impose cross-country constraints dominate the heterogeneous ones in terms of efficiency. This implies that if the long-run coefficients are the same for individual countries, both estimators are consistent, but PMG estimators are efficient (Semargandi et al. 2015).

In sum, the ARDL framework is an attempt to address endogeneity problem through including the lags of the dependent (p) and independent (q) variables in error correction form in the standard ARDL (p, q) model. Additionally, the approach is useful for long-run analysis as it is valid regardless of whether the independent variables are exogenous, or endogenous, and irrespective of whether the underlying variables are I(0) or I(1). It can accounts for slope heterogeneity. These features of ARDL approach are appealing for fitting the Kaldor growth model at hand, because in such model reverse causality that may lead to biased coefficients is likely. However, the global dynamism may affect regions and countries in different ways. Thus, cross-section dependence of the error terms is a possibility in a model of equation 16 type. This makes the cross-section dependence (CD) test a must do task; ignoring the cross-section correlation in the error could lead to problem. If cross-section dependence is observed in the panel data, the use of cross-section augmented ARDL approach (CS-ARDL) is preferred, instead of the traditional ARDL approach. As will be discussed below, CS-ARDL involves augmenting the right hand side variable set with the cross-sectional average of dependent and independent variables as well as a series of their lag values (Pesaran 2006; Chudik et al. 2013; 2011). The additional variables are intended to account for the cross-section correlation in the error terms. Apart from this, Chudik et al. (2013; 2015) have introduced a cross-section augmented distributed lag model (CS-DL) approach with some desirable properties when the intent of the research is to estimate only long-run coefficients. These approaches will be explained in further detail in the next section.

6.4 The Econometric Models and Empirical Analysis

It may sound interesting to estimate variety of econometric models that differ in their inherent assumption about the parameter, the error term and dynamics to confirm the consistency of the estimates, and the sign and magnitude of the long-term effects of sectoral developments on growth of the economy. The econometric models given below are applied to estimate the growth equations of not only for the First Law, but also for the Second and Third Growth Laws of Kaldor [and for both sectors], as discussed in section 6.2

Static Model:

The three Kaldor's law can be estimated employing both static and dynamic models. For the static model, the following regression is used:

$$y_{i,t} = \alpha_i + \beta_i x_{i,t} + \varepsilon_{i,t} \qquad (25)$$

Where y_{it} denotes the dependent variable [such as economic growth explained by total value added growth for the first law; sectoral productivity growth and employment growth for the second law and economy-wide productivity growth for the third law], and x_{it} represents explanatory variables [such as sectoral value added growth, productivity growth and employment growth as well as investment growth, export growth and government consumption growth] as explained in equations 16 to 24 and in the subsequent sections. α_i is an intercept. The dependent and the independent variables as well as their coefficients and the intercept constitute the observable part of the model and are specific to country i (number of units) at time periods t for i= 1, 2, … ,N and t=1, 2, …,T.

The coefficients of the static panel time series model is estimated for the whole period of analysis for the full sample and for Asia and SSA panels separately. In equation (25), the parameters are imposed homogeneous and that the error terms are assumed cross-sectionally independent. In such framework, cross-country dependencies that stem from combined effect of unobserved common factors are disregarded. The equation is fit for pooled OLS (POLS) and fixed effects (FE) estimators. Additionally, the IV mean group (MG) estimator is employed which allows for heterogeneous parameters (tackling observed country-specific conditions).

Nevertheless, as already indicated in part five, a common problem in panel data estimation with a large number of observations across time and cross-sectional units is cross-sectional dependence, which may lead to biased and inconsistent estimates if not taken care of (Ditzen 2018). To turn a blind eye to the exposure of countries to common shocks or unobserved common factors might result in biased and inconsistent estimates. Unobserved factors are sources of error cross-section dependence and drive all variables in a fashion that differ across countries. To tackle this problem, Pesaran and Chudik and Pesaran (2015) have developed common correlated estimators to estimate static and dynamic models. As already explained in part five, the idea of these estimators is to add cross-sectional averages which approximate cross-sectional dependence (Ditzen 2018).
Thus, equation (25) should be reconstructed in a manner that allows for cross-sectionally dependent errors as in equation (26) below:

$$y_{i,t} = \alpha_i + \beta_i x_{i,t} + \theta_i \bar{y}_{it} + \theta_i \bar{x}_{i,t} + \varepsilon_{i,t} \qquad (26)$$

Where $\bar{y}_{it}$ and $\bar{x}_{it}$ are the cross-section averages of total output growth and sectoral value added growth (that is, manufacturing, the two segments of services and agriculture for the first law as well as the respective dependent and independent variables for the second and third growth laws). Following Pesaran (2006), the cross-section averages are used as proxies for the unobserved common factors. Equation (26) is thus estimated using CCEMG estimator of Pesaran (2006), in which case heterogeneous slopes and unobserved heterogeneities are allowed. As already indicated previously, this estimator has two advantages: (i) the predetermined weights of the averages usually lead to a better small sample performance than do others that deal with error cross-section dependencies (Chudik and Pesaran 2015b); and (ii) it allows for non-stationary factors; the augmentation with averages also provides consistent estimates in the presence of structural breaks and serial correlation in errors; it does not require prior knowledge of the number of unobserved common factors or that the variables of the model and factors be cointegrated (Pesaran 2006). Additionally, for the reason already indicated in part five, the model will also be estimated through augmented mean group (AMG) estimator that allows for heterogeneous parameters (that is addressing observed country-specific conditions).

Dynamic Models:

The dynamic representation of the model is intended to deal with the various time series properties that cannot be tackled by the different static models. In the dynamic models, the long-run effects of the sectoral value added growth on GDP growth are estimated through an error correction model (ECM) form of autoregressive distributed lag (ARDL) approach.

Consider the following dynamic ARDL (1,1) panel model with heterogeneous coefficients:

$$y_{i,t} = \alpha_i + \gamma_i y_{i,t-1} + \beta_{1,i} x_{i,t} + \beta_{2,i} x_{i,t-1} + u_{it} \qquad (27)$$

$$u_{i,t} = \sum_{i=1}^{m} \sigma_{yi,1} f_{t,1} + \varepsilon_{it} \qquad (28)$$

$$x_{i,t} = \sum_{i=1}^{m} \sigma_{xi,1} f_{t,1} + v_{it} \qquad (29)$$

With, i =1,…,N and t =1,…,Ti,

Where y_{it} is the dependent variable and x_{it} an observed independent variables, which include m unobserved common factors, $f_{t,1}$ $(= f_{t,1}, \dots, f_{t,m})'$, which vary across time. The common factors are covariance stationary, have absolute summable auto-covariance, are distributed independently over ε_{it} and the fourth order moments are bounded (Chudik and Pesaran 2015; Ditzen 2018). It is assumed that $f_{t,1}$is a strong common factor that could possibly be correlated with the observed independent variables $x_{i,t}$.

In equation (28), ε_{it} is a cross-section unit-specific independently distributed (IID) error term; the factor loadings, σ_{yi1} and σ_{xi1} are heterogeneous across units and α_i is a country-specific intercepts of individual time series regressions, which capture the effects of any country-specific omitted factors that are relatively stable overtime (a unit-specific fixed effects). The heterogeneous coefficients are randomly distributed around a common mean, such that $\beta_i = \beta + b_i$, $b_i \sim IID(0, \Omega_b)$ and $\gamma_i = \gamma + c_i$, $c_i \sim IID(0, \Omega_c)$ where Ω_b and Ω_c denote the variance covariance matrices. And, γ_i lies strictly inside the unit circle to ensure a non-explosive series. Additionally, the random deviation γ_i and β_i are independently distributed of the error term and the common factors. The coefficients $\beta_{1,i}$ and $\beta_{2,i}$ denote the short-run, immediate effects of changes in x_{it} in periods t-1 and t on y_{it} in period t whereas the coefficient on the lagged dependent variable, γ_i, captures the extent of which short-run effects have long-run consequences (on the dependent variables). Put in other words, dynamic models allow the estimation of long-run relationships and this can be computed from the averages of the individual country coefficients as follows:

$$\theta = \frac{\overline{\beta_1} + \overline{\beta_2}}{1 - \bar{\gamma}} \qquad (30)$$

Where, $\overline{\beta_1}, \overline{\beta_2}\ and\ \bar{\gamma}$ are the means of the individual coefficients $\beta_{1,i}$, $\beta_{2,i}$ and γ_i respectively. The conventional approach in panel studies to compute the long-run means by dividing the sums of the pooled short-run coefficients by one minus the pooled coefficient on the lagged dependent variable. To be consistent with this approach, we compute the long-run average coefficients by dividing the sums of the average short-run coefficients by one minus the average coefficient on the lagged dependent variable (Pesaran and Smith 1995). The subscripts, i, in these coefficients indicates that all coefficients are allowed to vary across countries by estimating separate time series regressions for each country and then averaging the individual country coefficients. In the words of Pesaran and Smith (1995), the standard panel estimator techniques (such as OLS, IV and GMM) impose slope homogeneity restrictions across countries (i), and hence, they result in inconsistent and potentially misleading estimates of the average slope coefficients when the coefficients are heterogeneous.

Pesaran (2006) and Chudik and Pesaran (2015b) propose an estimator to estimate equation (27) consistently by approximating the common factors with cross-sectional averages. In a dynamic model the floor of $\sqrt[3]{T}$ lags of the cross-sectional averages are added. The estimated equation becomes:

$$y_{i,t} = \alpha_i + \gamma_i y_{i,t-1} + \beta_{1,i} x_{i,t} + \beta_{2i} x_{i,t-1} + \sum_{i=0}^{PT} \delta'_{i,1} \bar{z}_{t-1} + \varepsilon_{i,t} \qquad (31)$$

Where, $\bar{z}_t = (\bar{y_t}, \bar{x_t})' = (1/N \sum_{i=1}^{N} y_{it}, 1/N \sum_{i=1}^{N} x_{i,t})'$ represent the cross-sectional averages of the dependent and independent variables; and $\delta_{i1} = (\delta_{y,i,1,}\delta_{x,i,1})'$ are the estimated coefficients of the cross-sectional averages which are treated as nuisance parameters. This estimator is known as common correlated effects mean group estimator (CCEMG). The mean group parameter can be estimated as the unweighted average of the cross-sectional individual coefficients as follows:

$$\hat{\varsigma}_{MG} = \left(\hat{\gamma}_{MG}, \hat{\beta}_{1,MG}, \hat{\beta}_{2t,MG}\right) = \frac{1}{N}\sum_{i=1}^{N} \hat{\varsigma}_i \quad (32)$$

The asymptotic variance of the MG coefficients is the unweighted variance of the cross-sectional specific coefficients as shown below:

$$Var(\hat{\varsigma}_{MG}) = \frac{1}{N}\sum_{i=1}^{N}(\hat{\varsigma}_i - \hat{\varsigma}_{MG})\ (\hat{\varsigma}_i - \hat{\varsigma}_{MG})' \quad (33)$$

The long-run relationship in equation (31) can be estimated in three ways according to the common correlated effects (CCE) approach. These are: (i) ECM or PMG estimator if it is an ARDL (1,1); (ii) CS-DL, if it is a more general ARDL (p_y, p_x), directly without the short-run coefficients; and (iii) CS-ARDL, indirectly with the short-run coefficients. These approaches are presented below.

The error correction form of the ARDL model is given below (in line with Pesaran et al. 1999):

$$\Delta y_{i,t} = \alpha_i - \delta_i\left(y_{i,t-1} - \theta_{1,i}x_{i,t-1}\right) - \beta_{1,i}\Delta x_{i,t} + \sum_{i=0}^{PT} \eta'_{i,1}\bar{z}_{t-1} + \ \varepsilon_{i,t} \quad (34)$$

Where, $\theta_i = \frac{\beta_{1,i}+\beta_{2,i}}{1-\gamma_i}$

$$\Delta y_{i,t} = y_{i,t} - y_{i,t-1}$$

$$\Delta x_{i,t} = x_{i,t} - x_{i,t-1}$$

$\delta_i = (1 - \gamma_i)$, is the speed of adjustment to long-term equilibrium, tells how fast the adjustment occurs;

$\left(y_{i,t-1} - \theta_{1,i}x_{i,t-1}\right)$ represent the error correction term or the cointegrating relationship between $x_{i,t}$ and $y_{i,t}$. According to, Pesaran et al. (1999), a long-run relationship exists if $\delta_i \neq 0$.

$\beta_{1,i}$ captures the short-run (immediate) effect of $x_{i,t}$ on $y_{i,t}$.

The ECM representation allows to distinguish the short-term effects from the long-term effects and analyze the speed of convergence towards the long-term equilibrium [equilibrium here represent an econometric concept rather than a macroeconomic definition, and refers to the range of years in the sample] as well as to study cointegration through a statistical analysis of the error correction term. θ_i captures the long-run or equilibrium effect between variables. In the case of without cross-sectional dependence and homogenous long-run coefficients ($\theta_i = \theta \; for \; all \; \varepsilon i$), the model cane be estimated by the pooled mean group (PMG) estimator (Pesaran et al. 1999).

Compared with the static specification, the ARDL model allows for dynamic and feedback effects of lagged dependent variable on the explanatory variables in a way that allows to address a possible reverse causality. Chudik et al. (2017) state that a sufficiently long lags are necessary to fully address reverse causality and to get consistent ARDL estimates. So, adequate lags should be included for the dependent and independent variables in the ARDL system so as to properly account for endogeneity and the short-term dynamics from which the long-run coefficients are derived.

Though the dynamic specifications deal with slope heterogeneity, dynamics, and endogeneity, they do not model common shocks and the error correction cross-section dependencies they cause. Hence, it is important to use appropriate model that can account for observed and unobserved factors, reverse causality and dynamics. To this end, CS-ARDL model is employed (see Chudik et al. 2013, 2016; Chudik and Pesaran, 2015a). In this approach, the short-run coefficients are estimated and then the long-run coefficients are calculated. The advantage of the CS-ARDL approach is that a full set of estimates for the long- and short-run coefficients are obtained. Given that ARDL model can be constructed as ECM and hence, the long-run estimates from the CS-ECM and CS-ARDL approaches are numerically equivalent.

Equation (27) can be generalized to an ARDL (p_y, p_x) model as follows:

$$y_{i,t} = \alpha_i + \sum_{i=1}^{p_y} \gamma_{1,i} y_{i,t-1} + \sum_{i=0}^{p_x} \beta_{1,i} x_{i,t-1} + \sum_{i=0}^{p} \delta'_{i,1} \bar{z}_{t-1} + \varepsilon_{i,t} \quad (35)$$

with

$$\bar{z}_{t-1} = (\bar{y}_{qi,t}; \bar{x}_{i,t-1})$$

The individual long-run coefficients are computed as follows:

$$\hat{\theta}_{CS-ARDL,i} = \frac{\sum_{i=0}^{p_x} \widehat{\beta_{1,i}}}{1 - \sum_{i=1}^{p_y} \widehat{\gamma_{1,i}}} \quad (36)$$

The coefficients can be directly estimated by the mean group or pooled estimator. If the mean group estimator is used, the mean group variance estimator can be applied (Chudik et al. 2016).

The CS-ARDL approach permits to estimate the long-run effects in large dynamic heterogeneous panel data models with cross-sectionally dependent errors. The conventional ARDL estimators (MG, DFE and PMG) ignore error cross-sectional dependence, which is an important characteristic of macro data, with serious consequences (Pesaran 2006). In this respect, Pesaran (2006) suggests common correlated effects (CCE) approach that consists of estimating the linear combination of the unobserved factors by cross-section means of the dependent and independent variables, and then running standard panel regressions augmented with these cross-section averages. Therefore, in contrast to the traditional ARDL approach, the CS-ARDL model is augmented with sufficient lags for the cross-sectional averages of the dependent and independent variables to capture the dynamic effect of unobservable common factors while allowing for slope heterogeneity and weakly exogenous regressors.

Monte Carlo simulations indicate that the use of (weighted) cross-sectional averages of the dependent and independent variables as additional regressors help remove the effects of both strong and weak factors. This is in fact the intuition behind the basic cannon of all (static, dynamic, homogenous and heterogeneous) CCE estimators. It also evidenced that CCE estimators perform better under cross-sectional dependence than alternative estimators. Most importantly, the dynamic CCE and CS-ARDL estimator is better than the static CCE estimator in that it is robust to the presence of weakly exogenous regressors and hence, to short-run feedback effects. Chudik and Pesaran (2015b) evidenced that the dynamic CCEMG estimator is consistent under the assumption of stationarity of the data while, as already indicated earlier, the findings of Kapetanios et al. (2011) suggest that CCEMG produce consistent estimates even if the series are non-stationary and co-integrated. The disadvantage of the CS-ARDL approach is that p_y and p_x need to be known (Ditzen 2018).

Chudik et al. (2013; 2016) developed a cross-sectionally distributed lag (CS-DL) approach to estimate long-run effects in large dynamic heterogeneous panel data models with cross-sectionally dependent errors. Besides, the cross-sectional DL model is also employed as an alternative approach to estimate the long-run effects while accounting for common shocks. Chudik et al. (2016) argued that the CS-DL model is robust to breaks in the errors and residual serial correlation, and to the possibility of unit roots in some or all of the regressors and/or factors. Thus, under the assumption that γ_i lies in the unit circle, the general representation of the ARDL (p_y, p_x) model can be constructed in DL form as follows:

$$y_{i,t} = \alpha_i + \theta_{1,i}x_{i,t} + \mu_i(L)\Delta x_{i,t} + \tilde{u}_{i,t} \qquad (37)$$

$$\text{Where, } \mu_i(L) = -\textstyle\sum_{i=0}^{\infty}\left[\gamma_i^{l+1}(1-\gamma_i)^{-1}\beta_{1,i}\right] L^i$$

$$\alpha_i = (1-\gamma_i L)^{-1}\mu_i$$

$$\tilde{u}_{i,t} = (1-\gamma_i L)^{-1}u_{i,t}$$

L is lag operator

Chudik et al. (2016) show that equation (36) can be directly estimated by the CCE estimator, known as cross-sectionally augmented distributed lag (CS-DL) approach. The regression is augmented with the differences of the explanatory variables (x), their lags and the cross-sectional averages. As in Pesaran (2006), the estimation is consistent even if the errors are serially correlated.

With a general ARDL (p_y, p_x) model with added cross-sectional averages to take out strong cross-sectional dependence, the CS-DL estimator would have the following form:

$$y_{i,t} = \alpha_i + \theta_{1,i}x_{i,t} + \sum_{i=0}^{p_x-1}\mu_{i,1}\Delta x_{i,t-1} + \sum_{i=0}^{p_{\bar{y}}}\delta_{y,i,1}\bar{y}_{t-1} + \sum_{i=0}^{p_{\bar{x}}}\delta_{x,i,1}\bar{x}_{t-1} + \varepsilon_{i,t} \qquad (38)$$

Where, $\bar{y}_{t-1}$ and $\bar{x}_{t-1}$ are cross-sectional averages of $y_{i,t}$ and $x_{i,t}$; and $p_{\bar{x}} = \sqrt[3]{T}$ and $p_{\bar{y}} = 0$. The mean group coefficients can be calculated as follows:

$$\hat{\alpha}_{i,MG} = \frac{1}{N}\sum_{i=1}^{N}\hat{\alpha}_i \text{ and } \hat{\theta}_{1,MG} = \frac{1}{N}\sum_{i=1}^{N}\widehat{\theta 1}_{,i} \qquad (39)$$

The variance estimator is the same as in equation (33), but with the MG of the long-run coefficients rather than of the short-run coefficients.

The CS-ARDL and CS-DL approaches are panel data models which are applicable where the time dimension (T) and the cross-section dimension (N) are both large. CS-ARDL relies on the estimation of country-specific ARDL specifications, appropriately augmented with cross-section averages to filter out the effects of the unobserved common factors, from which long-run effects can be indirectly estimated. The main drawback of calculating long-run coefficients from CS-ARDL specifications is that due to the inclusion of lagged dependent variables in the regressions, a relatively large time dimension is required for satisfactory small sample performance, especially if the sum of the AR coefficients in the ARDL specifications are close to one. With heterogeneous slope coefficients, the CS-ARDL estimates of the long-run coefficients could also be sensitive to outlier estimates of the long-run effects for individual cross-section units (Chudik et al. 2015a). Based on a series of Monte Carlo simulations, they showed the robustness of panel CS-ARDL estimates to endogeneity problem. The CS-DL approach is based on a distributed lag representation that does not feature lags of the dependent variable, and allows for residual factor error structure and weak cross-section dependence of idiosyncratic errors. As for CCE estimator of Pesaran (2006), Chudik et al. (2015a) augment the individual regressions by cross-section averages to deal with the effects of common factors. They derive the asymptotic distribution of the CS-DL mean group and pooled estimators under the coefficient heterogeneity and large time and cross-section dimensions. The main advantage of CS-DL approach is that its small sample performance is often better compared to estimating unit-specific CS-ARDL specifications, under a variety of settings investigated in the Monte Carlo simulations when T is moderately large ($30 \leq T < 100$). Also, the imposition of CS-DL estimates of long-run coefficients can substantially improve the estimates of short-run coefficients when T is moderately large. They confirmed that CS-DL estimators are robust to residual serial correlation, breaks in error processes and dynamic misspecifications. Chudik et al. (2015a) point out that the approach should only be considered as complementary rather than superior to the CS-ARDL approach. When compared with CS-ARDL approach, the main drawback of CS-DL approach, they argued, is that it does not allow for feedback effects from the dependent variable onto the regressors. It could be subject to simultaneity bias. Nevertheless, the endogeneity bias of the CS-DL approach is more than compensated for by its better sample performance relative to the CS-ARDL approach when the time dimension (T) is moderately large; CS-ARDL seems to dominate CS-DL only when the time dimension is sufficiently large and the underlying ARDL model is correctly specified.

For the CS-ARDL and CS-DL models, the dynamic CCEMG estimator is employed. The static and dynamic models are estimated for the base line specifications and with additional variables that fall both from the demand and supply side as the case may be.

6.5 Presentation of Estimation Results

6.5.1 Preliminary Analysis of the Series for the First Growth Law

First, it is necessary to see if the variables demonstrate cross-sectional dependence. The Stata command xtcse2 is used to estimate the exponent of and test for cross-sectional dependence for the dependent and independent variables for the sectors analyzed. The results of the CD test statistics for all variables are reported in Annex IV Table 10. As can be evident from the Table, almost all series exhibit a strong degree of cross-sectional dependence in both panels as the CD statistics are highly significant with very large test. In other words, the cross-section dependence test rejects the null of weak cross-sectional dependence for all variables and the estimated exponent of the cross-section dependence is well above 0.5. Additionally, the CD test results followed by MGIV and two ways fixed effect estimation of equation (16) for manufacturing (M here after), higher-productivity services (HPS here after), Baumol's Diseases services (BDS here after) and agriculture (AG here after) are summarized in Tables 27 for the full panel, SSA panel and Asia panel. The Table confirm the existence of cross-sectional dependence, as the null hypothesis of cross-sectional independence is rejected at 0.01 level of significance. The presence of strong cross-section dependence in the errors might be attributed to unobserved common factors/shocks that are omitted or not properly accounted for; the various global common factors that may affect the pace of technological development and innovation, thereby the domestic economy; commodity price shocks (mainly volatile prices of primary commodities, which dominate the export baskets of most developing economies); financial crises and recessions (e.g. the 1997 Asian financial crisis that hit badly the economy of some of the countries in the region, the 2008 financial crisis and the consequent economic recession); frictions in the labor and product or services market; financial sector development and health of the financial system; and the like.

Second, the slope heterogeneity test reported in Annex IV Table 11 shows that countries differ remarkably from each other and that the sample is heterogeneous. Both the Swamy S test for parameter consistency and the slope heterogeneity test (Blomqust and Weserlund, 2013; Pesaran and Yamagata, 2008) with cross-sectional dependence confirmed the presence of slope heterogeneity in the sample, rejecting the null hypothesis of homogeneity.

Table 27: Estimates of MG-IV and 2FE Models for Kaldor's First Growth Law

Variables	All Sample		Asia		SSA	
	2FE	MG-IV	2FE	MG-IV	2FE	MG-IV
QAGR	0.336* (0.058)	0.346* (0.039)	0.429* (0.094)	0.442* (0.073)	0.302* (0.054)	0.319* (0.067)
Constant	0.047 (0.011)	0.040* (0.002)	0.036* (0.012)	0.043* (0.004)	0.035* (0.002)	0.054* (0.016)
CD –test	-4.099*	7.728*	-4.430*	8.279*	4.516*	-4.331*
QM	0.304* (0.048)	0.325* (0.031)	0.424* (0.034)	0.415* (0.039)	0.226* (0.033)	0.220* (0.059)
Constant	0.039* (0.012)	0.032* (0.002)	0.018 (0.010)	0.029* (0.003)	0.034* (0.003)	0.055* (0.019)
CD - test	-2.824*	5.138*	-4.279*	3.161*	5.481*	-3.391*
QHPS	0.399* (0.047)	0.401* (0.0371)	0.519* (0.055)	0.482* (0.032)	0.282* (0.047)	0.333* (0.066)
Constant	0.030* (0.011)	0.023* (0.003)	0.013 (0.011)	0.023* (0.002)	0.027* (0.003)	0.043* (0.018)
CD – test	-3.218*	5.196*	-4.307*	7.033*	2.543*	-3.391*
QBDS	0.483* (0.035)	0.558* (0.045)	0.664* (0.060)	0.731* (0.047)	0.375* (0.037)	0.424* (0.041)
Constant	0.024* (0.009)	0.019* (0.002)	0.017** (0.008)	0.015* (0.003)	0.025* (0.002)	0.027* (0.015)
CD- test	-3.86*	4.983*	-4.068*	4.588*	3.914*	-4.16*

Notes: Abbreviations are QM –Manufacturing output; QAGR- Agriculture output; HPS – Higher-productivity producer services output; QBDS – Baumol's diseases services output; MG-IV - Mean group IV estimation with heterogeneous slope; 2FE – Two way fixed effects model. Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.
Source: Own computation

Third, after confirming the presence of cross-sectional dependence in the errors, second generation panel unit root test was carried out to investigate as to whether the variables are stationary or not. Most of the variables are found stationary at levels and first differences.

7.5.2. Estimates of the Static and Dynamic Models for the First Law

A. Model Selection and Rules for Interpretation of Results

True that, the countries in each sub-continent have diverse characteristics comprising difference in levels of per capita income, resource base, production composition and leading economic activities, degree and structure of industries, institutional quality, etc. Also, the presence of cross-sectional dependence may make the estimates of the static and the conventional ARDL models biased and inconsistent. In such cases, the use of CS-ARDL and CS-DL approaches might become appropriate as both approaches take care of the dynamics to all variables, cross-sectional dependence and slope heterogeneity. Nevertheless, the regression results from the AMG and CCEMG models, according to the static specifications, as well as MG estimator according to the conventional ARDL approach and the dynamic CCEMG estimation are presented.

Another important point worth noting, however, is that the estimates from the static and dynamic models may not give conclusive answer to the direction of causation between the explanatory variables and GDP growth. This may make it imperative to look into additional support as a complement to the estimation results of the various model specifications. This is essentially because the regression is intended to reexamine Kaldor's growth laws in the sense of exploring which economic sector played and continues to play engine of growth role, if there be any such sector, in the considered SSA and Asian economies. To this end, the study employs the criterion suggested by Fagerberg and Verspagen (1999), wherein *the growth engine hypothesis shall be endorsed for the sector in question when the values of the slope coefficients are positive and larger than the value added share of the sector in question*. As discussed in parts two and three, an economic sector may have more growth-propelling effect to the economy than other sectors if it has a higher backward- and forward-linkages and host of spillovers.

While, therefore, interpreting estimates of the different model specifications, the following points are considered as guiding rules: (i) when the coefficient for manufacturing turns out to be positive and statistically significant and its magnitude exceeds its value added share in GDP and if the difference is significant, the engine of growth role for the sector is endorsed, regardless of whether the share in total value added of other sectors exceeds the share of manufacturing; (ii) when the magnitude of the coefficient for manufacturing (in both the close and open economy specifications) significantly exceeds the coefficients for both the Baumol's diseases services and higher productivity services, the role of manufacturing as growth escalator in the economy can be validated. According to Kaldor's theory prediction, manufacturing will be considered special to play a unique engine of growth role, if agriculture and services would not render the same contributions; (iii) when the coefficient for manufacturing appears statistically significant (under both the closed and open economy model specifications) while the slope coefficients for the two broad segments of the services sector turn out to be statistically insignificant, the pace setter role of manufacturing can be validated; (iv) if manufacturing passes the two spuriousness tests while services and agriculture fails in both or one of the tests, then the pace setter role of manufacturing will be endorsed and services stand to serve as *"stimulus complement"* to it; (v) if the coefficients for the two broad segments of the services sector appear to be more or less on equal level, the claim for the role of services as *"stimulus complement to manufacturing"* and the synergetic relationship between the two sectors can be endorsed; and (vi) the difference in the magnitude for the coefficients between the two panels (SSA and Asia) is taken as strong evidence for the central tenet of structuralism, which states that the divergence transformation path and development level between countries and regions worldwide is explained by the types of economic activities they specialize in.

Taking the above in mind, the estimation results for the long-run effects of output growth to GDP growth for manufacturing, skill-intensive services, Baumol's diseases services and agriculture are presented and discussed below in that order.

B. Estimates Based on the Static and Dynamic Model Specifications for Manufacturing

Hypothesis: Manufacturing maintains special qualities to play engine of growth role to the economy. Hence, shifting resources to this sector is believed to be a viable option for straggler economies to see catch-up growth and move up the quality ladder. Therefore, a positive relationship between growth rates of GDP and manufacturing output is predicted in all country groups. According to Kaldor's proposition, the magnitude of the coefficients would appear less than unity, a testimony of the existence of increasing returns to scale in manufacturing. Additionally, the magnitude of the coefficient may go in tandem with the sector's contribution to total value added growth, and hence, it is expected to be higher in the Asian panel than in SSA panel.

Table 28 presents estimation results from the AMG and CCEMG estimators for the full sample and the two country groupings over the entire period of investigation, with two specifications. Specification (a) depicts estimates based on the baseline regression taking manufacturing value added growth as the only explanatory variable; and specification (b) includes with it investment growth, government consumption growth and export growth (both in constant prices) as regressors. The inclusion of the three aggregate demand components with the regression has twin objectives: to see the robustness of the consistency of the estimates across different specifications and to evaluate the long-term effects of these variables on the growth of the economy. Note that the two specifications shall be replicated to all models and to the other sectors too without the need to defining them again and again.

As can be evident from the Table, the coefficients for the manufacturing value added growth are positive and statistically significant for both panel dataset, despite differences in magnitude. This may indicate that growth rate of manufacturing output has positive, long-term statistical effects on economic growth even in SSA economies where the share of manufacturing in GDP is far lower than their Asian counterparts. In the AMG estimator, the constant term is always significant for both specifications with little variation of the magnitude on the country groupings; its magnitude ranges between 1.6 and 5.4 percent. Nevertheless, the validity of the two model specifications are reliant on the assumption that error terms are cross-sectional independent. To this effect, the CSD test was carried out and the null hypothesis is rejected at the conventional level of significance for model specification (a). This implies that the presence of strong cross-section dependence is a concern with estimates of both AMG and CCEMG, which may make the econometric model specification and accuracy of the estimates problematic.

The estimates based on the conventional ARDL MG and the DCCEMG approaches are reported in Table 29 for the two specifications, (a) and (b). The Table reports estimates of the MG estimator, which allows for slope heterogeneity, and the estimates according to the DCCEMG estimator. The same lag order, p, is used for all countries [taking different values that range between 1 to 3 in a way to evaluate how sensitive the estimates may be to the choice of different lag orders]. The results reported in the Table are for only a single lag order in all panels for two reasons: to save space and manage the interpretation, and the difference in the magnitude of the coefficients does not significantly alter the conclusion to be drawn, and most importantly the signs of the coefficients did not vary across different lag orders. In both specifications, (a) and (b), the long-run coefficients for manufacturing output growth are statistically significant at 0.01 level. Generally speaking and in line with the expectations, the estimation results confirm strong positive correlation between manufacturing output growth and real GDP growth in both estimators for all panels.

Under specification (a), the value of the coefficient ranges between 0.305 to 0.447 with the use of ARDL-MG and DCCEMG estimators and across the two panels. More specifically, the coefficient in the DCCEMG estimator is slightly lower than those obtained through ARDL-MG. As expected, the value of the coefficient is less than unity in both panels, but slightly higher in the Asia panel (0.488) than in the whole sample (0.395) and SSA panel (0.289) under the ARDL-MG estimator. So, a one percent increase in manufacturing growth will cause real GDP to increase by above 0.30 percent. The value of the coefficient is lower than the value in Kaldor's original estimation.

The inclusion of the three macro variables to the estimation in specification (b) slightly altered the magnitude of the regression coefficients for manufacturing growth, though its sign and level of significance remain unbroken. This may suggest that the signs and level of significance of the slope coefficients could not be influenced with the different assumption of the model used. In both estimators, the long-run impacts of investment growth, government consumption growth and export growth on economic growth are positive for all panels. In short, the estimation results do not show any big difference with different lag orders and assumption on slope homogeneity or heterogeneity.

Although the ARDL specification is presumed to deal with issues related to heterogeneity, endogeneity and dynamics, interpretation of the results demand caution because the model assumes that the error terms in the causal relationship between manufacturing growth and real GDP growth are cross-sectionally independent. However, the plausibility of this assumption is questionable as variety of global factors may annul it; these factors are mostly unobserved and can simultaneously affect both variables, resulting in misleading results if they are found correlated with the regressors. So, results of the CD test of Pesaran (2015), which is based on the average pairwise correlations of the residuals, from the underlying ARDL-MG and DCCEMG regressions are reported in Table 30. Under specification (a), these residuals display a strong degree of cross-sectional dependence – that is, the null hypothesis of weak cross-sectional independence are strongly rejected at 0.01 level for the Asia and SSA panels in DCCEMG, and for the whole sample and Asia panel with the ARDL-MG estimation. Under specification (b), the null of weak error cross-sectional dependence are accepted except for one instance; that is, in SSA panel under DCCEMG estimation.

The CS-ARDL and CS-DL approaches are employed to treat endogenous and reverse causality problem based on Chudik and Pesaran (2013a) and Chudik et al. (2015), which involves augmenting the traditional ARDL and DL specifications with cross-sectional averages of the dependent and independent variables and adequate number of their lags as proxies for unobserved common factors. The lag length of averaged dependent and independent variables is set up to $\sqrt[3]{T}$ = $\sqrt[3]{45}$ =3.53 regardless of p, the lag order chosen for the underlying ARDL specification. The estimation results are summarized in Table 30, where estimates are reported for the two specifications, (a) and (b).

The generated evidence based on the two regressions are in congruence with the coefficients according to the static models and the panel ARDL estimator as well as DCCEMG in terms of the sign and effect of the growth of manufacturing output on GDP growth. Specifically, the estimated coefficients are positive and statistically significant (in most cases at 0.01 level) in both CS-ARDL and CS-DL regressions. In particular, for specification (a), the value of the coefficients fall in the range of 0.277 to 0.434, with the lower range somewhat higher than the one observed in the

DCCEMG estimates. Interestingly, the value of the coefficient for the two panels either changes very slightly or remain the same. The result indicates that a 1 percent increase in manufacturing growth will cause real GDP growth to increase by 0.389 percent (full sample), 0.434 percent (Asia) and 0.318 percent (SSA) with the CS-ARDL model. For the CS-DL model, the magnitude of the coefficient become slightly higher for the whole sample (0.393 percent) and decreased to 0.277 percent for SSA while it is persistently the same for Asia.

When modelling manufacturing value added growth with other variables, the level of significance and sign of the estimates coincide with the results discussed above. Under specification (b), the long-run coefficient for manufacturing output growth is positive and statistically significant for both panels with the values ranging between 0.257 and 0.403 percent, suggesting that a one percent increase in manufacturing growth will increase real GDP growth by 0.257 percent to 0.403 percent. Moreover, the signs of the slope coefficient for the other variables remain positive, despite their values and level of significance vary across panels and across different lag orders. In all panels and model specifications, investment growth, export growth and government consumption growth are found persistently positively impacted on economic growth. Overall, the empirical results reported in the Table 27 reinforce Kaldor's proposition. The estimates indicate that perpetual increase in the growth of manufacturing output and the three demand components will positively affect GDP growth in the long-run. Now, the null hypothesis of cross-sectional dependence is no more rejected, indicating that any cross-sectional dependence caused by global common factors was accounted for with augmentation of the regression with cross-section averages. In all estimates, the error correction term appears to be negative that fall within the dynamically stable range, giving strong support to the presence of long-term relationships between manufacturing value added growth and GDP growth.

