

ADDIS ABBA UNIVERSITY
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THE DETERMINANTS OF STRUCTURAL TRANSFORMATION IN AFRICA: EVIDENCE
FROM ETHIOPIA

By

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DECLARATION

I, the undersigned, declared that this thesis is my original work and has not been presented for a first degree or master's degree in any other university, and that all source of materials used for this thesis have been duly acknowledged.

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This is to certify that the thesis prepared by Mesele Chane, entitled *'The determinants of structural transformation in Africa, Case of Ethiopia'* submitted in partial fulfillment of the requirements for the Degree of Master of Art in African Study, Specialization in Human and Economic Development, complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

The purpose of this study is to investigate the determinants of structural transformation in Ethiopia. The study relied on data obtained and constructed from various sources and comprised seven variables, covering the period 1981 to 2015. The study also analyzed trends of structural transformation in Africa for the same period. In this study, an Autoregressive Distributive Lag bound test method was employed to co-integration in order to investigate the long run relationship and Error Correction Model between structural transformation (dependent variable) and the dependent variables (urbanization, trade openness, share of agricultural value added, GDP per capita, network index, and gross capital formation). The result reveals that there is a stable long run relationship between structural transformation and its determinants. In the long run; gross capital formation and gdp per capita are positively associated and significantly affected structural transformation; whereas agricultural value added is significantly affected structural transformation though the relationship is inverse with negative expected sign. Similarly, the short run coefficients show that gross capital formation, gdp per capita, urbanization and network index are positively associated with structural transformation. Like the long run, the share of agriculture is negatively associated with structural transformation. The trend analysis results for Africa shows share of agricultural in gdp fell from 61.6 percent in 1981 to 49.8 percent in 2010. What is striking, however, is that manufacturing did not expand during this period. Finally, the error correction coefficient is highly significant and the correct negative sign and imply a very high speed of adjustment to equilibrium and the ECM confirms the existence of a stable long-un relationship. The policy implication is that investments in gross capital formation, network infrastructure, declining investment in agricultural development and urbanization are crucial to accelerate structural transformation.

Key Words: Ethiopia, Structural Transformation, ARDL, Bound test, Trend, Determinants.

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List of Acronyms

ACI	Akaike criterion information
ACET	African center for economic transformation
AfDB	African Development Bank
ADF	Augmented Dicky Fuller test
ARDL	Autoregressive distributive lag
AU	African Union
CLRM	Classical linear regression model
FDRE	Federal Democratic Republic of Ethiopia
FDI	Foreign direct investment
GDP	Gross domestic product
GTP	Growth and Transformation Plan
GVA	Gross Value added
ECM	Error Correction term
FPE	Final prediction error
HQ	Hannan-Quinn information criterion
IMF	International monetary fund
ISI	Import substitution industrialization
LM	Lagrange multiplier
LR	Likelihood Ratio test statistics
MF	Ministry of Finance
OLS	Ordinary list square
OECD	Organizations for economic cooperation and development
PASDEP	Plan for Accelerated and sustainable development to end poverty
NBE	National bank of Ethiopia
NPC	National Planning Commission
SC	Schwartz information criterion

SSA	Sub Saharan Africans
VIF	Variance Inflation Factor
VoIP	Voice-over-IP
WWL	Fixed wireless local loop
WB	World bank
WEO	World Economic outlook
WESO	World economic and social outlook
WGI	World Governance Indicator
WDI	World development indicator
UN	United Nations
UN ECA	UN economic commission for Africa
UN CTAD	UN conference on trade and development

Chapter One

1. Introduction

1.1 Background of the study

Historically economic growth has been involved with a change in the composition of gross domestic product (GDP) and most of the developed countries of today went from being primarily agricultural economies to primarily manufacturing and, then, to services. This phenomenon described as, structural transformation, has started to be seen as the source of the economic growth and recovery by Kuznets (1973: 251) and Chenery & Syrquin (1975). Syrquin (1994: 5) emphasizes the existence of a strong relationship between development level/growth and structural transformation with economic structure.

Kuznets (1971) identified structural transformation as one of six stylized facts of economic development and distinguished between two phases of structural transformation. In the first phase of structural transformation, an economy allocates most of its resources to the agricultural sector. As the economy develops, resources are reallocated from agriculture into industry and services. In the second phase, resources are reallocated from both agriculture and industry into services.

According Timmer et al. (2012), structural transformation is both the cause and effect of economic growth. They define structural transformation as a process by which (a) the shares of agriculture in GDP and employment fall over time (b) there is increased migration as people move from rural to urban areas, (c) an agriculture and rural sector based economy is replaced by an industrial and urban sector based economy, and (d) a demographic transformation whereby high birth and death rates are replaced by low birth and death rates. According to these scholars, any existing dualism between the agricultural and the non-agricultural sectors gradually disappears over time.

Recently there has been a growing interest in the study of structural transformation. These growing interest and emphasis has led to a rapidly expanding body of theoretical and empirical work. Large datasets have been compiled to document regional patterns—with varying degrees of sector disaggregation and country coverage. Nevertheless, there has been limited study in Africa due to data constraints (McMillan & Headey, 2014).

A review of structural transformation is also provided in a recent paper by Herrendorf, Rogerson, and Valentinyi (2011). Their research reflects a growing realization that dual economy models may be more useful than the Solow model for studying growth processes in developing countries (as argued in Temple, 2005).

Cognizance of this, in Africa, a new and a more optimistic narrative on structural transformation is emerged from a series of high level reports—the 2014 African Transformation Report (ACET 2014), the African Union’s Agenda 2063 (AU 2015), the African Development Bank’s (ADB 2015), the UN Economic Commission for Africa’s 2013 report (UNECA 2013), UNCTAD’s 2012 report on structural transformation (UNCTAD 2012), multiple recent IMF papers (IMF 2013, among others), which point to the fact that Africa’s recent progress is not based solely on natural resources (McKinsey Global Institute 2010).

African countries since the early 2000s has registered strong economic performance which has frequently been attributed to high commodities prices, sound economic policies, political stability and institutional reforms—among others. However, the fast economic growth has not delivered commensurate socioeconomic benefits, while current growth rates might be difficult to sustain (McKay, 2013; Rodrick, 2014; UNECA, 2014). This can be partly attributed to the lack of structural change. Relative shifts in the structure of production—from agriculture to industry and services—have rarely been followed by a concomitant relocation of labor, which undermines the effect and sustainability of the growth process.

A recent report on economic transformation and poverty reduction in Africa found that the region’s economies are developing in unexpected ways. The region is largely “bypassing industrialization as a major driver of growth and jobs” (World Bank, 2014). While the role of structural transformation in economic development is structural transformation are not well explored in Africa in general and in Ethiopia in particular.

UNECA (2015 b) emphasizes the importance of international trade in the process of structural transformation process. In particular, it stresses the necessity of encouraging intra-African trade (which is at a low level) and arriving at an African consensus on international trade policy including on tariffs, domestic protection for infant industries and the like. Other policy measures considered include the rapid development of human capital, infrastructure development, stimulating FDI flows into the manufacturing sector and capital accumulation.

Dennis and Iscan (2011: 887) remark the negative relationship between the employment share of agricultural sector and real income per capita shall provide the transformation of the labor employed in agricultural sector to a country with high income level as a result of the reallocate between sectors. Structural transformations caused several characteristic changes such as total factor productivity in economy and it is the determinant of GDP elasticity (Moro, 2011: 403).

As with many African countries, In Ethiopia, economic growth has so far been rapid, broad based, pro-poor and sustainable. Despite high and sustained growth, however, structural transformation has been slow. Recent trends indicate that the service sector has slowly taken over the lead from agriculture in terms of its contribution to the gross domestic product (GDP). Whereas the share of manufacturing sector in GDP stagnated compared to the other sub sectors.

According to the AfDB (2014), Ethiopia is one of the fastest- growing economies in the world— with an average real gross domestic product (GDP) growth rate of 11% since 2004—a remarkable achievement considering that this growth has not been fueled by natural resources. However, the GDP growth has not been accompanied by structural transformation. For example, the manufacturing sector is contributing a small share of GDP.

Hence, bringing about structural change of the economy is key objective of the Ethiopian economy and structural change is envisaged to be measured through two main indicators: (i) increasing the share of manufacturing industry in GDP; and (ii) increasing the share of export earnings in GDP (NPC, 2016). Past studies shows the pace of structural transformation is slow and characterized by high share of agriculture in total GDP & employment. The manufacturing and industry is at infant stage which makes the aspiration to reach middle income country a daunting task. Thus the lag in structural transformation is one of the striking features of the economy. So, conducting study in structural transformation is of paramount importance and timely and this study focuses on Ethiopia, with a view to uncovering the main determinants of structural transformation.

1.2 Statement of the Problem

Economic history shows the process of structural transformation across countries are similar. As an economy moves from lower to higher stages of development, output and employment shifts

from primary agriculture sector to secondary industrial and tertiary service sectors. Today the history of Ethiopia is changing from drought, famine, war and low economic growth to fast and sustainable economic growth. The Ethiopian economy shows an annual growth rate of 12.7% in the year 2004/05 and the annual average growth rate at a constant price was 11% for the period 2004/05 to 2012/13 (NBE, 2011/12).

The recent emphasis on structural change has led to a rapidly expanding body of theoretical and empirical work. Large datasets have been compiled to document regional patterns—with varying degrees of sector disaggregation and country coverage. Nevertheless, there has been limited study in Africa due to data constraints (McMillan & Headey, 2014).

African countries since the early 2000s has registered strong economic performance which has frequently been attributed to high commodities prices, sound economic policies, political stability and institutional reforms—among others. However, fast economic growth has not delivered commensurate socioeconomic benefits, while current growth rates might be difficult to sustain (McKay, 2013; Rodrick, 2014; UNECA, 2014). This can be partly attributed to the lack of structural change. Relative shifts in the structure of production—from agriculture to industry and services—have rarely been followed by a concomitant relocation of labor, which undermines the effect and sustainability of the growth process.

In Ethiopia, Real GDP growth averaged 10.1% per annum for the past decades; However, there has been limitation in terms of structural transformation as a result the manufacturing industry in GDP remained low owing to slow pace of structural transformation (NPC,2016).

A study conducted by Martin (2015) reveals that there has been a sharp decline in the share of agriculture in GDP from about 55% in 1999 to 42% in 2013—a decline of 13 percentage points. However, this has not been accompanied by a commensurate increase in the share of a manufacturing, and the employment share in industry and service sector. But his studies examined the share of the main economic sectors in GDP.

Mengistu (2009) assesses the effects of human and physical capital on structural change (through export diversification) in Sub-Saharan Africa (SSA) and East Asia from 1975-2004. Using the feasible generalized least squares technique on 30 years of panel data for 41 countries, the results show that domestic investment and human capital are important factors for stimulating

diversification in both regions. However, the effect of Foreign Direct Investment (FDI) is found to be insignificant in SSA, which seems to imply that the FDI to SSA is below the threshold level required to induce a process of structural change. But his study doesn't include variables such as urbanization, network index and trade openness. So this study is not based on comprehensive variables thought to affect structural change.

World Bank report (2016) examined the declining share of agriculture in the national outputs from 57 percent in 1999 to 42 percent in 2011; However, agriculture continued to dominate employment and workers have been moved mainly into services as opposed to manufacturing.

Using rural urban computable general equilibrium model, Ayele Gelan, investigates the effect of trade liberalization on structural transformation and overall growth of economy. Dabla-Norris et al. (2013), for example, use several variables covering policy and institutional factors, as well as country 'fundamentals'. Nonetheless, it should be noted that their study evaluates differences in output structures.