Table 28: Static AMG and static CCEMG models for Kaldor's First Growth Law for the Full Sample and Country Groups -Man

Var	AMG						CCEMG					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	A	b	a	b	a	b	a	b	a	b
QM	0.354* (0.034)	0.270* (0.030)	0.410* (0.036)	0.317* (0.043)	0.260* (0.416)	0.215* (0.046)	0.372* (0.041)	0.273* (0.040)	0.426* (0.042)	0.377* (0.048)	0.267* (0.037)	0.219* (0.039)
Ig		0.072* (0.009)		0.108* (0.016)		0.052* (0.007)		0.089* (0.014)		0.105* (0.017)		0.062* (0.016)
Xg		0.029* (0.009)		0.021* (0.014)		0.027** (0.012)		0.055* (0.017)		0.042* (0.017)		0.056* (0.021)
GCG		0.050* (0.124)		0.051* (0.013)		0.047** (0.019)		0.108* (0.025)		0.059* (0.032)		0.050* (0.026)
CDP	0.606* (0.127)	0.621* (0.012)	0.760* (0.129)	0.622* (0.126)	0.732* (0.206)	0.747* (0207)						
C	0.036* (0.003)	0.025* (0.002)	0.021* (0.004)	0.016* (0.002)	0.054* (0.005)	0.042* (0.005)	0.002 (0.008)	-0.006 (0.006)	0.002 (0.005)	0.003 (0.006)	-0.002 (0.009)	-0.005 (0.008)
CD test	-1.822	-1.031	-3.359	0.840	-3.255	3.110	-2.42	-0.13	-3.70	-0.26	-3.38	-3.23
P Value	0.068	0.303	0.001	0.401	0.001	0.002	0.015	0.897	0.000	0.794	0.001	0.001

Notes: Abbreviations are QM – Manufacturing value added growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). AMG - augmented mean group; CCEMG – common correlated effects mean group; CDP – common dynamic parameter.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 29: Estimates based on ARDL-MG and Dynamic CCEMG Models for Kaldor's First Growth Law for the Full Sample and Country Groups - Man

Var	DCCEMG						ARDL MG					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	A	b	a	b	a	b	a	b	a	b
QM	0.356* (0.033)	0.294* (0.117)	0.394* (0.044)	0.377* (0.078)	0.305* (0.042)	0.249* (0.053)	0.395* (0.038)	0.363* (0.154)	0.488* (0.043)	0.379* (0.081)	0.289* (0.068)	0.289* (0.065)
Ig		0.145* (0.028)		0.120* (0.022)		0.047* (0.017)		0.127* (0.028)		0.136* (0.037)		0.047* (0.012)
Xg		0.106* (0.029)		0.072** (0.026)		0.059* (0.025)		0.066* (0.026)		0.080* (0.034)		0.067* (0.033)
GCG		0.148* (0.049)		0.073* (0.029)		0.077* (0.027)		0.109* (0.031)		0.075* (0.030)		0.079** (0.041)
C	-0.009 (0.009)	-0.044 (0.035)	0.000 (0.011)	0.006 (0.12)	-0.005 (0.011)	0.002 (0.004)						
CD test	-1.17	-1.17		-0.30	-3.20	-3.20	3.54	1.71	3.76	1.80	1.09	0.91
P Value	0.242	0.24		0.767	0.002	0.001	0.000	0.086	0.000	0.072	0.274	0.346
LY	0.101* (0.038)	0.087 (0.073)	0.122** (0.047)	0.181* (0.042)	0.023 (0.044)	-0.002 (0.004)	-0.864* (0.031)	-0.874* (0.056)	-0.857* (0.039)	-0.900* (0.095)	-0.791* (0.077)	-0.987* (0.047)

Notes: Abbreviations are QM – Manufacturing value added growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). DCCEMG- Dynamic common correlated effects mean group; ARDLMG – Autoregressive distributed lag mean group; CDP – common dynamic parameter.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 30: Estimates based on CS-ARDL and CS-DL Models for Kaldor's First Growth Law for the Full Sample and Country Groups -Man

Var	CS-ARDL						CS-DL					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	A	b	a	b	a	b	a	b	a	b
QM	0.389* (0.038)	0.392** (0.153)	0.434* (0.061)	0.333* (0.086)	0.318* (0.042)	0.253* (0.104)	0.393 (0.047)	0.403* (0.101)	0.434* (0.051)	0.401* (0.102)	0.277* (0.047)	0.257* (0.072)
Ig		0.081* (0.031)		0.125* (0.045)		0.036 (0.035)		0.113* (0.017)		0.142* (0.086)		0.042*** (0.025)
Xg		0.118* (0.037)		0.047* (0.045)		0.138* (0.053)		0.078* (0.023)		0.138* (0.073)		0.069** (0.031)
GCG		0.066** (0.031)		0.020* (0.046)		0.042 (0.058)		0.074* (0.034)		0.139* (0.073)		0.046 (0.044)
EC	-0.880* (0.038)	-0.996-* (0.067)	-0.744 (0.060)	-0.916 (0.090)	-0.974* (0.041)	-0.989* (0.094)						
CD test	-1.50	-1.38	-1.99	-1.69	-3.28	-0.57	-1.56	-0.58	-3.53	-0.73	-3.21	-1.10
P Value	0.135	0.169	0.047	0.092	0.051	0.571	0.119	0.565	0.041	0.466	0.042	0.269

Notes: Abbreviations are QM – Manufacturing value added growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). CS-ARDL – cross-sectional autoregressive distributed lag mean group; CS-DLMG – cross-sectional distributed lag mean group estimator.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

C. Estimates Based on Static and Dynamic Models for Higher-productivity Services

Hypothesis: The present dissertation hypothesized that the services sector, typically the modern, advanced and higher-productivity (and skill-intensive) producer services, can stand as "stimulus complement" to manufacturing in enhancing sustained long-term growth of the considered economies. The descriptive analysis evidenced that the services sector absorbed a good share of the labor force shifted from agriculture, attributed to weak manufacturing base in SSA. In such agrarian economies, there could be lower expectation for the shift of much employment from primary activities to manufacturing and thereby absorb productivity gains. The fact that the share of the services sector in GDP has been exceeding other sectors since recently in most of the economies included in the sample meant that the correlation between services sector output growth and overall economic growth could be much stronger than with any other sector. This makes the empirical estimation using various econometric techniques interesting.

In view of verifying this hypothesis, equation (16) is extended to the two broad segments of the services sector in an attempt to subject the First Growth Law in a more rigorous testing and thereby to evaluate as to whether higher-productivity (and skill-intensive) producer services can serve as *"stimulus complement" to manufacturing*. As previously, the regression is undertaken alternatively to the whole sample, as well as to the SSA and Asia panels separately for the entire period of analysis. The results are presented below first for the static model specification (AMG and CCEMG), then to the conventional ARDL-MG specification and DCCEMG specification, and finally for the CS-ARDL and CS-DL specifications. Generally speaking, it can be surely confirmed that the skill-intensive services contribute significantly to economic growth, especially in Asia, corroborating the hypothesis. [106]

The estimates from the static models of AMG and CCEMG are reported in Table 31 for the two specifications, (a) and (b). Overall, the estimated coefficient for the main variable is positive and statistically significant, confirming the long-run contribution of higher-productivity services to GDP growth for both panels. Also, the magnitude of the coefficient does not show big disparity across the AMG and CCEMG models for both panels. Particularly, the estimated results suggest that a one percent increase in higher-productivity services output growth will induce further increase in total output by 0.595 percent (full sample), 0.432 percent (SSA) and 0.50 percent (Asia) with the CCEMG model under specification (a). The coefficient for CDP come out positive and

[106] In fact, Kaldor did not acknowledged the role of services in the catching-up and development process although the magnitude of the slope coefficient was higher than that of manufacturing. Also, his study period (1953/54 to 1963/64) was much shorter than the current study (1971-2015).

statistically significant in both the full sample and the two country groupings. However, the CSD test shows that in both AMG and CCEMG estimators cross-sectional dependence is a concern in both specifications and all panels except one (or two) specific case(s). Therefore, the dynamic models are estimated to treat this problem.

The estimation results of the conventional panel ARDL-MG and the DCCEMG estimators are presented in Table 32 for the two specifications, (a) and (b). All estimated coefficients have the expected signs. In both estimators, the average estimates for higher-productivity services growth and the macro variables (that is, investment growth, government consumption growth, and export growth) and the error correction terms are statistically significant at 0.01 level of significance except in two cases (GCG for Asia and Ig for SSA with AMG estimator).[107] Generally, the estimates across the two estimators give evidence for the positive contribution of higher-productivity producer services growth to economic growth, corroborating estimates of the static models in terms of signs of the parameters. Typically, for specification (a), the estimated coefficient for output growth of skill-intensive services come out positive and always statistically significant at the 0.01 level of significance with its value ranging between 0.427 (SSA) and 0.50 (Asia) in the ARDL-MG estimator and between 0.457 (SSA) and 0.509 (Asia) in the DCCEMG estimator. Comparatively, the values of the coefficients are more or less similar with both ARDL-MG and DCCEMG specifications in both panels. Under specification (b), the magnitudes for the ARDL-MG estimates are slightly higher than those of DCCEMG estimates; but, in both estimators the estimates are significantly lower than the magnitude for own estimates under specification (a). Another interesting observation to note is that in both estimators and in all panels, the long-run impacts in the growth rates of investment, government consumption and export are positive. Of course, the values of the coefficient for investment is far higher than that for export, in turn is higher than that for government consumption for the full sample and Asia sample under DCCEMG estimate. The reverse is true for SSA sample. However, it is inconclusive under the ARDL-MG estimates. It is worth noting that the sign of the estimated results did not vary with the choice of different lag orders.

In both specifications, (a) and (b), the speed of adjustment to long-run equilibrium is fast and its magnitude fall within the dynamically stable range with the ARDL-MG. However, the results of the CSD tests reveal that the error terms across countries for specification (a) exhibit a high degree of cross-sectional dependence for Asia under DCCEMG and for the full sample and Asia under ARDL-MG as the reported CD statistics appear highly significant. The null of cross-sectional

[107] As indicated earlier, MG allows for slope coefficients to vary across countries. Also, the estimates of this estimator can be consistent under fairly general conditions given that the errors are cross-sectionally independent (Pesaran and Smith 1995).

independence is rejected for the full sample and Asia under DCCEMG estimates. The presence of cross-sectional dependence calls for accounting for the unobserved global factors, which may affect the entire economy in one way or another, through estimation of the CS-ARDL and CS-DL models.

Table 33 summarizes results of the CS-ARDL and CS-DL estimations for specifications, (a) and (b). The long-run effects of higher-productivity services growth on total output growth are similar to those of the ARDL estimates, positive and statistically significant. Turning to specification (b), there is still evidence for the positive growth effects of all variables in the long-run as the estimates are significant in all cases. Particularly, the values for the long-run effects of higher-productivity services output growth on GDP growth does not vary considerably while moving from ARDL to CS-DL models: ranging between 0.337 to 0.395 percent for ARDL-MG, between 0.248 to 0.453 for CS-ARDL and between 0.270 to 0.395 for CS-DL. In both CS-ARDL and CS-DL models, the value of the slope coefficient is slightly higher for Asia than for SSA panels. The CD statistics in Table 33 confirm a substantial decline in the average pairwise correlation of the errors after the cross-sectional augmentation of the standard ARDL and DL models. However, the null hypothesis of cross-sectional dependence is not still rejected under specification (a) for Asia with the CS-ARDL and in specification (a) and (b) with the CS-DL model even at large lag orders for p.

Finally, the speed of convergence to equilibrium is very fast (and in some cases faster than with the ARDL model without augmentation). However, the error correction here should be considered as indicative, attributed mainly to sample bias in the estimates of the short-run dynamics.

Table 31: Static AMG and static CCEMG models for Kaldor's First Growth Law for the Full Sample and Country Groups –SS

Var	AMG						CCEMG					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	A	b	a	b	a	B	a	b	a	b
QHPS	0.494 (0.043)	0.363* (0.036)	0.503* (0.037)	0.343* (0.038)	0.438* (0.076)	0.340* (0.057)	0.595* (0.073)	0.391* (0.049)	0.500* (0.063)	0.414* (0.059)	0.432* (0.074)	0.366* (0.080)
Ig		0.053* (0.011)		0.090* (0.020)		0.037* (0.009)		0.084* (0.017)		0.091* (0.021)		0.061* (0.024)
Xg		0.072* (0.015)		0.062* (0.016)		0.057* (0.018)		0.099* (0.017)		0.077* (0.018)		0.092* (0.023)
GCG		0.066* (0.014)		0.068* (0.025)		0.074* (0.015)		0.099* (0.026)		0.079* (0.022)		0.074* (0.027)
CDP												
C	0.024* (0.003)	0.016* (0.003)	0.014* (0.003)	0.006** (0.003)	0.037* (0.006)	0.024* (0.006)	-0.008 (0.010)	-0.006 (0.009)	-0.002 (0.002)	0.001 (0.004)	0.05 (0.010)	-0.009 (0.027)
CD test	-2.894	-3.109	-3.863	-2.909	-3.16	-3.170	-2.01	-2.64	-4.10	-3.46	-2.12	-1.77
P Value	0.004	0.002	0.000	0.004	0.002	0.002	0.045	0.008	0.000	0.001	0.034	0.076
LY	0.793* (0.104)	0.705* (0.110)	0.912* (0.129)	0.726* (0.114)	0.729* (0.107)	0.694 (0.163)						

Notes: Abbreviations are QHPS – Higher-productivity services output growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). AMG - augmented mean group; CCEMG – common correlated effects mean group; CDP – common dynamic parameter.
Level of significance * p < 0.01; ** p < 0.05; *** p < 0.10.
Source: Own computation

Table 32: Estimates based on ARDL-MG and DCCEMG Models for Kaldor's First Growth Law for the Full Sample and Country Groups -SS

Var	DCCEMG						ARDL MG					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	a	b	a	b	a	B	a	b	a	b
QHPS	0.547* (0.061)	0.321* (0.039)	0.509* (0.078)	0.0358* (0.047)	0.427* (0.102)	0.327* (0.070)	0.533* (0.044)	0.395* (0.055)	0.500* (0.039)	0.373* (0.077)	0.457* (0.095)	0.337* (0.066)
Ig		0.080* (0.018)		0.087* (0.022)		0.036* (0.025)		0.076* (0.031)		0.108* (0.052)		0.063* (0.024)
Xg		0.075* (0.016)		0.070* (0.019)		0.062* (0.022)		0.094* (0.027)		0.137* (0.038)		0.090* (0.039)
GCG		0.074* (0.023)		0.054* (0.024)		0.087* (0.042)		0.065** (0.037)		0.106** (0.063)		0.019* (0.007)
CDP												
C	-0.005 (0.009)	-0.022 (0.017)	-0.003 (0.002)	0.007 (0.008)	-0.003 (0.012)	-0.003 (0.009)						
CD test	-1.64	-2.31	-3.38	-3.12	-1.59	-1.68	6.28	1.72	7.16	1.93	0.84	0.58
P Value	0.101	0.021	0.001	0.002	0.112	0.093	0.000	0.085	0.000	0.054	0.401	0.559
LY	0.138* (0.053)	-0.015 (0.042)	0.156** (0.091)	0.084 (0.059)	0.106* (0.046)	0.052 (0.040)	-0.905* (0.044)	-0.939* (0.043)	-0.876* (0.075)	-0.924* (0.058)	-0.964* (0.038)	-0.806* (0.012)

Notes: Abbreviations are QHPS – Higher-productivity services output growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b); ARDL-MG – error correction (ECM) form of autoregressive distributed lag mean group; DCCEMG – common correlated effects mean group.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 33: Estimates based on CS-ARDL and CS-DL Models for Kaldor's First Growth Law for the Full Sample and Country Groups -SS

Var	CS –ARDL						CS-DL					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	a	b	a	b	a	B	a	b	a	b
QHPS	0.546* (0.041)	0.248* (0.066)	0.502* (0.039)	0.335* (0.072)	0.435* (0.076)	0.453* (0.269)	0.515* (0.041)	0.270* (0.093)	0.529* (0.039)	0.395* (0.065)	0.439* (0.074)	0.321* (0.108)
Ig		0.078* (0.031)		0.062* (0.055)		0.077* (0.123)		0.115* (0.023)		0.082** (0.035)		0.078** (0.037)
Xg		0.091** (0.038)		0.091* (0.028)		0.217** (0.121)		0.090* (0.021)		0.092* (0.028)		0.040* (0.025)
GCG		0.085*** (0.049)		0.093** (0.040)		0.076*** (0.246)		0.090* (0.036)		0.135* (10.036)		0.045*** (0.061)
EC	-0.915* (0.048)	-0.947* (0.062)	-0.821* (0.081)	-0.972* (0.080)	-1.001* (0.047)	-0.973* (0.082)						
CD test	-1.38	-1.95	-3.62	-1.89	-0.82	-0.33	-2.13	-0.63	-3.82	-2.78	-1.72	-1.45
P Value	0.168	0.052	0.000	0.058	0.415	0.739	0.033	0.529	0.000	0.005	0.086	0.147

Notes: Abbreviations are QHPS – Higher-productivity services output growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). CS-ARDL – cross-sectional autoregressive distributed lag mean group; CS-DLMG – cross-sectional distributed lag mean group estimator.
Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.
Source: Own computation

C. Estimates Based on the Static and Dynamic Models for Traditional Services

Hypothesis: The relationship of the traditional services growth and GDP growth is investigated in an attempt to validate whether Kaldor's First Law is confined to manufacturing or not. Generally speaking, the traditional services (hereafter, the Baumol's diseases services, BDS) are considered as low-productivity. However, the share in GDP of these services activities has been growing in SSA while still the largest portion of the labor force is engaged in small-scale subsistence agriculture in most of the countries. The descriptive analysis also showed that the greatest numbers of the workforce migrated from agriculture have predicted to be ended up in such services activities. More specifically, the wholesale and retail trade segments were playing important role in the growth dynamics (in terms of output typically) over the entire period of analysis. These services activities are generally engaged in the buying and selling of goods and commodities produced by manufacturing industries and agriculture sector. However, notwithstanding their growing share in GDP, the Baumol's diseases services activities cannot maintain special qualities to 'substitute' manufacturing and play engine of growth role. Still, the correlation between these traditional services value added growth and GDP growth is predicted to be positive and much stronger than other sectors given their commendable share in GDP for many countries in both SSA and Asia samples. Regardless of the difference in sample size, level of economic development of the sample countries, study period and in econometric models used, the results of the different model specifications are hypothesized to corroborate Kaldor's findings, despite the present dissertation run separate regressions for skill-intensive services and Baumol's diseases services.

Here also, the estimation is carried out alternatively to the full sample, as well as SSA and Asia panels for the entire period of analysis for the two specification, (a) and (b). The estimation results are presented for the static and dynamic models below. The estimates of the static models of AMG and CCEMG are reported in Table 34. Overall, the coefficient appears positive and statistically significant in both specifications (a) and (b), reflecting the positive long-run impacts that the Baumol's diseases services growth have on economic growth for both panels, although they are generally characterized as low-productive. Additionally, the values of the coefficient are consistently higher than those of manufacturing and higher-productivity (and skill-intensive services), but less than unity per Kaldor's prediction (though for the entire sector). Under the AMG specification, the constant term has always a positive sign, suggesting that real GDP growth varies within that range whether or not the growth of these services activities change much. Focusing on specification (b), the signs of the coefficient for government consumption growth was negative for the SSA panel with the use of the CCEMG model and only significant for the full sample. The CD test statistics gives evidence for cross-sectional dependence for all panels under both specifications (a) and (b) with the two models. This may justify the need to run the ARDL-MG and the DCCEMG models.

Accordingly, the estimation results of the standard panel ARDL and DCCEMG estimators are presented in Table 35 for the two specifications, (a) and (b). The average estimates of the long-run effects of the variables under consideration on economic growth and the mean estimates of the coefficient of the error correction term have the expected signs. More specifically, the estimates across the two estimators suggest strong and positive correlation between the output growth of Baumol's diseases services and GDP growth, which are in agreement with the static models with respect to the signs of the parameters. Focusing on specification (a), the estimated coefficient for the variable at hand is positive and always statistically significant at 0.01 level of significance with its value ranging between 0.536 (SSA) and 0.784 (Asia) in the ARDL-MG estimator, and between 0.581 (SSA) and 0.837 (Asia) in the DCCEMG estimator. So, the magnitude of the coefficient shows minor differences across the two estimators. However, the CSD tests suggest that cross-sectional dependence is still a concern for the full sample in both ARDL-MG and DCCEMG.

Turning to specification (b), the magnitude of the ARDL-MG estimates for Baumol's diseases services is relatively higher than that of DCCEMG estimates in all panels. The estimates are statistically significant at the 0.01 level of significance. Also, the magnitude of the slope coefficient for investment growth exceeds that for export growth, and in turn surpasses for government consumption in the full sample and Asia panel with both estimators. And, the value of the coefficient for investment growth in the Asia sample exceeds that in the full sample and SSA panel with the DCCEMG model. The Pesaran CD test statistics suggest that the cross-section dependence caused by common factors have completely ruled (even without augmenting the regression with average terms of related variables in the ARDL-MG model). It is also worth noting that the speed of adjustment in the ARDL-MG estimation is fast, where the values fall within the acceptable range. However, as indicated previously, this does not mean that the effects of changes in Baumol's disease services would be fast on the level of real GDP. The lag value of the dependent variable comes out to be negative in both specifications (a) and (b) for SSA and specification (b) for Asia.

The conclusion drawn from Table 35 cannot be decisive in regard to correlation of the unobserved common factors with the regressors. Therefore, the estimation of the CS-ARDL and CS-DL models, which augment the ARDL regressions with cross-sectional averages of the variables and their lags, sounds appropriate to draw conclusion. The estimation results of the two model specifications are reported in Table 36. Under specification (a), the long-run estimates of the coefficient is modestly higher than the one reported in Table 36, ranging between 0.617 (SSA) and 0.793 (Asia) with CS-ARDL, and between 0.604 (SSA) and 0.799 (Asia) with CS-DL, but still statistically significant at 0.01 level of significance. Turning to specification (b), there is evidence for the positive growth effects of all variables to GDP growth in the long-run. The values of the coefficient for Baumol's disease services with the CS-ARDL estimation are far lower than those of the CS-DL estimates, especially for the full sample. The CSD statistics in Table 36 confirm a significant decrease in the average pairwise correlation of error terms and rejected the null of cross-sectional independence for both panels with CS-ARDL and CS-DL models. And, the speed of convergence to equilibrium fall within the dynamically stable range, although relatively faster than the values obtained without augmentation.

Table 34: Estimates based on AMG and Static CCEMG models for Kaldor's First Growth Law for the Full Sample and Country Groups -BDS

Var	AMG						CCEMG					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	a	b	a	b	a	b	a	b	a	b
QBDS	0.678* (0.053)	0.532* (0.040)	0.780* (0.060)	0.637* (0.066)	0.535* (0.056)	0.495* (0.056)	0.695* (0.046)	0.582* (0.044)	0.804* (0.046)	0.655* (0.068)	0.522* (0.053)	0.517* (0.052)
Ig		0.064* (0.010)		0.075* (0.017)		0.039* (0.011)		0.073* (0.011)		0.088* (0.015)		0.046* (0.013)
Xg		0.047* (0.009)		0.044** (0.014)		0.033* (0.014)		0.061* (0.012)		0.060* (0.017)		0.059* (0.019)
GCG		0.015 (0.011)		0.022 (0.017)		0.001 (0.0131)		0.011* (0.019)		0.014 (0.028)		-0.012 (0.013)
CE	0.810* (0.114)	0.709* (0.153)	0.651 (0.094)	0.473 (0.145)	0.807* (0.191)	0.738* (0.205)						
C	0.016* (0.003)	0.011* (0.002)	0.011** (0.003)	0.004 (0.003)	0.026* (0.004)	0.021* (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.002 (0.006)	0.003 (0.005)	-0.002 (0.003)	-0.003 (0.006)
CD test	-3.820	-3.109	-3.720	-2.909	-3.948	-3.170	-3.91	-2.70	-4.04	-3.08	-3.71	-3.52
P Value	0.000	0.002	0.000	0.004	0.000	0.002	0.000	0.007	0.001	0.002	0.000	0.000

Notes: Abbreviations are QBDS –Baumol's Diseases Services; Ig- investment growth; Xg– export growth; GCG– government consumption growth; a – specification (a) and b – specification (b). AMG - augmented mean group; CCEMG – common correlated effects mean group; CDP – common dynamic parameter.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 35: Estimates based on ARDL-MG and DCCEMG Models for Kaldor's First Growth Law for the Full Sample and Country Groups -BDS

Var	DCCEMG						ARDL MG					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	a	b	a	b	a	B	a	b	a	b
BDS	0.657* (0.050)	0.513* (0.038)	0.784* (0.071)	0.587* (0.074)	0.536* (0.073)	0.487* (0.057)	0.690* (0.053)	0.658* (0.070)	0.837* (0.064)	0.662* (0.078)	0.581* (0.069)	0.489* (0.067)
Ig		0.070* (0.013)		0.091* (0.022)		0.032** (0.016)		0.089* (0.014)		0.075* (0.029)		0.064* (0.018)
Xg		0.069* (0.014)		0.052* (0.014)		0.059* (0.019)		0.073* (0.018)		0.101* (0.019)		0.081* (0.023)
GCG		0.006 (0.022)		0.004 (0.025)		0.108 (0.025)		0.013* (0.033)		0.039** (0.021)		0.001 (0.037)
EC							-0.993* (0.038)	-1.035* (0.057)	-0.899* (0.064)	-0.952* (0.049)	-1.039* (0.053)	-1.035* (0.063)
LBDS	0.078*** (0.046)	0.007 (0.042)	0.132* (0.056)	-0.003 (0.040)	-0.003 (0.068)	-0.002 (0.046)						
C	-0.005 (0.006)	-0.011 (0.007)	()	0.002 (0.012)	0.001 (0.007)	-0.001 (0.012)						
CD test	-2.64	-1.19	-2.76	-1.54	-1.81	-1.41	4.10	-0.44	3.75	-1.32	1.29	0.63
P Value	0.008	0.236	0.10	0.124	0.070	0.157	0.000	0.658	0.002	0.186	0.227	0.532

Notes: Abbreviations are QBDS –Baumol's Diseases Services; Ig- investment growth; Xg– export growth; GCG– government consumption growth; a - specification (a) and b – specification (b). ARDL-MG – error correction (ECM) form of autoregressive distributed lag mean group; DCCEMG – common correlated effects mean group.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 36: Estimates based on CS-ARDL and CS-DL Models for Kaldor's First Growth Law for the Full Sample and Country Groups -BDS

Var	CS ARDL						CS-DL					
	All Sample		Asia		SSA		All Sample		Asia		SSA	
	a	b	a	b	a	b	a	B	a	b	a	b
BDS	0.704* (0.070)	0.510* (0.046)	0.793* (0.146)	0.616* (0.137)	0.617* (0.121)	0.484* (0.087)	0.783 (0.073)	0.536* (0.065)	0.0799 (0.098)	0.585* (0.101)	0.604* (0.107)	0.508* (0.067)
Ig		0.090* (0.017)		0.121* (0.026)		0.043** (0.024)		0.091* (0.020)		0.107* (0.024)		0.052*** (0.030)
Xg		0.087* (0.018)		0.047** (0.026)		0.060** (0.026)		0.098* (0.021)		0.064* (0.025)		0.093* (0.023)
GCG		-0.009 (0.020)		-.052 (0.050)		0.047 (0.033)		-0.011 (0.027)		0.006 (0.031)		0.008 (0.039)
EC	-0.920* (0.045)	-1.081 (0.047)	-0.641* (0.166)	-1.092* (0.083)	-1.047* (0.089)	-0.998 (0.074)						
CD test	-1.81	-2.47	-1.74	-0.13	-1.45		-1.66	-1.75	-2.17	-0.36	-2.13	-1.15
P Value	0.070	0.013	0.082	0.900	0.147		0.097	0.080	0.030	0.719	0.034	0.248

Notes: Abbreviations are QBDS –Baumol's Diseases Services; Ig- investment growth; Xg– export growth; GCG– government consumption growth; a –specification (a) and b – specification (b). CS-ARDL – cross-sectional autoregressive distributed lag mean group; CS-DLMG – cross-sectional distributed lag mean group estimator.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

D. Estimates Based on the Static and Dynamic Models for Agriculture Sector

Hypothesis: The descriptive analysis confirms that agriculture still generates a good share of employment in SSA and few countries in Asia. The sector's contribution to total value added is still high in various economies. This may continue especially in low-income SSA economies where the majority of the population still resides in rural areas, generating their income from subsistence farming. This means that the sector may continue serving as refuge to the growing labor force. What is worrying, however, is that the redistribution of land to new entrants (young labor force) and the lack of capabilities to undergo rapid industrialization in most of these economies lead to land fragmentation and scarcity which would put serious strains on the agricultural development-led industrialization strategy. The sector's contribution in employment generation, foreign exchange earnings and total value added may indicate that the growth and transformation plans of many SSA Governments may not be realized neglecting and marginalizing agriculture at their early stages of transformation and development process.

The above contrasts with the experience of most of today's mature industrialized economies where agricultural revolution in most cases preceded Industrial Revolution, making the complementarity or synergy perspective discussed in part three more plausible. True that the importance of the services sector in value added contribution pushes agriculture to second place in most SSA economies even in the face of very low-income level, including the fastest growing ones. This puts these economies in a cross-road. Some observers claim that agriculture is the only growth escalator that majority of SSA economies should place due focus to achieve sustainable growth. This proposition rests purely on the comparative advantage canon, snubbing the possibility for leapfrogging current comparative advantage through the implementation of a well thought targeted industrial policy and political commitment. So, agriculture plays important part in the growth of low-income agrarian economies where the transformation and development process is still in its early stage. The present dissertation hypothesized that agriculture cannot share many of the special features conventionally confined to manufacturing to play growth escalator role in the long-run, although it contributes substantially to the transformation process without which the path for rapid industrialization could not come to reality. There exists complementary relationship between the two sectors.

For that reason, the estimation process extends Kaldor's First Law (equation 16) to agriculture sector in an attempt to validate the above statements. The results are reported in Tables 37-39 for the various model specifications, both static and dynamic. Table 37 summarizes estimates of the AMG and CCEMG models, for two specifications, (a) and (b).[108]

Focusing on specification (a), the estimates of agriculture sector growth coefficient show slight variation moving from AMG to CEEMG, but remain positive and significant in both. The other interesting, but surprising, observation is that the magnitude of the regression coefficient is higher for agriculture value added growth than that of manufacturing value added growth in all panels. Another surprise is that the value of the coefficients are far lower for both the skill-intensive services and Baumol's diseases services in SSA. One may thus argue that a green revolution might be as important as Industrial Revolution of some sort for these economies to succeed in structural transformation and in a way to realize their vision of becoming middle-income countries in between 2025 and 2030. Generally, the results from the AMG model are not meaningfully different from the results from CCEMG, suggesting that simultaneity bias does not seem to be an important problem. But, when it comes to regional groupings, the magnitude of the coefficient in Asia is higher than that of SSA, indicating the importance of agriculture in these economies to induce total output growth over the considered period. This may give evidence to the proposition that the considered Asian economies had undergone agrarian reforms and achieved sustained, high growth that made them development success stories. In the Asia sample economies, except the city states of Hong Kong and Singapore, as Joe Stud (2013) well documented, household farming played a critical role for economic transition and development.[109]

Under specification (b), the magnitude of the estimation coefficient for agriculture value added growth is always slightly lower than the estimates with specification (a); but, always statistically significant at 0.01 level. The magnitude for the slope coefficient of investment growth is now higher (chiefly for the full sample and Asia panel) than the value of the coefficient with estimation results of the two static models in manufacturing, and the two broad segments of the services sector. But,

[108] In both estimations, the constant term has negative sign and almost always statistically significant for both SSA and Asia panels under specification (a), but positive under specification (b) of AMG. It is worth noting that the constant term is higher for SSA than Asia, suggesting that the contribution of agriculture to economic growth is far lower in the former than in the latter.

[109] The measures taken by Japan, then South Korea, Taiwan and, then China were threefold: (i) create conducive environment for small farmers to thrive, in particular granting them with ownerships of plots of land and allowing them to profit from the fruits of their labor. These economies embarked on equitable distribution of land to farmers; (ii) extract surpluses from agriculture to build an export-oriented manufacturing power base, and that "the technological upgrading of manufacturing is the natural vehicle for swift economic transformation." Of course, economic history witnesses that successful countries supplement the invisible hand of market forces with the heavy hand of state-driven industrial policy. In this respect, the Asian forerunners engaged in protectionism strategy and then culling losers (that is cutting off resources to firms that do not succeed in export markets); and (iii) the formation of a closely controlled financial system; that is, nurturing both small-scale farming and export-oriented manufacturing with financial institutions controlled closely by the government.

in both models, cross-sectional dependence is a concern. So, the standard ARDL-MG, DCCEMG, CS-ARDL and CS-DL approaches are employed.

The above findings are consistent with the estimates of the standard ARDL-MG and DCCEMG models for the estimates of the regional panels given in Table 38. The estimates appear positive and statistically significant in the long-run. Again, the magnitude of the estimate is relatively higher in most cases in the ARDL-MG estimator than in the DCCEMG estimator except for Asia under specification (a). Interestingly, for specification (a), the value of the coefficient is higher for agriculture than manufacturing in all panels under the ARDL-MG and DCCEMG specifications.

In sum, the estimates are positive and statistically significant across the two estimators. For specification (b), the long-run estimates for agriculture value added growth are somewhat lower than those observed in specification (a) under the ARDL-MG estimation. On the other hand, there is more evidence for the existence of positive and strong economic growth effects of investment growth in the long-run as its values are higher for all panels both in the ARDL-MG and DCCEMG estimators than observed in the previous estimates with other sectors. And, the magnitude of the estimates for investment growth, export growth and government consumption growth are continued to be higher for Asia than SSA panels. The relatively higher value of export growth in Asia than in SSA may be explained by the type and quality of exports in the two regions, where the export items of SSA being mostly concentrated in the periphery of the product space. This may also be a manifestation of the limited capabilities in SSA countries to maintain successful production transformation in line with the stylized facts of transformation. The reverse is true for the Asian success stories. However, the Pesaran CD test statistics show that cross-sectional dependence remains a concern for the full sample and Asia panel typically under specification (a).

The presence of cross-sectional dependence in the baseline model suggests that the estimates reported in Table 38 might be misleading. To this regard, the CS-ARDL and CS-DL regressions are applied to treat the problem. The estimated results are reported in Table 39 for the two specifications, (a) and (b). For specification (a), when agriculture value added growth is the only independent variable, the coefficient has the expected sign, where value added growth of the sector impacted positively on GDP growth for all panels. In both CS-ARDL and CS-DL models, the value of the slope coefficient is mostly higher in Asia panel than in SSA panel. The positive sign and level of significance for the coefficient remain intact when growth rates of investment, government consumption and export are included to the regression equation under specification (b).

Table 37: Estimates based on AMG and static CCEMG models for Kaldor's First Growth Law for the Full Sample and Country Groups -AGR

VAR	AMG						CCEMG					
	All sample		Asia		SSA		All sample		Asia		SSA	
	a	b	a	b	a	b	a	b	a	B	a	b
QAG	0.439*	0.354*	0.522*	0.387*	0.351*	0.336	0.529*	0.42	0.522*	0.451*	0.396*	0.363*
	(0.057)	(0.054)	(0.081)	(0.071)	(0.071)	(0.067)	(0.062)	(0.058)	(0.078)	(0.093)	(0.079)	(0.063)
Ig		0.068*		0.130*		0.048*		0.103*		0.151*		0.049*
		(0.012)		(0.026)		(0.079)		(0.018)		(0.032)		(0.009)
Xg		0.053*		0.574*		0.043**		0.084*		0.118*		0.053*
		(0.013)		(0.011)		(0.198)		(0.024)		(0.028)		(0.020)
GCg		0.079*		0.109*		0.073*		0.107*		0.130*		0.061*
		(0.012)		(0.028)		(0.011)		(0.025)		(0.035)		(0.011)
CDP	0.839*	0.615*	0.935	0.610*	0.754*	0.698*						
	(0.094)	(0.097)	(0.150)	(0.126)	(0.142)	(0.148)						
C	0.040	0.024*	0.034*	0.014*	0.045*	0.035	0.001	-0.009	-0.004	-0.000	0.005	0.002
	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)	(0.007)	(0.007)	(0.000)	(0.006)
CD TEST	-3.474	-0.946	-4.127	-0.770	-2.748	-2.895	-3.21	0.03	-4.06	-0.63	-2.05	-2.67
P-VALUE	0.001	0.344	0.020	0.441	0.016	0.004	0.031	0.973	0.020	0.527	0.041	0.018

Notes: Abbreviations are QAG - Agriculture sector output growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). AMG - augmented mean group; CCEMG – common correlated effects mean group; CDP – common dynamic parameter.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 38: Estimates based on ARDL-MG and DCCEMG Models for Kaldor's First Growth Law for the Full Sample and Country Groups -AGR

VAR	**DCCEMG**						**ARDL-MG**					
	All sample		Asia		SSA		All sample		Asia		SSA	
	a	b	A	b	a	b	a	b	a	b	a	b
LY	0.398*	0.199*	0518*	0.363*	0.194*	0.301*						
	(0.052)	(0.037)	(0.063)	(0.085)	(0.053)	(0.099)						
EC							-0.794*	-0.875*	-0.829*		-0.779*	-0.831*
							(0.034)	(0.052)	(0.055)		(0.091	(0.080)
QAg	0.422*	0.348*	0.429*	0.527*	0.393*	0.398*	0.505*	0.418*	0.627*	0.417*	0.438*	0.408*
	(0.062)	(0.049)	(0.105)	(0.166)	(0.087)	(0.151)	(0.074)	(0.067)	(0.123)	(0.103)	(0.091)	(0.080)
Ig		0.089*		0.241*		0.065**		0.147*		0.219*		0.074*
		(0.018)		(0.045)		(0.031)		(0.029)		(0.047)		(0.016)
Xg		0.071*		0.146*		0.079**		0.086*		0.117*		0.062*
		(0.021)		(0.054)		(0.039)		(0.027)		(0.041)		(0.025)
GCg		0.078*		0.148*		0.104*		0.062*		0.109*		0.076*
		(0.019)		(0.058)		(0.038)		(0.033)		(0.041)		(0.019)
CD TEST	0.55	0.25	-2.81	-0.87	-0.98	-1.02	8.86	1.69	10.96	1.97	1.84	0.89
P-VALUE	0.583	0.802	0.005	0.382	0.325	0.309	0.000	0.091	0.000	0.049	0.066	0.374

Notes: Abbreviations are QAG – agriculture sector output growth; Ig- investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). ARDL-MG – error correction (ECM) form of autoregressive distributed lag mean group; DCCEMG – common correlated effects mean group.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

Table 39: Estimates based on CS-ARDL and CS-DL Models for Kaldor's First Growth Law for the Full Sample and Country Groups -AGR

VAR	**CS-ARDL**						**CS-DL**					
	All sample		Asia		SSA		All sample		Asia		SSA	
	a	b	A	b	a	b	a	b	a	b	a	b
AG	0.472*	0.458*	0.545*	0.407*	0.462*	0.431*	0.484*	0.496*	0.559*	0.406*	0.441*	0.422*
	(0.096)	(0.073)	(0.124)	(0.115)	(0.119)	(0.068)	(0.100)	(0.129)	(0.158)	(0.075)	(0.087)	(0.067)
Lg		0.098*		0.158*		0.052*		0.131*		0.144*		0.071*
		(0.024)		(0.027)		(0.014)		(0.029)		(0.032)		(0.019)
Xg		0.097*		0.090**		0.059*		0.094*		0.092*		0.065*
		(0.029)		(0.047)		(0.025)		(0.027)		(0.032)		(0.024)
GCg		0.097*		0.151*		0.063**		0.099**		0.080**		0.052
		(0.024)		(0.066)		(0.033)		(0.050)		(0.048)		(0.032)
EC	-0.694*	-0.865*	-0.705*	-0.877*	-0.805*	-0.876*						
	(0.041)	(0.053)	(0.049)	(0.069)	(0.162)	(0.076)						
CD TEST	1.78	1.34	-3.25	0.23	0.24	-1.73	-2.48	-0.38	-2.75	-0.05	-1.86	-1.61
P-VALUE	0.076	0.180	0.001	0.821	0.809	0.084	0.0131	0.700	0.026	0.964	0.063	0.107

Notes: Abbreviations are QAG- agriculture sector output growth; Ig- Investment growth; Xg– export growth; GCg– government consumption growth; a – specification (a) and b – specification (b). CS-ARDL – cross-sectional autoregressive distributed lag mean group; CS-DLMG – cross-sectional distributed lag mean group estimator.

Level of significance * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$.

Source: Own computation

E. Results for the Spuriousness Tests

The two spuriousness tests of equations (16a and 16b) are carried out to validate Kaldor's hypothesis that manufacturing has unique characteristics that are not shared by services and agriculture. The estimation results are reported in Tables 40 to 43, respectively for manufacturing and the two segments of services and agriculture sectors for Asia and SSA country groupings in view of validating the research claims and the discussions held in parts three and four by answering the research questions.. The significant and positive signs of the coefficient gives supportive evidence for the engine of growth role of manufacturing.

Manufacturing: The first test estimates the excess of manufacturing growth on GDP growth, and the relationship should be positive and significant to support the engine of growth hypothesis for manufacturing. As cane be evident from Table 40, manufacturing passes both spuriousness tests in the Asia country groupings across the different models and fails the first test for SSA panel as the sign of the coefficient turns out to be negative in the various estimation models. All in all, the results of the two tests suggest that manufacturing still maintains host of spillover effects to the rest of the economy in Asia, which is consistent with the predictions of Kaldor's and other scholars from the structuralist tradition. The result suggest that the Asian sample economies, on average, followed manufacturing-led development journey over the study period.

Higher-productivity (and skill-intensive) services: the findings of the previous sections confirmed that growth in both segments of the services sector is positively related to total output growth across all estimation models. Nonetheless, Table 41 shows that these services activities fail to pass the first side test of spuriousness in that the sign of the coefficient for excess value added growth of these services activities appear negative and consistently significant across the different estimation models for both SSA and Asia panels. However, as expected, they pass the second test in all estimation models. This suggests that output growth of these services activities contributed positively and significantly to the growth of other sectors during the study period. One may argue that the productivity spillover from these services activities (mainly information technology, business services) may contribute to the positive contribution as productivity gains may not be related to number of workers. The size of the correlation of the skill-intensive services activities and manufacturing with GDP shows comparable magnitude across the various model specifications – that is, the coefficient of these services activities turns out slightly higher than manufacturing or comparable to manufacturing. This may give impetus to the synergy hypothesis of this dissertation, whereby services can stand merely as stimulus complement to manufacturing rather than its perfect substitute.

Baumol's diseases services: The results in Table 42 show that these services activities fail to acquiesce the first spuriousness test as excess growth in their value added has negatively related with GDP growth in the different estimation models. Of course, they pass the second test in all models. Interestingly, when compared with manufacturing and higher-productivity services, the coefficient of the Baumol's diseases services output growth come out substantially higher than the size of manufacturing and skill-intensive services, albeit the size of the coefficient in both cases is far higher for Asia than SSA. The bigger size of these services activities is associated partly with their larger size in the economy, essentially because its share in GDP is becoming exceeding those of manufacturing and skill-intensive services. The fact that these services activities fail to pass the first test of spuriousness may suggest that the first test is superior to the second test, albeit the second test is considered as the preferred one, given that the bigger size for the value added share of these services activities could cause the occurrence of spurious relationship.

Agriculture: As to the two segments of the services sector, agriculture fails to pass the first test for spuriousness for Asia because the sign of the estimated coefficient become negative. In fact, the size of the coefficient is extremely lower (hardly exceeding 0.1 percent) than those of manufacturing and services sectors with this test for SSA too (see Table 43). Nonetheless, growth in agricultural sector value added appear significantly related to growth in other sectors, albeit the size of the estimated coefficient in Asia panel exceeds that in SSA. This may be related to disparity in productivity gains, as already indicated in part four both land and labor productivity in Asia are, on average, higher for Asia than SSA.

In sum, the findings give supportive evidence to the lengthy discussion made in part three to defend the synergetic relationship between manufacturing and services and between agriculture and manufacturing. The results gives insights on the question: *Does services sector maintain the potential to become alternative growth escalator for the country groups in the same way as manufacturing did in the past, so that countries follow service-led growth path for their development?* If the expansion of services is a byproduct of growth driven by rising income on account of productivity growth in goods producing industries (that boost the demand for services), the answer to the question may be big no. However, the results here suggest that services sector differ from manufacturing with respect to their engine of growth effect. Notably, manufacturing passes the two tests of spuriousness at least for Asia panel, but services do not, with almost all model specifications. Therefore, the results give supportive evidence to the hypothesis that services can stand to serve as *"stimulus complement"* to manufacturing, rather than taking up the engine of growth role in the countries under investigation.

Table 40: Effects of Excess Growth in Manufacturing Value Added on GDP and Growth in Manufacturing Value Added on Growth in non-Manufacturing Sectors Value Added

Variables	**AMG**		**CCEMG**		**DCCEMG**		**ARDL MG**		**CS-ARDL**		**CS-DL**	
	Asia	**SSA**	**Asia**	**SSA**	**Asia**	**SSA**	**Asia**	**SSA**	**Asia**	**SSA**	**Asia**	**SSA**
QM-Qnm	0.137* (0.055)	0.135* (0.042)	0.097* (0.084)	-0.115* (0.049)	0.302* (0.108)	-0.126** (0.057)	0.265* (0.145)	-0.119** (0.124)	0.345** (0.208)	-0.164* (0.118)	0.248* (0.089)	-0.09*** (0.051)
CDP	0.920* (0.135)	0.844* (0.153)										
Constant	0.048* (0.003)	0.061* (0.006)	0.003 (0.007)	0.002 (0.011)	0.003 (0.015)	0.001 (0.013)						
CD Test	-3.834		-3.92	-3.70	-3.39	-2.87	6.84	2.56	-2.12	-2.48	--3.33	-3.39
P-value	0.000		0.000	0.000	0.001	0.004	0.000	0.011	0.034	0.013	0.005	0.001
LY					0.275* (0.068)	0.213* (0.063)						
EC							-0.679* (0.063)	-0.749* (0.042)	-0.670* (0.077)	-0.783* (0.073)		
QM	0.270* (0.027)	0.135* (0.042)	0.304* (0.000)	0.133* (0.050)	0.283* (0.061)	0.166* (0.046)	0.379* (0.056)	0.162* (0.071)	0.338* (0.063)	0.165* (0.043)	0.274* (0.053)	0.150* (0.039)
CDP	0.857* (0.130)	0.844* (0.153)										
Constant	0.025* (0.005)	0.060* (0.006)	0.003 (0.006)	-0.006* (0.006)	-0.001 (0.013)	0.005 (0.009)						
CD-test	-3.791	-3.915	-3.93	-4.14	-3.00	-3.46	4.13	1.40	-2.79	-3.81	-3.49	-3.71
P-value	0.000	0.000	0.000	0.000	0.003	0.001	0.013	0.160	0.005	0.000	0.009	0.001
LY					0.263* (0.078)	0.195* (0.072)						
EC							-0.762* (0.056)	-0.774* (0.073)	-0.782* (0.065)	-0.964* (0.046)		

Notes: abbreviations are as previously given
Source: own Computation

Table 41: Effects of Excess Growth in Skill-intensive Services Value Added on GDP and Growth in Skill-intensive Services Value Added on Growth in non- Skill-intensive Services Sectors Value Added

Variables	AMG		CCEMG		DCCEMG		ARDL MG		CS-ARDL		CS-DL	
	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA
QHPS-Qnhps	-0.077 (0.076)	-0.143* (0.052)	-0.132 (0.087)	-0.113** (0.067)	-0.132* (0.073)	-0.163** (0.072)	-0.277** (0.0132)	-0.182* (0.082)	-0.177** (0.087)	-0.171** (0.078)	-0.147** (0.081)	-0.16** (0.071)
CDP	0.884 (0.167)	0.774* (0.165)										
Constant	0.053 (0.003)	0.065* (0.005)	-0.001 (0.005)	0.001 (0.005)	0.006 (0.013)	0.006 (0.010)						
CD Test	-3.682	-2.613	-3.63	-2.42	-3.36	-1.99	9.28	2.48	-3.47	-2.13	-1.54	-1.37
P-value	0.000	0.009	0.003	0.016	0.001	0.047	0.000	0.048	0.001	0.331	0.123	0.172
LY					0.391* (0.046)	0.125* (0.049)						
EC							-0.724* (0.036)	-0.833* (0.053)	-0.569* (0.043)	-0.921* (0.045)		
QHPS	0.407* (0.039)	0.217* (0.055)	0.409* (0.074)	0.228* (0.071)	0.408* (0.089)	0.221* (0.091)	0.454* (0.047)	0.273* (0.076)	0.445* (0.071)	0.267* (0.092)	0.395* (0.078)	0.212** (0.091)
CDP	0.933 (0.138)	0.741* (0.142)										
Constant	0.018 (0.004)	0.041* (0.004)	-0.002 (0.003)	-0.006 (0.016)	-0.007 (0.010)	-0.005 (0.016)						
CD-test	-3.954	-4.127	-4.14		-3.57	-3.73	10.32	0.07	-3.68	-3.74	-3.56	-3.10
P-value	0.000	0.000	0.000		0.001	0.00	0.000	0.942	0.000	0.001	0.000	0.040
LY					0.192** (0.094)	0.174* (0.067)						
EC							-0.988* (0.062)	-0.905* (0.061)	-0.849* (0.079)	-0.883* (0.047)		

Notes: abbreviations are as previously given
Source: own Computation

Table 42: Effects of Excess Growth in Baumol's Diseases Services Value Added on GDP and Growth in Baumol's Diseases Services

Variables	AMG		CCEMG		DCCEMG		ARDL MG		CS-ARDL		CS-DL	
	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA
QBDS-Qnbds	-0.362 (0.106)	-0.13** (0.060)	-0.372 (0.094)	-0.139** (0.060)	-0.335* (0.074)	-0.088 (0.065)	-0.436* (0.113)	-0.244** (0.097)	-0.467* (0.105)	-0.122 (0.095)	-0.373* (0.120)	-0.089 (0.089)
CDP	0.781 (0.156)	0.766* (0.165)										
Constant	0.053 (0.003)	0.066* (0.006)	0.011 (0.008)	0.001 (0.012)	0.009 (0.015)	-0.003 (0.010)						
CD Test	-3.116		-3.17	-2.82	-3.05	-2.51	6.50	3.44	-1.44	-2.47	-0.26	-1.48
P-value	0.002		0.002	0.005	0.002	.012	0.000	0.000	0.149	0.026	0.793	0.139
LY					0.361* (0.046)	0.114** (0.048)						
EC							-0.842* (0.057)	-0.789* (0.040)	-0.725* (0.037)	-0.856* (0.049)		
QBDS	0.684* (0.082)	0.263* (0.055)	0.708* (0.076)	0.261* (0.052)	0.593* (0.094)	0.234* (0.062)	0.785* (0.118)	0.297* (0.064)	0.718* (0.121)	0.277* (0.094)	0.699* (0.089)	0.246* (0.087)
CDP	0.771 (0.108)	0.954* (0.199)										
Constant	0.018 (0.006)	0.045* (0.005)	-0.004 (0.009)	-0.002 (0.006)	-0.005 (0.011)	-0.013 (0.013)						
CD-test	-3.900	-2.806	-4.22	-4.23	-3.41	-2.70	4.51	1.50	-2.61	-3.48	-3.10	-3.73
P-value	0.000	0.005	0.000	0.000	0.001	0.007	0.000	0.133	0.009	0.001	0.002	0.000
LY					0.224* (0.070)	0.077 (0.061)						
EC							-0.921* (0.045)	-0.900* (0.057)	-0.843* (0.053)	-0.876* (0.072)		

Notes: abbreviations are as previously given
Source: own Computation

Table 43: Effects of Excess Growth in Agriculture Value Added on GDP and Growth in Agriculture Value Added on Growth in non- Agriculture Sectors Value Added

Variables	AMG		CCEMG		DCCEMG		ARDL MG		CS-ARDL		CS-DL	
	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA	Asia	SSA
QAG-QnAg	-0.274 (0.082)	0.066 (0.047)	-0.287* (0.078)	0.090** (0.040)	-0.209* (0.078)	0.071* (0.045)	-0.347* (0.093)	0.037 (0.09)	-0.275** (0.102)	0.105** (0.052)	-0.214* (0.078)	0.088** (0.041)
CDP	0.607 (0.174)	0.741* (0.155)										
Constant	0.046 (0.004)	0.066 (0.005)	0.003 (0.008)	0.000 (0.005)	0.001 (0.010)	0.004 (0.014)						
CD Test	-3.488	-3.537	-3.62	-3.43	-3.43	-3.16	7.94	2.42	-2.95	3.18	-3.01	-3.33
P-value	0.000	0.000	0.003	0.000	0.001	0.002	0.000	0.015	0.003	0.001	0.003	0.004
LY					0.321* (0.048)	0.130* (0.047)						
EC							-0.838* (0.061)	-0.774* (0.041)	-0.694* (0.051)	-0.834* (0.046)		
QAG	0.407* (0.084)	0.124* (0.052)	0.414* (0.083)	0.137* (0.049)	0.308* (0.116)	0.129* (0.055)	0.407* (0.096)	0.149** (0.067)	0.370* (0.086)	0.148* (0.056)	0.359* (0.099)	0.142* (0.056)
CDP	0.961 (0.155)	0.937* (0.187)										
Constant	0.0425 (0.006)	0.085* (0.009)	-0.005 (0.009)	-0.002 (0.005)	0.008 (0.018)							
CD-test	-4.002	-4.025	-3.97	-3.93	-2.85	-3.49	11.85	1.87	-2.88	-3.39	0.04	-3.59
P-value	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.061	0.004	0.001	0.947	0.000
LY					0.517* (0.058)	0.194* (0.053)						
EC							-0.798* (0.042)	-0.739* (0.037)	-0.681* (0.056)	-0.812* (0.059)		

Notes: abbreviations are as previously given
Source: own Computation

F. Results for the Open Economy Model Specification

Pacheco-Lopez and Thirlwall (2013) evidenced strong relation between the dynamics of countries exports to the growth of their manufacturing sector. In their view export growth depends on the structure of production and the income elasticity of demand for different products. In this respect, therefore, export growth is endogenous and is likely related to the growth of manufacturing value added as all manufactures are potentially tradable, albeit they do not fetch identical production and demand features. This makes manufacturing special. On one hand, although primary products are potentially tradable, they could not share similar production and demand characteristics with manufactures as the demand growth for primary products in foreign trade is low (Engel's law). On other hand, certain services activities are tradable; but many are not and their income elasticity of demand in international market is likely to be relatively lower than manufactures (chiefly, medium- and high-tech manufactured goods).

The slope heterogeneity tests show mixed results: Homogenous for the second structural function of the model (with export growth enter to the regression as dependent variable (equation 18) and heterogeneous with the first structural function (with predicted value of export as endogenous variable and GDP growth as dependent variable (equation 17). Accordingly, estimation is carried out using mean group instrumental variable (MGIV) for both homogenous and heterogeneous slope [which is in fact two-stage least square type] for the full sample and the two country groupings. The results are reported in Tables 44a and 44b with homogenous slope and heterogeneous slope respectively. Also, the test is applied, as previously, to the two services segments and agriculture sectors, despite Kaldor's theoretical framework and Pacheco-López and Thirlwall (2013) estimation were concerned with merely manufacturing (not services and agriculture for the reasons noted in the previous paragraph). Extending the test to the two sectors may, however, offer valuable insights on the debate as to whether the service sector has the potential to become the new growth escalator substituting manufacturing or merely stand as "stimulus complement" to manufacturing.

For the full sample, Kaldor's first law is supported: there exists positive relation between manufacturing growth and export growth – with a coefficient of 0.412 percent with the homogeneous slope and 0.479 percent with heterogeneous slope (there is no big difference here) as well as between GDP growth and export growth (Xghat) with value of 0.815 percent with the homogenous slope and 0.821 percent with the heterogeneous slope. In terms of size of the coefficients, the effect of export growth on GDP growth is almost twice larger than the effect manufacturing value added growth has on export growth. Similarly, there exist strong relations between manufacturing value added growth and export growth in Asia (with coefficient of 0.63

percent) and modest relation between the same in SSA (with a coefficient of 0.266) with homogenous slope. The coefficient reduced to 0.548 percent for Asia and increased to 0.378 percent for SSA with heterogeneous slope. For the two country groupings, the size of the coefficient for export growth (Xghat) become 0.537 and 1.106 percent with homogenous slope and 0.613 and 0.952 percent with heterogeneous slope respectively.

One other interesting finding is that the coefficient for the effect of higher-productivity services and Baumol's diseases services value added growth, and agriculture value added growth on export growth is lower than that of manufacturing for both country groupings with both homogenous and heterogeneous slopes, except for Asia wherein the size of the coefficient for the Baumol's diseases exceeds that of manufacturing. Likewise, the coefficient for export growth (Xghat) is positively impacting GDP growth comes out larger with services and agriculture sectors instruments than manufacturing, albeit it is more pronounced for the full sample and SSA than Asia.

To draw more concrete evidence, further research may be carried out employing different empirical specifications including classifying countries by their income level (low-income, middle-income and high-income); by their manufacturing exports level (manufacturing exporters and non-manufacturing exporters) as well as classifying exports into manufacturing, services and primary commodities, etc.

Table 44a: Effects of sectoral Value Added growth on Export Growth (First Stage) and that of Export Table Growth on GDP Growth (Second Stage): MG-IV with Homogeneous Slope

Variables	Full Sample		Asia		SSA	
	XG	GDP	XG	GDP	XG	GDP
QM	0.368* (0.081)		0.620* (0.109)		0.218* (0.068)	
Constant	0.058* (0.005)		0.058* (0.007)		0.051* (0.006)	
XG		0.571* (0.042)		0.466* (0.028)		0.541* (0.071)
Constant		0.005 (0.003)		0.010* (0.004)		0.023 (0.006)
QHPS	0.222* (0.070)		0.490* (0.154)		0.082* (0.065)	
Constant	0.065* (0.005)		0.064* (0.008)		0.057* (0.005)	
XG		0.919* (0.078)		0.655* (0.039)		1.332* (0.129)
Constant		-0.023* (0.006)		-0.008** (0.004)		-0.039* (0.008)
QBDS	0.311* (0.079)		0.752* (0.096)		0.179* (0.042)	
Constant	0.063* (0.005)		0.055* (0.006)		0.053* (0.006)	
XG		1.106* (0.048)		0.739* (0.046)		1.179* (0.089)
Constant		-0.038* (0.004)		-0.056* (0.005)		-0.029* (0.006)
QAG	0.207* (0.049)		0.477** (0.232)		0.138* (0.044)	
Constant	0.074* (0.006)		0.087** (0.232)		0.058* (0.006)	
XG		1.020* (0.127)		0.539* (0.071)		1.192* (0.162)
Constant		-0.031* (0.009)		0.003 (0.008)		-0.029* (0.008)

Notes: Abbreviations are: QM – manufacturing value added growth; XG – export growth; Y – GDP growth; QHPS – Higher-productivity services value added growth; QBDS –Baumol's diseases services value added growth; QAG – agriculture sector value added growth. Numbers in parenthesis are standard errors. Level of significance are: * p < 0.01; ** p < 0.05; *** p < 0.10. First refers to first stage results where the dependent variable is export growth (XG) and second denotes for second stage where the dependent variable is GDP growth (Y). The results are carried out with homogeneous slope.
Source: Own computation

Table 44b: Effects of sectoral Value Added growth on Export Growth (First Stage) and that of Export Growth on GDP Growth (Second Stage): MG-IV with Heterogeneous Slope

Variables	**Full Sample**		**Asia**		**SSA**	
	XG	**GDP**	**XG**	**GDP**	**XG**	**GDP**
QM	0.428* (0.065)		0.538* (0.103)		0.302* (0.074)	
Constant	0.056* (0.001)		0.063* (0.008)		0.049* (0.005)	
XG		0.607* (0.071)		0.8* (0.051)		0.647* (0.089)
Constant		0.002 (0.006)		0.008** (0.05)		0.005 (0.006)
QHPS	0.257* (0.072)		0.477* (0.103)		0.028* (0.059)	
Constant	0.062* (0.006)		0.066* (0.005)		0.060* (0.005)	
XG		0.916* (0.124)		0.652* (0.055)		1.356* (0.217)
Constant		-0.023** (0.009)		-0.006 (0.005)		-0.041* (0.014)
QBDS	0.474* (0.126)		0.731* (0.216)		0.165** (0.072)	
Constant	0.053* (0.007)		0.057* (0.012)		0.054* (0.007)	
XG		1.167* (0.199)		0.669* (0.155)		0.775* (0.480)
Constant		-0.041* (0.0170		-0.010 (0.013)		0.000 (0.034
QAG	0.318* (0.0760		0.489* (0.134)		0.078* (0.071)	
Constant	0.070* (0.005)		0.084* (0.007)		0.058 (0.067)	
XG		1.377* (0.161)		0.696* (0.145)		1.443* (0.253)
Constant		-0.061* (0.013)		-0.015 (0.016)		-0.046* (0.015)

Notes: Abbreviations are: QM – manufacturing value added growth; XG – export growth; Y – GDP growth; QHPS – Higher-productivity services value added growth; QBDS –Baumol's diseases services value added growth; QAG – agriculture sector value added growth. Numbers in parenthesis are standard errors. Level of significance are: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$. First refers to first stage results where the dependent variable is export growth (XG) and second denotes for second stage where the dependent variable is GDP growth (Y). The results are carried out with heterogeneous slope.

Source: Own computation

6.5.3. Estimates of the Static and Dynamic Models for the Second Law

Hypothesis: The Second Growth Law states that manufacturing productivity growth relies largely on manufacturing value added growth through static and dynamic economies of scale than in other sectors. The empirical results of Kaldor suggest that cross-country overall growth rates disparities across countries were associated with differences in manufacturing productivity. Kaldor, inspired by Young (1928) distinguished between manufacturing industry as the increasing returns and agriculture as the diminishing returns sectors. By contrast, some observers argue, that Young (1928) did not explicitly distinguish between manufacturing and agriculture for understanding increasing returns, as the market in his view is considered as aggregate of economic activities tied together through trade. In this sense, growth of one sector would expand the demand for the products of other sectors, which in turn, propels growth in the original sector. Therefore, there exists reciprocal exchange relationship among the various sectors, comprising agriculture. The empirical evidence for the Second Law is at best mixed, some of them argue that the intuition behind this Law distorts the existence of symbiotic relationships among sectors while favoring manufacturing may lead to adverse terms of trade for agriculture and may create demand constraint for manufacturing industry itself.

This section seeks out to evaluate whether this Law is still valid, justifying special treatment to manufacturing. Also, the empirical model specifications are extended for the skill-and knowledge-intensive services and Baumol's diseases services to examine whether the second Law is also justified to the services sector. In both the static and dynamic model specifications, two cases are estimated. Case (a) includes manufacturing productivity as dependent variable and manufacturing value added growth as explanatory variable, and case (b) takes employment growth in manufacturing as dependent variable and value added growth of the sector as explanatory variable.[110] The two specifications are extended to the services and agriculture sectors. The Second Law, also known as the Kaldor-Verdoorn Law, is supported by the two panel datasets, though not as strongly as the First Law.

The cross-sectional dependence test results are reported in Annex IV Table 12, and the CSD test rejects the null of weak cross-sectional dependence in some of the variables (accepts in some others)

[110] According to Kaldor (1975), case (b) is the main test for deciding whether Verdorron's law is valid or not. In his words, case (a) is "the automatic consequence of measuring the same thing twice" given that output growth is productivity growth minus employment growth, and hence, it "does assert anything." He found that the regression coefficient equation of productivity on output growth for agriculture and commerce was approximately 1, which is not a meaningful result. He also found that the regression coefficients of both productivity on output growth (case a) and employment on output growth (case b) was around 0.5 for manufacturing, which suggests that a one percentage point increase in output results in half a percentage increase in productivity.

and the estimated exponent of the cross-sectional dependence is well above 0.5. It could, therefore, be justifiable to use estimation approaches that take into account cross-sectional dependence and slope heterogeneity. Table 45 shows results of the fixed effect and Pesaran CSD tests. As can be evident from the Table, the null hypothesis of cross-sectional dependence is rejected in very few cases but accepted in others. In both panels, cross-sectional dependence is not a concern for the two segments of the services sector in both specifications.

Table 45: Estimates of Two Way Fixed Effect Model and Pesaran (2015) CD Statistics

	Asia							
	Manufacturing		Higher-productivity services		Baumol's Diseases services		Agriculture	
	Pm	Em	Phps	Ehps	PBDS	EBDS	Pag	Eag
Q	0.565*	0.429*	0.707*	0.243*	0.830*	0.160**	0.875*	0.114*
	(0.010)	(0.031)	(0.037)	(0.035)	(0.036)	(0.037)	(0.050)	(0.043)
Constant	-0.028**	0.022	-0.025*	0.029*	-0.027*	0.028*	-0.006	-0.001
	(0.014)	(0.014)	(0.006)	(0.003)	(0.003)	(0.003)	(0.016)	(0.002)
CD Stat.	-4.451	-4.283	0.095	-0.345	2.551	1.843	0.428	0.413
P-value	0.001	0.001	0.924	0.730	0.011	0.065	0.669	0.000
	SSA							
	Manufacturing		Skilled-services		Baumol's Diseases		Agriculture	
	Pm	Em	Phps	Ehps	Pm	Em	Phps	Ehps
Q	0.562*	0.446*	0.620*	0.365*	0.696*	0.223*	0.852*	-0.018
	(0.030)	(0.027)	(0.035)	(0.034)	(0.027)	(0.026)	(0.017)	(0.012)
Constant	-0.005	0.018*	-0.028*	0.032*	-0.032*	0.037*	-0.017*	0.019*
	(0.015)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
CD Stat.	-3.806	1.004	0.708	0.706	1.585	1.698	0.178	3.653
P-value	0.000	0.315	0.479	0.480	0.059	0.090	1.347	0.000

Note: Q represents output growth of the respective sectors (such as qm for manufacturing; qhps for higher-productivity services; qbds for Baumol's diseases services; qag for agriculture); P denotes productivity growth of each sector and E refers to employment growth of each sector considered; * level of significance at 0.01 level; ** level of significance at 0.05 level

Source: own Computation

One interesting observation from the Table is that the coefficients in specification (a) are positive and significant, where the size of the coefficient for agriculture is the largest, followed by Baumol's diseases services, skill-intensive services and manufacturing in that order for both Asia and SSA. The reverse is true with respect to the effect of sectoral value added growth on its employment growth: manufacturing, skill-intensive services, Baumol's diseases services, and agriculture (which is negative for SSA). The result give indication that expansion of manufacturing production generates relatively higher jobs than other sectors.

The Swamy S test of for parameter constancy and the Roy-Zellner test (Pesaran, Yamagata 2008; Blomqust, Westerlund 2013) test for slope heterogeneity were implemented and results are reported in Annex IV Table 13. Both test results evidenced that heterogeneity is present in the full sample, rejecting the null hypothesis of slope homogeneity. With the view to tackle slope heterogeneity and global common shocks, the rest of this section presents and discusses results generated from other static and dynamic estimation models.

A. Estimation Results for Manufacturing

The estimated results of the static AMG and CCEMG models are reported in Table 46. The regression coefficients turn out to be positive in line with Kaldor's prediction and statistically significant in both cases (a) and (b), reflecting the long-run effects of manufacturing output growth on growth of productivity and employment in same. The values of the parameter of both manufacturing productivity and employment growth are more or less similar, moving from AMG to CCEMG models in the full sample as well as in the SSA and Asia panels. However, there appear large differences on the magnitude of the coefficients between the two panels. More specifically, the regression coefficient under case (a) ranges between 0.565 percent (AMG) to 0.573 percent (CCEMG) for the full sample; between 0.627 percent (CCEMG) and 0.639 percent (AMG) for Asia and between 0.480 percent (AMG) and 0.504 percent (CCEMG) for SSA, implying that a one percent increase in manufacturing growth results in productivity growth by that range. The value of the coefficient for the full sample and Asia panel is slightly higher than Kaldor's findings, which was 0.50. The higher value of the coefficient in Asia than in SSA reflects the difference in level of industrialization in the two panels. On the other hand, the evidence in case (b) reflects the magnitude of the employment effect which appears 0.411 (for full sample), 0.351 (for Asia) and 0.483 (for SSA) with the AMG specification; and 0.410 (for full sample), 0.372 (for Asia) and 0.490 (for SSA) with the CCEMG specification. So, the employment growth effect of manufacturing growth has been higher in SSA than in Asia panel while the reverse was the case with the relation of productivity on output growth. The CSD statistics suggests that both specifications suffer from cross-sectional dependence.

The standard panel ARDL-MG and DCCEMG are thus employed and the results are reported in Table 47. The average estimates of the long-run effects of manufacturing growth on productivity and employment growth rates as well as mean estimates of the coefficient of the error correction term and the lag of the dependent variable bear the expected signs. The estimates are always statistically significant at the 0.01 level of significance. The magnitude of the coefficients is slightly altered moving from the above discussed static specifications to the dynamic estimators. The magnitude of the coefficient under specification (a) was 0.542 (for full sample), 0.698 (for Asia) and 0.426 (for SSA) with standard ARDL-MG model, which became 0.556 (full sample), 0.658

(Asia) and 0.439 (SSA) with DCCEMG. The Pesaran CD statistics show that the null of cross-sectional dependence is rejected without augmenting the regression with average terms of the variables. Also, the speed of adjustment is statistically significant and its values are within the acceptable range. The first lag of the dependent variable in specifications (a) and (b) was positive, though insignificant for Asia.

Table 48 reports estimation results of the CS-ARDL and CS-DL models. The estimates are similar with the ones reported in Table 47 above, in terms of signs of the coefficients. Now, the regression coefficient for the productivity effect of manufacturing grows turns out to be statistically significant. The values of the coefficient are robust with the use of different models. However, the CD statistics suggest that cross-sectional dependence is not a concern in both models; the use of higher different lag orders leads to rejection of the null hypothesis of cross-sectional dependence.

Table 46: Estimates based on AMG and static CCEMG Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - Man

VAR	AMG						CCEMG					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Pm	Em	Pm	Em	Pm	Em	Pm	Em	Pm	Em	Pm	Em
QM	0.565*	0.411*	0.639*	0.351*	0.480*	0.483*	0.573*	0.410*	0.627*	0.372*	0.504*	0.490*
	(0.066)	(0.069)	(0.052)	(0.054)	(0.112)	(0.120)	(0.059)	(0.064)	(0.069)	(0.063)	(0.102)	(0.106)
CDP	0.503*	0.415*	0.903*	0.911*	0.506*	0.467*						
	(0.176)	(0.171)	(0.138)	(0.054)	(0.214)	(0.186)						
C	-0.017	0.021*	-0.034*	0.038*	-0.110**	0.016**	0.003	0.001	0.001	0.003	0.001	0.010
	(0.004)	(0.005)	(0.006)	(0.008)	(0.005)	(0.006)	(0.003)	(0.007)	(0.004)	(0.007)	(0.005)	(0.015)
CD TEST	-3.398	-2.894	-4.359	-4.245	-2.268	-2.296	-3.38	-2.90	-4.25	-4.12	-2.85	-2.16
P-VALUE	0.001	0.004	0.000	0.000	0.023	0.022	0.001	0.004	0.000	0.000	0.004	0.031

Note: Abbreviations are: Pm- productivity growth of manufacturing; Em – employment growth of manufacturing; * level of significance at 0.01

Source: Own Computation

Table 47: Estimates based on ARDL-MG and DCCEMG Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - Man

VAR	ARDL-MG						DCCEMG					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Pm	Em	Pm	Em	Pm	Em	Pm	Em	Pm	Em	Pm	Em
EC	-0.705*	-0.751	-8.58*	-0.901	-0.605*	-0.621*						
	(0.085)	(0.078)	(0.098)	(0.089)	(0125)	(0.108)						
Lp							0.113**	0.174*	0.012	0.087	0.28*	0.214**
							(0.057)	(0.062)	(0.058)	(0.063)	(0.087)	(0.103)
QM	0.548*	0.497*	0698*	0.419*	0.426*	0.663*	0.556*	0.402*	0.658*	0.358*	0.439*	0.480*
	(0.098)	(0.696)	(0.121)	(0.095)	(0.123)	(0.105)	(0.056)	(0.063)	(0.058)	(0.065)	(0.096)	(0.103)
CD TEST	-2.47	-1.61	-2.78	-3.02	-1.61	-1.27	-2.60	-2.39	-3.96	-3.91	-1.68	-1.79
P-VALUE	0.0136	0.108	0.005	0.003	0.107	0.206	0.009	0.017	0.000	0.000	0.092	0.073

Note: Abbreviations are: Pm- productivity growth of manufacturing; Em – employment growth of manufacturing; EC- error correction term; * level of significance at 0.01

Source: Own Computation

Table 48: Estimates based on CS-ARDL and CS-DL Models for Kaldor's Second Growth Law for the Full Sample and Country Groups

VAR	CS-ARDL						CS-DL					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Pm	Em	Pm	Em	Pm	Em	Pm	Em	Pm	Em	Pm	Em
QM	0.553*	0.536*	0.605*	0.401*	0.429*	0.676*	0.542*	0.571*	0.608*	0.514*	0.429*	0.615*
	(0.066)	(0.083)	(0.111)	(0.119)	(0089)	(0.097)	(0.065)	(0.091)	(0.086)	(0.157)	(0.125)	(0.139*)
EC	-0.771*	-0.722*	-0.905	-0.993*	-0.694*	-0.613*						
	(0.075)	(0.087)	(0.797)	(0.143)	(0.108)	(0.106)						
CD TEST	-1.05	-1.91	-1.48	-1.90	-1.56	-1.36	-1.26	-1.86	-192	1.89	-1.35	-0.40
P-VALUE	0.295	0056	0.131	0.057	0.119	0.175	0.209	0.064	0.055	0.059	0.175	0.686

Note: Abbreviations are: Pm- productivity growth of manufacturing; Em – employment growth of manufacturing; EC- error correction term; * level of significance at 0.01

Source: Own Computation

B. Estimation Results for Higher-productivity Services

For Kaldor, increasing returns were confined to manufacturing. If that is so, special focus should be given to promote manufacturing production. This implies that the Verdoorn law, which describes the relationship between productivity growth and scale of output, cannot be applied to other sectors. However, as already said in part three, recent studies evidenced that increasing returns can also be observed in higher-productivity (and skill-intensive) services as much with manufacturing. Therefore, this section seeks out to examine if the regression coefficients for productivity growth and employment growth of the higher-productivity (and skill-intensive) services give meaningful result, which are less than unity, and if the estimates according to the static and dynamic models are similar with those in manufacturing, at least in terms of signs and level of significance. The objective here is to validate the hypothesis that these services can serve as “stimulus complement” to manufacturing.

Table 49 provides generated results of the AMG and CCEMG specifications, for the two cases, (a) and (b). The coefficients bear the expected signs. More specifically, under case (a), a one percent increase in higher-productivity (and skill-intensive) services value added growth will induce productivity growth by 0.694 (for full sample), 0.757 percent (for Asia) and 0.561 percent (for SSA) in the AMG model, and by 0.642 percent (full sample), 0.765 percent (for Asia) and 0.549 percent (for SSA) in the CCEMG model. By contrast, a percentage point increase in growth of higher-productivity (and skill-intensive) services will cause employment growth to go up by 0.252 percent and 0.642 for the full sample, by 0.196 percent and 0.223 percent for Asia, and by 0.347 percent and 0.461 percent for SSA with AMG and CCEMG, respectively. The other observation is that the values of the coefficients of productivity and employment on output growth rates do not show substantial disparity in SSA compared with those of the Asia panel wherein the difference is visibly big. Yet again, the higher productivity effect observed in manufacturing appear in higher-productivity (and skill-intensive) services too. The CD statistics show that cross-sectional dependence is not a concern under both the AMG and CCEMG estimates. In both modes, the constant term turns out to be negative for case (a) and positive for case (b), but statistically significant only in the AMG specification.

With a view to see the consistency of the estimates, the standard ARDL-MG and DCCEMG models were applied and generated results are reported in Table 50. The coefficients bear the expected signs and are in most cases significant at 0.01 levels of significance. The productivity effect continued to dominate for full sample and the Asia panel in both the ARDL-MG and DCCEMG estimators, which is not the case in SSA panel. More specifically, for the Asia panel, a percentage point increase in skill-intensive services will cause productivity growth to go up by 0.812 percent under ARDL-MG and by 0.781 percent under DCCEMG. However, the respective employment effect appear far lower, amounting to 0.195 percent and 0.220 percent. The reverse is always true with SSA panel, where a one percent rise in higher-productivity (and skill-intensive) services growth causes productivity growth to increase by 0.476 percent under ARDL-MG estimator and 0.504 percent under DCCEMG estimator. The respective employment effect became 0.585 percent and 0.456 percent, which may thus make the conclusion to be drawn indecisive. It is also worth noting that cross-sectional dependence is not a concern especially for SSA panel.

However, the CS-ARDL and CS-DL models are estimated for robustness check on the consistency of the estimates reported above. The estimated results are reported in Table 51. For both panels, the values of the regression coefficient are positive and statistically significant. When it comes to SSA panel, the magnitude of the coefficient [for case a] is the same under CS-ARDL and CS-DL models while for case (b) the magnitude in the CS-ARDL specification (0.634) is slightly higher than that in CS-DL (0.629). For the Asia panel, the value of coefficient for case (a) is more or less the same in both models. However, the test statistic for cross-sectional dependence is significant with both models for Asia and in CS-ARDL model for the full sample.

Table 49: Estimates based on AMG and static CCEMG Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - SS

VAR	AMG						CCEMG					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps
QHPS	0.694*	0.252*	0.757*	0.196*	0.561*	0.347*	0.642*	0.302*	0.765*	0.223*	0.549*	0.461*
	(0.065)	(0.058)	(0.044)	(0.028)	(0.122)	(0.113)	(0.071)	(0.062)	(0.064)	(0.044)	(0.120)	(0.122)
CDP	0.667*	0.872*	0441**	0.775**	0.575*	0.687*						
	(0.184)	(0.189)	(0.235)	(0.318)	(0.181)	(0.222)						
C	-0.051*	0.052	-0.043*	0.048	-0.051*	0.049*	-0.001	0.001	-0.002	0.002	-0.004	0.006
	(0.007)	(0.006)	(0.010)	(0.007)	(0.10)	(0.014)	0.002	(0.007)	(0.002)	(0.007)	(0.009)	(0.011)
CD TEST	-3.273	-3.753	-3.802	-3.920	-2.809	-3.446	-2.88	-3.71	-3.62	-3.89	-3.45	-2.98
P-VALUE	0.001	0000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.001	0.000

Note: Abbreviations are: QHPS – Higher-productivity services; Phps- productivity growth of higher-productivity services; Ehps – employment growth of higher-productivity services; * level of significance at 0.01

Source: Own Computation

Table 50: Estimates based on ARDL-MG and DCCEMG Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - SS

VAR	ARDL-MG						DCCEMG					
	Phps		Ehps		Phps		Ehps		Phps		Ehps	
	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps
QPHS	0.648*	0.321*	0.812*	0195**	0.476*	0.585*	0.638*	0.315*	0.781*	0.220*	0.504*	0.456*
	(0.086)	(0.084)	(0.113)	(0.108)	(0.184)	(0.204)	(0.069)	(0.082)	(0.069)	(0.053)	(0.105)	(0.118)
EC	-0.804	-0782*	-0.923*	-0.937**	-0.739*	-0.672*						
	(0.050)	(0.053)	(0.070)	(0.108)	(0.075)	(0.070)						
LP							0.106*	0.282*	0.059	0.086	0.165*	0.305*
							(0.041)	(0.057)	(0054)	(0.062)	(0.068)	(0.065)
CD TEST	-2.55	-2.16	-3.56	-3.41	-1.70	-1.70	-2.49	-1.55	-3.38	-3.62	-1.58	-1.93
P-VALUE	0.011	0.031	0.000	0.000	0.090	0.089	0.013	0.1210	0.001	0.000	0.114	0.054

Note: Abbreviations are: QHPS – Higher-productivity services; Phps- productivity growth of higher-productivity services; Ehps – employment growth of higher-productivity services; * level of significance at 0.01

Source: Own Computation

Table 51: Estimates based on CS-ARDL and CS-DL Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - SS

VAR	**CS-ARDL**						**CS-DL**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps	Phps	Ehps
QPHS	0.665*	0.376*	0.783*	0.213*	0.519*	0.634*	0.678*	0.365*	0.787*	0.314**	0.512*	0.629**
	(0.136)	(0.113)	(0.119)	(0.118)	(0.206)	(0.212)	(0.168)	(0.169)	(0.075)	(0.168)	(0.154)	(0.331)
EC	-0.870	-0.751*	-1.016*	-0.927*	-0.718*	-0.601*	-0.870					
	(0.066)	(0.052)	(0.087)	(0.059)	(0.091)	(0.054)	(0.066)					
CD TEST	-2.07	-227	-2.20	-3.30	-0.76	-1.83	-1.42	-1.45	-2.11	-247	-1.92	-1.54
P-VALUE	0.038	0.023	0.028	0.001	0.448	0.067	0.142	0.148	0.035	0.014	0.055	0.124

Note: Abbreviations are: QHPS – Higher-productivity services; Phps- productivity growth of higher-productivity services; Ehps – employment growth of higher-productivity services; * level of significance at 0.01

Source: Own Computation

C. Estimation Results for Baumol's Diseases Services

As already indicated earlier, Kaldor held the view that a regression coefficient of close to unity of productivity on output growth for agriculture and commerce was not meaningful. With this in mind, the Second Law is tested for Baumol's diseases services using static and dynamic models as above. Table 52 presents estimates according to the AMG and CCEMG estimators for both productivity and employment growth of the services activities in this category. As can be evident from the Table, the productivity effect of the growth of the Baumol's diseases services segments turns out to be the same, 0.902 and 0.888 in the AMG and CCEMG models for Asia panel, which is far higher than those observed in manufacturing and skill-intensive services. However, the coefficient for employment growth appears statistically insignificant for the AMG model. By contrast, the productivity and employment effects are positive and statistically significant for SSA panel and the full sample, though the magnitude varies moving from AMG to CCEMG model specifications.