In a nut shell, prior research conducted in Ethiopia, by and large, attempted to examining (a) trends, pace, and patterns of structural transformation (b) the contribution of the within and between effects productivity to aggregate growth and (c) analyzing the sectoral shifts. There are no prior studies aimed at investigating determinants of structural transformation macroeconomic and policy variables, even if there are such kind of studies, they were not based on comprehensive variables.

Therefore, this study aspires to fill this gap and empirically analyze the determinants of structural transformation in Ethiopia during the specified period of time. The study adds to the existing literature by providing an empirical analysis of the major drivers of structural transformation.

1.3 Objective of the study

The general objective of the study is to investigate the determinants of structural transformation in Ethiopia in the specified periods.

Specifically, the study will have the following specific objectives

- ✓ To analyze the trends of structural transformation in Africa.
- ✓ To identify the short and long-term determinants of structural transformation in Ethiopia.

1.4 Study questions

There are many economic and non-economic factors affecting structural transformation in Ethiopia. To meet the aforementioned general and specific objectives, the study sought to answer the following study questions.

- ✓ What are the major determinants of structural transformation in Ethiopia?
- ✓ What is the observed trend of structural transformation in Africa?
- ✓ Is there a long run relationship among the selected macroeconomic variable?

1.5 Significance of the study

Many studies carried out so far in this area have dealt with trend analysis, pace and pattern study and sectoral shift analysis. Prior research attempt has been towards understanding share of gross value added, employment and labor productivity across the main economic activities. In Ethiopia in particular, studies on determinants of structural transformation has not well explored. This is not to say there are not any prior study, however, empirical studies carried out in both developed and developing countries examined are cross country studies. In Ethiopia examining determinants of structural transformation using macroeconomic determinants such trade openness, physical capital, human capital, networks, educational attainment etc. is non-existent.

Because one can be believing that a continuous and multi-disciplinary rigorous study is required to take the policy implications seriously as relevant to Ethiopia. Therefore, this study tried to provide comprehensive evidence on the selected determinants of structural transformation in Ethiopia during period of 1981 -2015.

The issue of determinants of structural transformation is still on debate, therefore, the significance of this study is to provoke and lead a path for further studies in the field. But its immediate outcome is for policy makers as a bench marks. Students who will do their study in structural transformation will also benefited to greater extent as there is very few study conducted on the determinants of structural transformation in Ethiopia.

1.6 Limitations of the study

This study is limited to the period between 1981-2015, which covered 34 years of time-series data on macroeconomic and policy variable that can affect structural transformation. The limitation of this study was the one associated with data availability. There is shortage of data for critical variables such as age dependency ratio, Network index (proxied telephone subscriber), educational attainment, foreign aid, particularly, for the period 1981-2015. Because of this problem, some variables are substituted by others. However, for some (e.g. network index) proxy measurements have been used.

The main aim of this study was to analyze the macroeconomic determinants of structural transformation. However, there are also non-economic factors that affecting structural transformation like political stability, rules of economic regulation, and rules of law (property right) which are not addressed here and might be consider other limitations of this study. In this study the main data source is the World Development Indicators (WDI). Table 3.1 shows the list of variables included for the analysis, and more information regarding the chosen variables is discussed later on in chapter three.

1.7 Organization of the study

The remaining part of the thesis is organized as follows. Chapter two is dedicated to the reviews of the theoretical and empirical literature related to the determinants of structural transformation. Chapter three outlines the methodologies and methods of the study: included are study design, data source and types, model speciation, estimation procedure and variable definition. In chapter four, the structure of the Ethiopian economy is presented. Chapter five describes the econometric and descriptive results of the study. The last chapter, summarizes and concludes.

Chapter Two

2. Literature Review

This section of the study provides a brief description of pertinent theoretical and empirical literatures underpinning the study. Specifically, the chapter depicts definitional & measurement issues; narrates the theories of economic development; and discuss mechanisms & determinants of structural transformation. The chapter then culminates with a review of relevant empirical studies for the globe, African and Ethiopia.

2.1 Conceptualizations of Structural Transformation

The economic growth literature has largely relied on theoretical models underpinned by an aggregate production function – such as Solow’s neoclassical growth model – thus emphasizing the role of economy-wide factor accumulation and productivity. Critiques of one sector model however, have contributed to a renewed interest in dual economy models and the role of structural change in the growth process (McMillan and Heady, 2014).

Kuznets (1957), Chenery (1960), and Chenery and Taylor (1968) uncovered important stylized facts on the relationship between a country’s economic structure and its income level. This literature posits that structural change is a key characteristic and driver of economic and social development. In fact, the historical experience of developed and emerging economies confirms that sustained economic development requires structural change.

Although structural transformation has been defined in different ways, the most common meaning refers to long-term and persistent shifts in the sectoral composition of economic systems (Chenery and others, 1986; Syrquin, 2007). More specifically, it is associated with modifications in the relative importance of different sectors over time, measured by their share of output or employment. Other aspects taken into account are changes in the location of economic activity, such as the urbanization process, or in a broader sense, changes in the institutional environment.

Kuznets (1966) provided the broader definitions of structural change and go beyond changes in economic structure – such as production and employment – as they also encompass changes in other aspects of society. For instance, structural change may entail a spatial reorganization of the

population (through rural-urban migration) and demographic change (arising from lower fertility rates).

To recap, structural transformation, also denoted as structural change in this study, is defined as the transition of an economy from low productivity and labour-intensive economic activities to higher productivity and skill intensive activities. The driving force behind structural transformation is the change of productivity in the modern sector, which is dominated by manufacturing and services.

It is also characterized by the movement of the workforce from labour-intensive activities to skill-intensive ones. The movement of labour is severely affected by the existence of opportunities in skill-intensive sectors because, even if these opportunities exist, labour might only move to a new sector if it is properly trained to be absorbed by the sector. The existing labour force would therefore require requisite training before moving to the new sector.

In summary, the most significant and distinguished changes in the economic structure that one encounters in the literature are the following:

- A. Changes (increase) of the accumulation rates (Rostow, Lewis),
- B. Changes of the sector composition of the economic activities, initially focused on the allocation of the employment (Fisher, Clark), and later on production and application of the factors (Kuznets, Chenery),
- C. Changes in the location of economic activities, and
- D. Other aspects of changes of economic structure (demographic, distribution of income, etc.) (Syrquin, 1988).

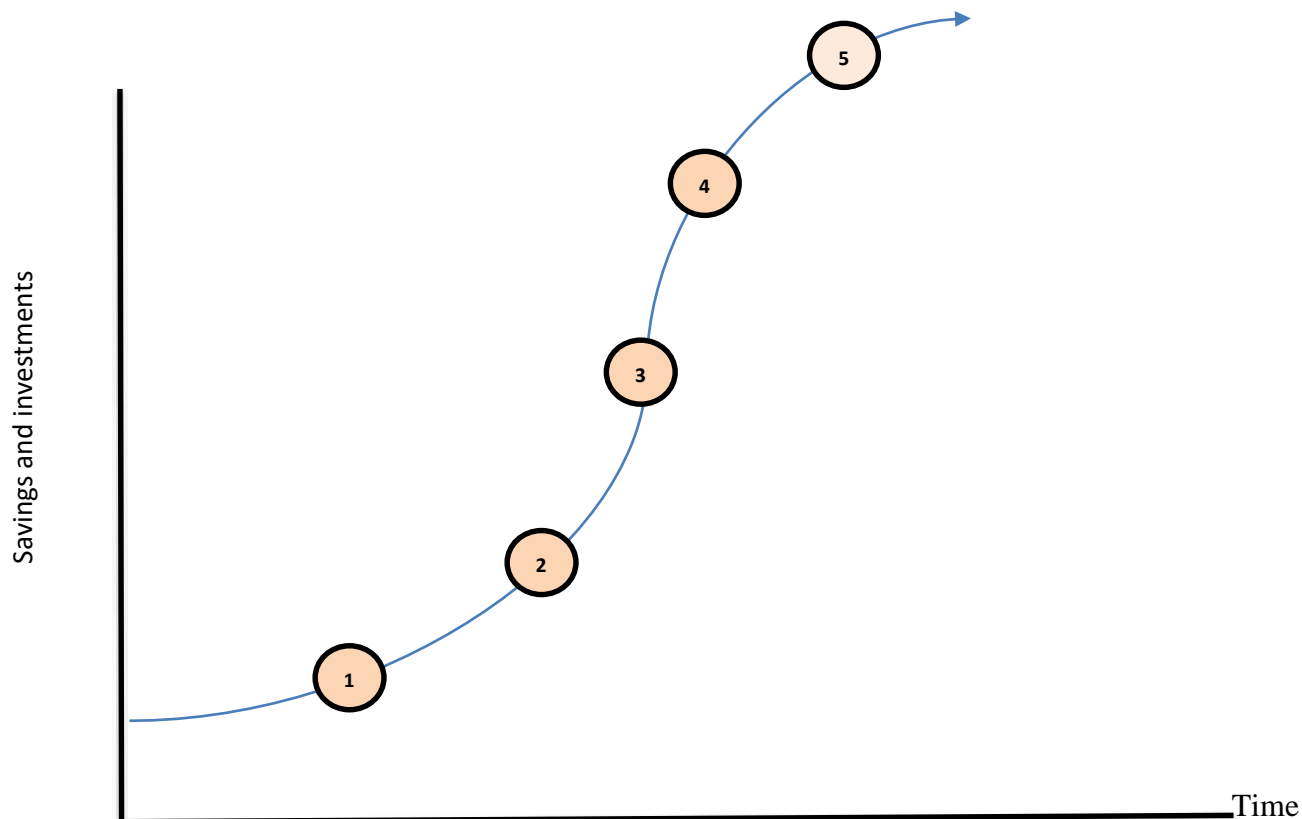
2.2 Theories of Economic Development

2.2.1 Classical Theories of Economic Development

The Linear Stages of Growth Models: Economic development models formulated in the early years after the World War II focused on massive injections of capital to achieve rapid GDP growth rates. The two famous models are Rostow's stages growth model and the Harrod–Domar model (Todaro and Smith 2009). Rostow (1960) identified the transition from underdevelopment to development would pass through five stages: the traditional society, the preconditions for take-off, the take-off, the drive to maturity and the age of high mass consumption. The decisive stage is the

take-off, through which developing countries are expected to transit from an underdeveloped to a developed state.

Figure 2.1: Rostow's five stage model of economic development



Source: (Potter, Binns, Elliot & Smith, 1999:51)

1 Traditional Society: Traditional societies are characterized by nature and limitation of technology. Thus more than 75 percent of labor force is occupied in agricultural activities. Low Social mobility and great division of wealth and political power were recognized as other main features. According to Rostow, the traditional society is characterized by subsistence agriculture or hunting and gathering; almost wholly a "primary" sector economy; Limited technology; and A static or 'rigid' society: lack of class or individual economic mobility, with stability prioritized and change seen negatively.

2 Pre-conditions for self-sustaining growth

According to Rostow, pre-condition of takeoff were characterized by change in political and social transition from feudalism (Thirwall, 2006). Thus the stage between feudalism and takeoff is called

as transitional stage. The main economic requirement in the transition phase is the level of investment should be increased at least to 5- 10 percent of national income to ensure self-sustaining growth. The main direction of investment is for developing physical and social infrastructure i.e. transport. There are three important dimensions to this transition: firstly, the shift from an agrarian to an industrial or manufacturing society begins, albeit slowly. Secondly, trade and other commercial activities of the nation broaden the market's reach not only to neighboring areas but also to far-flung regions, creating international markets. Lastly, the surplus attained should not be wasted on the conspicuous consumption of the land owners or the state, but should be spent on the development of industries, infrastructure and thereby prepare for self-sustained growth of the economy later on.

Take off: The characteristics of takeoff is sometimes difficult to distinguish from the stage of pre-condition to take off. However, since the pre condones for the takeoff have been met in the transition stage, take off is a short stage of development that takes nearly two decades. Development become self-sustaining and investment must rise exceeding 10 percent of national income so as to increase per capita income and level of investment. According to historical records, domestic finance for takeoff has fulfilled through two main sources i.e. agricultural taxes, rents (Meiji reforms, Japan, and voluntary investment by land lords. According to Rostow there are three main requirements for take-off:

- ✓ "The rate of productive investment should rise from approximately 5% to over 10% of national income or net national product.
- ✓ The development of one or more substantial manufacturing sectors, with a high rate of growth;
- ✓ The existence or quick emergence of a political, social and institutional framework which exploits the impulses to expansion in the modern sector and the potential external economy effects of the take-off" I.e., the needed capital is mobilized from domestic resources and is steered into the economy and not into domestic or state consumption.



- ✓ Drive to Maturity: Rostow defines it as the period when a society has effectively applied the range of modern technology to the bulk of its resources." Now regularly growing economy drives to extend modern technology over the whole front of its economic activity. Some 10-20% of the national income is steadily invested,

permitting output regularly to outstrip the increase in population. The make-up of the economy changes unceasingly as technique improves, new industries accelerate, and older industries level off. The economy finds its place in the international economy: goods formerly imported are produced at home; new import requirements develop, and new export commodities to match them. The leading sectors will in an economy be determined by the nature of resource endowments and not only by technology.

5 **Age of Mass Consumption:** The age of high mass consumption refers to the period of contemporary comfort afforded many western nations, wherein consumers concentrate on durable goods, and hardly remember the subsistence concerns of previous stages. Rostow uses the Buddenbrooks dynamics metaphor to describe this change in attitude. In Thomas Mann's 1901 novel, *Buddenbrooks*, a family is chronicled for three generations. The first generation is interested in economic development, the second in its position in society. The third, already having money and prestige, concerns itself with the arts and music, worrying little about those previous, earthly concerns. So too, in the age of high mass consumption, a society is able to choose between concentrating on military and security issues, on equality and welfare issues, or on developing great luxuries for its upper class. Each country in this position chooses its own balance between these three goals. There is a desire to develop an egalitarian society and measures are taken to reach this goal. According to Rostow, a country tries to determine its uniqueness and factors affecting it are its political, geographical and cultural structure and also values present in its society. Historically, the United States is said to have reached this stage first, followed by other western European nations, and then Japan in the 1950s.

Like Rostow's stages growth model, the Harrod–Domar model emphasized that the prime mover of the economy is investments (Ghatak 2003). This means every country needs capital to generate investments and with a target growth rate, the required saving rate can then be known. If domestic savings were not sufficient, foreign savings would be mobilized. Although Rostow (1960), Harrod (1948) and Domar (1947) were right about the important role of investments that is most closely correlated with the economic growth rate, this is not the only condition for a country to develop. The key weakness of these models lies in their simplifying assumptions.

The basic equation in the model is:

$g = s/c$ where, g is the growth rate of national income

$s = S/Y$ is the ration of saving to income Y

C is the marginal capital-output ratio

Structural Change Models: During most of the 1960s and early 1970s, economists generally described the development process as structural change by which the reallocation of labor from the agricultural sector to the industrial sector is considered the key source for economic growth. Two well-known representatives of this approach are the two-sector model(Lewis1954).

In Lewis' (1954) two-sector model or theory of surplus labor, labor increasingly moves away from the agricultural sector to the industrial sector. However, with unlimited supply of labor from the traditional sector, these transferred workers continually received only subsistence wages. The excess of modern sector profits over wages and hence investments in the modern sector continued to expand and generate further economic growth on the assumption that all profits would be reinvested. Both labor transfer and modern sector employment growth were in turn brought about by output expansion in that sector. This process of modern sector self-sustaining growth and employment expansion facilitated the **structural transformation** from a traditional subsistence economy to a more modern developed economy to take place.

The structural change models focused on the pattern of development and hypothesized that the pattern was similar in all countries and was identifiable. However, empirical works, such as Chenery (1960), Chenery and Taylor (1968), and Chenery and Syrquin (1975), on the process of structural change does recognize that pattern of development can be different among countries, which is dependent on the countries' particular set off actors including "a country's resource endowment and size, its government's policies and objectives, the availability of external capital and technology, and the international trade environment" (Todaro and Smith 2009, p. 120).

International Dependence Models: The international dependence theory was very popular in the 1970s and early 1980s. The dependence theorists argued that underdevelopment exists because of the dominance of developed countries and multinational corporations over developing countries. The theory is considered an extension of Marxist theory (Hein 1992). The poor countries are said to be dependent on the developed countries for market and capital. However, developing countries

received a very small portion of the benefits that the dependent relationship brought about. The unequal exchange, in terms of trade against poor countries, made free trade a convenient vehicle of “exploitation” for the developed countries. Developed countries can exploit national resources of developing countries through getting cheap supply of food and raw materials. Meanwhile, poor countries are unable to control the distribution of the value added to the products traded between themselves and the developed countries (Cohen 1973; Dos Santos 1973). The growth of international capitalism and multinational corporations caused poor countries to be further exploited and more dependent on the developed countries. Poor countries therefore could not expect sustained growth from that dependence. Following the international dependence theory, developing countries should therefore end the dependence by breaking up their relationships with the developed world, as well as by closing their doors on the developed countries (Elkan 1995; Ghatak 2003; Ferraro 2008).

Neoclassical Counter-Revolution Models: last, in the 1980s, neoclassical counter-revolution economists used three approaches, namely the free market approach, the new political economy approach and the market-friendly approach, to counter the international dependence model. In contrast with the international dependence model, these approaches mainly argued that underdevelopment is not the result of the predatory activities of the developed countries and the international agencies but was rather caused by the domestic issues arising from heavy state intervention such as poor resource allocation, government-induced price distortions and corruption (Meier 2000). Neoclassical economists focused on the market to find a way out for the developing countries.

2.2.2 Contemporary Theories of Economic Development

New Growth Theory: Endogenous growth or the new growth theory emerged in the 1990s to explain the poor performance of many less developed countries, which have implemented policies as prescribed in neoclassical theories. Unlike the Solow model that considers technological change as an exogenous factor, the new growth model notes that technological change has not been equal nor has it been exogenously transmitted in most developing countries (World Bank 2000). New growth theorists (Romer 1986; Lucas 1988; Aghion and Howitt 1992) linked the technological change to the production of knowledge. The new growth theory emphasizes that economic growth results from increasing returns to the use of knowledge rather than labor and capital. The theory argues that the higher rate of returns as expected in the Solow model is greatly eroded by lower

levels of complementary investments in human capital (education), infrastructure, or study and development (R&D).

Theory of Coordination Failure: The foundation of the theory of coordination failure is the idea that the market may fail to achieve coordination among complementary activities. When complementariness exists, that is when returns of one investment depend on the presence or extent of other investments, there exist two scenarios. On the one hand, optimally, all investors as a whole are better off with all investments to be achieved at the same time. On the other hand, it would not make sense for an investor to take similar actions when he believes that others may not do the same as well. The market is said to have failed to coordinate investors' actions in this way. Coordination failure therefore leads the market to an (equilibrium) outcome inferior to a potential situation in which resources would be optimally allocated and all agents would be better off. As a result, underdevelopment equilibrium is possible (Hoff and Stieglitz 2000). The theory of coordination failure became influential in the 1990s. However, it has a history of more than half a century. Coordination issues among complementary industries were first raised by Rosenstein-Rodan (1943). Like Rosenstein-Rodan (1943), early coordination failures economists Nurkse (1953) and Hirschman (1957) emphasized the role of the government to solve the problem.

2.3 Sources of Transformation

2.3.1 *Technology-led Productivity growth*

Lewis' dual economy theory was the first seminal contribution to understanding how technology led productivity growth in the industrial sector leads to economic transformation (Lewis 1954). Observations on the streets of Bangkok inspired Lewis to hypothesize the existence of a large traditional sector in which "the marginal productivity of labor is negligible, zero or even negative" in many low income developing countries (Lewis 1954: p140, Lewis 1979). The difference between a leading modern sector (often the industrial sector) with higher productivity and a lagging traditional sector (often the agricultural sector) with lower productivity, combined with an unlimited supply of labor from this traditional sector (which keeps economy-wide wages down), allows production to grow in the economy through the migration of labor from the traditional sector to the modern sector. Led by productivity growth in the modern sector, the dual economy will eventually converge to a mono economy with equalization in the economy-wide marginal productivity of labor and full employment.

2.3.2 Rapid Capital Accumulation

As discussed throughout this study, early development economists in the 1950s and 1960s emphasized the role of capital investment in industry as a means for rapid growth and transformation in low-income countries (Chenery 1960, Kuznets 1961, Rosenstein- Rodan 1964). This view is supported by the successful reconstruction in post-World War II Europe', where investments in infrastructure and industry were an important component of rapid economic recovery and growth (Krueger 1988).

Several empirical studies have confirmed the important role of capital accumulation in rapid growth, showing that the share of investment in GDP increases significantly during the transformation process (Kuznets 1961, 1966; Syrquin and Chenery 1968). To finance these investments (and subsequent industrialization), early development economists paid special attention to increasing a country's saving rate. Against this background, the dual economy model treated the agricultural sector as a surplus provider to finance the process of industrialization. This rationale served as a major argument for developmental planners to introduce agricultural export taxes, high tariff protection in industry and other measures (e.g. overvalued exchange rates) aimed at transferring resources from agriculture to industry (Krueger et al. 1991). Schultz argued that the accumulation of capital is a necessary but not sufficient condition for transformation, especially in the case of agriculture (Schultz 1964). In this view, the profitability in the agricultural sector is low when agriculture employs only traditional factors. Low returns to agricultural investment explain the minimal saving behavior of farmers and the low accumulation rate of traditional factors.

2.3.3 The Role of Linkages

While productivity growth and capital accumulation are important elements of transformation, together with changes in consumer demand (which are not discussed in detail herein), they also further enhance economic inter-linkages during the transformation process. Hirschman (1958) was among the first development theorists to emphasize the backward and forward linkages created by capital investments in the industrial sector. Johnston and Mellor (1961) thereafter extended this concept by going beyond industrial sectors and explicitly emphasizing the interactions between agricultural and non-agricultural sectors. In this view, agriculture should not be seen merely as a source of surplus to support industrialization, but as a dynamic source of growth, employment and more equal income distribution.

Inter-sectoral relations between agriculture and non-agriculture will likely determine the course of transformation in many developing countries. While the share of agriculture in the economy will decline over the longer run as transformation progresses, successful agricultural development in the short- and medium-run is a prerequisite for transformation (Meier 1989).

This dynamic role of agriculture is embodied in the process of transforming traditional agriculture into a modern sector, as this process enhances both consumption and production linkages between agriculture and non-agriculture and between rural and urban areas. The backward linkages occur through increased demand of agriculture for modern inputs, such as fertilizer (produced by the manufacturing sector), and marketing and trade (provided by service sectors). The strongest backward linkages are the consumption linkages, which are especially strong in low-income countries, leading to higher growth multipliers and poverty reduction effects (Delgado et al. 1996, Christiaensen et al. 2006, Diao et al. 2007, World Bank 2007). A stagnant agricultural sector is therefore likely to inhibit industrial and service sector growth (because the farmers lack purchasing power), whereas agricultural productivity growth will allow higher agricultural output at lower costs. This allows agriculture to provide cheap raw materials for various industries (e.g. food processing), thereby opening up opportunities for the development and diversification of food manufacturing and marketing activities.