The estimation results of the conventional ARDL-MG and DCCEMG models are reported in Table 50. The coefficients have positive signs, statistically significant at 0.01 levels except one case. More specifically, a one percent increase in Baumol's diseases services growth will cause productivity and employment growth to go up respectively by 0.699 and 0.243 for the full sample; by 0.999 percent and 0.025 percent for Asia panel, and by 0.705 percent and 0.325 percent for SSA panel under the ARDL-MG estimator. The values of the productivity effect showed slight decline in both panels and of employment effect a slight increase for the full sample and Asia panel, but a slight decrease for SSA panel moving from ARDL-MG to DCCEMG estimators. The CD test shows that cross-sectional independence is apparent in most cases, which suggests that the estimated results summarized in Table 53 might be biased and misleading, necessitating the importance of accounting for unobserved common effects through augmentation of the standard ARDL-MG and DCCEMG.

Therefore, Table 54 reports estimates of the CS-ARDL and CS-DL models for the two dependent variables: productivity growth and employment growth. For the first model specification, the long-run effects of output growth on productivity growth remain positive and statistically significant. Particularly, for the Asia panel, a percentage point rise in value added growth will cause productivity growth to increase by 0.873 percent with the CS-ARDL and by 0.832 with CS-DL. In contrast, in the SSA panel, a one percent increase in output growth of the considered services will result in the increase in productivity growth by 0.568 percent (with the CS-ARDL model) and by 0.543 percent (with the CS-DL model). Moreover, the employment effect is statistically significant for the full sample and SSA panel under both models. Finally, the speed of adjustment is much slower in Asia panel than in SSA panel.

Table 52: Estimates based on AMG and static CCEMG Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - BDS

VAR	**AMG**						**CCEMG**					
	FULL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds
QBDS	0.722*	0.159**	0.902*	0.064	0.518*	0.289**	0.664*	0.219*	0.888*	0.185*	0.683*	0.321*
	(0.071)	(0.067)	(0.063)	(0.067)	(0.095)	(0.120)	(0.067)	(0.074)	(0.103)	(0.061)	(0.092)	(0.101)
CDP	0.692*	0.550*	0.806*	0.875*	0.834*	0.400**						
	(0.156)	(0.162)	(0.240)	(0.247)	(0.222)	(0.158)						
C	-0.047*	0.047*	-0.050*	0.049*	-0.044*	0.048*	-0.013**	0.001	-0.007	0.001	-0.011	0.013
	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)	(0.009)	(0.007)	(0.023)	(0.014)	(0.003)	(0.011)	(0.009)
CD TEST	-3.078	-2.899	-4.104	-3.905	-3.329	-3.139	-3.76	-3.08	-3.48	-3.76	-4.03	-3.49
P-VALUE	0.002	0.004	0.000	0.000	0.001	0.002	0.000	0.002	0.000	0.000	0.000	0.001

Note: Abbreviations are: Man – manufacturing; Pm- productivity growth of manufacturing; ESS – employment growth of manufacturing; * level of significance at 0.01

Source: Own Computation

Table 53: Estimates based on ARDL-MG and DCCEMG Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - BDS

VAR	**ARDL-MG**						**DCCEMG**					
	FULL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds
QBDS	0.699*	0.243*	0.999*	0.025	0.705*	0.325*	0.662*	0.249*	0.978*	0.218*	0.455*	0.280*
	((0.091)	(0.073)	(0.097)	(0.085)	(0.126)	(0.114)	(0.072)	(0.078)	(0.095)	(0.089)	(0.085)	(0.099)
EC	-0.701*	-0.661*	-0.800*	-0.808*	-0.546*	-0.506*						
	(0.052)	(0.052)	(0.069)	(0.075)	(0.063)	(0.056)						
LBds							0.173*	0.392*	0.078	0.214*	0.259*	0.517*
							(0.048)	(0.065)	(0.055)	(0.087)	(0.067)	(0.082)
CD TEST	-2.38	-0.84	-2.91	-2.25	-2.85	-1.84	-2.83	-2.00	-3.18	-2.89	-3.00	-1.66
P-VALUE	0.017	0.399	0.004	0.025	0.041	0.066	0.005	0.046	0.001	0.004	0.003	0.097

Note: Abbreviations are: QBDS– Baumol's diseases services value added growth; Pbds- productivity growth of Baumol's diseases services; EBDS – employment growth of Baumol's diseases services; EC- error correction term; * level of significance at 0.01

Source: Own Computation

Table 54: Estimates based on CS-ARDL and CS-DL Models for Kaldor's Second Growth Law for the Full Sample and Country Groups - BDS

VAR	CS-ARDL						CS-DL					
	FULL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds	Pbds	Ebds
BDS	0.768*	0.197*	0.873*	0.037	0.568*	0.320**	0.768*	0.242*	0.832*	0.050	0.543*	0.489*
	(0.089)	(0.085)	(0.233)	(0.096)	(0.106)	(0.168)	(0.187)	(0.110)	(0.211)	(0.087)	(0.191)	(0.189)
EC	-0.708*	-0.622*	-0.779*	-0.821*	-0.575*	-0.434*						
	(0.053)	(0.058)	(0.094)	(0.071)	(0.057)	(0.057)						
CD TEST	-1.91	-2.28	-3.15	-2.72	-1.36	-2.09	1.61	-1.59	-1.30	-2.79	-1.08	-1.70
P-VALUE	0.056	0.023	0.002	0.006	0.174	0.037	0.108	0.113	0.193	0.005	0.281	0.088

Note: Abbreviations are: QBDS– Baumol's diseases services value added growth; Pbds- productivity growth of Baumol's diseases services; EBDS – employment growth of Baumol's diseases services; EC- error correction term; * level of significance at 0.01

Source: Own Computation

6.5.4. Estimates of the Static and Dynamic Models for the Third Law

A. Manufacturing industry

Hypothesis: Testing the Third Law may give important insights as to whether structural change in SSA and Asia panels was productivity-inducing over the study period. To this regard, this section intends to explore the effect of growth in the employment of manufacturing to economy-wide productivity growth. As such, the Third Law predicts that the faster growth of employment in non-manufacturing industry sectors will cause slower growth of economy-wide productivity growth. Hence, the two variables will have inverse relationship. Therefore, following the prediction of Kaldor, the estimate should be positive for manufacturing output growth and negative for employment growth outside of manufacturing industry. The employment growth in non-manufacturing sectors (which envelopes other industry sub-sectors, services and agriculture) shall also be replaced with employment growth of agriculture, skill-intensive services and Baumol's disease services in an attempt to evaluate if employment growth in services sector has been productivity-inducing or not. The model is extended to the two segments of services sector to evaluate the proposition that the growth of such services activities will cause economy-wide productivity to go up. If so, the complementarity of manufacturing and the higher-productivity services could be confirmed so that the latter should serve as "stimulus complement" to the former.

The cross-sectional dependence test results are reported in Annex IV Table 14, and the CD test rejects the null of weak cross-sectional dependence in most of the variables and the estimated exponent of the cross-sectional dependence is well above 0.5. Similarly, the test results for parameter constancy and slope heterogeneity (summarized in Annex IV Table 15) proved that heterogeneity is present in the full sample, rejecting the null hypothesis of slope homogeneity. It is, therefore, necessary to employ estimation approaches that take into account cross-sectional dependence and slope heterogeneity.

Generated estimates of the variables are presented below for the various static and dynamic model specifications. Estimates of each model are reported for two specifications, for manufacturing and the two segments of services sector one after the other. When it comes to manufacturing, specification (a) includes manufacturing value added growth and employment growth of non-manufacturing sectors as regressors, while in specification (b) employment growth rates of non-manufacturing sectors are broken down into skill-intensive services, Baumol's diseases services and agriculture.

Table 55 summarizes the estimates of AMG and CCEMG, in their static specifications. The results validated the hypothesis, with estimated slope coefficients appear statistically significant, bearing the expected signs in both specifications (a) and (b): Positive slope coefficient for manufacturing value added growth, and negative slope coefficient for employment growth of non-manufacturing sectors in all panels. More specifically, for specification (a), a one percent increase in manufacturing output growth will cause economy-wide productivity to go up by 0.284, 0.212 and 0.337 percent for the whole sample, SSA panel and Asia panel, respectively with AMG estimation, and by 0.281, 0.226 and 0.364 percent for same with CCEMG estimation. On the other hand, a one percent increase in non-manufacturing employment growth will cause economy-wide productivity to go down by 0.633, 0.655 and 0.668 percent for the whole panel, SSA panel and Asia panel, respectively with MG estimation and by 0.708, 0.832 and 0.665 for the respective panels with CCEMG estimation. The negative effects seem outpaced the positive contribution.

The positive signs of the slope coefficient and level of significance for manufacturing are not altered when employment growths of higher-productivity services, Baumol's diseases services and agriculture sector are included to the regression instead of the total employment growth outside of manufacturing as shown in specification (b) of Table 55. The long-run effects of the growth of employment in agriculture and Baumol's disease services on total productivity growth are negative in the whole sample and the two country groupings across the static models. By contrast, the estimated slope coefficient for higher-productivity services has surprisingly positive signs for SSA in both models and the full sample with CCEMG, whereas the long-run effect on total productivity growth of higher-productivity services is negative for the Asia panel under both model specifications. From the Table, one can deduce that Kaldor's Third Law is confirmed for the country groupings under investigation. Also, the magnitude of the slope coefficients show minor disparity with choice of different lag orders. Another important observation from Table 55 is that the null hypothesis of cross-sectional independence is rejected for all panels under specification (a) with AMG estimation.

Therefore, the standard ARDL-MG and DCCEMG estimations are carried out and results are reported in Table 56, for the two specifications. As an be evident from the Table, the slope coefficients are mostly statistically significant in both specifications, (a) and (b), more or less bearing the expected signs. The fact that the signs of the slope coefficients bear the expected signs across different models and lag orders meant that the estimates are predictable. In particular, for specification (a), the slope coefficient for manufacturing output growth is positive while the estimated slope coefficient for non-manufacturing sectors employment growth come out negative.

Focusing on the ARDL-MG estimates, a one percent increase in manufacturing output growth will cause economy-wide productivity to increase by 0.319 percent (full sample), 0.290 percent (SSA) and 0.350 percent (Asia) while a one percent increase in non-manufacturing employment growth will cause economy-wide productivity to go down by 0.761 percent (full sample), 0.918 percent (SSA) and 0.593 percent (Asia). Turning to specification (b), the values for the slope coefficient of manufacturing output growth are relatively slightly higher with the DCCEMG model than ARDL-MG model for the full sample and Asia while the reverse is true for SSA, but lower than own estimates under specification (a) in both panels. The long-run effects of employment growth of Baumol's diseases services on total productivity growth turns out to be negative across panels and estimators, irrespective of the lag order chosen. However, the signs of the slope coefficients for employment growth rates of higher-productivity services change is positive for SSA in ARDL-MG. The slope coefficient for agriculture sector employment growth appears negative and statistically significant with both estimators for both panels while the reverse is true with the significant level of the slope coefficient for the skill-intensive services.

With the ARDL-MG model, the speed of convergence to long-run equilibrium is fast. However, the error terms in specification (a) exhibit cross-sectional dependence as the reported CD statistics are highly significant while the null of cross-sectional independence is not rejected in most cases for specification (b) with both ARDL-MG and DCCEMG estimates. The mixed CD test results may suggest that the estimates might be biased given that the unobserved global factors that affect the economies are not accounted for.

Therefore, the CS-ARDL and CS-DL models are employed and estimated results are reported in Table 57, for the two specifications, (a) and (b). Under the CS-ARDL model, the long-run effects of manufacturing output growth and employment growth of non-manufacturing sectors on total productivity growth come out in agreement with the standard ARDL estimates: The signs of the slope coefficient became positive for the former and negative for the latter. In particular, for specification (a), the long-run estimates for manufacturing output growth are slightly lower than those reported in the previous Table for both estimators. However, the estimate from CS-DL are slightly higher than or equal to those obtained from CS-ARDL. Focusing on specification (b), there is still evidence for the positive growth effect of total productivity of manufacturing growth in the long-run as the slope coefficients become significant at the 0.01 level in all panels and in both CS-ARDL and CS-DL models. Interestingly, the estimates of the coefficient for employment growth in agriculture and Baumol's diseases services across the two models turn out to be negative and statistically significant in both panels. Likewise, the signs of the coefficient for higher-productivity services employment growth appears positive in the SSA panel under the CS-ARDL and in the Asia panel with the CS-DL specification, but statistically insignificant in both cases. This may give indication that the *"stimulus complement"* hypothesis for higher-productivity services is plausible. Overall, taking stock of the various models, one can deduce that the Third Growth Law of Kaldor has been confirmed for the sample countries in SSA and Asia, despite low manufacturing base have coexisted with growing services sector in most SSA economies even during the "Africa rising" narrative period.

Table 55: Estimates based on AMG and static CCEMG Models for Kaldor's Third Law for the Full Sample and by Country Groups - Man

VAR	**AMG**						**CCEMG**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
QM	0.284*	0.262*	0.337*	0.334*	0.212*	0.177*	0.281*	0.0269*	0.364**	0.378*	0.226*	0.179*
	(0.029)	(0.032)	(0.037)	(0.039)	(0.036)	(0.039)	(0.032)	(0.039)	(0.042)	(0.049)	(0.038)	(0.040)
Enm	-0.633*		-0.558*		-0.655*		-0.708*		-0.665*		-0.832*	
	(0.070)		(0.163)		(0.10)		(0.097)		(0.108)		(0.259)	
Eag		-0.511*		-0.338*		-0.674*		-0.921*		-0.480*		-0.782*
		(0.077)		(0.039)		(0.039)		(0.349)		(0.131)		(0.195)
Ehps		-0.007		-0.049		(0.039)		0.137*		-0.006		0.018
		(0.029)		(0.033)		(0.045)		(0.056)		(0.043)		(0.767)
Ebds		-0.216*		-0.265*		-0.160*		-0.408**		-0.293*		-0.096
		(0.042)		(0.042)		(0.067)		(0.192)		(0.086)		(0.106)
CDP	0.717*	0.461*	0.752*	0.696*	0.797*	0.534*						
	(0.129)	(0.11)	(0.079)	(0.127)	(0.191)	(0.121)						
C	0.024*	0.026*	0.008**	0.014*	0.040*	0.038*	0.026*	0.032**	0.023*	0.018*	0.028*	0.027*
	(0.003)	(0.003)	(0.005)	(0.004)	(0.006)	(0.005)	(0.005)	(0.017)	(0.005)	(0.007)	(0.009)	(00051)
CD TEST	-2.477	-2.445	-3.548	-2.085	-3.793	-3.987		0.66		1.63		1.61
P-VALUE	0.013	0.014	0.000	0.037	0.000	0.000		0.506		0.103		01084

Note: Abbreviations are: QM – manufacturing; Enm- employment growth of non-manufacturing; Eag – employment growth of agriculture; Ehps – employment growth of higher-productivity services; Ebds – employment growth of Baumol's diseases services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

Table 56: Estimates based on Standard ARDL-MG and Dynamic CCEMG Models for Kaldor's Third Law for the Full Sample and by Country Groups - Man

VAR	ARDL-MG						DCCEMG					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
EC	-0.829*	-0.876*	-0.751*	-0.748*	-0.903*	-0.995*						
	(0.041)	(0.043)	(0.065)	(0.058)	(0.042)	(0.049)						
LP							0.068**	0.019	0.034	0.067	0.032	-0.069
							(0.033)	(0.049)	(0.047)	(0.059)	(0.048)	(0.043)
Man	0.319*	0.263*	0.350*	0.318*	0.290*	0.212*	0.294*	0.029*	0.323*	0.333*	0.260*	0.206*
	(0.032)	(0.034)	(0.049)	(0.054)	(0.042)	(0.039)	(0.032)	(0.037)	(0.051)	(0.050)	(0.037)	(0.044)
Enm	-0.761*		-0.593*		-0.918*		-0.625*		0.621*		-0.683*	
	(0.167)		(0.171)		(0.282)		(0998)		(0.474)		(0.186)	
Eag		-0.625*		-0.438*		-0.800*				-0.296*		-0.552*
		(0.122)		(0.093)		(0.214)				(0.129)		(0.226)
Ehps		-0.028		-0.093		0.033				-0.024		-0.088
		(0.068)		(0.080)		(0.109)				(0.059)		(0.118)
Ebds		-0.171**		-0.214**		-0.132				-0.276*		-0.177
		(0.072)		(0.097)		(0.108)				(0.078)		(0.299)
CD TEST	4.51	1.17	3.70	1.84	3.57	1.05	-246	-2.48	-2.12	-1.50	-0.62	-2.32
P-VALUE	0.000	0.243	0.000	0.066	0.000	0.294	0.036	0.013	0.034	0.133	0537	0.021

Note: Abbreviations are: QM – manufacturing; Enm- employment growth of non-manufacturing; Eag – employment growth of agriculture; Ehps – employment growth of higher-productivity services; Ebds – employment growth of Baumol's diseases services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

Table 57: Estimates based on CS-ARDL and CS-DL Models for Kaldor's Third Law for the Full Sample and by Country Groups - Man

VAR	**CS-ARDL**						**CS-DLMG**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
QM	0.306*	0.217*	0.290*	0.263*	0.283*	0.187*	0.308*	0.236*	0.284	0.286*	0.286*	0.180*
	(0.041)	(0.048)	(0.071)	(0.079)	(0.046)	(0.041)	(0.369)	(0.037)	(0.073)	(0.071)	(0.046)	(0.054)
Enm	-0.643		-0.372*		-0.750*		-0.663*		-0.469*		-0.727*	
	(0.162)		(0.312)		(0.253)		(0.241)		(0.219)		(0.234)	
Eag		-0.784*		-0.344*		-0.795*		-0.836*		-0.483*		-0.545**
		(0.174)		(0.734)		(0.255)		(0.228)		(0.141)		(0.323)
Ehps		-0.040		-0.105		0.025		-0.070		0.019		-0.169
		(0.1051)		(0.103)		(0.098)		(0.125)		(0.062)		(0.153)
Ebds		-0.279*		-0.262*		-0.067*		-0.262**		-0.416		0.024
		(0.099)		(0.100)		(0.223)		(0.136)		(0.096)		(0.145)
EC	-0.976*	-0.911	-0.871*	-0.768*	-0.994*	-1.096*						
	(0.041)	(0.042)	(0.064)	(0.069)	(0.054)	(0.059)						
CD TEST	-1.47	-0.97	-1.26	-1.13	0.51	-0.90	-1.95	-1.9*	-1.89	-1.63	-1.91	-1.95
	0.143	0.333	0.207	0.260	0.608	0.369	0.0516	0.052	0.058	0.103	0.056	0.053

Note: Abbreviations are: QM – manufacturing; Enm- employment growth of non-manufacturing; Eag – employment growth of agriculture; Ehps – employment growth of higher-productivity services; Ebds – employment growth of Baumol's diseases services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

B. Higher-productivity Services

The estimates of the Third Law based on the different model specifications for higher-productivity services may give interesting insights. Some recent studies documented that the higher-productivity services maintain special elements that could make it possible for them substitute manufacturing to become pace setter in the economy. However, the present dissertation hypothesizes that these services activities can serve merely as "*stimulus complement*" to manufacturing. Whatever the case may be, however, the long-run effects of the estimate for the output growth of these services activities on economy-wide productivity growth are predicted to be positive across the various model specifications, static and dynamic. Similarly, the long-run effects of employment growth outside of the higher-productivity services activities are hypothesized to be negative. Nevertheless, when employment growth of the non- higher-productivity services sectors is broken down to manufacturing, agriculture and Baumol's diseases services, the signs of the slope coefficients are predicted to be negative for the latter two, and positive or mixed for the former, depending on the panel units and econometric models used. So, in view of subjecting the Third Law to a more arduous testing, the various static and dynamic models are estimated for two specifications, (a) and (b). For specification (a), higher-productivity services value added growth and employment growth of non-skill-intensive services sectors are entered in the regression as explanatory variables, and for specification (b), employment growth rates of agriculture, manufacturing and Baumol's diseases services are included with skill-intensive services output growth.

Table 58 reports the estimates of AMG and CCEMG models, in their static specifications. The results confirm the hypothesis as the slope coefficients bear the expected signs in both specifications (a) and (b): Positive for higher-productivity services value added growth and negative for employment growth outside of non- higher-productivity services sectors. All estimates are statistically significant. More specifically, under specification (a), a one percent increase in higher-productivity services output growth would result in the increase in economy-wide productivity by 0.436, 0.387 and 0.444 percent for the whole panel, SSA panel and Asia panel, respectively with AMG estimator and by 0.438, 0.403 and 0.457 for respective panels with CCEMG. In both models, the magnitude of the slope coefficient exceeds that of manufacturing value added growth discussed earlier. On the other hand, a one percent increase in non- higher-productivity services employment growth will cause economy-wide productivity to go down by 0.628, 0.631 and 0.662 percent for the full panel, SSA panel and Asia panel, respectively with AMG estimator and by 0.729, 0.810 and 0.667 for the respective panels with CCEMG estimator.

The positive relationship between value added growth of higher-productivity services and total productivity growth are confirmed when employment growth rates of manufacturing, Baumol's diseases services and agriculture sector are included to the regression as shown in specification (b) of Table 58. As expected, the long-run effects of the growth of employment in agriculture and Baumol's services on total productivity growth are negative and significant in all panels across the different models. By contrast, the sign for the estimated slope coefficient for manufacturing employment growth is found positive in the full sample and SSA panel, and negative for Asia, albeit it is only significant for SSA in specification (b) with CCEMG. Another important observation from Table 58 is that the null of cross-sectional independence is rejected for all panels under specification (a), but mixed CD test results observed under specification (b). This makes estimation of the dynamic models in order.

Therefore, estimation results based on the standard ARDL-MG and DCCEMG estimators are carried out and results are summarized in Table 59, for the two specifications. The slope coefficients are statistically significant in both specifications, (a) and (b). They also endure the expected signs across the different models and lag orders, demonstrating the predictability of the estimates. In particular, for specification (a), the slope coefficient for higher-productivity services output growth is positive while the estimated slope coefficient for the non- higher-productivity services sectors employment growth appear negative. Referring to the ARDL-MG estimates, a one percent increase in higher-productivity services output growth will cause economy-wide productivity growth to go up by 0.472 percent (full sample), 0.440 percent (SSA) and 0.506 percent (Asia), which slightly exceeds the values of the coefficient reported in Table 58. On the other hand, a percentage increase in non- higher-productivity services sectors employment growth will cause economy-wide productivity growth to decrease by 0.785 percent (full sample), 0.786 percent (SSA) and 0.785 percent (Asia).

Turning to specification (b), the value for the slope coefficient of the higher-productivity services output growth is found relatively higher with ARDL-MG specifications than with DCCEMG specification for all panels, but lower than own estimates under specification (a) in both panels. The long-run effects of employment growth of agriculture and Baumol's diseases services on total productivity growth turn out to be negative across panels and estimators, independent of the lag order chosen. However, the sign of the slope coefficient for employment growth rates of manufacturing is positive in SSA panel under DCCEMG and negative in the full sample and Asia panel with both estimators making the conclusion to be drawn inconclusive.

In both specifications, (a) and (b), for the ARDL-MG model, the speed of convergence to long-run equilibrium or the magnitude of the error correction term still fall within acceptable range. Surprisingly, the first lag of the dependent variable has negative sign in both specifications (a) and (b) though significant only in the latter. The results of the CD tests show that the error terms in specification (a) exhibit cross-sectional dependence for the full sample and Asia panel as the reported CD statistics are highly significant. The null of cross-sectional independence is rejected in the SSA panel with ARDL-MG and DCCEMG estimation. However, for specification (b), the null of cross-sectional independence is rejected for SSA in ARDL-MG and all panels in DCCEMG. This may suggest need to employ the CS-ARDL and CS-DL models are employed so as to take care of unobserved global factors that affect the economies.

The estimated results are reported in Table 60, for the two specifications (a) and (b). The Table depicts that long-run effects of higher-productivity services growth and employment growth of non-higher-productivity services sectors on total productivity growth are similar to the previous estimates as the signs of the slope coefficients appear positive for the former and negative for the latter. However, the magnitude of the parameters shows slight variation moving from one model to another. In particular, in the long-run, estimates for higher-productivity services growth are lower than those reported in Table 59 of the standard ARDL-MG model for both estimators as revealed in specification (a). However, the estimate from CS-DL are slightly lower than those obtained from CS-ARDL for the full sample and SSA panel. Focusing on specification (b), there is still evidence for the positive growth effect of higher-productivity services output growth in the long-run as the slope coefficients are significant at the 0.01 level with the use of both CS-ARDL and CS-DL models. Interestingly, the estimates of the coefficient for employment growth in agriculture, manufacturing and Baumol's diseases services across the two models turn out negative, but statistically significant for agriculture and Baumol's diseases services in both panels. The coefficient for employment growth of manufacturing is statistically significant for Asia panel with CS-DL and DCCEMG estimator (negative in both). The CD statistics in Table 60 confirm that cross-sectional dependence is no more a problem after cross-sectional augmentation of the ARDL model.

All in all, the results of the various models give indication that the Third Growth Law of Kaldor is valid when higher-productivity services growth entered to the regression, instead of manufacturing output growth for the full sample and the two country groupings. One may thus confidently maintain that the higher-productivity services can stand as *"stimulus complement"* to manufacturing.

Table 58: Estimates based on AMG and CCEMG Models for Kaldor's Third Law for the Full Sample and by Country Groups - SS

VAR	**AMG**						**CCEMG**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
QHPS	0.436*	0.397*	0.444*	0.414*	0.387*	0.341*	0.438*	0.401*	0457*	0.402*	0.403*	0.379*
	(0.041)	(0.038)	(0.034)	(0.034)	(0.066)	(0059)	(0.049)	(0.040)	(0.065)	(0.031)	(0.064)	(0.057)
Enhps	-0.628*		-0.662*		-0.631*		-0.729*		-0.666*		-0.810*	
	(0.076)		(0.034)		(0.107)		(0.105)		(0.106)		(0.178)	
Eag		-0.466*		-0.295*		-0.690*		-0.604		-0.316*		-0.862*
		(0.086)		(0.104)		(0.155)		(0.106)		(0.094)		(0.153)
Em		0.006		-0.022		0.036		0.036		-0038		0.093**
		(0.026)		(0.034)		(0.045)		(0.032)		(0.032)		(0.046)
Ebds		-0.216*		-0.233*		-0.191**		-0.244*		-0.278*		-0.231**
		(0.056)		(0.056)		(0.106)		(0.056)		(0.052)		(0.102)
CDP	0811*	0.551	0.838*	0.677*	0.737*	0598*						
	(0.107)	(0.107)	(0.148)	(0.129)	(0.098)	(0.171)						
C	0.014*	0.012*	0.003*	0.007	0033*	0.034*	-0.001	0.001	-0.003	-0.006	-0.003	0.184*
	(0.004)	(0.004)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)	(0.002)	(0.101)	0.0071	(0.004)	(0.007)
CD TEST	-3.250	1.640	-3.486	1.684	-3.667	3.191	-324	-1.33	-3.85	-1.40	3.36	1.13
P-VALUE	0.000	0.101	0.000	0.092	0.000	0.001	0.001	0.182	0.000	0.1610	0.001	0.2576

Note: Abbreviations are: QHPS – Higher-productivity services output growth; Enhps- employment growth of non-higher-productivity (and skill-intensive) services; Eag – employment growth of agriculture; Em – employment growth of manufacturing; Ebds – employment growth of Baumol's diseases services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

Table 59: Estimates based on Standard ARDL-MG and Dynamic CCEMG Models for Kaldor's Third Law for the Full Sample and by Country Groups - SS

VAR	**ARDL-MG**						**DCCEMG**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
EC	-0.915*	-0.979*	-0.931*	-0.912*	-0.901*	-1.043*						
	(0.043)	(0.040)	(0.067)	(0.062)	(0.058)	(0.048)						
LP							0005	0.001	0.022	0.0326	-0.012	-0.131**
							(0.031)	(0.045)	(0.035)	0.059	(0058)	(0.0581)
QHPS	0.472*	0.0427*	0.506*	0.475*	0.440*	0.382*	0.422*	0.387*	0.394*	0.367*	0.409*	0.342*
	(0.042)	(0.042)	(0.058)	(0.056)	(0.063)	(0.062)	(0.044)	(0.053)	(0.035)	(0.047)	(0.083)	(0.212)
Enhps	-0.785		-0785*		-0.786*		-0.714*		-0.766*		-0.818*	
	(0.126)		(0.109)		(0.225)		(0.164)		(0.093)		(0.305)	
Eag		-0.579*		-0.405*		-0.743*		-0.537				-0.804**
		(0.104)		(0.118)		(0.161)		(0.174)				(0.376)
Em		-0.033		-0.059		-0.009		-0.081		-0.068*		0.045
		(0.045)		(0.043)		(0.079)		(0.069)		(0.022)		(0.115)
Ebds		-0.241*		-0.248*		-0.235*		-0.111		-0.319*		-0.247**
		(0.057)		(0.064)		(0.094)		(0.116)		(0.073)		(0.125)
CD TEST	5.34	3.80	6.38	6.14	1.64	0.08	-1.79	-0.44	-3.22	-0.90	-199	-1.50
P-VALUE	0.000	0.001	0.000	0.000	0.100	0.934	0.0073	0.660	0.001	0.368	0.047	0.133

Note: Abbreviations are: QHPS – Higher-productivity services output growth; Enhps- employment growth of non-higher-productivity (and skill-intensive) services; Eag – employment growth of agriculture; Em – employment growth of manufacturing; Ebds – employment growth of Baumol's diseases services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

Table 60: Estimates Based on CS-ARDL and CS-DL Models for Kaldor's Third Law for the Full Sample and by Country Groups - SS

VAR	CS-ARDL						CS-DL					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
QHPS	0.427*	0.461*	0.359*	0.416*	0.469*	0.347*	0.424*	00.401*	0.371*	0.388*	0.423*	0.245*
	(0.045)	(0.071)	(0.056)	(0.064)	(0.119)	(0.081)	(0.044)	(0.060)	(0.042)	(0.059)	(0.091)	(0.078)
Enhps	-0.765*		-0.772*		-0.829*		-0.721*				-0.810*	
	(0.045)		(0.186)		(0244)		(0.146)		(0.181)		(0.235)	
Eag		-0.596*		-0.373**		-0.701*		-0.581*		-0.405*		-0.755**
		(0.127)		(0.205)		(0.175)		(0.168)		(0.152)		(0.387)
Em		-0.045		-0.016		0.089		-0.114		-0.121*		0.024
		(0.103)		(0.088)		(0.085)		(0.069)		(0.037)		(0.093)
Ebds		-0.294*		-0.329*		-0.337*		-0.219**		-0.284*		-0.166**
		(0.081)		(0.065)		(0.139)		(0.109)		(0.083)		(0.096)
EC	-0.949*	-1043*	-0.887*	-0.820	-1.02*	-1.172*						
	(0.042)	(0.074)	(0.072)	(0.086)	(0.072)	(0.062)						
CD TEST	-1.21	0.58	-0.096	0.69	-1.62	-1.89	-1.81	-0.94	-1.51	-1.84	-0.70	-1.51
P-VALUE	0.227	0.559	0.339	0.491	0.106	0.059	0071	0.345	0.131	0.066	0.486	0.130

Note: Abbreviations are: QHPS – Higher-productivity services output growth; Enhps- employment growth of non-higher-productivity (and skill-intensive) services; Eag – employment growth of agriculture; Em – employment growth of manufacturing; Ebds – employment growth of Baumol's diseases services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

C. Baumol's diseases services

The long-run effects of the estimate for the growth of these services on total productivity growth are predicted to be positive across the static and dynamic model specifications, while the long-run effects of employment growth outside of these services activities are hypothesized to be negative. The signs of the slope coefficients for the employment growth of agriculture and higher-productivity (and skill-intensive) services sectors are predicted to be negative when employment growth of the non-Baumol's diseases services is broken down to manufacturing, agriculture and skill-intensive services. So, in view of testing the third Law for the less-skill-intensive services activities, the various static and dynamic models are estimated for two specifications, (a) and (b). For specification (a), the Baumol's diseases services value added growth and employment growth of non-Baumol's diseases services are entered in the regression as explanatory variables, and for specification (b), employment growth rates of agriculture, manufacturing and higher-productivity (and skill-intensive) services are included with Baumol's diseases services output growth.

Table 61 reports the estimates of AMG and CCEMG models and the results confirm the hypothesis as the slope coefficients bear the expected signs: Positive for Baumol's diseases services value added growth and negative and statistically significant. Under specification (a), a one percent increase in Baumol's diseases services output growth would result in the increase in economy-wide productivity by 0.603, 0.446 and 0.736 percent for the whole sample of countries, SSA panel and Asia panel, respectively with AMG estimator and by 0.613, 0.457 and 0.762 respectively with CCEMG estimation. In both models, the magnitude of the slope coefficient exceeds that of manufacturing value added growth and the higher-productivity (and skill-intensive) services growth. On the other hand, a one percent increase in non-Baumol's diseases services employment growth will cause economy-wide productivity to go down by 0.482, 0.652 and 0.359 percent for the full panel, SSA panel and Asia panel, respectively with AMG and by 0.469, 0.564 and 0.312 for the respective panels with CCEMG. The negative effect is more pronounced in SSA than in Asia, which could be a reflection of the production composition and nature of structural transformation in the two regimes. Surprisingly, the magnitude of the slope coefficient for employment growth of non-Baumol's diseases services is far lower than those of non-manufacturing and non- higher-productivity (and skill-intensive) services in all panels (country groups), though it is more pronounced with the Asia panel.

The positive relationship between value added growth of Baumol's diseases services and total productivity growth are confirmed when employment growth rates of manufacturing, higher-productivity (and skill-intensive) services and agriculture sector are included to the regression as shown in specification (b) of Table 61. As expected, the long-run effects of the growth of employment in agriculture and higher-productivity (and skill-intensive) services on total productivity growth are negative and significant in all panels across the two models. However, the former is statistically significant in all panels and models while the latter is significant only for the full sample under AMG and for the Asia panel with CCEMG model. By contrast, the sign for the estimated slope coefficient for manufacturing employment growth is found positive in SSA panel in both models and in the full sample under CCEMG, and the magnitude of the coefficient is lower than agriculture and higher-productivity (and skill-intensive) activities, but statistically insignificant in all models. Another important observation from Table 61 is that cross-sectional dependence is a great concern for all panels in both specifications (a) and (b) except for SSA under specification (b). This makes estimation of the dynamic models a must.

Therefore, estimation results based on the standard ARDL-MG and DCCEMG estimators are carried out and results are summarized in Table 62 for the two specifications. The slope coefficients endure the expected signs across the different models and lag orders, statistically significant in both specifications, (a) and (b), and demonstrating the predictability of the estimates. Focusing on specification (a), the slope coefficient for Baumol's diseases services activities output growth is positive while the estimated slope coefficient for the non-Baumol's diseases-intensive services sectors employment growth appear negative. Results of the ARDL-MG estimates show that, a one percent increase in Baumol's diseases services output growth will cause economy-wide productivity growth to go up by 0.626 percent (full sample), 0.498 percent (SSA) and 0.763 percent (Asia), which are slightly higher than the values of the coefficient reported in Table 61 On the other hand, a percentage increase in non- Baumol's diseases services sectors employment growth will cause economy-wide productivity growth to decrease by 0.499 percent (full sample), 0.681 percent (SSA) and 0.305 percent (Asia). Turning to specification (b), the value for the slope coefficient of the Baumol's diseases services output growth is found relatively slightly higher with ARDL-MG specifications than with DCCEMG specification for all panels. The long-run effects of employment growth in agriculture and higher-productivity (and skill-intensive) on total productivity growth turn out to be negative across panels and estimators, independent of the lag order chosen. Likewise, the sign of the slope coefficient for employment growth rates of manufacturing is negative in all panels, but statistically significant for the full sample at 0.10 level with ARDL-MG and for Asia at 0.01 level with DCCEMG.

The speed of convergence to long-run equilibrium or the magnitude of the error correction term still fall within acceptable range in both specifications, (a) and (b). Surprisingly, the first lag of the dependent variable has negative sign in specification (a) for Asia and in specification (b) for SSA and it is significant for SSA only in both specifications, (a) and (b). The results of the CD tests show that the error terms in specification (a) exhibit cross-sectional dependence for the full sample and Asia panel as the reported CD statistics are highly significant under ARDL-MG and for Asia and SSA with DCCEMG. However, for specification (b), cross-sectional dependence is nor more a problem for SSA in ARDL-MG and for all panels in DCCEMG. Therefore, the CS-ARDL and CS-DL models are employed so as to take care of unobserved global factors that affect the economies.

The estimated results are reported in Table 63, for the two specifications (a) and (b). The Table depicts that long-run effects of Baumol's diseases services growth and employment growth of non-Baumol's diseases services sectors on total productivity growth are similar to the previous estimates as the signs of the slope coefficients appear positive for the former and negative for the latter. As usual, the magnitude of the parameters shows very slight variation across the two models. Focusing on specification (b), there is strong evidence for the positive productivity growth effect of Baumol's diseases services output growth in the long-run as the slope coefficients are significant at the 0.01 level with the use of both CS-ARDL and CS-DL models. The estimates of the coefficient for employment growth in agriculture across the two models turn out negative and in manufacturing and higher-productivity (and skill-intensive) services mixed.