2.3.4 The Roles of Market, Institutions, and Governments in Transformation

Institutional change in general and market development in particular are necessary parts of transformation. As stated by Matthews (1986), the choice of technique or institution may affect both institutional change and market development, albeit in opposite directions. Most economists agree that the quality of institutions can explain differences in growth and transformation processes by shaping incentives to develop new technologies and innovation (Rodrik et al. 2004, Easterly and Levine 2003). Moreover, by drawing lessons from studies in several countries, Rodrik finds that the onset of the transformation process does not necessarily require extensive institutional reform, but rather institutional reform should be seen as an endogenous part of the transformation process (Rodrik 2003). The lack of market institution development and investment in infrastructure and information systems results in high transportation and transaction costs, forcing farmers to remain within a traditional, subsistence mode of production. Moreover, increased use of modern inputs and growing agricultural production can significantly increase the market and profitability risk of small farmers in the process of transformation, further lowering their incentive to adopt any new technology.

The active role of the state in transformation during the 1950s and 1960s was based on the optimistic view that transformation or development in general can be accelerated by a defined series of policies and direct public interventions. The pre-World War II economic crisis, the existence of market underdevelopment, and the pervasiveness of market failure in developing countries forced many governments to engage in central planning. Additionally, the apparent initial success of central planning in many Eastern Bloc countries further encouraged governments to rely on the “commanding heights” of the state rather than the market (Yergin and Stanislaw 1998). The core elements of this strategy included planned investment in capital accumulation, utilization of rural surplus labor reserves, adoption of import substitution industrialization (ISI) strategies, and a series of policy interventions in international trade and domestic markets.

2.4 Mechanisms and Measures of Structural Transformation

2.4.1 Mechanisms of Structural Transformation

According to Timmer et al. Four quite relentless and interrelated **processes** define the structural transformation process:

- i. A declining share of agriculture in gross domestic product (GDP) and employment,
- ii. The rapid process of urbanization as people migrate from rural to urban areas,
- iii. The rise of a modern industrial and service economy, and
- iv. A demographic transition from high to low rates of births and deaths.

The final outcome of structural transformation is an economy and society where agriculture as an economic activity has no distinguishing characteristics from other sectors, at least in terms of the productivity of labor and capital, or the location of poverty.

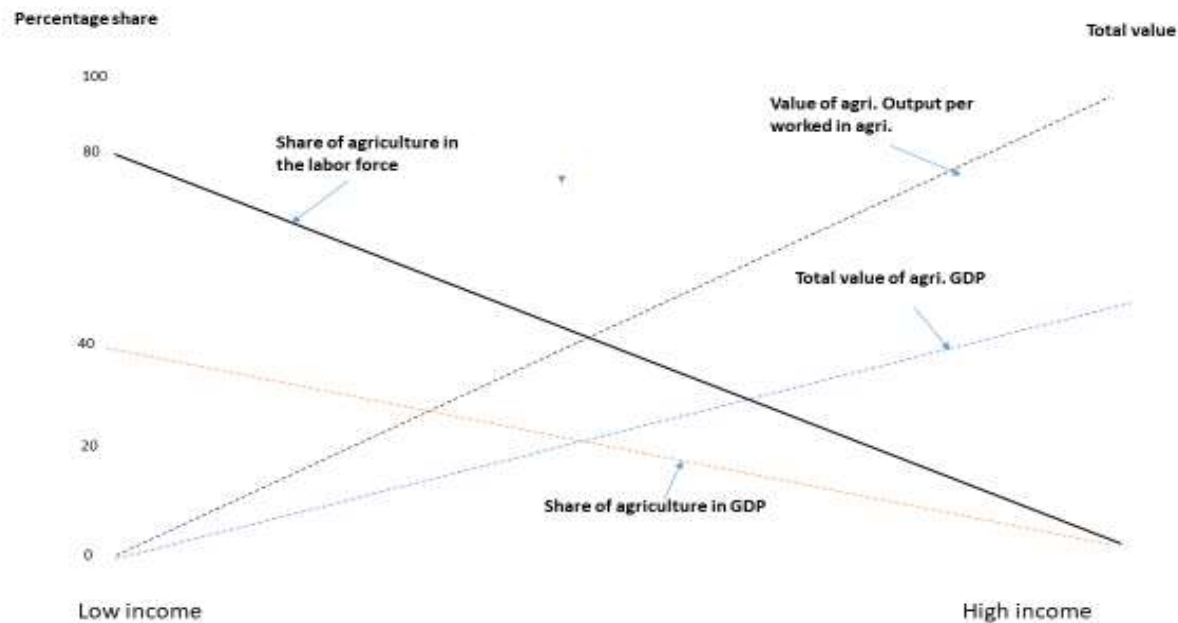
The process of structural transformation is a progressive one and entails transfer of resources from less productive activities to more productive ones (Usui, 2011). **First**, economic structure changes significantly during the transformation period, when industrialization triggers a rapid increase in the share of manufacturing in the economy, and a concomitant decline in agriculture’s share (Chenery 1960, Kuznets 1966, Chenery 1968). **Second**, the share of the total labor force employed in the agricultural sector falls, while that in other economic sectors rises. However, that does not imply an absolute decline in the number of laborers employed in the agricultural sector, as the share of agricultural employment in the total labor force can decline relatively slowly compared with declines in the agricultural sector’s GDP share in the economy (Fisher 1939, Hayami and

Ruttan 1985). **Third**, within this process, the center of the country's economy shifts from rural areas to cities, and the degree of urbanization significantly increases (Kuznets 1966, Stern et al. 2005). Thus, transformation also involves the modernization of a country's economy, society and institutions.

Kuznets describes the necessary adjustments in society and institutions during transformation as a "controlled revolution" (Kuznets 1973: p252). Shifts in production structure lead to changes in incentive structures, educational requirements, and the relative positions of different groups in society. Urbanization leads to shifts in family formation, gender relations and personal status. Changes in transport and communication services open up less favored areas and connect factor and commodity markets.

Figure 1 illustrates the dynamics of structural transformation. Although, it shows the share of agricultural labor in the total labor force and the contribution of agriculture to overall GDP—both declining smoothly until parity is reached when a country is "rich"—the actual relationship between the two shares depends critically on the pace of change outside of agriculture and on the labor intensity of those activities. Figure 1 also shows a basic but often-overlooked fact about the "failure" of agriculture to grow as quickly as the rest of the economy and thus to decline as a share of GDP and in the labor force: despite structural transformation, agricultural output continues to rise in absolute value.

Figure 2.2: Schematic illustration of structural transformation.



Source: Peter Timmer (2012)

2.4.2 Measures of Structural Transformation.

The three most common measures of economic activity at the sectoral level are employment shares, value added shares, and final consumption expenditure shares. Employment shares are calculated either by using workers or hours worked by sector, depending on data availability. Value added shares and final consumption expenditure shares are typically expressed in current prices (“nominal shares”), but they may be expressed in constant prices also (“real shares”). Employment shares and value added shares are related to production whereas final consumption expenditures are related to consumption.

Production measure of structural transformation: The production measure of structural transformation analyzes the sectoral changes in employment and value added shares in the gross domestic product (GDP) as economies grow. That is, structural transformation is said to occur when the increase in GDP per capita is associated with a decrease in both the employment share and the share in agriculture, and increases in both employments share and the value added share in services and industry.

As departure from the conventional measures of structural transformation, socio-demographic indicators as a measure of structural transformation is widely employed. The socio-demographic

dimensions are captured by the level of urbanization, demographic transition, and human capital accumulation. The rationale behind these measures is that as the historical evidence shows high rates of growth in per capita income in the developed world were accompanied by rapid shifts in production and social structure mainly referred to as industrialization and/or urbanization accompanied by shifts in demographic patterns, an increasing input into human capital through formal education, and shifts in sets of values that largely conform to the opportunities and requirements associated with modern urban life. The demographic transition from high fertility/high mortality rate to low fertility/low mortality is also considered as one aspect of structural transformation.

Shift-share analysis methods: The shift-share decomposition method is an example of the accounting-based approach designed to analyze the effect of structural change on productivity growth. As described by Fagerberg (2000: 400), the shift share decomposition “is a purely descriptive technique that attempts to decompose the change of an aggregate into a structural component, reflecting changes in the composition of the aggregate, and changes within the individual units that make up the aggregate. The method is derived as follows.

Let P = labor productivity, Q = value added, N = labor input in terms of worker-years, and I = industry ($i = 1, \dots, m$). Then, we can write labor productivity as:

$$P = \frac{Q}{N} = \frac{\sum_i Q_i}{\sum_i N_i} = \sum_i \left[\frac{Q_i N_i}{N_t \sum N} \right] = \sum_i [p_i q_i]$$

Where $P=Q/N$ Labor productivity in industry i and S_i the share of industry in total employment.

Shapley decomposition methods: Empirical studies on structural change are invariably focused on the decomposition of labor productivity growth—often measured by output per worker. A broader framework one that provides additional insights, particularly on the contribution of the employment rate and demographic change to output growth can be expressed as:

$$\frac{Y}{N} = \frac{Y}{E} * \frac{E}{E} * \frac{E}{A} * \frac{A}{N}$$

where Y is total output (value added), N is total population, E is total employment, and A is the working- age population. Output per capita is represented by y , while the remaining components

consist of output per worker (w), the employment rate (e), and the relative size of the working-age population (a).

2.5 Determinants of structural transformation

Generally, there are two broad economic mechanisms which drive the observed reallocation of economic activity across sectors. One class of multi-sector general equilibrium models focus on preferences or “demand” factors, with income effects driving the process of structural transformation (Echevarria, 1997, 2000; Bopport, 2011; Kongsamut et al., 2001). A second group of models emphasize relative price effects or “supply factors” to explain the long-run patterns in the sectoral reallocation of resources. Relative price changes and sectoral shifts are generated by having differential rates of productivity growth (Ngai and Pissarides, 2007; Duarte and Restuccia).

2.6 Empirical Literature

In connection with the empirical literature numerous studies have been conducted in structural transformation for cross country difference, panel data approach and time series data in both developed and developing economies using a wide variety of explanatory variables. However, there are few widely agreed on results.

The first quantitative analyses of patterns in the transformation process were by Chenery (1960) and his collaborators (Chenery & Taylor, 1968; Chenery and Syrquin, 1975). The empirical results in McMillan *et al.* (2014) suggest that a higher share of agriculture in employment, a lower share of raw materials in total exports, an undervalued exchange rate, and greater labor market flexibility all contribute to growth-enhancing structural change.

Global-Empirical investigation

In terms of the empirical literature, globally, while there is general recognition of the negative association between output per capita and the agricultural sector’s share across countries, evidence on other proximate determinants of these shifts remains scarce. The results of the empirical study vary across regions and discussed as follows.

To start with Dabla-norris, et al. (2013) documented the stylized facts on the process of structural transformation around the world for a panel of 168 countries over the period 1970-2010. They find

that a large proportion of the cross-country variation in sector shares is accounted by country characteristics that include real GDP per capita, demographic structure, and population size. They find also liberalization of the agriculture sector is negatively related to the real value added share in agriculture, but positively related to manufacturing and services share. Reforms in the electricity and telecommunications sectors are also positive and statistically significant for the services sector share and negative for the agriculture. Additionally, trade openness is strongly correlated with industry productivity but less with services productivity. However, measures of the regulatory environment are strongly correlated with productivity in services. (Duarte & Restuccia, 2010).

McMillan et al. (2014) perform a cross sectional analysis on 38 developing countries (from Africa, Asia and Latin America) to examine factors that help to determine the magnitude of structural change and whether or not it goes in the right direction. According to their results, countries with a comparative advantage in primary products are at a disadvantage. The study documents a negative relationship between the share of natural resources in exports and the productivity enhancing structural change. Moreover, policy variables such as currency undervaluation and labor market flexibility are also found to have a positive effect on structural change.

On the other hand, structural change and transformation are also associated with the structure of export trade. Empirical literature, in this case, shows that structural change of economies depends on the structure and value of country's export. Badibanga, et al. (2009) analyzed the dynamics of structural transformation as reflected by the structure of export trade. They find that China's relatively rapid structural transformation is determined by the high proximity of its export basket to capital goods, consumer durables, and intermediate inputs.

The study by De Souza (2015) employs a growth regression model on 62 developing countries including Sub-Saharan Africa and finds complementarities between agriculture and industrial development, whereby the growth of one percentage point in agriculture leads to the growth of manufacturing by between 0.28 and 0.58 percentage points.

Structural change is also mostly associated with urbanization. One of the important elements of economic transformation is the movement of people and resources out of agriculture and rural areas into services and industry in urban areas (Kolavalli, et al., 2012). Jedwab (2013) documents several stylized facts regarding the processes of urbanization and structural transformation using the cross and within country evidence. According to Jedwab (2013), most developing countries,

especially in Asia have urbanized with structural transformation and resource-rich developing countries, especially in Africa have experienced urbanization without structural transformation. In Africa, thus, the processes of urbanization and structural transformation are disconnected. Contrary to the standard theories of structural transformation, Africa did not urbanize following a green revolution or an industrial revolution, but Africa's urbanization is because of natural resource exports (Gollin, Jedwab, & Vollrath, 2016).

African Experience- Empirical investigation

Some of the empirical literature on structural change/transformation in African countries are discussed below.

De Vries, Timmer, & de Vries (2013) studied recently about the structural transformation in Africa and its implications for productivity growth for 11 Sub-Saharan African countries during 1960 to 2010 by extending the work of McMillan & Rodrik (2011). According to de Vries, Timmer, & de Vries (2013), the expansion of manufacturing activities during the early post-independence period in Africa led to a growth enhancing reallocation of resources. The process of structural change held up in the mid-1970s and 1980s, but in the 1990s, labor mainly shifted to the market services. In addition, the market services activities had above-average productivity levels, but productivity growth was low and increasingly falling behind the world frontier. Therefore, the pattern of static gains but dynamic losses of reallocation since 1990 are observed for many African countries.

According to McMillan and Rodrik (2011), the structural change did not contribute to growth in Africa, despite Africa's high growth performance. They also show that during the period from 1960 to 1975, Africa took a step forward by expanding its manufacturing activities, which was related to growth-enhancing structural change. However, after 1990 market services activities expanded and the productivity levels in market services were above the economy average. The overall effect was a limited role for structural change post-1990, which compares unfavorably to Africa's earlier period of high growth, which is also observed in Latin America, but not in Asia.

In another similar study, McMillan, Rodrik, & Verduzco-Gallo (2014) find that on the average structural change in Africa during 1990–99 was growth reducing but since 2000 labor has moved from low to high productivity activities, contributing to Africa's growth by 1 percentage point per annum. They also identify factors that help determine the extent to which structural change contributes to overall productivity growth. Accordingly, countries with a relatively large share of natural resources in exports experienced growth-reducing structural change. On the other hand, competitive or undervalued exchange rates and labor market flexibility have contributed to the growth-enhancing

structural change. In addition, rural-to-urban migration accompanies structural change as relatively poor rural dwellers leave rural areas for opportunities for income generation in urban areas (McMillan & Headey, 2014).

Morsy et al. (2014) use a regression analysis to identify the main factors that explain the level of structural change across a sample of 28 countries including 7 from Africa. The authors document a greater potential for structural change resulting from increased trade openness, access to credit and an initial surplus labor in agriculture. Similar to McMillan et al. (2014), the specialization in agriculture and primary commodities was also found to be detrimental to structural change.

An analysis for the effect of structural change on the growth performance of Africa is provided by Carmignani and Mandeville (2014). The study documents some stylized facts that point to the reallocation of resources from agriculture to services and the non-manufacturing industry. This results in a positive relationship between sectoral concentration and income per capita and indicates a pattern of structural change with specialization (i.e., without diversification).

Mengistu (2009) assesses the effects of human and physical capital on structural change (through export diversification) in Sub-Saharan Africa (SSA) and East Asia from 1975-2004. Using the feasible generalized least squares technique on 30 years of panel data for 41 countries, the results show that domestic investment and human capital are important factors for stimulating diversification in both regions. However, the effect of Foreign Direct Investment (FDI) is found to be insignificant in SSA, which seems to imply that the FDI to SSA is below the threshold level required to induce a process of structural change.

Szirmai and Verspagen (2015) find a positive and significant effect on the interaction between manufacturing and education, which implies that manufacturing yields positive effects on growth in developing countries with a highly educated workforce. Marouani and Mouelhi (2016) show that, in the case of Tunisia, the enormous investment in tertiary education has had a negative effect on structural change. According to the authors, the increased investment in tertiary education was not accompanied by an improvement in the skills of high value added activities, and without the motivation to invest in this kind of tasks, increasing investment in education is no longer a sufficient condition.

McMillan and Rodrik (2011) examine the effect of globalization on structural change and productivity growth. Transformation of factors of production from less efficient to more efficient gives rise to economic growth, even if there is no productivity growth in overall economy. This is a kind of growth – improving structural change. Dabla-Norris et al. (2013) investigated, the determinants of sectoral output shares in agriculture, manufacturing, and services – rather than structural change as measured by the employment reallocation effect. And concluded that human and physical capital are important for structural change – in addition to a set of initial conditions (e.g. natural resource dominance).

Nickell et al. (2008) examined the role of changes in relative prices, technology, and factor endowments (capital, arable land) in driving changes in the production structure of OECD countries. They find and that low educational attainment among males is associated with a higher share of agriculture in output.

Kochhar et al. (2006) and Jaumotte and Spatafora (2007) examined the relative importance of agriculture, industry, and services in India and Asian economies, respectively, compared to what fundamentals, such as income, population, and the size of the economy, would predict. Dabla-Norris et al. (2013) investigated the determinants of sectoral output shares in agriculture, manufacturing, and services – rather than structural change as measured by the employment reallocation effect. However, the authors also conclude that human and physical capital are important for structural change – in addition to a set of initial conditions (e.g. natural resource dominance).

Ethiopia-Empirical investigation

The literature on structural transformation in Ethiopia is inadequate. In this section, empirical literature on structural transformation are reviewed. To start with, a recent empirical study by Eshete & Kimuyu (2014a) examined the effects of alternative sectoral drivers of economy-wide growth using sectoral TFP in the dynamic CGE model. The finding show that economic openness for the agriculture sector, imported capital goods and services for the industry, and service liberalization for services are the positive drivers and enablers of sectoral total factor productivity in Ethiopia.

Martins (2014), based on data disaggregated into eight sectors for the period 1996–2011, suggests that the structure of output has changed considerably from agriculture to services. Structural change is also accelerating in its pace and relative contribution to output growth. Yet, changes in the composition of employment have lagged behind. In addition, the labor productivity growth in the period has been strong across most sectors, though mainly driven by the within-sector productivity improvements. On the other hand, labor productivity growth has been strong, with output per worker doubling in the past decade. In fact, GVA growth has been mainly driven by labor productivity growth. Conversely, employment elasticities have fallen but remain positive – suggesting that productivity growth was accompanied by employment growth. Moreover, productivity gaps across economic sectors are very large. While within-sector productivity growth accounts for much of the aggregate productivity performance, structural change (i.e. between-sector productivity growth) is playing an increasingly important role.

McMillan and Rodrik (2011) argue that the potential gains in overall productivity growth from sectoral reallocations can be very large. Based on their estimate, Ethiopia’s productivity could increase six-fold by assuming that sectoral productivity levels remain constant and that the inter-sectoral distribution of employment matches that of advanced economies. The potential gain of Ethiopia is positive as compared with other countries in Africa, only lagging behind Senegal and Malawi.

McMillan and Rodrik (2011) also observed a significant degree of heterogeneity across countries in the structural change. Some countries in Africa experienced growth-enhancing structural change, such as Ethiopia and Ghana. They find that in a sample of 38 developed and developing countries, Ethiopia has the second highest contribution of structural change to productivity growth. Strong economic growth may not always help in poverty reduction, because of its failure to generate sufficient productive employment in terms of better jobs.

According to Dorosh, Schmidt, & Shiferaw (2012), although agriculture continues to be the foundation for economic growth and poverty reduction, in Ethiopia government policy slowed rural-urban migration through various regulations including prohibiting the sale of land, loss of land rights for those who leave rural areas, and registration requirements for new migrants. The modes rate of urbanization and slow development of industrial sector inhibited structural transformation in Ethiopia. Therefore, allocation of public investments across sectors along with policies and regulations on land and labor mobility will be important factors for the growth of

Ethiopia's economy and poverty reduction in the coming decade (Dorosh, Schmidt, & Shiferaw, 2012).

Finally, Ferede & Kebede (2015) analyzed the structural change of Ethiopia using decomposition tool. According to their findings, the within-sector productivity represents the largest contribution to aggregate labor productivity growth, accounting for about 66% of total labor productivity growth. The structural effect, which consists of employment and the interaction effects, contributed close to a third of the total labor productivity growth, with the employment effect accounting for about 40% of the total labor productivity growth. The contribution of the interaction effect to the overall labor productivity growth is negative, supporting the structural burden hypothesis. This indicates that sectors with fast-growing labor productivity cannot maintain their shares in total employment. The negative effect can be larger if sectors with high productivity growth are faced with declining employment shares. While agriculture, manufacturing, and electricity and water sectors exhibited declining employment shares with positive labor productivity growth, transport and communication and other services experienced the opposite.

Chapter Three

3. Research Design and Methodology

3.1 Research Approach and design

The study uses quantitative research approach to investigate the determinants of structural transformation. The secondary data was obtained from both published and unpublished document from international organizations and national accounts.

In terms of research design, the study employed an explanatory study design in order to achieve its objectives. It is considered as an appropriate design for analyzing effects and determinants of a particular phenomenon of interest. i.e. Between structural transformation and explanatory variable.

3.2 Data Type and Sources

The study used secondary data obtained mainly from World Development Indicators, NBE, MF and African sector data base. In this study, secondary time series data from 1981-2015 were collected and constructed to investigate the determinants of structural transformation in Ethiopia. Aside, the study assessed the trends of structural transformation for 48 African countries for the year period 1981 to 2015.

The choice of independent variables is constrained by data availability, existence of missing values, as is mostly the case with time-series data. Notwithstanding this constraint, this study used seven variables that are commonly employed in structural transformation. The variables used in the analysis of the determinants of structural transformation includes: Gross capital formation, Share of agricultural value added, Gdp per-capita, Urbanization, Network index, (proxied by fixed telephone line subscriber), and trade openness. Whereas variables used in the analysis of trends in structural transformation in Africa includes: Share of agriculture, share of industry, Share of manufacturing, and Share of service in total GDP.