Table 61: Estimates based on AMG and static CCEMG Models for Kaldor's Third Law for the Full Sample and by Country Groups - BDS

VAR	**AMG**						**CCEMG**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
BDS	0.603*	0.567*	0.736*	0.716*	0.446*	0.378*	0.613*	0.567*	0.762*	0.732*	0.457*	0.392*
	(0.054)	(0.058)	(0.053)	(0048)	(0.067)	(0068)	(0.052)	(0.053)	(0.056)	(0.053)	(0.065)	
Enbds	-0.482*		-0.359*		-0.652*		-0.469*		-0.312*		-0.564*	
	(0.078)		(0.091)		(0.115)		(0.052)		(0.098)		(0.114)	
Eag		-0.480*		-0.224*		-0.757*		-0.507*		-0.240*		-0.698*
		(0.083)		(0.064)		(0.128)		(0.086)		(0.057)		(0.124)
Em		-0.022		-0.025		0.012		0.001		-0.032		0.003
		(0.022)		(0028)		(0.037)		(0.029)		(0.024)		(0.044)
Ehps		-0.091*		-0.139*		-0.034		-0.133		-0.129*		-0.072
		(0.038)		(0.043)		(0.058)		(0.049)		(0.034)		(0.062)
CDP	0.762*	0.558*		0.706	0.757*	0.455*						
	(0.118)	(0.106)	(0.096)	(0103)	(0.176)	(0.127)						
C	-0.002	0.004	-0.017	-0.015**	0.016*	0.022*	0.002	0.004	0.003**	-0.001	0.009*	0.015*
	(0.003)	(0.233)	(0.005)	(0.005)	(0.006)	(0.006)	(0.003)	(0.006)	(0.001)	(0.005)	(0.002)	(0.004)
CD TEST	-3.542	-3.082	-3.534	-2.965	-3.809	-3.171	4.39	-3.19	2.14	-3.27	3.29	1.63
P-VALUE	0.000	0.002	0.000	0.003	0.000	0002	0.000	0.002	0.032	0.001	0.000	0.104

Note: Abbreviations are: BDS – Baumol's Diseases services; Enbds- employment growth of non-Baumol's Diseases services; Eag – employment growth of agriculture; Em – employment growth of manufacturing; Ehps – employment growth of higher producitivity services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

Table 62: Estimates based on Standard ARDL-MG and Dynamic CCEMG Models for Kaldor's Third Law for the Full Sample and by Country Groups - BDS

VAR	**ARDL-MG**						**DCCEMG**					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
EC	-0.961*	-0.983*	-0.945*	-0.909*	-0.976*	-1.051*						
	(0.039)	(0.040)	(0.045)	(0.045)	(0.065)	(0.061)						
LP							0.051	0.016	-0.027	0.023	0.129**	-0.099**
							(0.062)	(0.033)	(0.037)	(0.044)	(0.063)	(0.051)
QBDS	0.626*	0.563*	0.763*	0.754*	0.498*	0.399*	0.594*	0.522*	0.727*	0.734*	0.437*	0.295*
	(0.051)	(0.058)	(0.066)	(0.067)	(0.064)	(0.067)	(0.073)	(0.065)	(0.109)	(0.075)	(0.112)	(0.077)
Enbds	-0.499*		-0.305*		-0.681*		-0.567*		-0.439*		-0.406***	
	(0.104)		(0.144)		(0.138)		(0.320)		(0.076)		(0.237)	
Eag		-0.486*		-2.42*		-0.714*		-0.521*		-0.363*		-0.662*
		(0.088)		(0.064)		(0.139)		(0.158)		(0.143)		(0.254)
Em		-0.067***		-0.056		-0.077		0.005		-0.062**		-0.078
		(0.039)		(0.039)		(0.069)		(0.049)		(0.029)		(0.107)
Ehps		-0.073**		-0.121*		-0.027		-0.161*		-0.119*		-0.049
		(0.035)		(0.032)		(0.060)		(0.033)		(0.048)		(0.087)
C							0.025***	-0.006	-0.025	-0.018	-0.011	0.002
							(0.014)	(0.011)	(0.026)	(0.009**)	(0.02)	(0.017)
CD TEST	3.50	2.03	2.41	1.77	1.46	-0.03	-0.75	-1.49	-3.50	-0.15	-2.41	-2.01
P-VALUE	0.001	0.042	0.016	0.076	0.144	0.979	0.456	0.136	0.001	0.880	0..016	0.044

Note: Abbreviations are: QBDS – Baumol's Diseases services; Enbds- employment growth of non- Baumol's Diseases services; Eag – employment growth of agriculture; Em – employment growth of manufacturing; Ehps – employment growth of higher productivity (and skill-intensive) services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

Table 63: Estimates Based on CS-ARDL and CS-DL Models for Kaldor's Third Law for the Full Sample and by Country Groups - BDS

VAR	CS-ARDL						CS-DL					
	ALL SAMPLE		ASIA		SSA		ALL SAMPLE		ASIA		SSA	
	A	B	A	B	A	B	A	B	A	B	A	B
QBDS	0.619*	0569*	0.757*	0.806*	0.466*	0.286*	0.618*	0.055*	0.769*	0.804*	0.449*	0.233*
	(0.055)	(0.058)	(0.081)	(0.095)	(0.057)	(0.06)	(0.053)	(0.065)	(0.075)	(0.089)	(0.061)	(0.076)
Enbds	-0.473*		-0.397*		-0.660*		-0.477*		-0.373*		-0.753	
	(0.109)		(0.116)		(0.133)		(0.125)		(0.111)		(0.275)	
Eag		-0589*		-0.053		-0.811*		-0.596*		-0.304*		-0.858*
		(0.153)		(0.164)		(0.236)		(0.145)		(0.081)		(0.329)
Em		0.161		0.071		-0.224		0.082		0.016		-0.313
		(0.199)		(0.052)		(0.180)		(0.091)		(0.053)		(0.248)
Ehps		-0.278**		-0.164*		0.116		-0.214*		-0.127*		0.129
		(0.164)		(0.063)		(0.105)		(0.125)		(0.049)		(0.162)
EC	-0.972*	-0.974*	-0.970*	-0.934*	-0.994*	-1.079*						
	(0.036)	(0.045)	(0.044)	(0.065)	(0.060)	(0.067)						
CD TEST	0.84	-173	-1.85	-1.65	-1.49	-1.79	-0.16	-1.42	-1.90	-1.60	-1.08	-0.37
P-VALUE	0.399	0.084	0.065	0.099	0.135	0.073	0.872	0.156	0.058	0.109	0.278	0.714

Note: Abbreviations are: QBDS – Baumol's Diseases services; Enbds- employment growth of non- Baumol's Diseases services; Eag – employment growth of agriculture; Em – employment growth of manufacturing; Ehps – employment growth of higher productivity (and skill-intensive) services; C- constant term; * level of significance at 0.01; ** level of significance at 0.01 level

Source: Own Computation

6.6 Summary

Part six sought to empirically examine the role of manufacturing, skill-intensive services, Baumol's disease services, and agriculture sectors on economic growth of sample economies from SSA and Asia employing the classic Kaldor growth laws as the analytical framework. The econometric analysis was carried out using panel data from 1970-2015. Kaldor's growth laws predict that manufacturing has unique potential to act as growth escalator in the economy attribute to various elements, which other sectors cannot share, including its dynamic productivity potential. Part six tested Kaldor's engine of growth hypothesis via running recent econometric models to his three growth laws which predicts the prevailing role of manufacturing in the growth trajectories of the considered countries. The first growth law of Kaldor was tested for its baseline regression model as it stands along with two side tests of spuriousness. Also, following Pacheco-Lopez and Thirlwall (2013), it tests the open economy effect, which relates to exports and balance of payment aspects of sectoral contribution to GDP. The tests of the closed economy and open economy sectoral effects are extended to services and agriculture sector to look into supportive evidence for the research claim, especially the synergetic relationship between economic sectors in part four or refute the claim to identify if services and agriculture sectors could have the potential to play an alternative engine of growth in the considered countries. It contributes to the literature employing recent econometric models that corrects issues related to cross-sectional dependence, slope heterogeneity, global common shocks, reverse causality and the like, which were not employed in previous empirical works on Kaldor's growth laws. Also, it gives insights as to whether services demonstrates growth escalator effect in the considered countries (especially those in SSA); if so, whether services activities complement or replace manufacturing. Future research may draw important insights testing the sectoral engine of growth hypothesis by splitting the period of analysis into at least two sub-periods.

Reading of economic history witnessed that today's developed countries achieved their development status at the yoke of extensive manufacturing growth. Emerging economies such as China have followed that route and achieved growth miracles that stunned the world. The descriptive analysis evidenced that SSA saw growth spurts during the 2000s, which has received wider recognition – with "Africa Rising", Time for Africa narratives. What has been contentious, nonetheless, is the quality and hence, sustainability of this growth momentum. More specifically, skeptics contend that the capabilities that the countries have currently and the composition of the production structure, which is dominated by traditional and low-productivity sectors/activities, could hardly enable them achieving their vision of reaching a middle-income and high-income economy status in between 2025-2030. Catching-up remains a big concern for the region while the Asia forerunners are aspiring for forging-ahead. Most of the countries in SSA, including the fastest growing ones, have achieved growth upsurge without meaningful transformation of the production structure in the direction of dynamic economic activities that have higher potential for cumulative productivity increases, capital accumulation, increasing returns, employment creation, etc. The growth upturn was not accompanied by quality jobs, poverty reduction and wealth redistribution in any meaningful way. Since recently, the services sector took the place of agriculture in terms of value added share in GDP while the share of manufacturing industry in the economy remains low, though some countries exhibited employment industrialization with marginal increase in share during 2000-2015. The findings may lend support for the occurrence of stagnant (stalled) industrialization or tertiarization much earlier than the historical norm. Of course, some of the countries have never been industrialized (which in the notion of Tregenna are under-industrialized). One may comfortably argue that the economies in Asia sample have managed to shift their economies in the direction of high-productivity sectors/activities, whereby the share of the manufacturing industry in the economy of these countries has been commendable. With this background, part six empirically explored as to whether manufacturing has engine of growth effects relative to services and agriculture sectors in SSA and Asia (and if so, in what extent) during the study period.

When it comes to the engine of growth role hypothesis (Kaldor's First Growth Law), the dataset for Asia and SSA confirmed its validity using variety of static and dynamic panel models of estimation in both the closed and open economy contexts. For the closed economy effect model additional demand side variables were included to make the model more robust. More specifically, investment, government consumption and export (in their real growth rates) were included in the model bearing positive sign, statistically significant effect on growth of the respective economies, the magnitude mostly higher than that of SSA. The results corroborate previous findings in that manufacturing has higher potential or important place in the growth trajectories of both Asia and SSA economies, despite the magnitude of the long-run effect of manufacturing growth on real GDP growth has substantial difference between the two regions and across countries. In sum, two possible observations may come out from the estimation results, particularly from models that consider observed and unobserved heterogeneities: (i) the expansion of manufacturing may smooth the effects of unobserved common factors, and therefore promote an efficient allocation of resources from the primary sector which propels economic growth across countries; and (ii) growth of manufacturing may be detrimental to long-term growth of the economy of the considered countries. This is true notwithstanding: (i) the value added growth (at constant price) not only of manufacturing, but also these sectors were found to be statistically significant and positive in affecting the growth of the economies under study in both the static and dynamic model specifications for the closed economy effect, and (ii) the coefficient for the value added growth of manufacturing come out lower, in most cases, than those of services across the different estimation models. The larger size of the coefficient, especially for the Baumol's diseases services activities value added growth, might arise in part from their higher share in GDP compared with manufacturing. Therefore, caution is in order while drawing conclusion from the estimation result as the probability of spuriousness is not underestimated; hence, the first side test of spuriousness (that is, contemporaneous with excess growth of respective sectors) may give useful insights to draw plausible insights. In this respect, manufacturing passes all tests for Asia while the two segments of services and agriculture failed to pass the first side tests of spuriousness.

As cane be evident from Table 64 below, it would be possible to say that services growth (especially Baumol's diseases services) has exhibited strong correlation with real GDP growth compared with manufacturing by simply observing the slope coefficients for the value added growth of agriculture, manufacturing and the two services segments. However, caution is required while interpreting the results. For, the estimates may not give definite evidence to the hypothesis that this section intends to validate. This can be validated, though may not be perfectly conclusive, by comparing the estimation result with the value added share of the sector, which is depicted in the below Table.

Table 64: Value added share against estimation results of selected models

Var.	Share	Estimates					Difference				
		AMG	CCEMG	ARDL	CS-ARDL	CS-DL	AMG	CCEMG	ARDL	CS-ARDL	CS-DL
						Asia					
Man	0.201	0.410	0.426	0.447	0.434	0.434	0.209	0.225	0.246	0.233	0.233
HPS	0.176	0.503	0.569	0.500	0.502	0.519	0.327	0.393	0.324	0.326	0.343
BDS	0.313	0.780	0.821	0.837	0.793	0.799	0.467	0.508	0.524	0.480	0.486
AGR	0.192	0.522	0.410	0.567	0.545	0.559	0.330	0.218	0.435	0.355	0.367
						SSA					
Man	0.112	0.260	0.267	0.330	0.334	0.325	0.148	0.155	0.218	0.222	0.213
HPS	0.196	0.438	0.432	0.457	0.435	0.348	0.242	0.236	0.261	0.239	0.152
BDS	0.300	0.535	0.522	0.581	0.617	0.566	0.235	0.222	0.281	0.317	0.266
AGR	0.250	0.351	0.374	0.438	0.462	0.312	0.101	0.124	0.188	0.212	0.062

Note: Abbreviations are as given previously. * Level of significance at 0.01; ** level of significance at 0.01 level
Source: Own Computation

As can be evident from the Table, the lowest estimate for manufacturing (0.260) in SSA panel is higher than the average share of manufacturing value added observed in all periods considered for SSA panel (0.112). This may give evidence for the engine of growth hypothesis for manufacturing that Kaldor's First Growth Law postulates. As expected, the coefficient estimates of manufacturing for the Asia samples are considerably higher than the value added share of manufacturing. This may give evidence for the higher potential manufacturing has to be pace-setter or growth escalator in the economy of the sample economies. But, the difference between the regression coefficient and value added share of the two services segments turns out to be higher than that in manufacturing in both Asia and SSA panel, but it is more pronounced with the Baumol's diseases services typically in Asia. This does not mean that the services sector has taken over the growth escalator role of manufacturing in the economy of the sampled countries. But, the services sector, especially, the higher-productivity (and skill-intensive) services would serve as *"stimulus complement"* to manufacturing. Surprisingly, the difference between the regression coefficient and value added share of agriculture come out larger than that in manufacturing in Asia and lower than that in manufacturing in SSA.

The two spuriousness tests results suggest that manufacturing passes the two tests at least in Asia with the various model specifications and fails the first test in SSA, as the sign of the coefficient turns out to be negative in the different estimation models. The two segments of the services sector failed to pass the first spuriousness tests for both Asia and SSA panels, but they passed the second test suggesting that output growth of these services segments contributed positively and significantly to the growth of the other sectors during the study period. Also, agriculture failed to pass the first test of spuriousness for Asia panel; the coefficient come out positive (mostly insignificant) for SSA while its size is extremely lower than those of manufacturing and the two services sector segments.

Additionally, the growth engine effects of manufacturing is supported according to the open economy estimations. There is indication that services have an open economy effect for both the full sample and the two country groupings. Two surprise observations come out from the estimation results: (i) the size of the coefficient for the Baumol's diseases services appear higher than not only of manufacturing, but also higher-productivity (and skill-intensive) services activities and agriculture sector; and (ii) the size of the coefficient for manufacturing growth exceeds those of services and agriculture. The result may thus give evidence for the synergetic relationship according to the proposition of part three. On one hand, the fall in the share of manufacturing and agriculture in most countries accompanied by the rise in the share of the services sector may be taken as indicative of the potential for higher-productivity (and skill-intensive) activities to share the growth inducing role of manufacturing in the future. On other hand, the spuriousness and the open economy estimation results suggest that the falling or stagnation share of manufacturing in GDP could not lead one to jump into conclusion that manufacturing-led development path is outdated, giving way to services-led development path. The findings of the close and open economy models give supportive evidence to the lengthy discussion made in part three to defend the synergetic relationship between manufacturing and services, and between manufacturing and agriculture.

Kaldor's Second Law, also known as the Verdoorn Law, was also supported in both the full sample and the two panel dataset. Two cases were considered for the estimation. The first case takes productivity growth of each of the sectors as dependent variable and value added growth of the sector in question as explanatory variable. In this case, the coefficient bears the expected sign for manufacturing, positive and statistically significant at 0.01 level of significance in both the full sample, Asia and SSA in affecting productivity growth in the sector. The magnitude of the coefficient ranges between 0.542 (with CS-DL) and 0.573 (with CCEMG) for the full sample; between 0.605 (CS-ARDL) and 0.698 (ARDL-MG model) for Asia and between 0.426 (with ARDL-MG) and 0.504 (with CCEMG), implying that a percentage point increase in output leads to above half a percentage point increase in productivity [interestingly, the size of the coefficient is almost the same across the six estimation models]. Turning to the two services sector segments, there is clear pattern moving from the static model specifications to the dynamic models in Asia dataset, where the productivity effect of Baumol's diseases services growth is always higher than the effect for higher-productivity (and skill-intensive) services activities and in turn higher than that of manufacturing. In SSA too, output growth of the two services segment is statistically significant and positively affects their productivity growth in the long-run, although there appears slight disparity with respect to the magnitude of the coefficients moving across the different models.

In the second case, employment growth of manufacturing (also higher-productivity (and skill-intensive) services, Baumol's disease services and agriculture) was the dependent variable and value added growth of each sector taken as explanatory variable. The coefficient appear positive and statistically significant for all sectors in all panels. However, there appear slight variation with respect to the size of the slope coefficients, which may be attributed to the model specifications and the methods used as well as lag order chosen. Four interesting observation are worth noting here: (i) irrespective of the models used, output growth of manufacturing and the two services branches come out statistically significant and positively affects their employment in the long-run with the size of the effect become larger for SSA than for that of the full sample and Asia; (ii) the value of the slope coefficient for the effect of manufacturing output growth in employment growth is far higher than its effect on productivity growth in SSA panel, which is not true in the full sample and Asia as well as the two services segments; (iii) in the full sample and Asia panel, the growth of manufacturing and the two services segments output has higher productivity effect than employment effect in the long-run; and (iv) the employment effect for manufacturing exceeds that of the two services segments in either the full sample or the two country groupings. The slope coefficient for Baumol's diseases services in Asia panel turns out to be either low or statistically insignificant. These findings contrast with Kaldor's original findings, wherein the coefficients of productivity growth on output growth and employment growth on output growth were equal, approximately 0.50. In short, the employment effect is generally higher than the productivity effect of the increase in the value added growth of the sectors in SSA, except few cases.

Kaldor's Third Law is empirically supported in the full sample and in the two panel dataset, suggesting long-run relationship between manufacturing growth and economy-wide productivity growth in the economies of the considered Asian and SSA countries. This is notwithstanding the fact that the manufacturing base in most SSA economies is low, which hinders it to pull out labor from low-productivity sectors and induce their productivity implicitly as the theoretical formulation predicts. The slope coefficients bear the expected signs in the various models applied. The estimates of the various model specifications unanimously suggest that a one percentage point increase in manufacturing output growth will cause economy-wide productivity growth to go up and an increase in non-manufacturing sectors employment growth will in the long-run cause economy-wide productivity to go down. When employment growth outside manufacturing is broken down into the two broad segments of services and agriculture, an increase in employment growth of Baumol's diseases services and agriculture always cause the decrease in total productivity. The signs for the slope coefficient of employment growth of higher-productivity (and skill-intensive), likewise, turns out to be positive and statistically insignificant in various models. Kaldor's Third Law was also estimated with value added growth of Baumol's diseases services and employment growth of non- Baumol's diseases services included as explanatory variables. The regression coefficients in all static and dynamic models were statistically significant, with the former bearing positive effect and the latter negative signs. The size of the coefficient for services sector appear slightly higher than that of manufacturing, validating the hypothesis that such services can stand as *"stimulus complement"* to manufacturing. Therefore, the findings may give support to the observation come out from the discussion in parts three and four.

In sum, the empirical analysis give important insights on the stated knowledge gap, objectives and questions that the dissertation intends to contribute to the debate. So, the call for synergy between economic sectors needs to be taken into account with the policy menu of low-income countries.

PART SEVEN: CONCLUSION

There is no such other big question than this one: *Why today's low-income economies became poor and stayed that way, and rich countries developed and walked up on the development ladder?* The question so vital has no precise and simple answer. Different scholars tried to tackle the question differently corresponding to the intrinsic assumptions of the respective schools of thought. So, the debate over it continued unsettled, re-emerging over and over again. As such, governments of different countries in the developing world block have pursued development policies and alternative paths of economic transformation and development in line with their political ideology, with the core objective of achieving catch-up growth and breaking the vicious cycle of underdevelopment and poverty trap. Economic history witnessed that the world has seen tremendous technological advance since the Second World War, accompanied by remarkable rise in per capita income for the advanced capitalist economies and triumphant East Asian countries. Additionally, there has been increasing openness of current and financial accounts by several economies worldwide since the early 1980s with intensification of globalization and technology development dynamics. However, divergence in growth and inequality became the rule to the world economy, which in Lewis proposition is associated to the ways of imitation and trading. This implies that prophesy of the mainstream growth theories (in line with the neoliberal policies) on convergence remains the exceptions rather than the rule. Typically, there occurred twin divergence between the developed and developing economies, and among the developing countries blocks. Accordingly, there emerged big divergence between SSA and successful Asian forerunners especially in the 1980s, which were comparable in terms of per-capita income level in the 1960s and 1970s. The present dissertation sought to enquire the key driving forces behind such big divergence.

The dissertation claims that the divergence path of catching-up and level of development between regions (such as SSA and Asia) and across countries has to do with differences in the disproportionate evolution of the sectoral composition of production structures, which goes beyond fundamentals. Undoubtedly, initial conditions might have differed in some aspects and country-specificity is always there. Such other factors as geography, climate, bad luck, culture, etc. are predicted to have played part in the stagnant industrialization and poverty level of countries in Africa; but, those proximate factors are not exceptions to the continent. The key driving forces for the different economic growth trajectories and development level exhibited by the two set of countries could also be associated in part with difference in real per capita growth and capital accumulation, entrepreneurship, the quality of formal institutions, the quality of state administration and bureaucracy, etc. However, the relatively weak productive and technological capabilities to undergo production transformation and diversification in SSA, which made the region lose headway and caught at low-income level, can be explained chiefly by political factors [the political settlement and the consequent power distribution in society] and inappropriate industry policy. This requires an in depth assessment, however.

Part two set to present conceptual discussions on production transformation and synthesis of the various perspectives with a view to pick the analytical framework to address the research objectives and questions, clarify the concept of structural change in the context of economic development and sustainability. It has briefly outlined the two strands of view concerning the determinants (driving forces) of structural change: demand side and supply side views, and conclude that the two views could seem complementary and supportive rather than antithetical. As a continuation, part three reviews three strands of sector-led development journeys: Manufacturing-led, services-led, and agricultural-led development routes.. It discussed the debate (past and present) and suggested a synergetic relationship between economic sectors. It made lengthy discussion to give useful insights why services sector can only serve as stimulus complement to manufacturing rather than replacing manufacturing and become the new pace-setter in the economy.

Part four set out to scrutinize the patterns of structural transformation (in terms of resource transfer) at region and country level, and to examine the contribution of the different economic sectors to GDP and economy-wide labor productivity growth. There appears to be momentous heterogeneity across countries within and between SSA and Asia samples. On one hand, the well-heeled Asian economies have benefited from a virtuous cycle characterized by rapid productivity growth, growth-enhancing employment shift and diversification in the direction of sectors/activities with higher potential for cumulative productivity increases, forward- and backward-linkages, learning-by- doing, host of spillovers, etc. such as manufacturing. On other hand, the vast majority of SSA economies faced vicious circle characterized by low or stagnant productivity growth, low manufacturing base and productivity-reducing structural change, especially during the SAP period [covering the years 1980-1999]. Indeed, the process of production transformation is not static nature that could happen in a vacuum. Neither does it cost less. Additionally, not all sectors have similar potential in the transformation and development process, reflecting the presence of sectoral heterogeneity (which is typically the case for services sector). This may suggest the importance of targeted industrial policy and active role of the state with respect to taking the required coherent measures for supporting the process of structural transformation towards realizing long-term goals and for a better performance of the economic system.

The descriptive analysis in part four shows that most of the considered economies have seen substantial changes in the composition of their economic production structure – bad or good. The findings show jagged patterns of structural change across countries. The share of agriculture sector saw continued phenomenal drop in both value added and employment, with the former exhibiting a faster and sharper fall than the latter (relatively higher share of employment is more pronounced in SSA). What differentiates the Asian tigers and roaring lions from the crippling SSA ducks has been the observed disparity in the extent of manufacturing production and its contribution to the economy. In East Asia, structural transformation moved in the right direction; hence, resulted in diversification away from predominantly agrarian economy into a manufacturing powerhouse [rather than to traditional low-productivity services activities] that stunned the world**.** As Joe Studwell (2013) argues "the technological upgrading of manufacturing is the natural vehicle for swift economic transformation" in these economies. Put in other words, the Asian boomers have exhibited rapid industrialization [faster growth of manufacturing relative to agriculture and services, albeit both sectors grew robustly]. Some of these developmental states, like South Korea, have stretched up to defying their comparative advantage and walked up the quality ladder of the division of labor. In contrast, and as noted earlier, the pace and nature of sectoral reallocation in SSA was quite different from the historical norm of developed economies and those resurgent Asian comparators. Most SSA economies seem to have experienced premature tertiarization with industrial stagnation, in that the share of manufacturing remains low while structural change is fueled in most cases by expansion of services. India and other Asian sample economies have also followed a different structural transformation pattern than the historical norm. Most importantly, East Asian economies followed the conventional manufacturing-led development path. Industrialization has important place in the rapid growth observed in Vietnam, Cambodia, etc.

The economic structure of the considered SSA economies hardly showed any perceptible evolution towards higher-productivity manufacturing production over the entire periods of investigation, with few exceptions and signs of employment industrialization in the most recent period. Mauritius is an interesting success story. In most of the sampled SSA economies, agriculture continued to play an important role in contributing to a good share of GDP and employment generation, albeit its dilapidated trend. Another visible and worrisome fact of SSA's structural transformation record is the high and precipitously growing importance of the services sector in terms of value added share at a very low level of development (perhaps, encountered *premature tertiarization).* It is worrisome because the services sector is dominated by low-skill-intensive and less-productive activities including retail trade, social and personal services, although other branches of the industrial and services sectors (such as construction, transportation, and communication) have gained notable contribution to value added growth from their historic low level in the most recent years. The sheer weight of services sector value added share in advanced Asian economies is in line with the prediction of the structuralist tradition stylized facts. Most importantly, even in Asia the paths of structural transformation are uneven and incomplete, but East Asia. Countries in SSA seem to have bypassed industrialization stage that was important in Asian sample economies growth acceleration. So, SSA economies seem to be experiencing *premature tertiarization*, rather than *premature deindustrialization*.

The other side of the fence reveals that most SSA economies have seen productivity growth spurts, especially in the past decade. However, the productivity gains at sector level were better in countries experiencing a substantial fall in the average share of their agriculture sector than otherwise. In terms of productivity growth, labor productivity in skill-intensive services activities was relatively higher than that in manufacturing for some Asian economies [as they cannot absorb as much labor as manufacturing], and far lower for other countries. In contrast, labor productivity in some services activities was at par or outstepped that of manufacturing in majority of SSA economies. This does not mean that the relatively high-productivity (partly due to small number of employees) are widely available in continent. Neither does it mean that the Baumol's diseases services have unlimited potential for productivity increases. But rather, the countries have encountered stagnant industrialization with premature tertiarization; as already indicated above, most of them are under-industrialized. For most economies in both regions, productivity levels across the services sector branches are quite diverse. Also, productivity differentials between SSA and well-off Asian economies are still big, although the former witnessed laudable improvements over the 2000s. Agriculture remains the least productive sector in both economies, exhibiting no clear advance for most SSA countries over the last few decades, albeit the sector is the largest employer in most of the SSA and some Asian economies.

Results of the productivity decomposition exercise reveal that the contribution of labor reallocation to economy-wide productivity growth has been heterogeneous across economies and sectors. In those economies experiencing positive sectoral contribution to economy-wide labor productivity, labor has moved out of the least-productive sector (e.g. agriculture) to the most productive sectors/activities (e.g. manufacturing). Here, sectoral productivity is positively correlated to changes in sectoral employment shares. In the other economies, less productive sectors have gained employment shares (e.g. agriculture in Zambia) implying that the change in employment share of agriculture is less pronounced in SSA relative to Asia, though the sector's value added share showed diminutive pattern in both regions.

It is interesting to note also that the Granger causality test results suggest the presence of bidirectional causality, going from structural change, measured both in value added and employment, to economy-wide productivity growth and vice versa. This may inspire one to carry out further research using different dataset and empirical methods to make sure if the findings remain intact or change. It is necessary in future research to identify the factors determining structural change (comprising both the demand and sides) employing appropriate estimation techniques.

Part five sought to examine the extent of *premature tertiarization* as well as to identify the key driving forces (determinants) for manufacturing development (industrial development) in a comparative perspective between SSA and Asia sample economies. The test of premature deindustrialization and inverted U-shape for manufacturing output and employment replicated Rodrik's (2016) model, but the present study extends the estimation to higher-productivity (and skill-intensive) and Baumol's diseases services to validate case of *premature tertiarization* and the stimulus complement notion. This way it contributes to previous literature on industrialization and deindustrialization. The findings suggest that developing Asia were immune from deindustrialization and *premature tertiarization*, as they followed manufacturing-led development route, despite the growing importance of services in the economy of most countries. The findings for SSA come out inconclusive, but they send flash of light on the presence of more of industrial stagnation with *premature tertiarization*, rather than *deindustrialization*, albeit variation exists across countries.

To address the research question with respect to determinants of manufacturing development, the study employed recent panel data econometric approaches that correct cross-sectional dependence, slope heterogeneity, and the like. By empirically exploring the key determinants of manufacturing employment and real value added shares for sample economies in SSA and Asia (for the full sample and two regional country groupings) during the period 1970-2015, the study contributes to the literature on knowledge gap. The estimates of the different models give insights on why some countries (especially those in Asia) experienced structural transformation in the right direction and maintain relatively a higher share of manufacturing than other countries (such as those in SSA). The results of the different models suggest that the driving forces of industrial development appear heterogeneous in terms of the sign, magnitude and level of significance of the coefficients in impacting manufacturing value added and employment share. Some of the driving forces for manufacturing share appear to have similar (positive or negative effects) between the two country groupings (SSA and Asia) while they differ in certain other variables. The findings give supportive evidence to the findings of previous parts of the dissertation, in that Asian economies have followed manufacturing-led development path as most advanced economies were managed to do so in the past. The study incorporate various internal factors. Apart from the commonly internal and external variables that previous studies used (e.g. per capita income and its squared term, technological progress [productivity gaps], international trade and globalization, the study incorporates various other covariates including economic complexity index (ECI), industrial density, value added and employment share of skill-intensive and Baumol's diseases services, real exchange rate, etc. The results suggest the need to institute a concerted effort by governments of SSA countries to use well thought industrial policy to guide manufacturing firms compete in the GVCs and benefit from the opportunities created from the Fourth Industrial Revolution, mitigating risks.

The econometric exercises in part six was intended to not only examine the validity of the classical Kaldor laws (as they stand) to a heterogeneous and different set of countries and time period but also to validate the synergetic relationship between sectors (which is related to cumulative causation) and the *"stimulus complement"* hypothesis. To this regard, it addresses three questions: (i) does manufacturing still wear its premised cardinal potential that could enable it play engine of growth? Especially, did manufacturing demonstrate powerful growth engine effects relative to services and agriculture in the considered SSA and Asian economies? (ii) Can higher-productivity (and skill-intensive) services activities present special properties that enable them replace manufacturing or to play a mere stimulus complement role to manufacturing? (iii) Could agriculture have the capacity to be growth escalator in SSA economies? The contributions of part six to the literature are three-fold: (i) it tests the three growth laws while the third law received little attention since recently; (ii) it extends the three growth laws to services and agriculture sectors; splitting the services sector into two broad segments: relatively higher-productivity (and skill-intensive) services and the relatively lower-productivity Baumol's diseases services activities. It thus contributes to the debate on manufacturing-led and services-led development journey; (iii) includes aggregate demand elements (investment, export and government consumption growth) with Kaldor's first growth law as robustness check to the consistency of the estimates on one hand and to evaluate the impact of these variables on GDP growth on the other; (iv) it attempts to link the effects of the closed-economy and open-economy models; and (v) a first attempt or one of few attempts to use up-to-date dynamic panel estimation approaches to tackle pertinent issues such as endogeneity and reverse causality, cross-sectional dependence, non-stationarity of the series and slope heterogeneity with the engine of growth regression.

The results of the empirical estimation give supportive evidence to this proposition. Most importantly, Kaldor's growth Laws are empirically supported by the sampled SSA and Asian countries data. In the baseline model, the results for higher-productivity (and skill-intensive) services and Baumol's diseases services (as well as agriculture in some sense) bear positive signs [which are statistically significant] in affecting economic growth in the long-run. However, services and agriculture sectors fail to pass the first tests of spuriousness in both SSA and Asia panels; yet, manufacturing fails to pass this test in SSA. This may give support to the prediction that the present dissertation made at the very inception: Services can play part in the development and sustainability of the economies under investigation as *"stimulus complement"* to manufacturing. This implies that services cannot stand as growth escalator without parallel development of manufacturing core. Structural transformation in SSA has mostly taken the form of a shift from agriculture (also out of manufacturing in some instances) chiefly into traditional and informal services activities. The absence of any meaningful growth of employment in manufacturing in several countries made some scholars to posit that low-income countries in SSA may find it harder to use manufacturing-led development as their development path. However, there is no good base to conclude that services-led development path is an alternative feasible development path for the countries. The recent increase in employment share (though very low) in certain countries [employment industrialization] gives some clue on the possibility for these countries to undergo reindustrialization or industrialization (perhaps along with tertiarization) in the future.

In short, the theoretical discussion along with the descriptive and the empirical analysis offer important insights in addressing the claim, objective and questions that the dissertation raised at the first part. The findings validated the existence of heterogeneity among sectors/production activities. Hence, the specificity of economic sectors in production transformation, development and sustainability could be endorsed in the context of a synergetic relationship. The call for synergy between manufacturing and agriculture, and between manufacturing and skill- and knowledge-intensive services need to be taken into account with the policy menu of low-income countries. By way of recapitulation, this part attempts to boil down the findings and their implications in the following way.

Is manufacturing-led development journey a viable option to SSA economies?

History witnessed that developed economies and well-off East Asian economies have experienced a shift of production structure into higher productivity sectors/activities, especially manufacturing. As such, manufacturing appears to act as pace setter in driving rapid and sustained growth in well-off Asian economies. Yet, it does not seem driving considerable employment shifts in some economies. So, if the Lewis way of imitation works well, rapid industrialization and more so diversification on the road to higher-productivity manufactures could remain the key contributing factor for low-income SSA economies, such as Ethiopia, Tanzania, Malawi, etc. to catch-up their advanced counterparts and ascent the ladder of prosperity. Put in other words, if rapid industrialization was the largest driver of high and sustained growth in all developed economies and the newly industrialized South-East and East Asian economies, it can still matter for sustaining higher and faster growth in low-income SSA economies. The question remains why manufacturing? Because manufacturing has an unlimited potential of expansion with immense opportunities for better remunerating permanent and quality jobs, cumulative productivity increases, economic diversification, etc. Therefore, low-income SSA economies should transform their economic structure and production composition in this direction so as to sustain their recent impressive growth trajectories and vibrantly step-up to middle-income and high-income status. But, which types of manufacturing activities matter the most, and why?

The conceptual discussion, the descriptive analysis and the empirical results all only give indication that this depends on country context and there is no blue print to copy and apply given the complexity of the global supply chain. The difference in current capabilities and competences across countries may make the transformation and industrialization endeavor uneven. The domestic capability and hence the product space of these economies impose constraints when they attempt to ascent the ladder of the division of labor. Although the transition towards higher-productivity manufacturing activities follows a well-defined pattern, it does not take place out of nothingness. There is no clue to talk of predestination of whatsoever. Some of these economies may start working on resources and commodity based industrialization while others may undertake skill and technology-intensive activities away from commodity based ones depending on their capability and industrial policy which has also to do with the political commitment and power of the state in supporting the process of structural change. With no qualm, most of SSA economies have immense potential and comparative advantage for labor-intensive manufacturing activities. This comprises demographic dynamics - the advantage of low wage and trainable young labor force. This could be typically the reason why Chinese investment has been flooding to the region in the last decade, in particular to natural resource enclave industries. In some of the fastest growing countries such as Ethiopia, Ghana, Nigeria and Tanzania, there have been growing interest on investments in light-manufacturing too.

Overall, the contribution of the sector in GDP and in total employment is still below the expected level in several countries making them under-industrialized or experienced stagnant industrialization, albeit some improvements have been observed in recent years. There have also been improvements in the business environment in the region with a favorable macroeconomic and political stability, if not in all countries. The African states are also expressed time and again their commitment to do developmental states and undergo production transformation, which is the only panacea to alleviate dire poverty and to make it right the sustainable development goal of the UN more sustainable. This may not come to reality without industrialization and reindustrialization which necessitates public investment in infrastructure development and productive capability improvement. These all together with the demographic dividends that most countries endowed necessitate the need to work on rapid industrialization. The situations in the global context – global demand shift, global competition, and technological changes - do suggest the need for strengthening regional integration and boosting domestic demand for manufactures. *Indeed, the competition that manufacturers in SSA faced now in their domestic markets, especially from the Chinese and other Asian manufacturers such as Cambodia and Vietnam may lean-to cloud on the prospects of manufacturing-led development journey.*

So, should agricultural-led development journey be a first best option?

The lengthy discussion in previous parts of the dissertation unveils that the growth and transformation plans of the states of SSA countries could not be realized relegating agriculture at their early stages of economic transformation and development. The largest part of the population in various countries is still residing in rural areas. Correspondingly, agriculture is still absorbing most of the workers entering into the labor force in SSA and South Asia, serving as a basin of surplus labor. This means, the largest portion of the rural populace are still generating income from subsistence farming. So, the sector should not be marginalized at the very early stage of transition. The starting point for low-income economies, as Chang (2009) and Eshetu (2004) argue, should be agriculture because there are still many unexploited opportunities in that sector. This calls for instituting policies including egalitarian land reforms and ownership rights and hence land tenure security, standard setting, and increasing public expenditure and provision of improved seeds and fertilizers, etc. Can this make agriculture play engine of growth role? No. It only suggests the sector's importance and its complementarity with manufacturing.

The agricultural-led development path proposition has its own weak points as already outlined in part three. This is not contradictory with the experiences of the Asian boomers, where in substantial improvement in agricultural productivity played a pivotal part in reducing extreme poverty rate and facilitating the industrial transformation process. Some commentators argue that agriculture was at the root of transformation in the region; agricultural revolution and agrarian reform came first except in the city states of Hong Kong and Singapore which followed a different path. Even so, these Asian well-off economies have managed to sustain their solid growth momentum through successful industrialization and upgrading. The newly giants and fastest growers in the region – China and Vietnam (Bangladesh as well) - have built strong manufacturing base, though the good performance in their agriculture sector after the promulgation of the Land Act had enabled them to reduce the level of poverty at a significant level. In SSA, the movement of workers from agriculture has benefited traditional urban services, which in most cases are categorized within the informal economy, because their manufacturing sector remains weak in absorbing those workers flocking from rural areas. So, governments need to encourage commercial farming along with the expansion of domestic demand. Allocating adequate budget on agriculture is also required to modernize the sector through enhancing its productivity and expanding agro-processing activities. It is imperative to shift the production structure towards high productivity sectors outside of agriculture as it may boost productivity in agriculture itself. In this respect, there still exists wider-room for manufacturing to play leading role, with the rural economy supplying the required inputs and creating market for manufactured products. In addition, notwithstanding some industries without smokestacks (e.g. agro-processing industries including horticulture, aquaculture, floriculture, and the like) could stand as important intermediate stepping stone out of traditional farm produces, their labor absorption potential has thus far been limited. No country has diversified its economy and improve its economic complexity via agriculture-led development route, albeit transformation in the sector played substantial role in the early stage of growth departure in several countries. However, growth based on agriculture would peter out if it is not accompanied by rapid industrialization. So, would not be possible to achieve sustainable development through an agriculture-led path without factories. How about services?

Should SSA countries follow the path of service-led development without manufacturing core?