Table 3.1: Summary of dependent variables and in dependent variables used in the study

Variables	Descriptions	Source	Expected sign
Dependent variable			
Structural Transformation	The real value added value of non- agriculture outputs (manufacturing and services sectors) constructed from the real value added by economic activity series.	WDI	
Independent variables			
GCF	Gross capital formation	MoF	+
SA	Share of agriculture value added in total GDP (constant LCU)	WBI	-
TRO=	Total exports of goods and service	NBE	+/-
NI =	Number of telephone per 100 people. (measure of connectivity)	WBI	+
URB	Urbanization. i.e share of urban population to total population	WBI	+/-
GDPPC	GDP per capita	WBI	+

Source (Evidence): NAMA National Accounts Main Aggregates, WDI World Development Indicators, WEO World Economic Outlook, WESO World Employment and Social Outlook, WGI World Governance Indicators.

3.3 Definition of Variables and Expected Signs

Structural transformation (ST): In this study ST is measured by the sum total of non-agricultural outputs in GDP. This variable is used to measure the level of structural transformation. It is defined as sum of the value of nonagricultural value added output in the total GDP. The data is obtained and constructed from the World Bank World Development Indicators (WDI) database.

Share of Agricultural Value added: Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. Its effect on structural transformation is expected to be negative.

GDP per capita: GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus

any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant local currency. Its effect on structural transformation is expected to be positive.

Urbanization: This is proxied using urban population. Urban population (URB POP): indicates the ratio of urban population to the total population in the economy. The success of a structural transformation is dependent on the transfer of excess labor from the traditional to the modern sector. This is led by a shift in the habitual location from rural to urban areas (McMillan and Rodrik, 2011). However, when industrialization occurs at an unequal, slower pace compared to the rate of urbanization, this gives rise to the activities of the informal sector as well as the non-tradable services, which can further inhibit growth in the long run (Gollin et al., 2016). According to Jedwab (2013), most developing countries, especially in Asia have urbanized with structural transformation and resource-rich developing countries, especially in Africa, have experienced urbanization without structural transformation. In Africa, thus, the processes of urbanization and structural transformation are disconnected. Contrary to the standard theories of structural transformation, Africa did not urbanize following a green revolution or an industrial revolution, but Africa's urbanization is because of natural resource exports (Gollin, Jedwab, & Vollrath, 2016). Thus its effect on structural transformation is could either way.

Network index (proxied telephone subscriber): This is proxied by Fixed telephone subscriptions refers to the sum of active number of analogue fixed telephone lines, voice-over-IP (VoIP) subscriptions, fixed wireless local loop (WLL) subscriptions, ISDN voice-channel equivalents and fixed public payphones. Its effect on structural transformation is expected to be positive.

Trade openness: This refers to the real monetary values of goods and services produced by one country and purchases by citizens of another country. It consists the real values of transactions in goods and services from residents to non-residents. The revenue from exports made the import of inputs possible that are crucial for development purposes there by playing as an engine of growth to other sectors. Exports are expected to have positive effect on structural transformation as it is the main source of foreign currency earnings. According to Melitz (2003), a country's exposure to trade induces the more productive firms to enter the export market, while the less productive firms continue to produce for the domestic market. However, import competition also causes industries

to contract, and this releases labour to the less productive sectors such as agriculture and the informal sector (McMillan and Rodrik, 2011). Its effect on structural transformation is expected to be negative and positive.

Gross Capital Formation (GCF) is defined as Gross capital formation (formerly gross investment) in a country. However, getting such a readymade time series data in Ethiopia is difficult. Therefore, in this study, gross investment was used as proxy of this variable and would have a positive effect on structural transformation.

3.4 Methods of Data Analysis

Relevant descriptive and econometric methods of data analysis have been used in this study. In this study, descriptive statistics summaries such as mean or average values, minimum values, maximum values and standard deviations are included. The econometric analysis includes testing of important tests, the estimation of the model and interpretation of results based on econometric model results. Graphs and tables are used to briefly explain the determinants and trends of the variables used in the model. The statistical package known as E-views software version 9.0 was used.

3.4.1 Model Specification

The general specification of the econometric model is guided by a review of the existing theoretical and empirical literature. The potential determinants that are considered to have an effect on structural transformation includes Urbanization, GDP per-capita, Trade Openness, Gross Capital formation, Agricultural value added, and Network index (proxied by telephone subscriber).

Structural transformation = f (Urbanization, GDP per-capita, Trade Openness, Gross Capital formation, Share of Agricultural value added, and Network index (proxied by fixed line telephone subscriber)).

ARDL Method was used to investigate the determinants of structural change. Such variables are now presented in the following equation. Thus model to be used to investigate the determinants of structural transformation is presented as follows.

$$ST = f (X),$$

$$ST = f (URB, TRO, NI, GCF, SA, GDPPC) \dots\dots\dots (1)$$

$$\ln ST_t = \alpha + \beta_1 URB_t + \beta_2 TRO_t + \beta_3 NI_t + \beta_4 GCF_t + \beta_5 SA_t + \beta_6 GDPPC_t + \varepsilon_t \dots \dots \dots (2)$$

In forecasting economic variables, the use of log transformation is often useful to stabilize the variance of a series (Lutkepohl & Xu, 2009). This is done in order to avoid or eliminate the problem of heteroscedasticity. In addition, it helps us to arrive at the elasticities of the variables. Hence the study uses the log form of the above variables. Accordingly, the log linear forms of the models are written as follows;

$$\ln ST_t = \alpha + \beta_1 \ln URB_t + \beta_2 \ln TRO_t - \beta_3 \ln NI_t + \beta_4 \ln GCF_t + \beta_5 \ln SA_t + \beta_6 \ln GDPPC_t + \varepsilon_t \dots \dots \dots (3)$$

Where,

ST_t is Structural transformation at time t

URB_t is the rate of urbanization at time t

TRO_t is trade openness at time t

NI_t is Network index (proixed telephone subscriber) at time t

GCF_t gross capital formation at time

SA is Share of agricultural value added at time t

GDPPC_t is GDP per capita at time t

Where β are parameters to be estimated while ε_t is error term.

3.4.2 Estimation Procedure

Many economic and financial time series exhibit trending behavior or non-stationery in the mean. Therefore, it is necessary to test the stability of the series before identification of the relationship between variables. The regression analysis among the variables would not be consistent and spurious regression problem would occur if unstable data are used. So the data must be transformed to stationary form prior to analysis.

Stationarity (Unit root Test)

A time series is said to be stationary if its mean and variance are constant over time and the value of covariance between the two periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed (Gujarati, 2004).

Checking the time series properties of the variable is important since it affects the estimation procedures. Time series data for most developing countries such as the Ethiopia are nonstationary. For this reason, stationary test shall be conducted. Thus to make sure that stationary condition has been fulfilled a unit root test has been performed. The study first investigated the time series properties of the data using Augmented Dickey-fuller (ADF). The null hypothesis in these tests is that the underlying process which generated the time-series is non-stationary, it is integrated to a higher order and must be differenced till it becomes stationary.

Multi Collinearity Test

One of the assumptions of the classical linear regression model (CLRM) is that there is no exact linear relationship among regressors, (Gujarati, 2004). If there is one or more such relationship among the regressors, multicollinearity problem is said to exist. If the relationship is perfect or exact linear relationship among the explanatory variables, the regression coefficient of the variables becomes indeterminate and their standard error are infinite. In case of time series data, the regressors included in the model will share a common trend, that is, they may all increase or decrease over time (Gujarati, 2004).

To detect the existence of multicollinearity, the study used correlation matrix and Variance Inflation Factor (VIF) test using EViews software, to check if the independent variables are highly correlated or not. To determine the multicollinearity in the independent variables. Thus, the VIF values of all variables are not <10 which indicates there is multicollinearity problem between independent variables. However, through variable selection and reelection, it is possible to minimize the problems of mutli-collineratiy.

Diagnostic Tests

Diagnostic tests like serial correlation, functional form, normality distribution of the residuals and heteroscedasticity tests are checked because they affect the model's precision.

3.5 Autoregressive distributed lag Model (ARDL Model)

In order to estimate the long and short run relationship between dependent variable (Structural transformation) and independent variables (urbanization, trade openness, Network index (proxied telephone subscriber), GDP per capita, and gross capital formation); the study applied the Autoregressive Distributed Lag (ARDL) method to co-integration and error correction depending on the degree of stationary levels of the variables. The so called Autoregressive Distributive Lag (ARDL) also deals single co-integration and introduced by Pesarn and Shin (1999) and further extended by Pesaran et al. (2001). This method has certain econometric advantages in comparison to other single co-integration procedures. First ARDL can be applied irrespective of whether the underlying regressors are purely I (0), purely I (1) or mutually co-integrated (Pesaran and Shin 1999). The second advantage of using the bounds test approach to co integration is that it performs better than Engle and Granger (1987), Johansen (1991) co-integration and Philips and Hansen (1990) co-integration tests in small samples as the case in this study. Thirdly with ARDL approach it is possible that different variables have different optimal number of lags, while in Johansen type models this is not permitted. Fourthly, in ARDL estimation the long run and short run parameters are estimated simultaneously. Finally, by applying ARDL technique we can obtain unbiased and efficient estimator of the model (Narayan, 2005).

Chapter Four

4. Overview of Ethiopian Economy

4.1 Structure of Ethiopian Economy

4.1.1 The Imperial Regime (1930-1974)

The period referred here as the ‘Imperial Regime’ refers to reign of the last emperor, emperor Haile Selassie I, (1930-1974). During this period an attempt to modernize the country is made (an expansion of modern schools and health facilities, the first constitution, infrastructural development, the beginning of medium term planning etc are cases in point). During this regime, the land aristocracy (feudal structure) and the majority of peasants (tenants) constitute the major socio-economic agents. Land was the most important resource and source of power that served as institution to exploit the masses by the Monarchy and the Feudal land lords. The Imperial regime had also the positive record of modernizing the economy by developing infrastructure, establishing and encouraging the establishment of imports substituting industries, modern political system and in particular expansion of education.

In terms of policy, the Imperial regime pursued a market-oriented economic policy and economic growth during the period 1960-1974 was an average of 3.7 percent per annum (the per capita growth being 1.4 percent). Similarly, the sectorial growth performance for agriculture, Industry and service were 2.1, 6.9 and 7.6 percent, respectively for the same period (EEA, 2007/08). In addition, the sectorial share of agriculture, Industry and service to real GDP was 62, 10 and 14 percent, respectively during the same period.

Table 4.1: Sectorial share as percent of GDP –Derg Regime (1960-1974)

Agricultural share from GDP	62%
Industrial Share From GDP	10%
Service share from GDP	14%

Source: EEA and MoFED

During this regime, as seen in table 4.1, the share of agriculture is far more than the non-agriculture sectors. According to Alemayehu and Befekadu (2005), an economic growth of average of 4

percent per annum during 1960-1974 was achieved. However, it did not improve the lives of most Ethiopians.

4.1.2. The Socialist (Derg) Regime: (1974-1991)

The revolution in 1974 ultimately resulted in removal of the emperor from power. The government installed a socialist (command) economic system where market system was repressed and socialization of the production and distribution process followed. The average rate of growth of gross domestic product (GDP) and the per capita term was 1.6% and -0.7%, respectively (Eshetu and Mekonnen, 1992). However, in 1984 and 1985, the GDP growth rate began to decelerate, amounting to -5.3%, which means that the per capita GDP was -10% in the same period. Reports of EEA (2007/08) indicates that, the average annual growth of GDP and GDP per capita were 2% and 0.5%, respectively during the entire period of derg (1974-1991). The sectorial growth rate of agriculture, industry and service sector were 1.3, 1.4 and 3 percent, respectively during the same period.

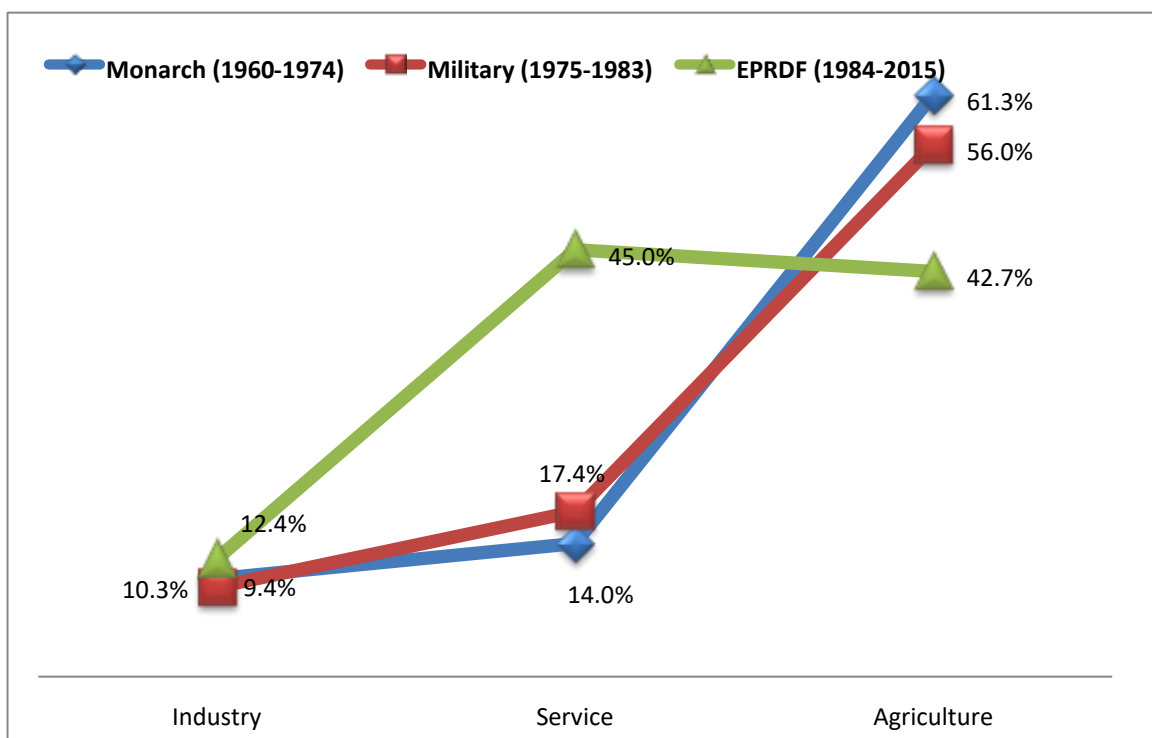
4.1.3. The EPRDF Regime (Since 1991)

The EPRDF adopted the typical structural adjustment policies of market liberalization, which issued a new economic policy in November 1991 by openly a market-oriented economic policy Alemayehu and Befekadu (2005).

Over the last two decades, the Government of Ethiopia (GoE) has been implementing a development program aimed at poverty reduction through rapid economic growth and macroeconomic stability. The country has recorded strong economic growth over the past decade, mainly due to the Government-led development policies emphasizing public investment, commercialization of agricultural sector and non-farm private sector development. The Ethiopian economy has experienced an impressive growth performance for the last two decades with an average GDP growth rate of 6.7 percent far away as compare with the monarch and military regime, which were 3.7 and 1.6 percent, respectively (see Figure 4.1). Specially, since 2004, the country grew with an average GDP growth rate of 10.9 percent; the per capita income also growing with an average of 8 percent while the estimated average population grew by 2.2 percent during the same period (NBE, 2013/14).

The Ethiopian economy continued to grow and the overall economic performance reflected the rapid expansion of the country. According to the National Bank of Ethiopia report (2012/13), real GDP continued to grow on average by 10.9 percent in the past decade (2003/04-2012/13). During the fiscal year 2013/14, the real GDP revealed a remarkable growth of 10.3 percent compared to the 5.4 percent for sub-Saharan Africa countries for 2014. The growth was mainly contributed by the service sector (51.7 percent), agricultural sector (21.9 percent) and industrial sector (26.4 percent).

Figure 4.1 Share of GDP in different regimes (1960-2015)

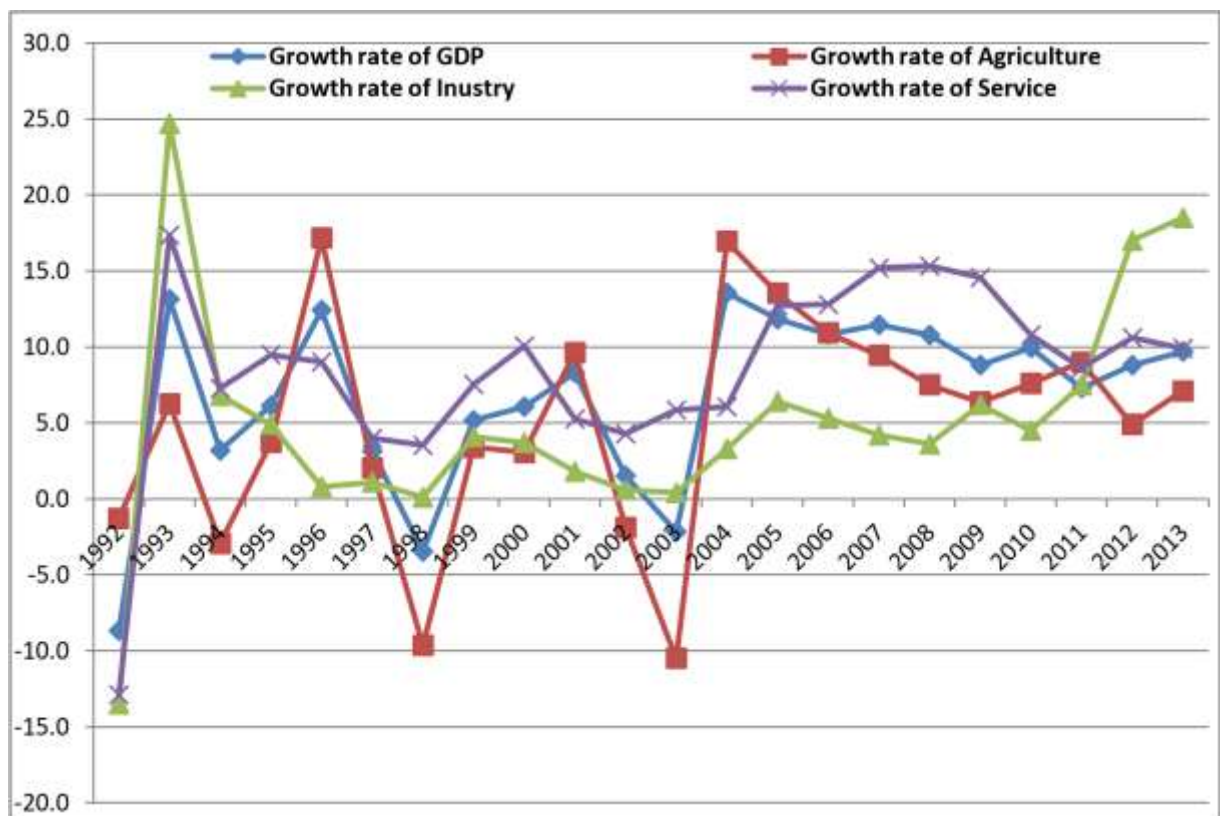


Source: Own computation from MoFED and NBE, data

As we have seen from the figure, the share of the industrial sector has remained stagnant in the past years. Although the country's development plan shows a direction from agriculture to industry and services, no significant change is observed with respect to increasing the share of industry. The average growth rate of the industry sector was 2.1 percent during 1960-2013. For this reason, a predominantly agriculture based economy (where agriculture employs more than 83 percent of the population (CSA, 2013) and nearly 43 percent to GDP), the economic performance

in Ethiopia is largely determined by what happens in the agricultural sector. Despite the amazing economic growth, the structure of the economy has not changed very much, agriculture have been dominating the other sectors until 2010/11. However, recently the share of the service sector including both distributive and other services has increased substantially. According to the Ethiopian Economic Association report, growth in Trade, Hotels, Financial intermediation and education services are the major components that contributed to the growth of the service sector (EEA, 2007/08). Despite the stagnant industrial growth, since 2011/12, a slight change is observed in the Ethiopian economy. Therefore, share of the economy was dominated by the service sector, which has relatively rapid growth rate among the three sectorial growth rates. (I.e. agriculture, industry and service grew by 7.9, 12.6 and 13.6 percent, respectively during 2005/06 – 2012/13, NBE, 2012/13).

Figure 4.2 Trend in sectorial share (1960-2015)



Source: Own computation from MoF and NBE data

In all sectors, the Ethiopian economic growth rate during 1992-2003 was oscillated as we can see in the graph. However, since 2004 the growth rate had grown evenly with double digits whatever

the growth rate is different in its magnitudes. Similarly, agriculture and industry sector growth were also like GDP growth while the service sector was in robust growth since the post reform and take over the largest share of GDP during 2012/2013 (GTP-APR, 2012/13) and which accounts 45.2 percent of the total GDP.

4.2 Growth and Transformation plan of Ethiopia

Ethiopia's *Growth and Transformation Plans* aims to spur economic structural transformation and sustain accelerated growth towards the realization of the national vision to become a low middle-income country by 2025. The country's long term vision, achievements of PASDEP and lessons drawn from its implementation are the bases for conceiving a five-year medium term strategic Growth and Transformation Plan. The plan has also been prepared considering growth constraining factors that emerged in the course of implementation and external shocks (MoFED, 2015)

4.2.1 Growth and Transformation Plan I (2010/11 -2015/16)

The Growth and Transformation Plan (GTP) is a five-year plan to improve the country's economy by achieving a projected gross domestic product (GDP) growth of 11-15% per year from 2010 to 2015. Looking at the performance of the overall economy during GTP, real GDP growth rate averaged 10.1percent. This real GDP growth rate is accounted for by agriculture, industry and services, which on average grew at 6.6%, 20.2% and 10.8% respectively during the same period. This rapid and broad based growth was more than double the sub-Saharan average growth registered during the same period.

As such, living standard of citizens has improved. This is reflected in the increase in per capita income from USD 377 in 2009/10 to USD 691 by the end of 2014/15. Provision of essential public services has also expanded as a result. Absolute poverty has declined from 26.9% in 2010/11 to an estimated 23.4% by 2014/15. Notwithstanding these achievements of GTP I, there remained challenges that deserve special attention. Despite the growth spur during GTP I period, not much progress has been forthcoming in terms of structural transformation of the economy. As such, the share of agriculture, industry and services stood at 38.5%, 15.1% and 46.3% respectively, by the end of 2014/15. Within the industry sector, the manufacturing sub-sector has registered an annual average growth rate of 14.6 % over the plan period. However, its share in GDP averaged 5% during the same period. This was mainly attributed to weak performances of small and medium

scale industries. On the other hand, the construction sub-sector has been the major driver of industrial GDP growth. As a result, the share of construction in GDP increased from 4% to 8.5% during the same period. The industrial sector, especially the manufacturing sub-sector, being small and at an infant stage, has performed better than other sectors during GTP I implementation. Its share in GDP has also increased in relative terms.

In sum, progress made, lessons drawn and experience gained during GTP I will serve as a strong foundation for sustaining growth, accelerate poverty reduction and its ultimate eradication given government commitment, visionary leadership, organized public participation and ownership of the development plan.