The descriptive analysis and empirical results show that the services sector has commendable long-run effect on the growth of the economy of the sampled Asian and SSA economies. Can we thus argue that both industry and services sectors are the most dynamic sectors in the region? There is no concrete evidence to draw such strong proposition. The evidences give more weight to the engine of growth role for industry and more so on manufacturing than for services. Of course, services cannot be labeled as 'stagnant' in the Asian context. In its 2007 report, the Asian Development Bank postulates that the service sector could serve as important "source of growth for Asia", because: (i) the sector is positively related, both in its value added and employment share, to per capita GDP. The broad historical patterns of the developed countries' economic structures showed that the share of services sector rises with the rise in GDP per capita. The fact that many Asian countries are at or approaching income levels where the share of services tends to increase implies that there is huge potential for the services sector in Asia to play key role in the development process; (ii) there is now growing demand for a wide range of services, comprising tourism, health care and financial services, among Asia's fast-expanding middle class; and (iii) manufacturing is maturing in some Asian economies and manufacturing productivity has reached pick levels, implying that the scope for manufacturing-led growth would be more limited than in the past. The proponents of this argument further posit the presence of a wider room for the sector to play pivotal role in emerging economies such as India and the Philippines. Does this suggest that services sector is substituting manufacturing in Asia? No. The evidence to date suggest that the potential of the tradable and skill-intensive producer services to substitute manufacturing is not cheering. It can rather serve as *"stimulus complement"* to manufacturing as discussed in part three. On one hand, expansion of services into higher-productivity activities (e.g. finance, business services, etc.) may occur at the later stage of the transformation and development process, after industrialization runs its course, and high-productivity (tradable) segments of services cannot absorb as much labor. On the other hand, labor-intensive tradable services (such as tourism) have typically spawned few links to the rest of the economy and have not produced much diversification (McMillan, Rodrik and Sepúlveda 2017).

The services sector has gained growing importance in terms of value added share in SSA too. However, the contribution of the traditional services activities took the lion's share of the sector's contribution. These activities are not tradable, characterized by low cumulative productivity increases, low potential for increasing returns, etc. which are unique features of manufacturing [and skill-intensive services]. Unfortunately, the modern dynamic, high-productivity and tradable services branches [which may share the growth escalator role that manufacturing has conventionally played] are not yet developed in SSA, despite considerable improvements have observed in the last decade. These services are skill-intensive, generally demanding relatively advanced technologies and high skills, which are lacking in low-income SSA economies, do not absorb less-skilled labor [the type of labor that low-income and middle-income SSA countries have in abundance] as manufacturing did in the past. The bulk of other traditional services are not technologically dynamic and non-tradable whose potential ability to expand rapidly is limited. In contrast, the low-tech manufacturing activities do not require such technological intensity and high level of skills. So, shifting workers from agriculture or other informal activities to such labor-intensive manufacturing activities may help sustaining the growth trajectories in SSA.

The analysis shows that the services sector cannot be the spine of a vibrant economy and cannot play an engine of growth role by itself. It can only serve as *"stimulus complement"* to manufacturing. This testifies the need to consider an alternative path, which is termed *"synergy"* or *"complementary interdependence"* between economic sectors. Yet, this does not deny the higher potential that manufacturing still have to be growth escalator, despite the likely risks associated with the digital technology dynamics and the dynamic of the global supply chain. In the first place, manufacturing can create demand for the growth of higher-productivity modern services activities including finance, telecommunication and transportation. Additionally, manufacturing generates export surpluses that can relieve foreign currency constraints in financing imports of capital goods, intermediate inputs and raw materials. By contrast, not all services are freely tradable. As discussed in part two, the services sector is highly relying on manufacturing as each segments of the services sector uses manufactured goods. For instance, wholesale and retail trades mostly buy and sell manufactured goods as the sheer weight of global trade is accounted for by manufactured goods. In a similar vein, real estate buys and sells a building (physical asset) which is classified in construction industry.

Moreover, being playing an intermediary role between resource owners and demanders, banks and other financial institutions distributes surplus resources generated by the non-financial sectors, indirectly depending on manufacturing and testifying the claim made at the beginning of the thesis that services can be *"stimulus complement"* to manufacturing, but cannot "substitute" manufacturing to become pace setter. The fact that an efficient manufacturing industry, as Chang argues, stimulates demand for services activities such as banking, insurance, transport and communication [and gives the platform for spin-offs knowledge intensive services comprising engineering and design consultancies] and hence, services can stand as "stimulus complement to manufacturing while the latter determines the overall wellbeing and sustainable performance of an economy.

Could it be plausible to shift resources from one sector (especially from agriculture) to another sector (especially manufacturing) in underdeveloped economies?

Generally speaking, workers are not objects that can be shifted around at the liking of policy makers. This is because growth enhancing transformation of economic activities is a complex interdependent process that primarily needs to restrain the critical stumbling blocks preventing catching-up by underdeveloped economies to the advanced countries. A multitude of factors can be listed down that likely destruct catching-up in these economies causing growth reversals, stagnation and collapse in SSA during the 1980s and 1990s neo-liberal periods. However, the driving forces contributing to the heterogeneous regional growth patterns and divergences remain contentious and complex lying on the demand side and supply side of the determinants. It is beyond the scope of this dissertation to thoroughly discuss and empirically test the explanatory power of all proximate and fundamental factors. Some of these factors are briefly discussed in Annex I.

In today's rich countries, industrial policy played important part in facilitating economic transformation, diversifying the production structure and shifting economic activities from low-value added to high-value added and higher technology activities, creating inter-sectoral and intra-industry linkages, boosting productivity, etc. Industrial policies generally involve various important issues comprising resource allocation, institutional changes, enforcement of laws and rules, distribution of rents and economic benefits, and so on. Most of these issues are in many cases contested. As Khan (2010), Eshetu (2004) and other scholars argue, politics and political features may play pivotal role in determining what a government can do such as the distribution of economic benefits, effective implementation of new institutions, enforcement of socially contested decisions, etc. Khan (2010) argued that political settlement, defined simply as the distribution of power in society, plays pivotal role in the evolution of growth and transformation in a given economy. Seeing in this lens, the considered Asian economies were successful than their SSA counterparts in terms of implementing industrial policies effectively towards the process of structural change, despite most of the regimes are said to have been authoritarian than democratic. This approach may give insight as to why governments introduce industrial policies, which sectors or economic activities they target, what kind of policies are required and how those policies are implemented effectively. In future research, the researcher will thoroughly explore the evolution of political development (and institutions) and economic growth in SSA and Southeast Asia taking comparator countries as a case study (e.g. Ethiopia vs Vietnam).

Which manufacturing activities should SSA undergo?

This question requires a separate treatment in future research. Attempt is made below to only give some insights based on the findings and related literature as a starting point for the researcher's future study based on more disaggregated (firm level) data.

Part of the explanation for the weak production transformation in SSA has to do with the lack of productive capabilities and the failure of the state to govern the dynamic forces that drive the process of structural transformation. Therefore, well-thought public policy and private-public cooperation seems a matter of priority for evolving the economy towards higher-productivity manufacturing and manufacturing-related modern services, absorbing labor from agriculture and traditional and informal services. The theoretical discussion indicates that the movement of resources, typically labor, into manufacturing could increase average productivity in both the increasing return and diminishing return sectors apart from improving wages and family income of the workers. However, as obvious the case may be, manufacturing industry is very composite in structure, disaggregated into more several activities that comprise traditional (such as food, footwear, textile and apparel) and highly innovative ones (such as ICT etc.) and what determines them. Partly because, it is on those activities that public policy (targeted industrial policy) has to act so as to manage the process of production transformation and sustainable development. Also, there may appear varying degrees of complementarity among these different manufacturing industries/production activities, a testimony of the existence of difference in their technological intensity.

Basically, there exist sectoral differences in innovation activities. Notably, manufacturing industries/production activities differ in technology use and knowledge acquisition. Typically, manufacturing production activities evolve from labor-intensive and low-tech at the early stage of industrial development to being more capital-, skill- and high-tech intensive at a higher stage of development. The level of skill required in the labor-intensive and low-tech manufacturing activities could generally be considered as low. Correspondingly, such industries would generate employment opportunities for large pools of low-skilled workforce. However, after a certain stage of development, well-trained, skilled and qualified workforces are required at various levels of manufacturing firms along with adequate investment on technological upgrading and innovation activities. The above suggests that different types of manufacturing activities across different levels of technological intensity (such as low, medium and high) can have diverse implications on fostering skill acquisition.

Pursuant to the technology catch-up growth perspective, technologically backward SSA economies can import technologies from the technologically frontier economies as import and imitation are less costly than innovation. However, the can benefit from the advantage of such backwardness, only if they manage to develop their capabilities (know-how and skills) to effectively use such technologies, taking the specificities of each country into account. The key issue at this juncture is *which manufacturing industries that are open to low-income SSA economies may be the initial carrier of further industrial transformation and growth, and may prove sufficient to build the required ladder*? A look into Hirschman's unbalanced development model, the product space framework and the nature of competition in the global supply chain might give useful insights to answer this question. Given their current capabilities, low-income SSA economies would pursue a development path initially geared on more traditional industries like textile, apparel, footwear, etc.

Afterwards, they would move to more innovative industries when they manage to build their technological and productive capabilities. Light-manufacturing industries are labor intensive, they could absorb large pools of relatively unskilled and underemployed work force from other sectors, typically agriculture, at significant productivity premium.

According to the perspective of the unbalanced development model of Hirschman (1958), manufacturing development is considered simply as the record of how processing activities at one stage leads to another. This model places focus on the ‘last stage industry’ for two reasons: the last stage industries create stimulating backward linkages and are relatively easy to set up as the inputs initially can be imported if they are not supplied by the local market. When the required inputs are available in the local market, the incentive to supply them locally will foster a dynamic economic development. In this respect, SSA economies should first go for light-manufacturing industries to enhance the process of production transformation, as backward linkages from the last stage industries or light-manufacturing industries would lead to a higher domestic demand for intermediate goods, rather than increased import of intermediate goods. Giving priority to such industries seems plausible because most of these economies are endowed with natural resources (such as wood, cotton, cattle, etc.) and large young and trainable labor force [yet, the quality of the raw materials produced locally versus those imported ones should not be overlooked].

From the flying geese model perspective too, low-income SSA countries should start with low-cost manufacturing activities that have higher appetite for attracting relatively low-skilled labor force. The region’s share in global production of light-manufacturing is very low, which opens wider scope for expanding in this area as the current global environment offers attractive opportunities. The triumphant East Asian economies had followed this route. They first entered the global market competition at the first level of labor intensive, low-tech production and move up the quality ladder of the division of labor, which then transitioned from the entry-level assembly to increasingly expand the domestic production and sourcing, the domestic design and eventually to the domestic branding of production. One may argue that these economies had, on average, a very well educated people, facilitating the assimilation of foreign knowledge and learning. Most of the emerging giants and transition economies in Asia (e.g. China, Vietnam, and Bangladesh) have managed to emulate them and hence, exhibited rapid industrial transformation and remarkable growth performance.

Particularly, China accounts for the lion share of low-skilled manufacturing jobs globally. It also has succeeded in moving up the technology ladder (and the quality ladder) and managed to diversify its economy towards the production of more sophisticated and high-tech manufactured goods and services. This is believed to open window of opportunities for SSA economies to exploit their latecomer advantage to move out of fragmented subsistence agriculture and traditional services activities into low-cost and more traditional manufacturing activities, which would be abandoned in China and other emerging economies attributed mainly to the surge in labor costs. For instance, Lin (2011) estimated that some 85 to 100 million jobs in manufacturing can be up for grabs when China moves up the next technological ladder and as labor cost increases putting a brake on its global competitiveness - more than double of the manufacturing jobs in developing countries today. If this estimation comes to reality and if the premise of the product space works well, SSA economies need to place focus initially on light-manufacturing activities. Of course, China's engagement in Africa (e.g. in Ethiopia) through industrial zones or industrial parks is offering the double opportunity of benefiting from China's direct investment and from its indirect effect of increased employment opportunities. It should be noted, however, that SSA economies may encounter substantial competitive challenge from successful countries in East Asia such as China and its successors (Vietnam and Cambodia) to capture gain from manufacturing.

However, SSA economies need to have to learn from China with respect to developing domestic capabilities. Most importantly, China has allotted high investments on R&D as a percentage of GDP and increased the number of scientists and engineers carrying out R&D, making it one of the top investors in R&D worldwide. It has also created appropriate technological commercialization infrastructure, developed an impressive number of science parks and business incubators, and implemented an aggressive strategy to promote spin-off activities in universities. All this has been complemented by important efforts to achieve broad diffusion of new technological knowledge, including specific programs such as the Spark program for rural innovation and the Torch program for high-tech innovation (Dalman 2010). China has also extensively exploited international knowledge resources in an "open national system of innovation" (Fu 2015). It combined fostering indigenous capabilities and opening to external knowledge sources. In doing so, it has used unconventional channels that are not often used in developing countries, such as outward direct investment, international innovative collaboration and attracting highly skilled migrants (Fu 2015). Furthermore, specific policies were implemented to strengthen the linkages between foreign and local firms to make effective technology transfer possible.

The global value chain has also offered the possibility of producing goods in multiple stages where each stage is undertaken at the most cost efficient location, increasing the development effects of being part of the global production-supply network and hence strengthening the competitiveness of domestic firms and increasing their capabilities. The inflow of FDI in these industries could thus facilitate insertion of the host country in the global value chain through creating access to new technologies, skills and capital. Establishment of industrial zones and parks as well as export processing zones in SSA economies may be worth investing. But, caution is in order here, as these parks and zones may only be helpful for insertion in the global value chain and do not automatically facilitate industrial upgrading and transform an agrarian economy to a manufacturing-led economy. Basically, manufacturing FDI is necessary in terms of facilitating productivity and growth-enhancing structural change and generating good quality jobs. In such scenario, the key issue is whether the required intermediate inputs can possibly be supplied domestically, and whether the economy in question has comparative and competitive advantage and the capability to produce those products. If the required inputs are imported rather than creating a domestic demand and stimulating the domestic market for the input, FDI firms will have few links and little effects on the economic transformation and development of host countries. The unbalanced growth theory concerns itself with the linkages between sectors, but when FDI enters the picture this focus is altered as FDI embodies investments into a specific firm rather than to a sector as a whole. As such, the linkages between firms on different stages of the production process become more important, e.g. through the use of sub-contractors.

The presence of SSA economies in the global value chain is still not bad. But, their involvement is concentrated in upstream production in particular, the supply of primary goods into production of final goods in other regions and countries. Downstream involvement in global value chains is relatively small, and has shown little improvement in the last decade and a half (Foster-McGregor et al. 2015). This is notwithstanding the modest improvement observed especially after the global financial crisis; not only total output generated from intermediate exports to other regions (forward production linkages) but also its share of value added coming from other regions in its manufacturing output (backward production linkages). However, industrialization in the sub-continent is still considered as stalled. Participation of the region in downstream global value chains is still the lowest, despite exports of the continent are involved particularly in upstream production and handful of economies have positioned themselves downstream in global value chains with Mauritius, Botswana, Ethiopia, Kenya and Tanzania reporting shares of downstream production in total global value chain involvement of 50 percent or more in 2010 (Foster-McGregor et al. 2015 pp 6). Upstream production in SSA manufactures is limited to low value added primary production with few learning and upgrading opportunities; manufacturing and high-tech sectors are not often major contributors to global value chain participation in African countries (see Annex III, figures 8a and 8b). The primary production accounts for 20 to 30 percent of upstream global value chain participation while low-tech and high-tech manufacturing industries contribute 10 percent and 9.5 percent respectively in 2010. This may suggest that the largest contribution to upstream global value chain participation comes from low- and high-tech services, with respective share of 28 percent and 27.5 percent. Generally, export sophistication and product discovery are found to be lower in SSA than in other developing and emerging economies, albeit the region has been exhibiting some progress in upgrading recently, particularly in electrical and machinery, transport, and other manufacturing industries (Foster-McGregor et al. 2015).

The transition towards more sophisticated manufacturing activities can still be feasible if the required capability is available. But, the structure of the product space imposes constraints when a given economy attempts to walk up the ladder of the division of labor because the production of specific products requires various combinations of imperfectly substitutable assets and capabilities. The product space framework posits that the process of structural transformation involves the acquisition of productive capabilities. And, the process of accumulating productive capabilities and shifting to new products does not take place in a vacuum. The probability of shifting production towards a new product rests on how proximate the assets and capabilities embodied in the existing production structure are to those required by the new product. So the ability of a low-income SSA economy to undergo growth enhancing structural transformation and diversifying its economy in the direction of more advanced manufacturing products relies to a large extent on what it is producing currently or its current productive structure. The productive structure of most SSA economies is dominated by primary products meant that they are relatively distant from manufactured products found in the core of the product space, with important implications for structural transformation. So, these countries may find it difficult to diversify the production structure into new products, chiefly towards relatively distant manufacture products because their existing productive capabilities impose constraints to do so.

Over the last two decades, the continent has seen little change in its productive structures despite heterogeneous evidence may come out across countries. Indeed, there were only few cases of manufacturing success stories. In any case, the existing productive structure of SSA economies and the productive capabilities that it embodies shall determine the future diversification of manufacturing industries in these economies. Most of the SSA economies are concentrated in low-income group where manufacturing remains in its lower base, suggesting that the productive capabilities inherent in most of these economies productive structure are too distant from those required to easily diversify into manufacturing products. Therefore, shifting production towards manufactured products for those economies that mainly produce peripheral products is much harder as the assets and capabilities embodied in the current structure are not aligned with those needed in manufacturing activities.

In sum, diversification of SSA economies on the road to manufacturing or modern and tradable services requires capability building as a prerequisite. It is about choosing a comparative advantage following vs comparative advantage defying strategy (Lin and Chang 2009). One may tend to argue that SSA economies should rely on comparative advantage following practice in the earlier stages of the development process and eventually move towards more comparative advantage defying strategies as the well-off East Asian economies (such as South Korea) did. Such hypothesis is built on the notion that endowments are endogenous and can be altered (Loll 2005), which makes the importance of industrial policy beyond question. Ramsden and Chu (2003) and several others validate this statement, arguing that advanced economies have all built their competitive edge by getting involved in new activities (learning-by-doing) and continuously adjusting policies to develop new and higher level productive activities that lead to production transformation, catching-up and forging-ahead. Several commentators posit that technological advancement (automation) in manufacturing made it "much more capital- and skill-intensive than in the past, reducing both the advantage of poor economies in manufacturing and the scope for labor absorption into the sector." Few others held the view that the Fourth Industrial Revolution [characterized by the fusion of digital, biological, and physical worlds, as well as the increasing utilization of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies, and the like] would have formidable impact on the existing manufacturing production. Over the last two decades, emerging technologies [including automation, robotics, and digital technologies in applications] have altered manufacturing processes and production technologies, resulting in the increasingly blurry boundaries between physical and digital production systems. Therefore, industrial policies in the future "will have to be grounded in the reality of digital production technologies, smarter in climbing the technology ladder, and more agile in selecting opportunities than has typically been the case in developing countries." As repeatedly noted, SSA countries should develop their capabilities to benefit from the fragmented GVCs and to take advantage of the opportunities associated with the Fourth Industrial Revolution. Andreoni, Chang and Labrunic (2021) highlighted that developing countries need to develop their "foundational capabilities", which "involves a mix of skills development, engaging with production, active industrial policies, and the development of supporting institutions." The capabilities may encompass skills development, engaging with production, active industrial policies, and the development of supporting institutions

Future research:

1. The findings from part five suggest the need to institute concerted efforts by governments of SSA economies to use well thought industrial policy to guide manufacturing firms

compete in the fragmented GVCs and benefit from the opportunities created with the Fourth Industrial Revolution. Further research is in order to use appropriate technique to identify different types of deindustrialization or premature trertiarization in the considered countries. It is important if future research delve deep to identify which sector (sub-sectors) expand and which other sector (sub-sectors) contract; which country groups encounter chronic deindustrialization (or premature tertiarization) and which other countries experience transient deindustrialization or premature tertiarization; which countries experience deindustrialization or premature tertiarization in value added or employment or both and in which sectors (sub-sectors). It may also be important if future research inquire the relationship between deindustrialization and premature tertiarization with technological advancement, Global Value Chains; how automation and the Fourth Industrial Revolution impact the various deindustrialization or premature tertiarization.

2. With respect to determinants of manufacturing development, it would give important insights if future research extends the estimation to different manufacturing activities by level of development (low-income, middle-income and high-income; by regions (South Asia, East Asia, Southeast Asia, Southern Africa, Eastern Africa, etc.); by manufacturing export level (manufacturing exporters and non-manufacturing exporter's); by population dynamics and size, and by sub-period (e.g. pre-1990 and post-1990). It may also sound important if future research includes additional variables to draw much wider insights on the determinants of industrial development (industrialization, reindustrialization, deindustrialization or tertiarization).
3. When data availability is improved, future research should considered increasing the number of countries included in similar research works. This may inspire one to carry out further research using different dataset and empirical methods to make sure if the findings remain intact or change.
4. It is necessary in future research to identify the factors determining structural change (comprising both the demand and sides) employing appropriate estimation techniques. This may also be important in detecting the most powerful determinants of industrial development or otherwise in developing economies; and in testing Kaldor's growth laws in a large set of countries in different sub-periods and income groups to test the validity of the synergetic relationship between sectors.
5. If rapid industrialization was the largest driver of high and sustained growth in all developed economies and the newly industrialized South-East and East Asian economies, it can still

matter for sustaining higher and faster growth in low-income SSA economies. The question remains why manufacturing? Because manufacturing has an unlimited potential of expansion with immense opportunities for better remunerating permanent and quality jobs, cumulative productivity increases, economic diversification, etc. Therefore, low-income SSA economies should transform their economic structure and production composition in this direction so as to sustain their recent impressive growth trajectories and vibrantly step-up to middle-income and high-income status. But, which types of manufacturing activities matter the most, and why? What determines manufacturing growth in the first place, or what drives the shift of the economy towards that sector? Do SSA have the required capabilities and competences to become manufacturing powerhouses? These are questions that need to be addressed in future researches at country level.

6. In future research, re-estimation of Kaldor's second growth law is required perhaps through including with the regression other variables like investment or aggregate demand (or its autonomous components), structural change, etc. to come out with more sensible results, which at the same time address the critiques on the original model.
7. Future research should evaluate the dynamic relationship between sectoral growth to poverty reduction and inequality. Most importantly, country-specific studies should be carried out to entangle the kind of policy intervention for growth enhancing structural change so as to stimulate good quality employment generation.
8. Future research may dwell on identifying the challenges and opportunities associated with the Fourth Industrial Revolution, identifying the role of different sectors, both high-tech and low-tech [farming, agro-industries, extractive industries, textiles, apparel, etc.].
9. In future research, the researcher will thoroughly explore the evolution of political development and institutions that determine the process of structural transformation and economic growth in SSA and Southeast Asia taking comparator countries as a case study.

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Annexes

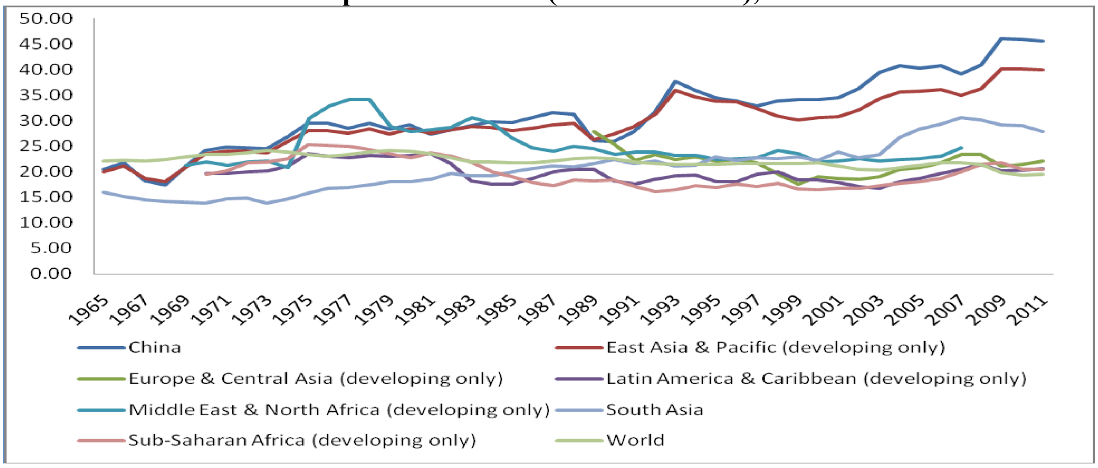
Annex I: Explaining the Stupefying Growth Divergence among SSA and Asian Economies

Meta-structural explanations: The most widely claimed and discussed meta-structural factors hampering economic development are the following: (i) *ill-disposed climate*, where proximity to the equator makes many African countries face high incidence of tropical diseases such as malaria with the ultimate impact of increasing healthcare costs and reducing labor productivity (see Sachs 2003; Diamond 2012); (ii) *detrimental geography* (e.g. being landlocked, inhibiting integration into the global economy; *bad neighborhood* (surrounded by poor economies with small markets restricting trading opportunities, and violent conflicts that often spillover to neighboring countries, etc.) which hampers economic development (Sachs 2012); (iii) *culture* (laziness or lack of hard work, inability to cooperate each other and plan for the future) and *religion* (being passive acceptance of current conditions); (iv) *ethnic diversity,* making the people distrust each other, and leading to violent civil conflicts (Easterly and Levine 1997); (v) *weak business environment and low-quality institutions* (extractive institutions, weak protection of private property rights, poor governance, corruption, rent seeking, etc.) as a result of the colonial legacy; (vi) natural resources endowments (the resource curse argument) which led to conflict-ridden underdevelopment, and so on.

Chang (2009, 2010) argue that *some of these factors are tenable and poor economies have suffered from them because of their underdevelopment and backwardness in technological advances to overcome the effect of these factors*. Six Acemoglu and Robinson (2012), as will be seen later, contend that none of these factors is either definitive or destiny; this being the case that Botswana has become one of the fastest-growing economies while other SSA such as Zimbabwe, the Congo, and, are mired in poverty and violence. Additionally, most of these meta-structural factors are not endemic to the region and they have been in existence throughout the continent's history. Ha-Joon Chang and others (e.g. Acemoglu and Robinson) to criticize those commentators blaming Africa's underdevelopment on culture, weather, geography and other related meta-structural factors; it is to confuse the cause of underdevelopment with its symptoms. SSA economies were unable to restraint the constraints imposed by these factors because of underdevelopment and policy vision. Many of today's rich countries had encountered one or more of these factors: suffered from their climate (incidences of malaria and other tropical diseases), geography), ethnic diversity, culture, bad institutions (high-quality institutions in today's rich countries are as much outcomes as they are the causes of economic development), etc. But these factors are no more problems to those prospered economies because they have acquired the money and the technology to deal with them. In addition, all those negative cultural traits of Africa cited today are the ones that used to be attributed to many of today's rich countries when they were poor themselves (for a detail critical explanation see Chang 2002; 2007b; Chang 2010). Had tropical climate and bad geography or being landlocked been the driving force crippling growth, SSA economies would have never experienced growth in those days before the implementation of structural adjustment programs. In spite of variations among countries, the continent achieved GDP per capita growth rate of between 1 and 2 percent per annum in the 1960s and 1970s, which dwindled to a negative rate of 0.4 percent in the 1980s and 1990s, and exhibited growth rate of about 2 percent in the 2000s. To be more specific, one of the landlocked, religious, diverse ethnic and cultural traits SSA economies (Ethiopia) has experienced faster and steadier growth since the mid-2000s, amidst the high costs of transport and logistics after the secession of Eritrea in the 1990s. Also, Tanzania notwithstanding the most heterogeneous country in the world has not suffered any serious ethnicity-based conflicts because it has succeeded in building a sense of Tanzanian nationhood. On the other hand, most of the well-off Asian economies have experienced sustained high growth while they faced most of the factors allegedly driving growth slump and stagnation in SSA. All in all, the overall growth collapse in SSA with the coexistence of low/negative productivity growth and high employment elasticity and rapid growth in Asian resurgence is explained mainly by the difference in the structure of growth and/or compositions of the production structure. This difference in turn is a manifestation of the policy environment and the underlying distribution of power in the society (the political foundations). This does not mean that meta-structural factors play no role in the transformation and development of a given economy.

Poor domestic investment effort in SSA: The earlier theories of economic development considered capital formation as the key driving force for economic growth. The plausible question one may ask here is why was capital investment considered as key driving force for the growth and prosperity of nations? The answer to this question lies at the role of investment as a hauler of technological change and productivity increases, as well as in infrastructure development (Habiyaremye and Zeisemer, 2006). The message here is that economic transformation and diversification require investment in new activities. The United Nations report (2006) asserts that sustained economic growth is associated with high investment in leading sectors, though there is no one-to-one relation. However, beginning the 1970s economists have been advising policymakers to de-emphasize the public sector, physical capital, and infrastructure, and to place emphasis on private markets, human capital (skills and training), and reforms in governance and institutions. As a result, public investment declined considerably. Thus, one of the vibrant forces causing the depressing growth performance, stagnation and collapse of SSA and the consequent inability of sustaining productivity growth during the structural adjustment (SAP) period was feeble investment. The average rate of domestic investment in the triumphant East and Southeast Asian economies was higher than that for developing SSA, enabling the Asian to experience more dynamic structural change on the road to economic activities characterized by higher potential for unlimited expansion and cumulative productivity increases, creation of well-remunerated jobs, and so on.

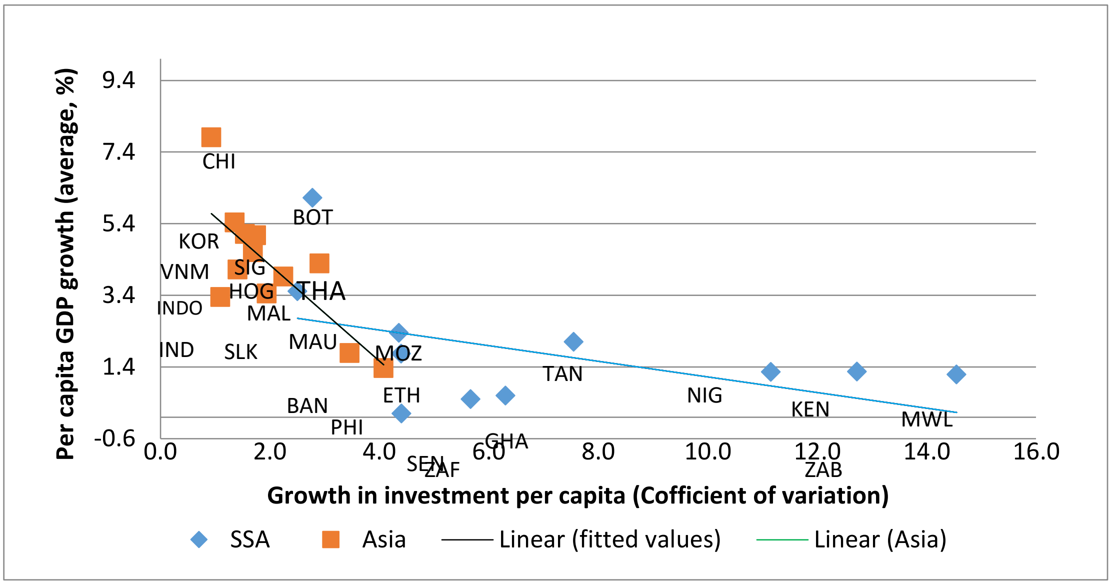
Patterns of Gross Fixed Capital Formation (as a % of GDP), 1965-2011



Source: Computed from WDI 2013 Database, World Bank

The above figure unveils that domestic fixed capital formation as percentage of GDP has been increasing remarkably for East Asia and China. In like manner to per capita income level, domestic investment in SSA was not too far from developing East Asian economies and China during the 1960's and 1970's, but it had outpaced South Asia's investment level until mid-1980s. In the 1990's, the share of gross fixed capital formation in GDP reached 31.9 percent and 32.8 percent, respectively, for developing East Asia and China. During the same period, investment rate increased in South Asia to reach 22.2 percent of GDP, showing a modest increase from 19.9 percent in the 1980's. By contrast, investment levels had decelerated in SSA to reach 17.1 percent, from its level of 20.2 percent in the 1980's. A similar pattern can be observed if comparison is made between individual countries, despite the presence of variations among them. Overall, the considered Asian economies observed dramatic increase in fixed investment with phenomenal impact in fostering cumulative productivity increases and output growth as well as employment creation in manufacturing. The dismal performance of SSA economies with respect to structural change and overall output growth is reflected partly on their slower growth of domestic investment, citrus paribus. This has been exacerbated with higher investment volatility, measured by the coefficient of variation. As can be seen from the figure below, investment volatility has been higher in countries with low income growth and much less pronounced in countries with robust growth trajectories.

The effect of investment volatility on per capita GDP growth, 1970-2011



Source: Author's computation based on data from UN/DESA

Source: Own Computation

A corollary of the above also is the dismal state of investment per worker for SSA in the 1980s and 1990's. The following Table presents the contrasting relationship between investment per worker and output per worker and the former with employment elasticity. On average, the experience of SSA economies follows a similar pattern except few cases. Average investment per worker was on the negative territory during 1975-1995, a pattern similar to labor productivity growth. When investment per worker improved over the period 1995-2011, productivity growth improved to stay in a positive territory. Investment can enhance productivity of a given economy for a substantial period of time. Yet, some scholars contend that investors need assurance that their prosperity will not be pillaged by the powerful; thus, political features matter.

Table: Contrasting Relationship between Investment, Labor Productivity and Employment, 1975-2011

	1975-1995			1995-2011		
Country	**Investment/ worker**	**Output/ worker**	**Employment elasticity**	**Investment/ worker**	**Output/ worker**	**Employment elasticity**
A. sub-Saharan Africa						
Ethiopia	1.07	-0.92	1.50	6.55	3.95	0.50
Ghana	-1.81	-1.35	1.79	11.11	3.38	0.48
Kenya	-0.97	0.18	0.95	4.82	1.15	0.95
Malawi	-1.48	0.77	0.78	7.50	2.37	0.59
Nigeria	-3.79	-1.10	1.84	8.83	4.18	0.44
Senegal	-0.30	-0.18	1.07	3.30	1.38	0.75
South Afr.	-2.40	-1.41	1.85	3.71	0.66	0.95
Tanzania	-0.74	-0.71	1.31	5.17	3.33	0.53
Zambia	-6.26	-2.86	12.73	16.32	1.97	0.53
B. Asia						
Bangladesh	4.47	**1.19**	**0.65**	6.05	**3.33**	**0.40**
Sri Lanka	4.30	3.64	0.22	4.27	3.31	0.39
China	7.37	5.11	0.29	11.10	8.75	0.08
India	4.42	2.59	0.49	7.56	4.99	0.29
Hong Kong	5.67	4.01	0.41	0.96	2.30	0.36
Singapore	4.27	3.84	0.49	1.90	2.50	0.60
Korea	10.04	5.22	0.35	1.53	3.49	0.25
Malaysia	7.65	3.70	0.46	0.45	2.21	0.56
Indonesia	6.89	2.66	0.54	2.91	2.49	0.41
Philippines	2.41	0.12	1.00	1.78	2.00	0.54
Thailand	7.59	4.88	0.37	-0.99	1.90	0.43

Source: Based on data from GGDC, UN/DESA and WDI

State intervention and weak business climate: The other factor repeatedly mentioned as growth restraint in SSA is excessive state intervention in the economy. The neo-liberal policy orientations prescribed minimal state intervention for unfettered market operation: the role of the state should be confined to ensure macroeconomic stability, to protect property rights and provide public goods. This contrasts to the heterodox policies that acknowledge the active role of the state in the transformation and development process including, for instance, through financing, nurturing and protecting infant industries as well as fostering public investment as the states of East and Southeast Asia did (and India, Bolivia and Ethiopia have pursued recently). For proponents of the neo-liberal paradigm, active state intervention and the corresponding inefficient resource allocation was the key factor responsible for the dismal economic performance and under-development of SSA economies while opponents of neo-liberalism contend that most countries in the sub-continent had managed to experience rapid growth in when the state played a much more active role (Mkandwire and Soludo 1990). The experience of China and Vietnam witnessed state intervention per se cannot obstruct growth and that not all state intervention could impede growth. Ethiopia achieved growth acceleration not in the reform years (1990s) but when the state pursued the development model of China and South Korea (in its dictatorship) and increase public investments since the mid-2000s. However, it should equally be noted that the developmental states approach of East Asian front runners may not be easily exportable and replicable to other countries. Meaning, a direct copy (blue-print) of that model in today's global supply chain could be perilous. This may imply that, as indicated earlier, imitating or emulating countries should first build their capabilities in implementing a pro-growth industrial policy.

A large body of literature documents that the recipes for the success stories of the triumphant Asian economies were attributed to their choice of efficient, coherent, and flexible economic policies and their effective implementation of industrial policy while avoiding the granting of monopoly positions to state institutions (Moon and Prasad 1998). Chang (2003) held that States of the Western countries played critical role in the transformation and development process from protection of domestic industries to financing. The overriding intention of the interventionist states of East Asia was to promote rapid industrialization and economic diversification; to construct a 'governed market' so as to create market niches in a competitive world; to direct, guide, discipline and coordinate the private sector through the strategic allocation of resources and the use of diverse policy instruments; to establish trust and close cooperation between the state and the private sector and the prevailing consensus on corporate goals while relatively free from predation and rent-seeking (Amsden 1989; Wade 1990; Evan 1995). Appelbaum and Henderson (1992) firmly argue that the interventionist states played critical role in terms of promoting industrial adjustment, creating new industries, transferring technology to the private sector, protecting infant industries, searching for information about world market conditions for domestic producers, deterring foreign exploitation of the local market, reducing the welfare system in order to reduce labor costs, and providing assistance to private enterprises according to their performance.

The below Table shows that the representative Asian economies were not least interventionists in international trade, international finance, and domestic markets. For instance, a comparison of Ghana with China and India or other individual SSA economies with their Asian counterparts elucidate the most successful economies in Asia were interventionists. One may ask here whether market and business friendly policies are incompatible with development and that state control of the central planning type that throttle the private sector participations is decisive for transformational growth. The answer is big no; but less intervention can neither be guarantee for good performance of a nation (Rodrik 2013; Chang 2009b). Of course, some proponents of neo-liberal paradigm ascribed the spectacular performance of East and Southeast Asian economies to government liberalization policies and other efforts to resolve obstacles facing private business, totally relegating the role of industrial policies and active intervention of the states of these economies. However, if one trusts the World Bank's doing business indicators and the Economic Freedom Indices, SSA economies are not too far behind those of the emerging Asian economies; indeed some of them are ranked better than their Asian counterparts.

Heritage index: A Comparison of Selected SSA and Asian Countries

Country	1995						2005						2012					
	P	C	B	T	I	F	P	C	B	T	I	F	P	C	B	T	I	F
	sub-Saharan Africa																	
Botswana	70	50	70	46	50	50	70	57	85	78	70	70	70	58	69	80	75	70
Ethiopia	30	30	55	27	10	30	30	25	55	52	50	30	30	27	64	66	25	20
Ghana	50	70	55	31	30	50	50	33	70	66	50	30	50	41	63	68	65	60
Kenya	50	50	55	54	50	50	50	19	55	56	50	50	30	21	62	67	50	50
Malawi	50	30	55	64	50	50	50	28	55	60	50	30	45	34	42	71	50	50
Nigeria	50	50	55	45	50	50	30	14	55	53	30	30	30	24	56	64	40	40
Senegal	50	33	55	65	50	50	50	32	55	68	50	50	40	29	58	72	45	40
South Afr.	50	50	85	43	70	50	50	44	70	78	50	50	50	45	76	76	45	60
Tanzania	50	30	55	54	50	50	30	25	55	54	30	70	30	27	45	74	55	50
Zambia	50	30	55	61	70	70	50	25	55	68	50	50	30	30	61	82	55	50
	Asia																	
Bangladesh	30	10	40	0	50	30	30	13	40	34	30	10	20	24	69	54	55	20
China	30	30	55	20	50	50	30	34	55	54	30	30	20	35	46	72	25	30
India	50	10	55	0	50	30	50	28	55	38	50	30	50	33	36	64	35	40
Indonesia	50	10	55	45	50	50	30	19	55	77	30	30	30	28	55	74	35	40
Malaysia	70	70	85	67	70	50	50	52	70	76	30	30	50	44	78	79	45	50
Sri Lanka	50	30	70	54	50	70	50	34	70	77	50	30	40	32	78	77	30	40
Sou. Korea	90	70	70	69	50	70	70	43	70	74	70	50	70	54	94	73	70	70
Taiwan	90	90	85	75	50	50	70	57	70	78	70	70	70	58	89	85	65	50
Thailand	90	70	70	66	50	50	50	33	70	68	30	50	45	35	73	75	40	70
Philippines	50	10	55	42	50	50	30	25	55	79	30	30	30	24	54	76	40	50
Vietnam	10	10	40	45	30	30	10	24	40	50	30	30	15	27	61	80	15	30

Note: P-property rights; C-Freedom from corruption; B-Business freedom; T-Trade freedom; I-Investment freedom; and F-Financial freedom; **Source: Heritage Foundation (http://www.heritage.org/index/).**

The Table below presents the ease of doing business rankings with ssix of the topics covered in the World Bank's doing business project for selected SSA and Asian economies in 2013. The specific topics of indicators suggest that insolvency was much more quickly resolved in Ethiopia and Uganda than in Ghana and Indonesia as well as Bangladesh, India, the Philippines, Vietnam, Tanzania and Rwanda. In fact, it was largely easier to get credit in Nigeria or Kenya than in Bangladesh, China, India, Indonesia, Sri Lanka, Thailand and Vietnam; and in Ethiopia than in the Philippines. Similarly, access to electricity was more problematic in Bangladesh, Indonesia, and Vietnam than in Ethiopia, Ghana and Rwanda. Paying taxes was less of a hassle in Rwanda and Zambia compared to China, India, the Philippines and Vietnam as well as in Kenya, Nigeria and Tanzania. Although the more changes in the indicators matters the most, developing SSA economies are not ranked bad relative to the emerging economies in Asia and elsewhere. As a matter of fact, SSA economies have liberalized their agricultural markets, opened up their domestic markets to international trade, maintained macroeconomic stability and so on. The important thing is how these fundamentals benefited those economies.

Table: Ease of doing business ranking, selected topics in selected economies, 2013

Economy	Ease of Doing Business	Starting a business	Getting Electricity	Getting Credit	Protecting Investors	Paying Taxes	Enforcing Contracts	Resolving Insolvency
	sub-Saharan Africa							
Botswana	65	95	96	71	51	48	87	33
Ethiopia	124	162	98	105	156	103	44	77
Ghana	62	111	88	24	32	92	43	116
Kenya	122	128	163	11	95	171	151	101
Mauritius	20	13	46	52	12	12	53	62
Nigeria	138	114	184	11	67	167	138	107
Rwanda	54	8	52	24	32	25	40	166
South Afr.	41	56	151	24	10	26	80	82
Tanzania	136	115	102	126	95	140	41	132
Uganda	126	146	177	40	113	96	114	68
Zambia	90	70	152	11	80	68	114	100
	Asia							
Bangladesh	132	83	189	82	21	98	185	121
China	99	153	116	82	95	122	19	80
India	131	177	110	24	32	159	186	119
Indonesia	116	171	121	82	51	132	146	142
Korea	6	23	1	11	51	29	2	14
Malaysia	8	19	28	1	4	15	29	42
Philippines	133	166	33	126	127	144	112	164
Singapore	1	3	5	11	2	5	11	5
Sri Lanka	83	47	107	71	51	175	136	51
Thailand	18	86	12	71	12	97	22	58
Vietnam	98	107	155	40	169	145	46	150

Note: Ease of doing business ranks economies from 1 to 189, with first place being the best. A high ranking (a low numerical rank) means that the regulatory environment is conducive to business operation. The index averages the country's percentile rankings on 10 topics covered in the World Bank's Doing Business. The ranking on each topic is the simple average of the percentile rankings on its component indicators.

Source: World Bank, Doing Business project (http://www.doingbusiness.org/).

Neither do the Economic Freedom indices, which attempt to quantify the extent to which economies are free of government encumbrance, suggest that SSA economies are in a worst situation relative to developing Asia. This can be inferred from The following Table. A comparison of Tanzania and Vietnam, Kenya and Sri Lanka, etc. in Cato Index suggests that SSA have not done worse than developing Asia. Generally, state intervention under reform is a common feature of Asian-style of adjustments, albeit some variations among Southeast Asian economies. For instance, the role of the state in Vietnam remains bigger in post-reform period than in other economies in the region. The diffusion of the green revolution in Southeast Asia was state-led, market-mediated, and smallholder-based. This contrasts with the experience of SSA economies. After liberalization, the states of many countries withdrew largely from their former heavy-handed regulatory role. The success stories of Asian jubilant suggest that positive interventions – something between central planning and laissez-faire – has been required to support cooperation between state officials and the public sector, on the one hand and the private sector, on the other hand. The above facts may give clue to favor the argument that the modern level of prosperity rests upon political foundations and hence power distribution in society.

Economic Freedom: Chain-Linked Summary Ratings for selected SSA and Asian economies

Country	1980	1995	2000	2005	2011	Country	1980	1995	2000	2005	2011
Botswana	5.25	6.4	7.42	7.33	7.46	**Bangladesh**	3.38	6.02	5.81	6.17	6.42
Cameroon	5.62	5.65	5.92	6.19	6.23	**China**	3.74	5.17	5.75	5.88	6.03
Ghana	3.05	5.66	5.53	6.49	6.83	**Hong Kong**	9.02	9.14	8.86	8.95	8.88
Kenya	4.8	5.89	6.72	7.24	6.84	**India**	5.35	5.8	6.32	6.89	6.5
Malawi	4.62	4.57	4.95	5.19	6.09	**Indonesia**	5.06	6.62	6.07	6.63	7.06
Mauritius	4.73	7.55	7.6	7.57	8.01	**Malaysia**	6.94	7.62	6.79	6.99	7.05
Nigeria	3.25	3.76	5.3	6.03	6.15	**Philippines**	5.33	7.3	6.97	7	7.14
Rwanda		3.78	5.4	5.93	7.38	**Singapore**	7.76	8.9	8.61	8.73	8.6
Senegal	4.43	4.56	5.88	5.72	5.72	**Korea**	5.49	6.67	6.79	7.26	7.3
South Afr.	5.85	6.57	7.08	7	6.93	**Sri Lanka**	4.77	6.07	6.16	6.21	6.42
Tanzania	3.64	5.43	6.07	6.44	6.49	**Taiwan**	6.58	7.41	7.45	7.68	7.86
Uganda	3.14	5.15	7	7.31	7.38	**Thailand**	6.09	7.18	6.51	6.68	6.6
Zambia	4.6	4.76	6.9	7.37	7.62	**Vietnam**				6.35	6.23

Source: Fraser Institute, *Economic Freedom of the World*: 2013 Annual Report, www.fraserinstitute.org

Externally imposed adjustment policies and reforms in SSA: Externally imposed macroeconomic policies and badly handled reforms are considered among the key forces deriving growth collapse and stagnation in most SSA economies over the 1980's and 1990's. This premise seems sound given that majority of these economies had experienced optimistic performance in the 1960s and 1970s where import substitution industrialization (ISI) policies and indigenous national-development strategies were pursued. This does not indeed mean that the policies and strategies pursued in the 1960's and 1970's were flawless and enabled those SSA economies achieving rapid industrialization. In this respect, political instability and the political settlement (power distribution in society) during the planning period come into the picture with economic development inhibiting implications. However, the key driving force for the collapse or stagnation of growth in the sub-continent may not be associated primarily to meta-physical factors such as geography, weather, fate or bad luck, culture, ethnic diversity, etc. Ignorance of what the right policies in SSA or difference in policy orientations and implementation of indigenous reform packages might have contributed to setting apart SSA and Asian economies in different growth territories. Again, this does not mean that all other factors played no part in the transformation and development process of these economies. The fact that SSA economies performed, on average, better during the pre-adjustment and pre-reform periods, when they pursued state-led and nationalistic development strategies testifies where the heart of the problems lie. Since the early 1980s, most countries in SSA were compelled to implement neo-liberal reform measures, as a pre-condition to secure aid and loans from the IMF, World Bank and other donor agencies, incorporating both macroeconomic stabilization policies and structural adjustment programs: more prudent macroeconomic policy, greater trade openness and capital flows, dismantling restrictions and barriers imposed on foreign trade, financial and labor market liberalizations, minimize current account imbalances, exchange rate devaluation, privatization of state-owned enterprises and deregulation, stronger protection of property rights, and minimal role for the state (UNCTAD 2010; Chang 2009b; George 1988). These policies were prominent in SSA more than any of the developing regions, owing to the insufficient outcomes of the indigenous development initiatives attributed to the two oil crises, the continuous foreign exchange crises and mounting debt servicing encountered by many countries.

A review of the development literature of the 1950s to 1970s revealed that policymakers and governments gave more weight to industry sector, in particular manufacturing industry, as engine of economic development. But, with adjustment policies each sector is given equal weights so long as they reflect "a country's comparative advantage." For that reason, the share of manufacturing in total value added was, on average, dropped from 10 percent in the early 1980's to 8 percent later than two decades. As a result, the production structure of SSA remains, overwhelmingly, dominated by agriculture and the extractive industries coupled with growing informal activities and traditional services. This is a reflection partly of the abandonment of industrial policies in the 1980s and 1990s on account of imposition from the Washington consensus. Overall, externally imposed adjustment policies were not effective remedies to restrain the problems that most SSA encountered; they rather had a deleterious effect on the performance of most adjusting countries. Following implementation of adjustment policies, per capita GDP in SSA plummeted to its lowest level and external debt more than doubled over the adjustment period with dismal economic growth and inability to sustain its servicing in the future. Also, infrastructure development and human development measured in terms of life expectancy, infant mortality and school enrollment had weakened. Accordingly, extreme poverty level intensified. A study by Ali (1998) disclosed that 'intensively adjusting' SSA economies (Ghana, Kenya, Malawi, Tanzania and Zambia) were performing poorly compared to the 'other adjusting' (Gabon, Gambia and Mali) and 'non-adjusting' economies (Ethiopia and Lesotho) included in the sample. The same study revealed that headcount poverty rate increased to 62.4 percent in 1988 from 56.6 percent in 1965 for the 'intensively adjusting' economies, and to 60.7 percent from 45.1 percent for the 'other adjusting' economies over the same reference period. This is in stark contrast with the 'non-adjusting' group of countries where headcount index dropped to 43.6 percent from 65.8 percent in the same reference period. In absolute terms, the number of poor people increased from 18.2 million to 36.2 million for the intensively adjusting group and from 2.3 million to 5.1 million for the 'other adjusting' group, but the absolute number of the poor remained constant around 17 million for the 'non-adjusting' group.

The experience of adjusting SSA economies contrasts to the experiences of successful Southeast and East Asian economies. These economies embarked trade and financial reforms on the basis of a cautious, pragmatic and gradual approaches in the 1980's and 1990's which were "implemented with a targeted mechanism without neglecting pro-growth macro fundamentals, while policy makers or development planners gave emphasis on the interaction between growth and economic structure in a way helping lift specific pressing economic and financial constraints toward industrialization mediated through state-led structural reforms" (Pieper 1998). According to Palma (2011 pp. 3 &4) did not led to de-industrialization in these economies: "where most actors implementing the reforms comprising of the local capitalist elites, the administrative classes, and most intellectuals have a different sense of national identity and a strong historical awareness" relative to those in SSA and Latin America (Palma, 2011 pp. 3-4). This meant that Asian-style reforms were undertaken in conjunction with efficient industrial policy and "they used to open their economies after they had developed their domestic capacities following many years of infant industry protection" (UNCTAD 2010). So, unlike SSA economies, where neo-liberal policies were embarked on without any consideration of industrial policy, the Asian states intervene proactively in the market to build productive capabilities and to target and protect infant industries with no neglect of pro-growth macroeconomic stability. Put differently, the policy strategy being pursued in Asian boomers pragmatically mixes infant industry protection and export promotion, based essentially on a cooperative relationship between the state and the private sector – the so called developmental state. Chang (2009) and many other scholars claim that "this development strategy was, in essence, the very strategy that almost all the successful economies – starting from 18th century Britain, through to 19th century US, Germany and Sweden, early postwar France, Finland, Austria, and Norway, down to Japan, South Korea and more recently China – have adopted to catch-up and climb to the development ladder." Many governments of SSA economies pursued industrial policies following either the capitalist paradigm or the socialist tautology, but only few countries had exhibited modest achievement in transforming their production structure in the 1960s and 1970s. This was, however, destructed in the 1980s and 1990s following the adoption of SAP policies. The countries de-industrialized prematurely. Hence, the SAP period led most of the countries in the sub-continent to go back to square one. In short, SSA economies were not successful in implementing their ambitious industrial policies owing mainly to the political conditions.

Politics and political features: As Khan (2010), Eshetu (2004) and other scholars argue, politics may play pivotal role in determining what a government can do such as the distribution of economic benefits, effective implementation of new institutions, enforcement of socially contested decisions, etc. Khan (2010) argued, political settlement, defined simply as the distribution of power in society, plays pivotal role in the evolution of growth and transformation in a given economy. This approach may give insight as to why governments introduce industrial policies, which sectors or economic activities they target, what kind of policies are required and how those policies are implemented effectively. In this respect, the considered Asian economies were successful than their SSA counterparts in implementing industrial policies repetitively, despite most of the regimes in those economies are said to have been authoritarian than democratic. The political settlement approach explains the politics that made state interventions possible. Essay two of the present dissertation will thoroughly explore the evolution of political development and economic growth in SSA and Southeast Asia taking Ethiopia and Vietnam as a case study.

In their book, *Why Nations Fail*, Acemoglu and Robinson (2012) established a political economy explanation to the dominant thinking about global divergence. They propounded that economic growth cannot be sustained without inclusive and pluralistic economic and political institutions, creating incentives for investment and innovation and a level playing field for everyone to invest in the future. Put in other words, power has to be centralized and the institutions of power have to be inclusive. They argue that order without inclusive institutions may enable an economy to lift millions out of penury, but will not allow the full ascent to modern prosperity. Inclusive institutions comprise property rights, contract enforcement, ease of starting new business, competitive markets, and freedom for citizens to enter the occupation and the industry of their choice and allow broad participation and place constraints, checks and balances or rule of law. Inclusive economic institutions The authors contend that most societies throughout history and today ruled by extractive institutions that are designed to protect the political and economic power of merely few political elites to resources from the rest of the society lagged behind and failed; in such political system the interest of the elite come to collide with, and prevail over, those of the wider society. They confirm the possibility of growth miracles with extractive states [such as China, where 'the controls the armed forces, the cadres and the news], but that cannot sustain. Indeed, they underscore that in countries like China today extractive institutions is especially feasible when it can proceed rapidly by importing existing technologies from other economies but inclusive institutions are still critical for sustained innovation. Overall, the politically powerful extractive elite in such extractive states invest in their own enterprises, prohibiting creative destruction to eliminate their own business. The authors also expound that although culture (religion, attitudes, and values), geography (climate, topography, disease environments and the like) and other meta-physical factors play important part on the ability of humans to form well-functioning societies. But, the main source of divergence between successful forerunners and stagnant nations is the divergence in the ability to take advantage of new economic opportunities. They said that more inclusive states tend to be more peaceful and resilient over the long term, where inclusiveness encompasses the broader population, not just the elites among competing factions that might otherwise resort to violence. They incorporated several historical case studies to justify that all successes to inclusive economic and political institutions and all failures to their extractive counterparts.

In short, prosperity or the lack of it is founded on man-made political and economic institutions. For instance, North Koreans are among the poorest in the world while the people of South Korea are among the richest, because the governments in the south forged a society that created incentives, rewarded innovation, and permitted everyone to participate in economic opportunities. Thus, the growth sustained as the government was accountable and responsive to the society. By contrast, the north endured decades of famine, political repression and different economic institutions with no end in sight. So, the difference in the Koreas emanates from the politics that created these completely different institutional trajectories. However, the question is how inclusive institutions come about. In addition, what inclusion actually means is blurred and it is not clearly articulated how institutional changes occur over time. It is not clear as to whether catch-up growth is faster under extractive political institutions than in inclusive political institutions.

Annex II: Factors ensuring the sustainability of growth in Africa

Some scholars argue that the growth acceleration in SSA since the late 1990s would sustain aided by the following factors:

First, improved policy environment (and improved economic governance) and growing inflows of direct foreign investment: The key driving force for the growth surge in most countries was improved fiscal and macroeconomic management, a growing middle class, and increased domestic demand fueled by consumption and the like. The Economist (April 6, 2013) declared that GDP is expected to go up, on average, by 6 percent per year over the next decade, to which the contribution of FDI (that went up from USD 15 billion in 2002 to USD 37 billion in 2006 and to USD 46 billion in 2012) would be estimable. In addition, the shifting of economic policy making from central planning to a market-oriented one (in countries like Ethiopia, Tanzania, etc.) fortified private sector's participation in the economy; notwithstanding in some economies, such as Ethiopia and Rwanda, the state sector still play very active role. The business environment shows considerable improvement and even becomes friendlier in some SSA economies (e.g. Kenya and Nigeria). The African Progress Report (2014) asserts that policy (hence, fiscal and macroeconomic management) in Africa has improved markedly over the last decade. Likewise, Andersen and Jensen (2013) argued that improvement in institutional quality might have played decisive role in the growth acceleration over the 'Africa rising' period. In their view, differences in the level of institutional quality predict cross-country variations in growth within Africa and that the continent "has seen many false dawns, caused in large part by ups in commodity prices, but a growth acceleration driven by institutions is likely to signify a genuine African takeoff."

Second, increased political stability explained by reduced conflicts: True that violent conflicts (which peaked in the 1990s) were defining features of Africa's political landscape, with which millions of lives were lost and many more displaced, and hindering development (Chingono 2016). Many SSA economies, which were engulfed with ravaged wars, inter-state and civil-strife, have stopped fighting, and the infrequent outbreaks of local conflicts became less lethal (The Economist, March 2, 2013). The African Progress Report (2012) confirmed that Africa's share of global violent conflict dropped significantly from 55 percent in 2002 to 24 percent in 2011. Additionally, many authoritarian and dictatorial leaders were compelled to give way to more democratically accountable regimes. Thus, "more private citizens are engaging with politics, some in civil-society groups, and others in aid efforts or as protesters" (The Economist, ibid), despite the quality of participation, transparency and accountability varies from country to country (African Progress Panel 2013). The prevailing political settlement in the region, albeit ethnic tensions (and growing nationalities in some countries such as Ethiopia) are live, may support for the continuity of the growth acceleration exhibited over the 2000s, enabling the fast growing low-income countries to catch-up and join the clubs of middle-income countries.

Third, the increasing use of new technologies that could create new opportunities for business: The African Progress Report (2014) claims that the continent has seen a wave of technological innovation driven from below. As a case in point, access to ICT devices such as the Internet has been growing, inducing people to participate in social and political affairs. Cellular phones are ubiquitously available across the continent. By 2013, there were more cellular phones than adult people on the continent (Fengler and Rowden 2013), and Africa has two mobile phones for every three people, the same as India (ibid). This all would contribute to improvement of economic lives through various ways such as increased participation of the remote areas in social and political life such as through connecting people to market information, increasing social and political connectivity, and supporting mobile banking.

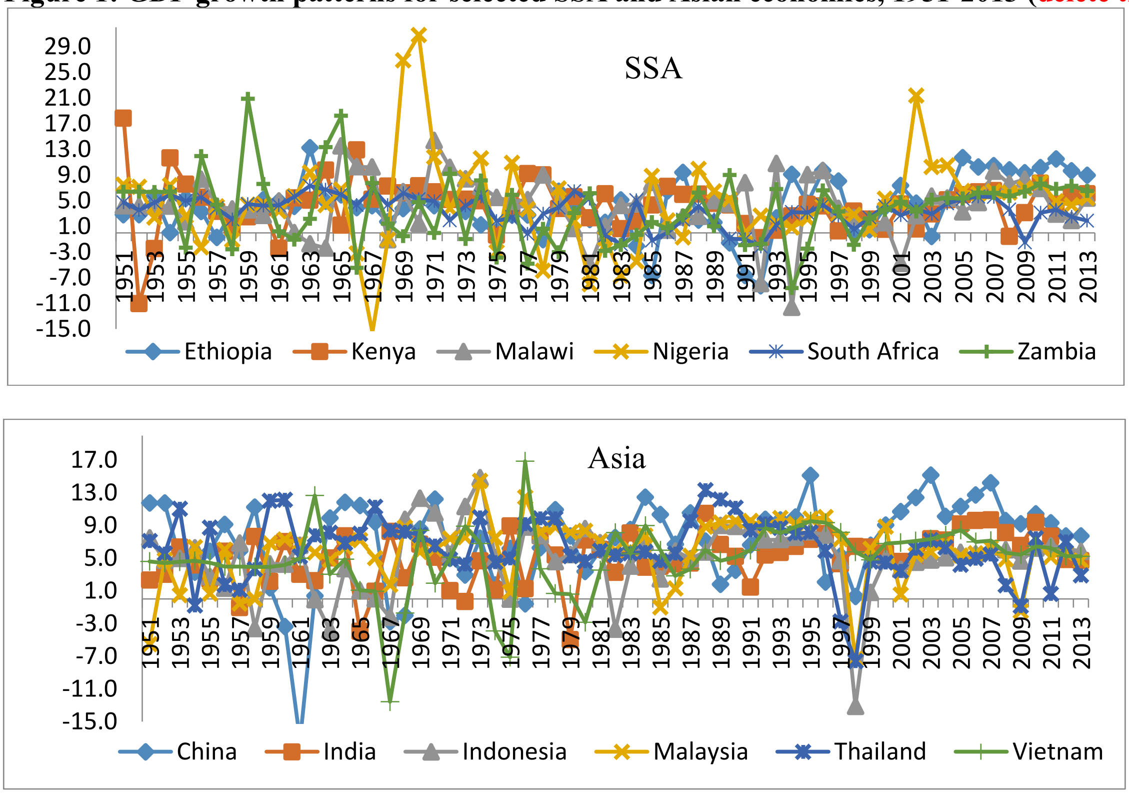
Fourth, improved human development in SSA during the "Africa rising" decade: Various countries saw improvement in some social indicators. For instance, some of the worst malaria affected countries reduced death rate by 30 percent; child and infant mortality rates dropped sharply in most countries; life expectancy increased by 10 percent across the continent; and the number of people in poverty declined, albeit variations exist across countries. The number of children in school was on the rise, with secondary enrollment grew by 48 percent in between 2000 and 2008 (ibid). The rise in the number of more educated, healthier and longer-living people may propel more growth (African Progress Panel 2013).

Fifth, demographic dynamics: Population growth in Africa (and hence its workforce) is faster than any other developing region, which is predicted to reach 2 billion by 2050, from 460 million in 2010. Half of the population is under 25 years of age while the young population in the age cohort of 15 to 24 years is growing at 3 percent per year (African Progress Report 2014), which makes the growth of the youth the fastest in the world. Thus, the number of young labor force is expected to surge over the next decades, which is projected to increase the ratio of the working age population (ages 15-64) to 50 percent by 2030 from 42 percent in 2010. This may accelerate dynamic and inclusive economic growth (demographic dividend) if the countries can manage to build their capabilities to use the youth productively (Devarjan and Fengler 2012; African Progress Panel 2013; 2014). The reverse would be the case [creating frustration among unskilled and unemployed youth] if they fail to undergo production transformation and create decent employment for the growing young labor force.

Additionally, human geography (urbanization) is considered by the African Progress Report (2014) as one of the potential drivers for transformative growth in Africa, providing new opportunities for migration into higher-paid occupations, inducing better economic prospects via creating conducive business environment and excellent services for people living in urban areas. According to the same report, people living in cities increased now to 40 percent of Africans, which was just over one quarter some two decades ago. By 2030, one half of Africans will live in cities, the largest 18 of which will have a combined annual spending power of USD 1.3 trillion. Yet, it may also "lead to the expansion of overcrowded, unsanitary informal settlements that become centers of marginalization."

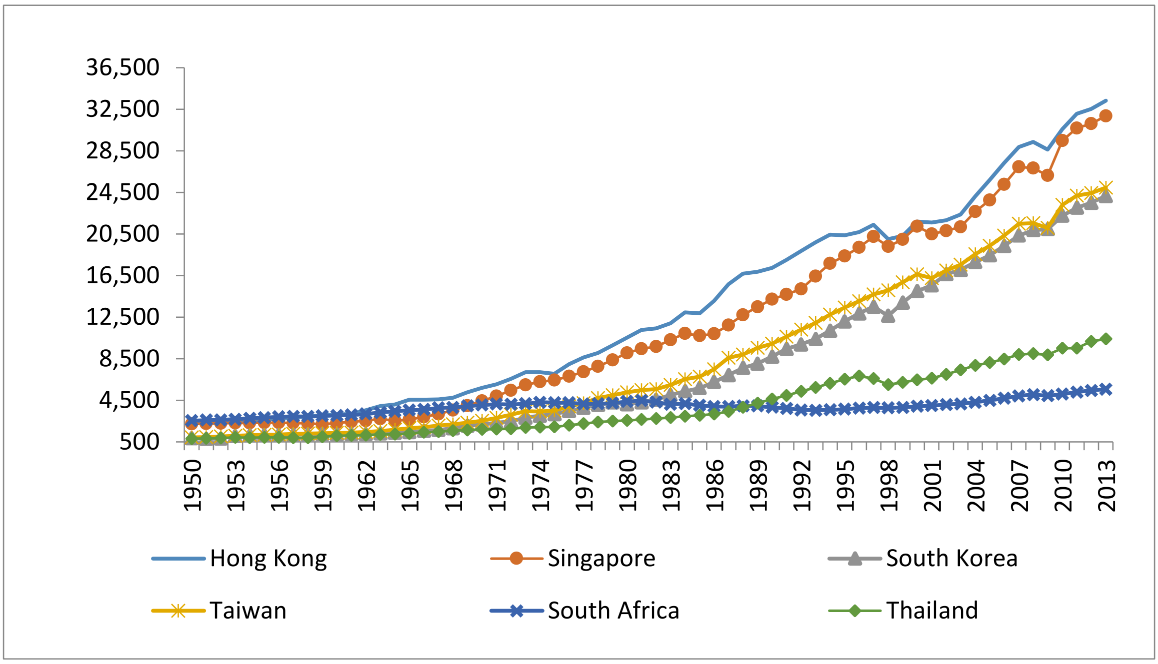
Annex III: Figures

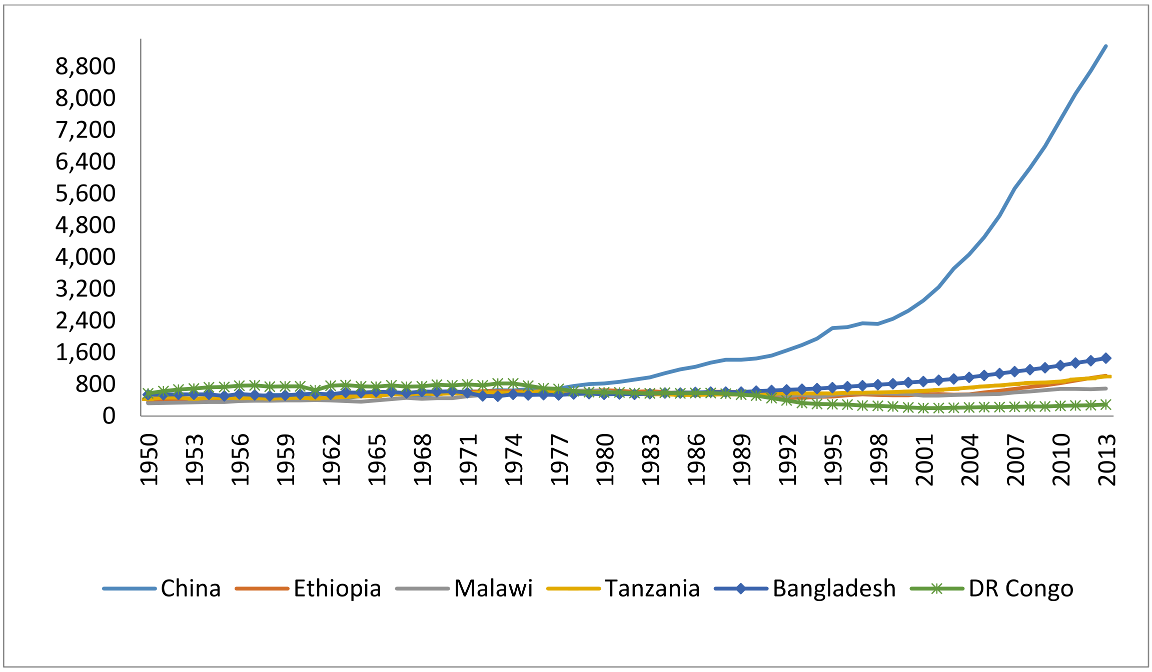
Figure 1: GDP growth patterns for selected SSA and Asian economies, 1951-2013 (delete this)



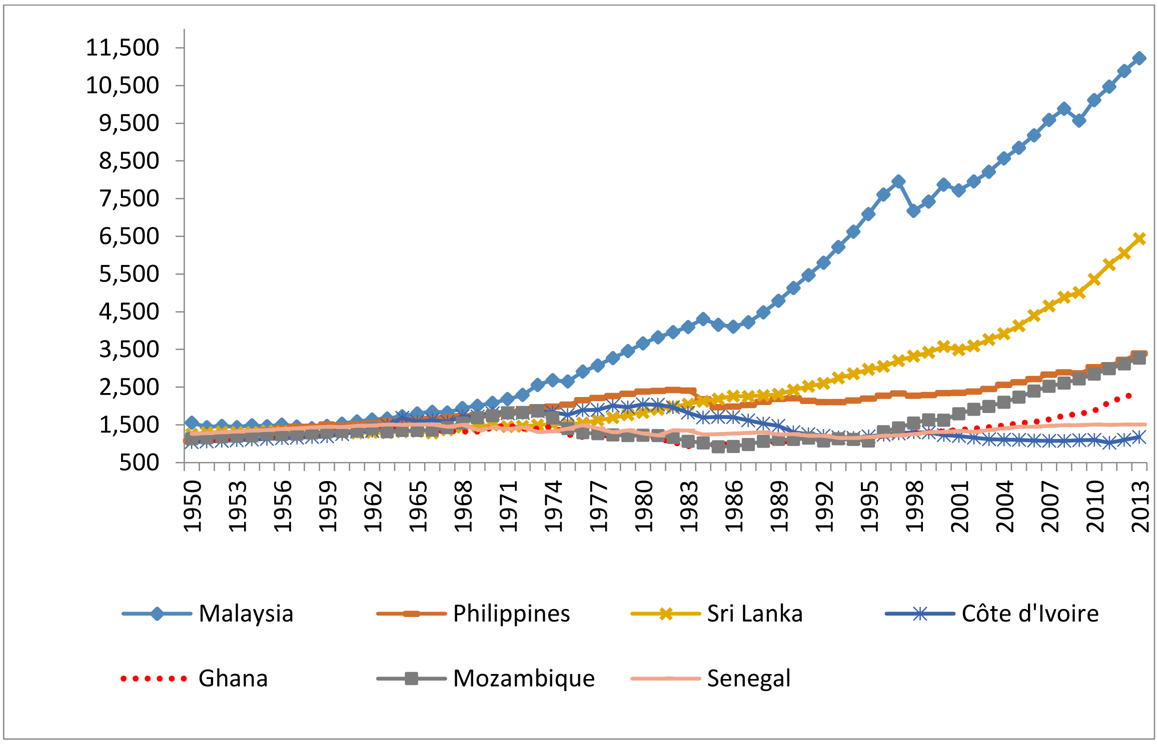
Source: Author's computation from the Conference Board, Total Economy Data base, data in constant 1990 USD GK PPP

Figure 2: Patterns of Real GDP Per Capita in Selected SSA and Asian Economies 1950-2013

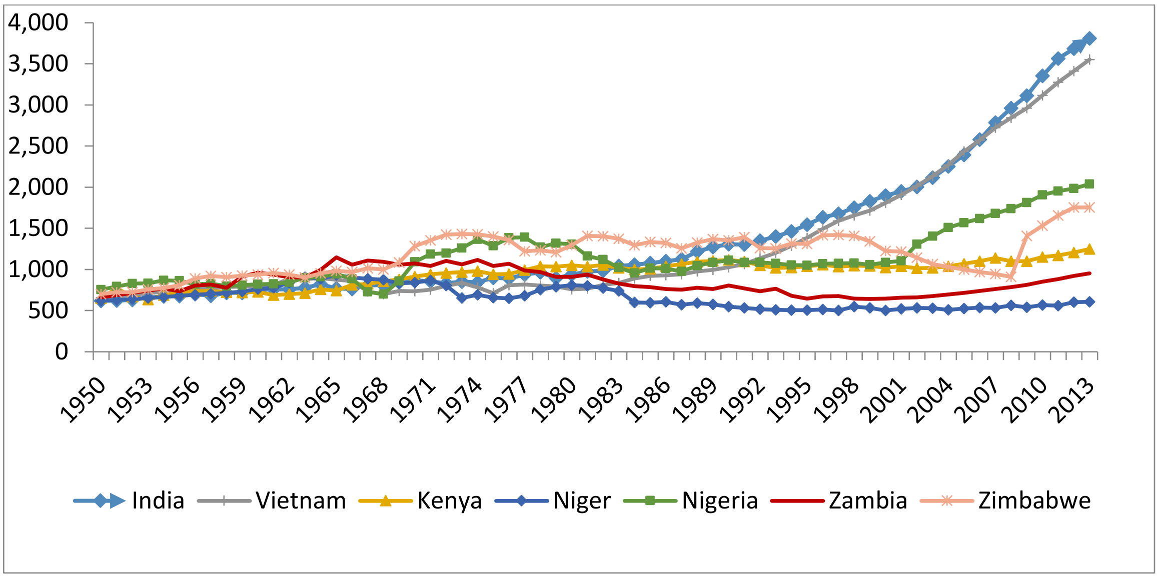




8,800
8,000
7,200
6,400
5,600
4,800
4,000
3,200
2,400
1,600
800
0
1950 1953 1956 1959 1962 1965 1968 1971 1974 1977 1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013
China
Ethiopia
Malawi
Tanzania
Bangladesh
DR Congo

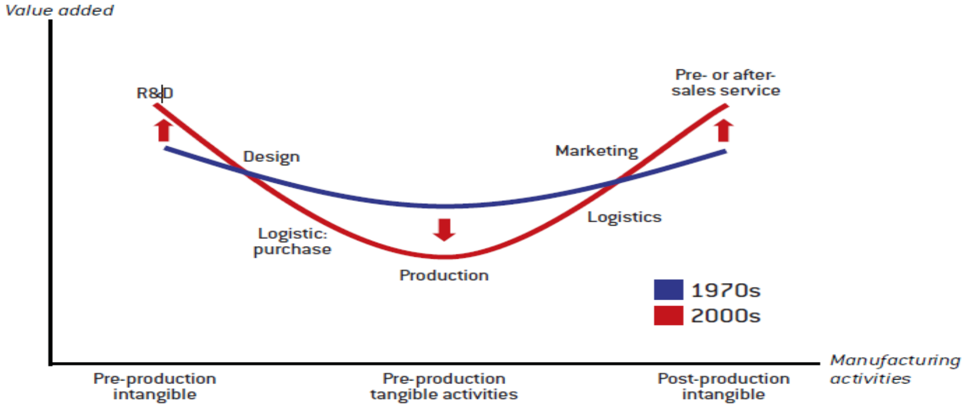


11,500
10,500
9,500
8,500
7,500
6,500
5,500
4,500
3,500
2,500
1,500
500
1950 1953 1956 1959 1962 1965 1968 1971 1974 1977 1980 1983 1986 1989 1992 1995 1998 2001 2004 2007 2010 2013
Malaysia
Philippines
Sri Lanka
Côte d'Ivoire
Ghana
Mozambique
Senegal



Source: The Conference Board 2014, Total Economy Database, 1990's US$ (converted at Geary Khamis PPPs)

Figure 3: The 'smile curve'



Source: Bruegel 2013 Pp. 27

Figure 4a: World machine tools production and consumption

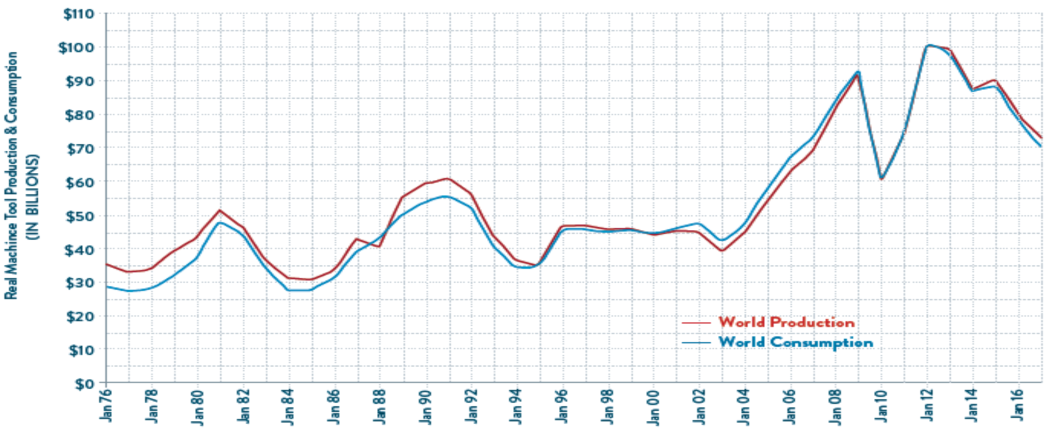
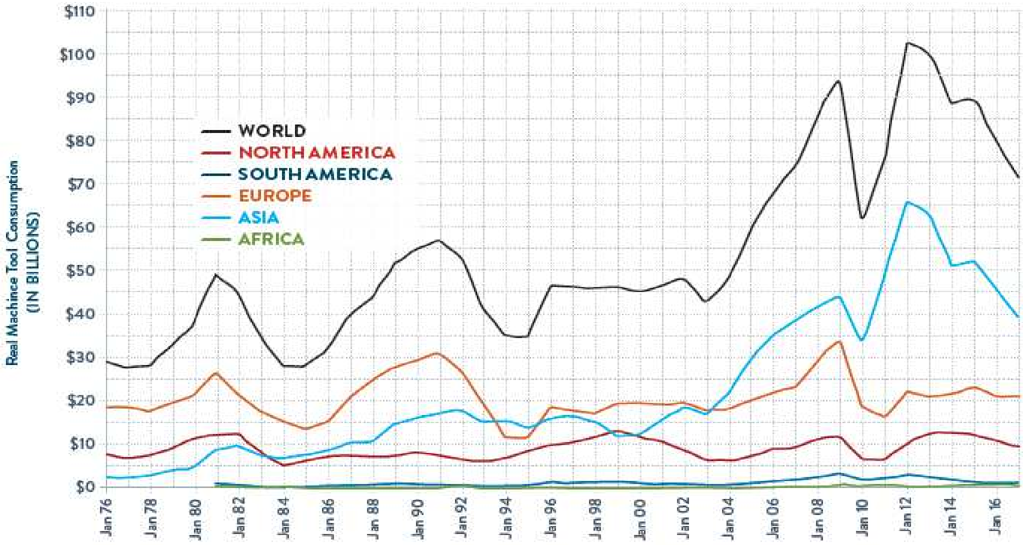
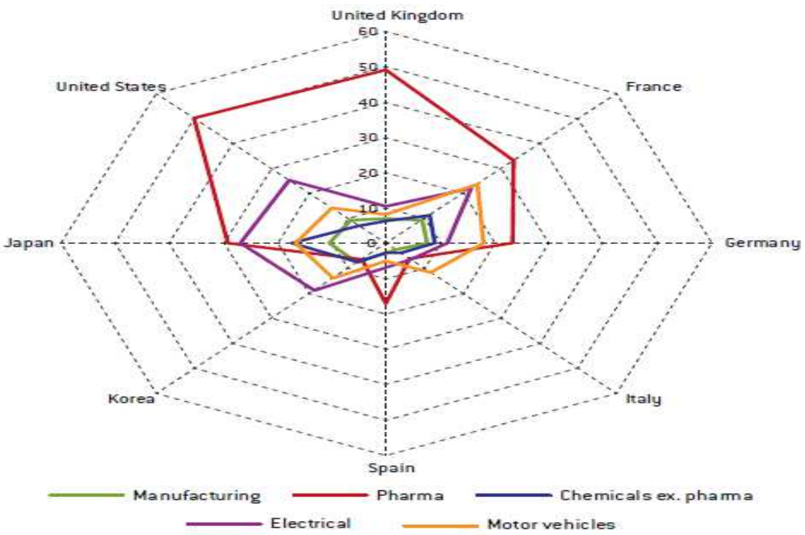


Figure 4b: Machine tool consumption by country groups



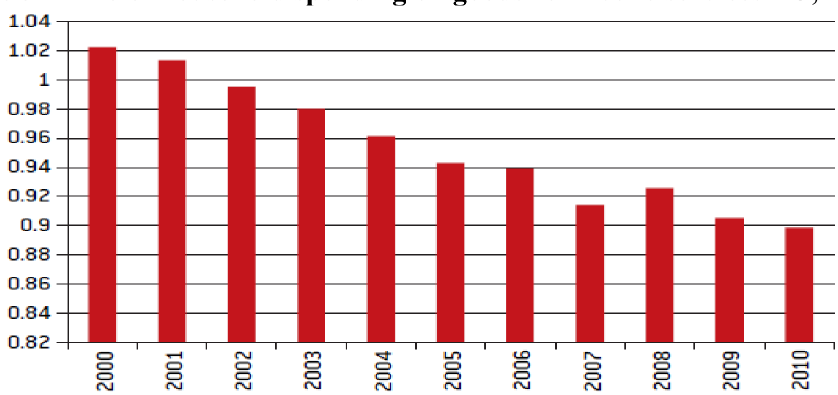
Source: Gardner Research, World Machine Tool Survey 2016

Figure 5: R&D intensity by sectors and countries



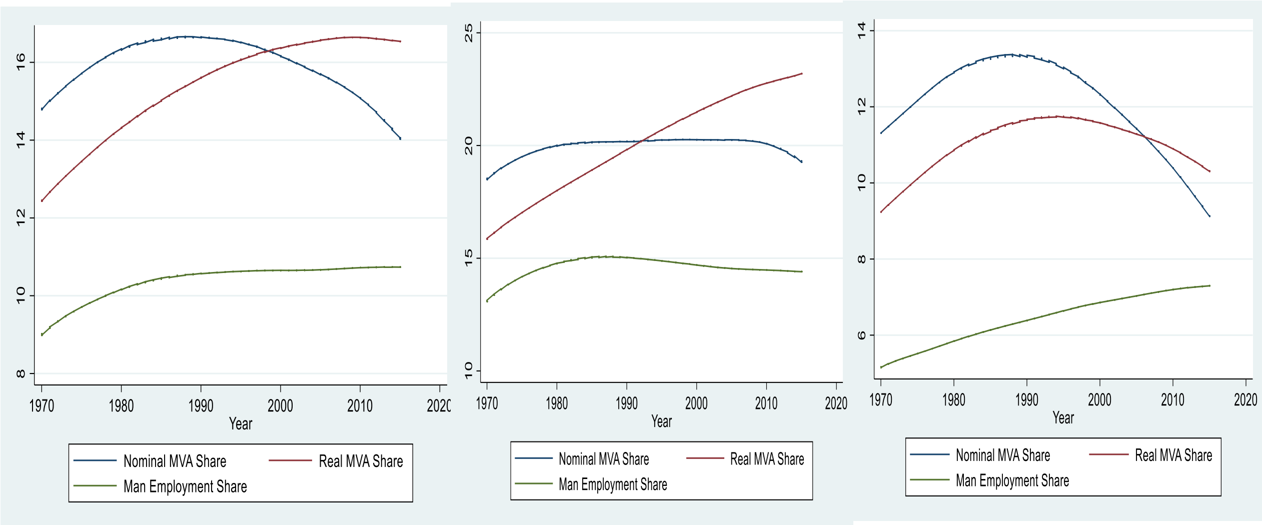
Source: Bruegel based on OECD STAN.

Figure 5: Ratio of household spending on goods relative to services EU, 2000-10



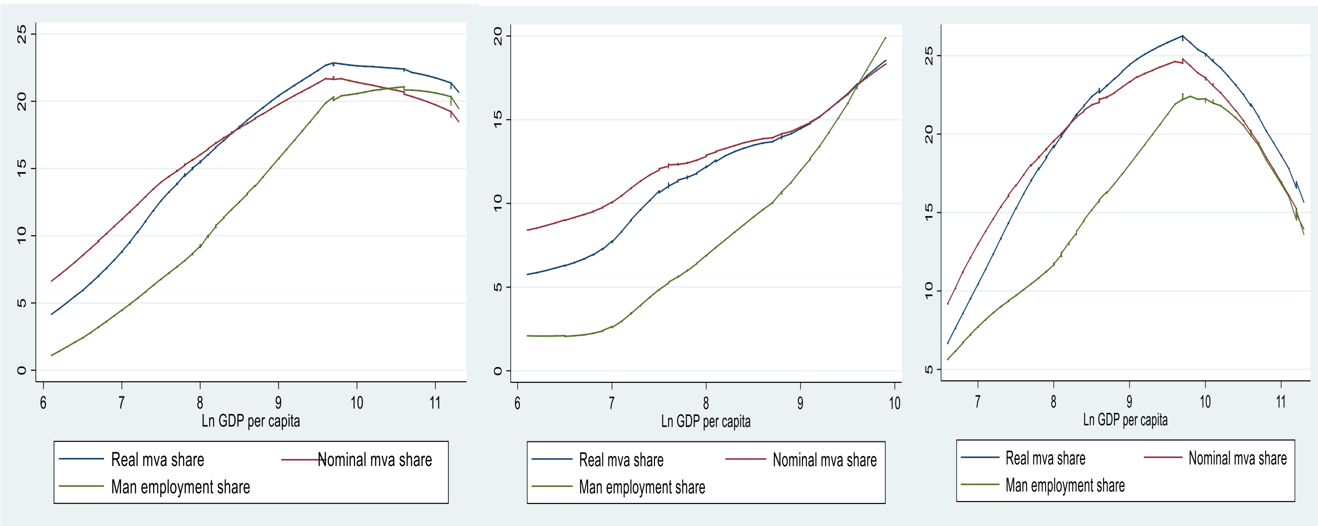
Source: Bruegel based on Eurostat

Figure 6: Manufacturing output share (both at current and constant prices) and employment share overtime, 1970-2015



(a) Full sample (b) Asia (c) SSA

Figure 7: Manufacturing output share (both at current and constant prices) and employment share against per capita GDP (constant prices), 1970-2015



(a) Full sample **(b) Asia** **(c) SSA**

Figure 8a: Upstream GVC Involvement, by Sector Type for African Countries, 2010

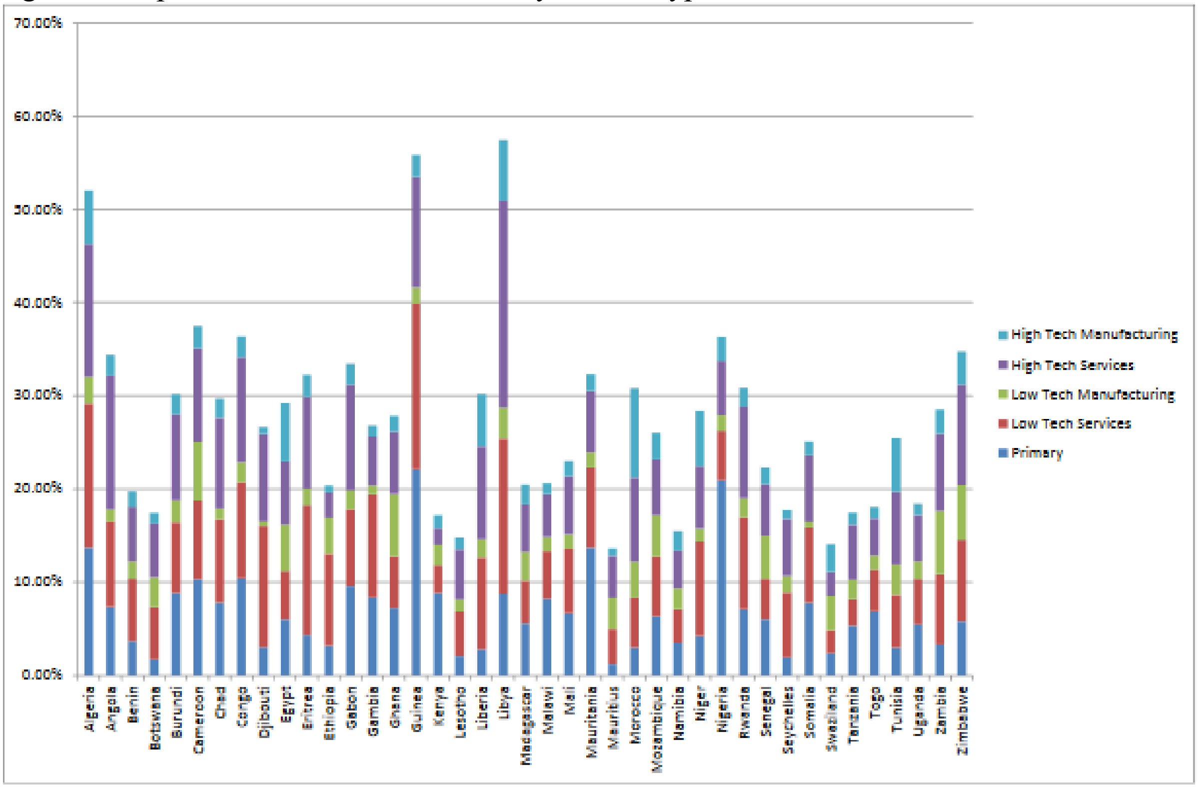
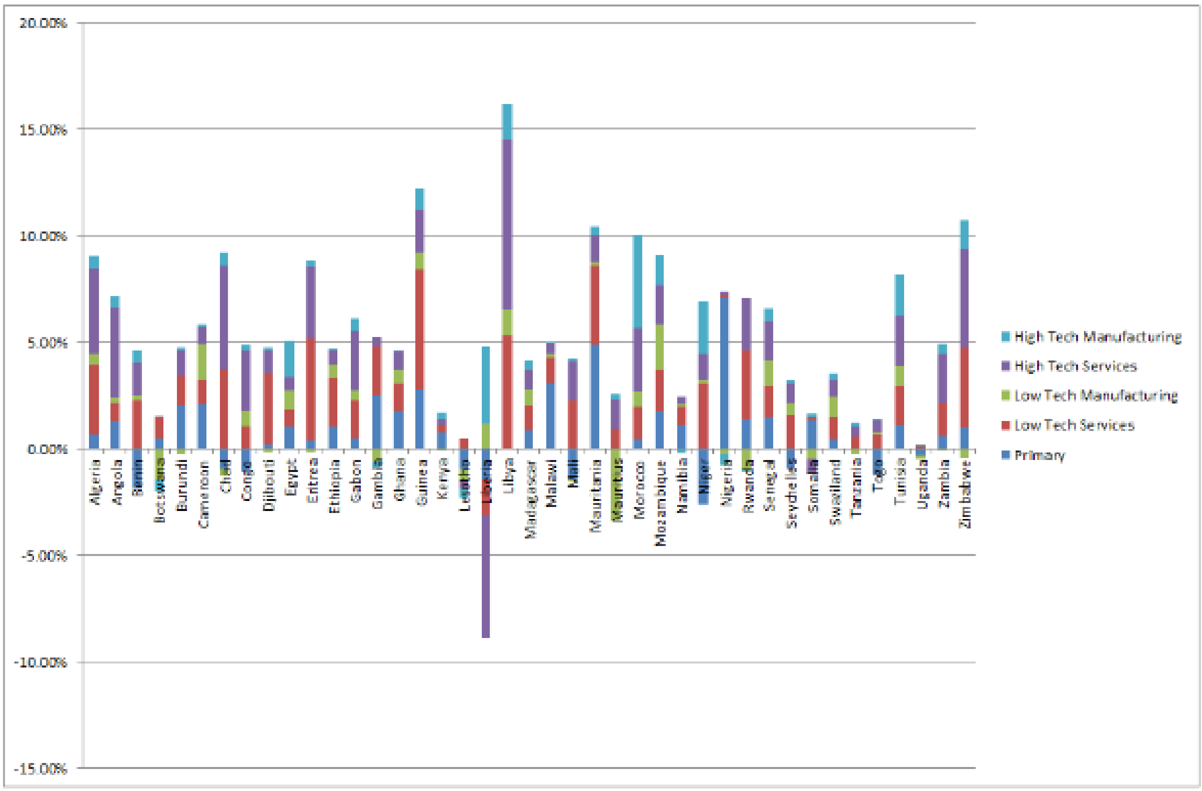


Figure 8b: Change in Upstream GVC Involvement, by Sector Type for African Countries, 2010



Source: Foster-McGregor et al. 2015, pp 33

Annex IV: Tables

Table 1: Change in the Share of Vulnerable Employment by country, (%)

	Initial year 2000	Final year 2011	Difference
World	52.4	48.5	-3.9
Developed economies & EU	11.3	10.1	-1.2
Central and South-Eastern Europe (non-EU) and CIS	22.6	19.7	-2.9
East Asia	57.5	47.6	-9.9
South-East Asia & the Pacific	65.6	60.2	-5.4
South Asia	80.9	77.3	-3.6
Latin America & the Caribbean	35.4	31.7	-3.7
Middle East	32.2	25.4	-6.8
North Africa	39.1	36	-3.1
SSA	79.9	77.6	-2.3

Source: ILO, Trends Econometric Models, October 2013

Table 2: Working Poor Indicators, (% of Total Employment), by country group

	US$ 1.25 a day (extremely poor)		US$ 2 a day (moderately poor)	
	2000	**2011**	**2000**	**2011**
World	26.5	13.3	45.9	28.7
Central and South-Eastern Europe (non-EU) and CIS	4.6	1.2	12.3	4.1
East Asia	31.1	7.1	55.1	17.7
South-East Asia & the Pacific	34.2	12.4	62.3	33.3
South Asia	44.2	27.3	78.5	64.1
Latin America & the Caribbean	7.9	3.3	16	7.2
Middle East	1.5	1.1	9.3	7.6
North Africa	6.9	3.2	23.8	14.9
SSA	55.8	42	75.4	65

Source: ILO, Trends Econometric Models, October 2013

Table 3a: Trends in Inequality in selected Asian economies, 1990-2010

Country	Initial Year		Final		Annualized growth (%)
	Gini	Year	Gini	Year	
China	32.4	1990	42.1	2009	1.39
South Korea	24.5	1992	28.9	2010	0.92
Indonesia	29.2	1994	35.6	2010	1.25
Cambodia	38.3	1994	37.9	2008	-0.07
Malaysia	47.7	1992	46.2	2009	-0.19
Philippines	43.8	1991	43.0	2009	-0.10
Thailand	45.3	1990	39.4	2010	-0.70
Viet Nam	35.7	1992	35.6	2008	-0.02
Bangladesh	27.6	1991	32.1	2010	0.80
India	32.5	1993	37.0	2010	0.77
Sri Lanka	32.5	1990	36.4	2010	0.57

Table 3b: Trends in Inequality in selected SSA economies, 1990-2010

Country	**Initial Year**		**Final**		**Annualized growth (%)**
	Year	**Gini**	**Year**	**Gini**	
Ethiopia	40.0	1995	29.8	2005	-2.90
Ghana	38.1	1992	42.8	2006	0.83
Kenya	57.5	1992	47.7	2005	-1.43
Madagascar	46.1	1993	44.1	2010	-0.26
Mozambique	44.5	1996	45.7	2008	0.22
Malawi	50.3	1998	43.9	2010	-1.13
Namibia	74.3	1993	63.9	2004	-1.36
Nigeria	44.9	1992	48.8	2010	0.46
Senegal	54.1	1991	39.2	2005	-2.27
Tanzania	33.8	1992	37.6	2007	0.71
Uganda	42.6	1992	44.3	2009	0.23
South Africa	59.3	1993	63.1	2009	0.39
Zambia	52.6	1993	57.5	2010	0.53

Source: Author's compilation from WDI, 2012

Table 4:Manufacturing value added and employment, selected economies and groups, 2014 shares (percent) and 1995-2014 changes (percentage points)

	Current prices		Constant prices (2005)		Employment	
	Share in total value added		Share in total value added		Share in employment	
	2014	Change (1995-2014)	2014	Change (1995-2014)	2014	Change (1995-2014)
World	16.5	-3.2	17.9	1.7	13.3	-0.6
Developed economies	14.1	-5.2	15.2	-0.3	13	-5.1
Germany	22.6	-0.1	23.4	1.8	19.8	-2.7
Japan	19	-3.2	21.4	2.7	14.2	-6.3
United States	12.3	-4.8	12.7	0	8.8	-5.1
Developing economies	20.2	-1.2	23.5	4.7	13.3	0.8
Africa	10.4	-4.4	11.6	-1.1	6.9	1
Latin America and the Caribbean	13.5	-4.2	15.4	-2.2	13	-1.2
Mexico	17.7	-1.9	16.7	-0.1	15.6	-2.1
Asia	23.2	-1.3	27.1	6.7	14.7	1.3
China	28.3	-6.1	34.9	5.7	18.2	2.8
NIEs	25.3	0.2	29.9	8.6	18.3	-5.4
Korea	30.3	2.5	32.7	10.7	16.6	-7
Taiwan	30	1	38.2	12.4	27.4	1.2
Oceania	8.6	-1	8.4	-1		
Developing economies, excl. China	15.7	-3.9	18.4	1.4	11.1	0.2
Developing economies, excl. NIEs	19.8		22.6	4.2	13.2	0.9
Transition economies	15.3	-5.9	16.7	-0.6	14.3	-4.3

Source: UNCTAD, 2017

Table 5: Panel unit-root tests, for the full sample period (1971-2015)

Variables	Im-Pesaran-Shin (2003)		Pesaran (2007)	
Asia Panel				
P	-15.356	0.0000*	-5.432	0.0000*
GDP	-13.379	0.0000*	-4.988	0.0000*
NAV-GVA	-16.265	0.0000*	-5.297	0.0000*
NAV-EMP	-10.302	0.0000*	-5.114	0.0000*
MLI-GVA	-16.710	0.0000*	-5.270	0.0000*
MLI-EMP	-11.341	0.0000*	-5.165	0.0000*
SSA Panel				
P	-14.067	0.0000*	-5.561	0.0000*
GDP	-14.271	0.0000*	-5.648	0.0000*
NAV-GVA	-10.649	0.0000*	-5.036	0.0000*
NAV-EMP	-8.216	0.0000*	-4.846	0.0000*
MLI-GVA	-11.793	0.0000*	-4.990	0.0000*
MLI-EMP	-8.316	0.0000*	-5.013	0.0000*

Note: * significant at 0.01 levels of significance
Source: Own Calculation

Table 6: Cross-Section Dependence Test

Cross-Sectional Dependence Exponent Estimation and Test

Panel Variable (i): id
Time Variable (t): year

Estimation of Cross-Sectional Exponent (alpha)

variable	alpha	Std. Err.	[95% Conf.	Interval]
lrman	.857004	.0469466	.7649904	.9490176
lme	.7961972	.0761944	.6468589	.9455356
lx	.966076	.1299506	.7113774	1.220775
lx2	.9654426	.2570375	.4616584	1.469227
lagr	.9566061	.1463333	.669798	1.243414
ltran	.9540837	.0999551	.7581753	1.149992
lbus	.9735306	.0719895	.8324337	1.114627
leagr	.9924785	.0634276	.8681627	1.116794
letran	.9494202	.8125383	-.6431255	2.541966
lebus	.9944039	.1282152	.7431067	1.245701
lupd_ss	.855389	.035487	.7858357	.9249423
lupd_bds	.7969674	.0365146	.7254001	.8685347
lopen	1.002399	.0471266	.9100326	1.094765
lrxr	1.00323	.0845931	.8374309	1.16903
lind	.9633102	.3053549	.3648256	1.561795
lgcy	.6863389	.0190335	.6490339	.7236438
eci	.7861553	.1071146	.5762146	.9960961
nfdi	.5066995	.0562973	.3963589	.6170401

0.5 <= alpha < 1 implies strong cross-sectional dependence.

Pesaran (2015) test for weak cross-sectional dependence.
H0: errors are weakly cross-sectional dependent.

variable	CD	p-value	N_g	T
lrman	16.082	0.000	31	45
lme	10.284	0.000	31	45
lx	86.592	0.000	31	45
lx2	87.836	0.000	31	45
lagr	72.618	0.000	31	45
ltran	88.246	0.000	31	45
lbus	44.888	0.000	31	45
leagr	101.796	0.000	31	45
letran	60.383	0.000	31	45
lebus	101.892	0.000	31	45
lupd_ss	5.161	0.000	31	45
lupd_bds	20.248	0.000	31	45
lopen	48.371	0.000	31	45
lrxr	97.053	0.000	31	45
lind	65.638	0.000	31	45
lgcy	2.103	0.035	31	45
eci	11.217	0.000	31	45
nfdi	19.066	0.000	31	45

Variables are centered around zero.

Table 7: Testing for parameter constancy and slope heterogeneity

A. Dependent variable is real manufacturing value added share				
Test	Chi2	Prob>Chi2	Delta	P-value
Swamy S test*	5.40E+05	0.000		
Blomquist and Westerlund ,2013**			40.369	0.000
Pesaran and Yamagata, 2008**			-1.73E+07	0.000
B. Dependant variable is manufacturing employment share				
Test	Chi2	Prob>Chi2	Delta	P-value
Swamy S test*	9.28E+04	0.000		
Blomquist and Westerlund, 2013**			31.495	0.000
Pesaran and Yamagata, 2008**			-3.72E+06	0.000

Note: * Swamy S test for parameter constancy
** Testing for slope heterogeneity in the presence of cross-sectional dependence
H0: Slope coefficients are homogenous
Source: Own computation

Table 8: Estimates of Relative Manufacturing Output for the Full Sample and Country Groups

Var	**FEDK**			**AMG**			**CCEMG**		
	All	**Asia**	**SSA**	**All**	**Asia**	**SSA**	**All**	**Asia**	**SSA**
Ln GDPPC	0.456** (0.201)	-0.302 (0.185)	0.953* (0.333)*	1.035* (0.385)	0.006 (0.049)	6.367** (2.649)	1.278** (0.5481)	0.084 (0.047)	7.588* (3.214)
LnGDPPC SQ	-0.016 (0.012)	0.062* (0.012)	-0.073* (0.022)	-0.071* (0.026)	0.008 (0.011)	-0.375** (0.172)	-0.079** (0.035)	-0.030* (0.004)	-0.509** (0.227)
LUPD_SS	-0.250 (0.576)	-1.767** (0.759)	2.595* (0.664)	1.935* (0.577)	1.152*** (0.857)	3.097* (0.815)	2.094* (0.542)	0.818** (1005)	-2640* (0.833)
LUPD_BDS	4.382* (0.489)	5.155* (0.692)	1.219* (0.347)	1.575* (0.383)	2.055* (0.743)	1.776* (0.597)	1.480* (0.441)	1.482** (0.759)	-1802* (0634)
LRXRM	0.066*** (0.038)	-0.055 (0.036)	0.247* (0.047)	-0.127 (0.022)	-0.089* (0.032)	-0.003 (0.031)	-0.037 (0.030)	-0.105* (0.036)	-0.023 (0.042)
LOPEN	-0.022 (0.045)	0.125* (0.035)	-0.134* (0.035)	0.073** (0.238)	0.103** (0.052)	0.063*** (0.037)	0.073* (0.037)	0.125** (0.058)	0.078** (0.036)
LAGR	0.332* (0.045)	0.884* (0.052*)	-0.220* (0.037)	0.323* (0.080)	-0.163 (0.124)	-0.427* (0.101)	-0289* (0.102)	0.166** (0.083)	-0436* (0.142)
LTRAN	0.169* (0.039)	-0.025 (0.082)	0.115* (0.027)	-0.133 (0.049)	-0.253** (0.116)	-0.054 (0.057)	-0.009 (0.082)	0.033 (0.162)	-0.081 (0.072)
LBUS	0.065*** (0.034)	-0.031** (0.015)	0.249* (0.034)	- 0.136** (0.069)	-0.142 (0.099)	-0.123 (0.087)	-0.149* (0.085)	-0.152 (0.116)	-0.132 (0.107)
NFDI	-0.258 (0.456)	0.074 (0.476)	-1.032* (0.234)	0.026 (0.107)	0.334* (0.128)	-0.319** (0.134)	-0.015 (0.244)	0.283 (0.239)	-0.293 (0.359)
ECI	0.088* (0.0025)	0.136* (0.047)	-0.097* (0.018)	-0.017 (0.015)	-0.067* (0.019)	-0.022 (0.020)	-0.041* (0.017)	-0.027 (0.032)	-0.03*** (0.018)
LIND	0.651* (0.012)	0.689* (0.018)	0.563* (0.028)	0.777** (0.036)	0.734* (0.063)	0.727* (0.059)	0.734* (0.053)	0.759* (0.059)	0.688* (0.089)
LDCY	0.107* (0.031)	0.252* (0.081)	0.021 (0.034)	-0.014 (0.016)	0.042 (0.035)	-0.004 (0.017)	-0.062* (0.024)	-0.115 (0073)	0.047 (0.064)
CDP				0.756* (0.159)	0.793* (0.112)	0.470* (0.215)			
TREND				0.008 (0.006)	0.001 (0.004)	0.008*** (0.005)			
C	-6.159* (1.031)		-4.136 (1.053)	-2.176 (3.221)	-0.219 (0.976)	-21.82** (0.112)	-4.399** (2.211)	0.677 (0.956)	-28.795* (11.097)

Abbreviations are as previously given. * Level of significance: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$

Table 9: Estimates of Relative Manufacturing Employment for the Full Sample and Country Groups

Var	FEDK			AMG			CCEMG		
	All	Asia	SSA	All	Asia	SSA	All	Asia	SSA
Ln GDPPC	0.147 (0.154)	-0.430 (0.289)	2.972* (0.368)	1079* (0.078)	-0.135 (0.140)	4989* (1.459)	1.814** (0.756)	-0.110 (0.127)	12.255* (3.8951)
Ln GDPPC SQ	-0.036* (0.008)	0.028 (0.019)	-0.199* (0.024)	-0.049* (0.042)	0.015* (0.007)	-0.320* (0.091)	-0.102** (0.047)	0.005 (0.007)	-0.814* (0.276)
LUPD_SS	-0.055 (0.526)	1.675** (0.853)	-5.063* (0.237)	2.243* (0.660)	0.936 (1.117)	-2.561* (0.564)	2.441* (0.846)	0.806 (1.120)	-2.941* (0.534)
LUPD_BDS	2.102* (0.526)	-5.037* (0.634)	-2.862* (0.258)	0.312 (0.539)	1.230** (0.644)	-2346* (0.536)	0.179 (0.648)	0.242 (1.492)	-2.448 (0.484)
LRXRM	0.021 (0.033)	0.225* (0.069)	0.141* (0.036)	-0.026 (0.030)	-0.058 (0.045)	0.007 (0.016)	0.037 (0.066)	0.037 (0.120)	0.024 (0.017)
LOPEN	-0.081** (0.037)	-0.07*** (0.039)	0.101* (0.027)	0.095* (0..036)	0.114** (0.056)	0.022* (0.013)	0.024 (0.076)	0.065 (0.214)	0.127 (0.033)
LAGR	0.322* (0.073)	0.547* (0.103)	-0.471* (0.107)	-0.354* (0.176)	-0.265 (0.178)	-0.481* (0.315)	-0.109 (0.496)	-0.74** (0.364)	-0.876 (0.240)
LTRAN	-0.266* (0.015)	0.218* (0.063)	0.401* (0.021)	-0.250* (0.090)	-0.237** (0.105)	0.156** (0.050)	-0.334** (0.152)	-0.263 (0.267)	0.177* (0.104)
LBUS	-0.088* (0.019)	0.125 (0.084)	0.042 (0.030)	0.049 (0.073)	-0.008 (0.063)	0.024 (0.093)	-0.114** (0.066)	-0.139 (0.092)	0.028 (0.084)
NFDI	0.013 (0.703)	-0.419 (0.450)	-0.569* (0.203)	-0.049 (0.262)	-0.597** (0.335)	-0.067 (0.097)	-0.818** (0.422)	-0.983** (0.549)	-0.505** (0.264)
ECI	0.169* (0.395)	0.297* (0.041)	-0.066* (0.026)	0.032 (0.029)	-0.06*** (0.036)	-0.01** (0.007)	0.066*** (0.035)	0.011 (0.039)	-0.06*** (0.034)
LIND	0.579* (0.016)	0.797* (0.038)	0.413 (0.020)	0.541* (0.084)	0.633* (0.110)	0.062* (0.040)	0.486* (0.079)	0.513* (0.099)	0.571* (0.088)
LDCY	-0.031 (0.018)	0.178** (0.089)	0.032 (0.034)	-0.076 (0.033)	-0.185* (0.067)	0.062 (0.040)	0.132*** (0.074)	-0.134 (0.138)	0.018 (0.053)
CDP				0.768* (0.159)	0.705* (0.320)	0.346 (0.228)			
TREND				0.012 (0.007)	-0.003 (0.004)	0.001 (0.004)			
C	1.047 (0.866)	5.301* (1.093)	-3.172* (1.203)	2.683** (1.413)	-2.177 (3.220)	-14.434 (18.360)	-6.744* (3.810)	0.337 (2.73)	-35.383* (13.621)

Abbreviations are as previously given. * Level of significance: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$
Source: Own Computation

Table 10: Cross-Section Dependence Test: Kaldor First Growth Law

Cross-Sectional Dependence Exponent Estimation and Test

Panel Variable (i): id
Time Variable (t): year

Estimation of Cross-Sectional Exponent (alpha)

variable	alpha	Std. Err.	[95% Conf.	Interval]
y	.7785344	.0237828	.731921	.8251477
ag	.758111	.0396959	.6803086	.8359135
m	.693435	.0182556	.6576546	.7292153
ss	.5625183	.0324904	.4988382	.6261984
bds	.5084222	.0261288	.4572107	.5596336
ig	.8105283	.0271652	.7572855	.8637711
xg	.8881842	.0164369	.8559685	.9203999
gc	.5915542	.0759368	.4427207	.7403876
nag	.7184518	.0334542	.6528829	.7840208
nm	.7218571	.0261407	.6706222	.7730919
nss	.7629159	.0273619	.7092876	.8165442
nbds	.768985	.0206351	.7285409	.8094291
ag_nag	.6607881	.0191665	.6232224	.6983538
m_nm	.7458336	.0238934	.6990035	.7926637
ss_nss	.4760975	.0309512	.4154344	.5367607
bds_nbds	.6398734	.0373143	.5667387	.713008

0.5 <= alpha < 1 implies strong cross-sectional dependence.

Pesaran (2015) test for weak cross-sectional dependence.
H0: errors are weakly cross-sectional dependent.

variable	CD	p-value	N_g	T
y	6.208	0.000	31	45
ag	1.249	0.212	31	45
m	6.639	0.000	31	45
ss	3.191	0.001	31	45
bds	3.909	0.000	31	45
ig	6.099	0.000	31	45
xg	14.201	0.000	31	45
gc	1.830	0.067	31	45
nag	5.390	0.000	31	45
nm	4.196	0.000	31	45
nss	4.430	0.000	31	45
nbds	5.327	0.000	31	45
ag_nag	2.740	0.006	31	45
m_nm	5.687	0.000	31	45
ss_nss	1.247	0.212	31	45
bds_nbds	2.367	0.018	31	45

Variables are centered around zero.

Table 11:Test of parameter constancy and slope heterogeneity: First Growth Law

		Test					
		Swamy S test		Blomqust and Westerlund, 2013		Pesaran and Yamagata, 2008	
Equation	Sector	Chi2	Prob>Chi2	Delta	P-value	Delta	P-value
16	Man	403.7	0.000	9.015	0.000	8.075	0.000
	SS	340.51	0.000	7.536	0.000	5.685	0.000
	BDS	478.84	0.000	10.668	0.000	10.389	0.000
	AG	734.62	0.000	8.524	0.000	12.228	0.000
16a	Man	494.81	0.000	7.459	0.000	7.325	0.000
	SS	669.25	0.000	3.265	0.000	9.968	0.000
	BDS	458.1	0.000	4.851	0.000	11.931	0.000
	AG	753.32	0.000	10.231	0.000	14.197	0.000
16b	Man	295.26	0.000	4.016	0.000	6.717	0.000
	SS	254.39	0.000	2.802	0.000	2.8	0.000
	BDS	337.71	0.000	5.255	0.000	7.63	0.000
	AG	388.67	0.000	3.937	0.000	4.188	0.000

Note: Abbreviations are: Man – Manufacturing; SS – Skill-intensive services; BDS – Baumol's diseases services; Ag – Agriculture
Source: Own computation

Table 12 Cross-section Dependence Test: Kaldor Second Growth Law

```
Cross-Sectional Dependence Exponent Estimation and Test

Panel Variable (i): id
Time Variable (t): year

Estimation of Cross-Sectional Exponent (alpha)
```

variable	alpha	Std. Err.	[95% Conf. Interval]	
pm	.4916438	.0292867	.4342428	.5490448
pss	.3768169	.0375993	.3031236	.4505101
pbds	.5213015	.0205618	.4810011	.561602
em	.611335	.0140474	.5838027	.6388673
ess	.5042935	.0564364	.3936803	.6149068
ebds	.5953247	.0295986	.5373125	.6533369
m	.67889	.0177487	.6441032	.7136768
ss	.6057685	.0380156	.5312592	.6802777
bds	.3992596	.0273183	.3457168	.4528025

```
0.5 <= alpha < 1 implies strong cross-sectional dependence.

Pesaran (2015) test for weak cross-sectional dependence.
H0: errors are weakly cross-sectional dependent.
```

variable	CD	p-value	N_g	T
pm	1.615	0.106	31	45
pss	-0.690	0.490	31	45
pbds	1.714	0.087	31	45
em	0.531	0.596	31	45
ess	0.470	0.638	31	45
ebds	0.669	0.503	31	45
m	6.040	0.000	31	45
ss	3.205	0.001	31	45
bds	4.356	0.000	31	45

```
Variables are centered around zero.
```

Table 13:Test of parameter constancy and slope heterogeneity: Second Growth Law

		Test					
		Swamy S test		Blomqust and Westerlund, 2013		Pesaran and Yamagata, 2008	
Equation	Sector	Chi2	Prob>Chi2	Delta	P-value	Delta	P-value
21	Man	5591.65	0.000	12.966	0.000	23.01	0.000
	SS	1078.51	0.000	7.355	0.000	17.496	0.000
	BDS	637.13	0.000	11.853	0.000	17.416	0.000
22	Man	4324.18	0.000	13.024	0.000	24.383	0.000
	SS	903.38	0.000	7.254	0.000	16.985	0.000
	BDS	648.92	0.000	11.642	0.000	16.296	0.000

Note: Abbreviations are: Man – Manufacturing; SS – Skill-intensive services; BDS – Baumol's diseases services. Equations are: $PQ_{mit} = \alpha_5 + \beta_6 Q_{mi} + \varepsilon_{it,} \qquad \beta_6 > 0$ (21)

$$EQ_{mit} = \alpha_6 + \beta_7 Q_{mit} + \varepsilon_{it,} \qquad 1 > \beta_7 > 0 \quad (22)$$

Source: Own computation

Table 14: Cross-section Dependence Test: Kaldor Third Growth Law

```
Cross-Sectional Dependence Exponent Estimation and Test

Panel Variable (i): id
Time Variable (t): year

Estimation of Cross-Sectional Exponent (alpha)
```

variable	alpha	Std. Err.	[95% Conf.	Interval]
p	.593286	.0168409	.5602785	.6262935
m	.67889	.0177487	.6441032	.7136768
ss	.6057685	.0380156	.5312592	.6802777
bds	.3992596	.0273183	.3457168	.4528025
eag	.6074435	.0197838	.568668	.6462191
em	.611335	.0140474	.5838027	.6388673
ess	.5042935	.0564364	.3936803	.6149068
ebds	.5953247	.0295986	.5373125	.6533369
enm	.716822	.0152687	.6868958	.7467482
enss	.8535891	.0135018	.827126	.8800521
enbds	.7891159	.0160333	.7576912	.8205406

```
0.5 <= alpha < 1 implies strong cross-sectional dependence.

Pesaran (2015) test for weak cross-sectional dependence.
H0: errors are weakly cross-sectional dependent.
```

variable	CD	p-value	N_g	T
p	6.251	0.000	31	45
m	6.040	0.000	31	45
ss	3.205	0.001	31	45
bds	4.356	0.000	31	45
eag	7.613	0.000	31	45
em	0.531	0.596	31	45
ess	0.470	0.638	31	45
ebds	0.669	0.503	31	45
enm	3.299	0.001	31	45
enss	5.322	0.000	31	45
enbds	6.443	0.000	31	45

```
Variables are centered around zero.
```

Table 15:Test of parameter constancy and slope heterogeneity: Third Growth Law

		Test					
		Swamy S test		Blomqust and Westerlund, 2013		Pesaran and Yamagata, 2008	
Equation	Sector	Chi2	Prob>Chi2	Delta	P-value	Delta	P-value
23	Man	455.16	0.000	11.038	0.000	8.255	0.000
	SS	442.83	0.000	6.302	0.000	6.607	0.000
	BDS	791.85	0.000	6.515	0.000	10.064	0.000
24	Man	791.85	0.000	14.81	0.000	7.76	0.000
	SS	914.79	0.000	11.815	0.000	6.613	0.000
	BDS	957.75	0.000	8.64	0.000	6.68	0.000

Note: Abbreviations are: Man – Manufacturing; SS – Skill-intensive services; BDS – Baumol's diseases services. Equations are: $P_{it} = \alpha_7 + \beta_8 EQ_{mit} + \beta_9 EQ_{nmit} + \varepsilon_{it} \quad \beta_8 > 0\ , \beta_9 < 0$ (23)

$$P_{it} = \alpha_8 + \beta_{10} Q_{it} + \beta_{11} EQ_{nmit} + \varepsilon_{it} \quad \beta_{10} > 0\ , \beta_{11} < 0 \qquad (24)$$

Source: Own computation