4.2.2 Growth and Transformation Plan II (2015/16 -2019/20)

The second Growth and Transformation Plan (2015/16-2019/20) is considered to be an important vehicle for Ethiopia's renaissance. Modernization in the development of the agriculture sector, expansion of industrial development with primary focus on light manufacturing, significant shift in export development are at the core of GTPII.

GTP II is an important milestone towards realizing Ethiopia's vision of becoming a lower middle income country by 2025. GTP I had given a special emphasis to economic sectors that have significant bearing on sustainable development and structural transformation of the economy. This primarily refers to the development of agriculture and industry sectors (productive sectors). The Second Growth and Transformation Plan (GTPII) is built on Sectoral policies, strategies and programs, lessons drawn from the implementation of GTP I and the post-2015 sustainable development goals (SDGs). It has also taken into account global and regional economic situations with direct or indirect bearings on the Ethiopian economy. The plan is a vehicle towards the realization of Ethiopia's vision of becoming lower middle income country by 2025. In the coming 10 years, Ethiopia's vision is to reach the level of lower middle-income countries where democracy, good governance and social justice are maintained through people's participation. The realization of this vision calls for creating competitive, productive and inclusive economy in all its aspects. This vision serves as a candle of hope indicating the long term paths of the country towards prosperity and development.

The overarching objective of GTP II is to sustain the accelerated growth and establish a spring board for economic structural transformation and thereby realizing the national vision of becoming a lower middle-income country by 2025. To this end, GTP II has set out the following specific objectives:

- i) Achieve an annual average real GDP growth rate of 11 percent within a stable macroeconomic environment and thereby contribute towards the realization of Ethiopia's vision of becoming a lower middle income country by 2025, while pursuing comprehensive measures towards narrowing the saving-investment gap and bridging the widening trade deficit.
- ii) Develop the domestic engineering and fabrication capacity and improve productivity, quality, and competitiveness of the domestic productive sectors (agriculture and manufacturing industries) to speed up structural transformation;
- iii) Further solidify the on-going public mobilization and organised participation to ensure the public become both owners and beneficiaries from development outcomes.
- iv) Deepen the hegemony of developmental political economy by strengthening a stable democratic developmental state.

4.3 Structural Change in Ethiopia

Economic growth in Ethiopia has so far been rapid, broad based, pro-poor and sustainable. Despite the high and sustained growth, structural transformation has been slow. Structural transformation is basically characterized by reallocation of resources from low productivity to high productivity economic activities. Recent trends indicate that the service sector has slowly taken over the lead from agriculture in terms of its contribution to the gross domestic product (GDP). During the plan period, the share of manufacturing sector in GDP stagnated compared to the other sub sectors. Hence, bringing about structural change of the economy will be the key objective of GTP II. Structural change of the economy is envisaged to be measured through two main indicators: (i) increasing the share of manufacturing industry in GDP; and (ii) increasing the share of export earnings in GDP. Overall, these two signals are in turn presumed to be realized largely through manufacturing expansion and export diversification (NPC,2016)

4.3.1 Increasing the share of manufacturing industry in GDP

The assessment results of GTP I implementation showed that the share of agriculture in GDP declined and the share of services sector has increased and surpassed that of agriculture in recent years while the share of the industry sector showed only a modest increase (2 percentage point over the base year) largely as a result of the expansion of the construction industry. The share of manufacturing industry in GDP has lagged behind the GTP I target and is even considered to be at a very low level compared to the SSA average. By the end of GTP II period, manufacturing, which is expected to be the engine of the structural transformation, is projected to grow at an annual average rate of 21.9 %, while its share in GDP is projected to pick up from 4.8 % in 2014/15 to 8.0 % by 2019/20. The share of the industrial sector in general will rise from 15.1 percent to 22.3 percent during the same period. The share of agriculture in GDP is projected to decline from 38.5 percent to 33.5 percent, while the share of services is projected to fall from 46.3 percent to 44.3 percent (Table 4.2).

Table 4.2: Share of major economic sectors in GDP under base scenario in percent.

Sector	Average Performance	Base year	Projection					Average
	2010/11 2014/15	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2015/16 2019/20
Agriculture and Related Activities	41.5	38.5	37.5	36.4	35.4	34.4	33.5	35.4
Industry	12.7	15.1	16.6	18.0	19.4	20.9	22.3	19.4
Manufacturing	4.3	4.8	5.2	5.7	6.2	6.9	8.0	6.3
Large and medium scale	3.1	3.7	4.0	4.4	4.8	5.3	5.9	4.9
Small and micro scale	1.2	1.1	1.2	1.3	1.4	1.6	1.8	1.4
Service	45.8	46.3	46.0	45.6	45.2	44.8	44.3	45.1
Gross Domestic Product (GDP)	100	100	100	100	100	100	100	100

Source: NPC (2016)

During the coming decade, the share of the manufacturing sector in GDP is expected to show a fourfold increase from 4.8 % in 2014/15 to 18 % by 2025. For this to be realized, the county has envisioned to pursue export-oriented manufacturing-led industrialization. Owing to the narrow base of the manufacturing sector, realization of the above vision requires a concerted effort of all stakeholders participating in the sector. Thus, the

government is determined to ensure a massive expansion of investment and improvement in productivity of manufacturing industry. Accordingly, private investment in primarily export oriented light manufacturing will be aggressively promoted. In addition, the domestic production of import items to save foreign exchange, enhance value addition, strengthening the metal and engineering industry and enhancing technological transfer and skill development in various industries will be major areas of endeavor during the GTP II period (Table 4.2).

Table 4.3: GDP's share of some major economic sectors under the high growth scenario (in %)

Sector	Average Performance	Base year	Projection					Average
	2010/11 - 2014/15	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2015/16 - 2019/20
Agriculture and Related Activities	41.5	39.1	38.6	38.1	37.6	37.2	36.9	37.7
Industry	12.7	15.1	16.6	18.0	19.4	20.9	22.3	19.4
Manufacturing	4.3	4.8	5.2	5.7	6.2	6.9	8.0	6.3
Service	45.8	46.3	46.0	45.6	45.2	44.8	44.3	45.1
Gross Domestic Product	100	100	100	100	100	100	100	100

Overall, with regard to structural change, according to the base case scenario (Table 2.3), the share of agricultural sector in GDP is projected to decline to 33.5 percent by 2019/20, and further decline to 29.2 percent by 2025. On the other hand, the industry sector is expected to grow faster than the remaining sectors and its share in GDP is expected to reach 22.3 percent by the end of the plan period (2019/20) and further to 32 percent by 2025. The share of the service sector is projected to decline slightly to 44.3 percent from its current level of 46.3 percent in 2014/15.

Increasing the share of merchandise export in GDP

The second feature of the structural change is expected to be manifested in increased role of merchandise exports in the economy. During GTP II period, merchandize export is set to grow at an annual average rate of 36.3 percent, and foreign exchange earnings from merchandize export is

expected to pick up from 3.1 billion USD to about 13.9 billion dollars by the of the planning period. Of this, agricultural products, industrial commodities and mining will have a share of USD 7.7 billion, USD 4.2 billion, and USD 2 billion, respectively. Overall, the share of merchandise export in GDP is expected to pick up from 4.9 % in 2014/15 to 11.8 % by 2019/20. Looking at the sub-sectors, the share of manufacturing goods export is expected to pick up from 0.6 percent in 2014/15 to 3.0 percent by 2019/20, while the shares of the agricultural commodities and mining exports are expected to pick up from 3.6 and 0.9 percent to 6.5 and 1.7 percent, respectively during the same period (Table 4.4).

Table 4.4: Projected share of merchandise export in GDP (%)

Item	Base year	Projection				
	2014/15 Performance	2015/16	2016/17	2017/18	2018/19	2019/20
Total Merchandise Exports Revenue	4.9	7.0	8.5	9.7	10.7	11.8
Agricultural Commodity Exports	3.6	4.7	5.3	5.8	6.1	6.5
Regular agricultural Commodity	3.2	4.1	4.7	5.0	5.3	5.5
Flower	0.3	0.4	0.4	0.5	0.6	0.6
Other Agricultural Commodity	0.1	0.2	0.2	0.3	0.3	0.4
Industrial commodity Exports	0.7	1.4	2.3	2.6	3.0	3.6
Manufacturing	0.6	1.2	1.6	2.0	2.5	3.0
Electricity	0.1	0.2	0.7	0.6	0.6	0.5
Mining Export	0.6	0.9	0.9	1.3	1.5	1.7

4.4 Sectoral Shares (% of GDP),1981-2015

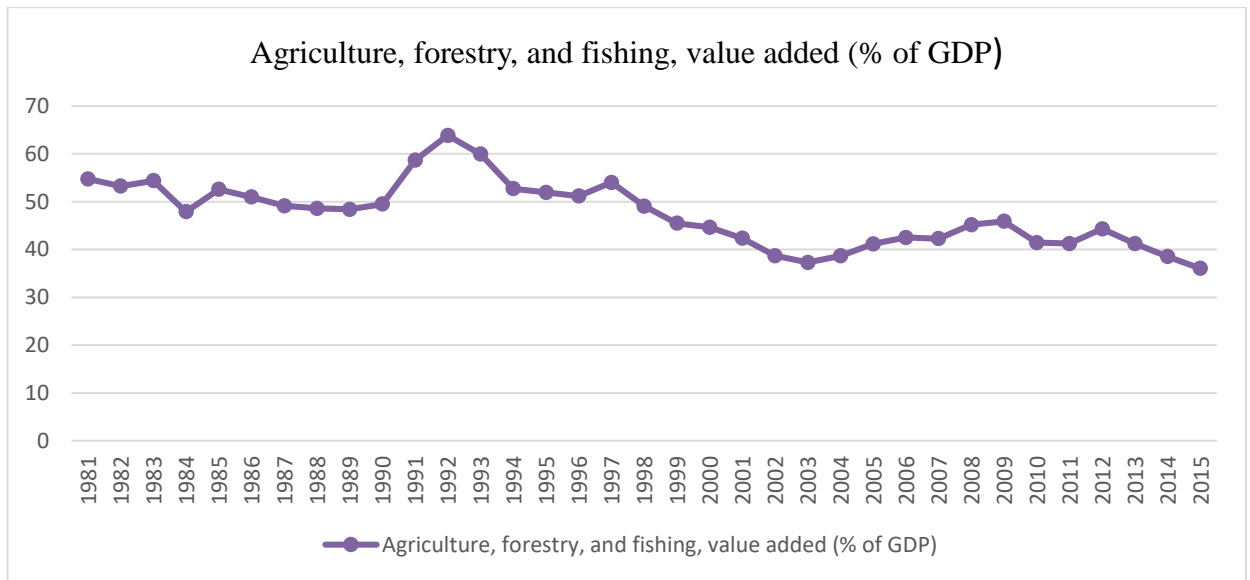
4.4.1. Agriculture, Forestry, and fishing, value added (% of GDP)

Figure 4.3 presents data on the share of agricultural value added in total GDP. As shown in figure 4.3 the agricultural share of GDP declined sharply from 54.7 % in 1981 to 36 % in 2015. This pattern reflects the classic Lewis-type dual economy model, where workers moved out of (subsistence or traditional) agriculture and are absorbed in modern manufacturing (Lewis, 1954). Consistent with stylized facts of structural transformation, there is a clear negative relation

between the share of agricultural value added and GDP per capita. The average GDP per capita increased from ETB 6732 in 1981 to ETB 14210 in 2015.

Looking the data during the first GTP period, the data showed that the share of agricultural value added has declined from 41 % in 2010 to 36 % in 2015.

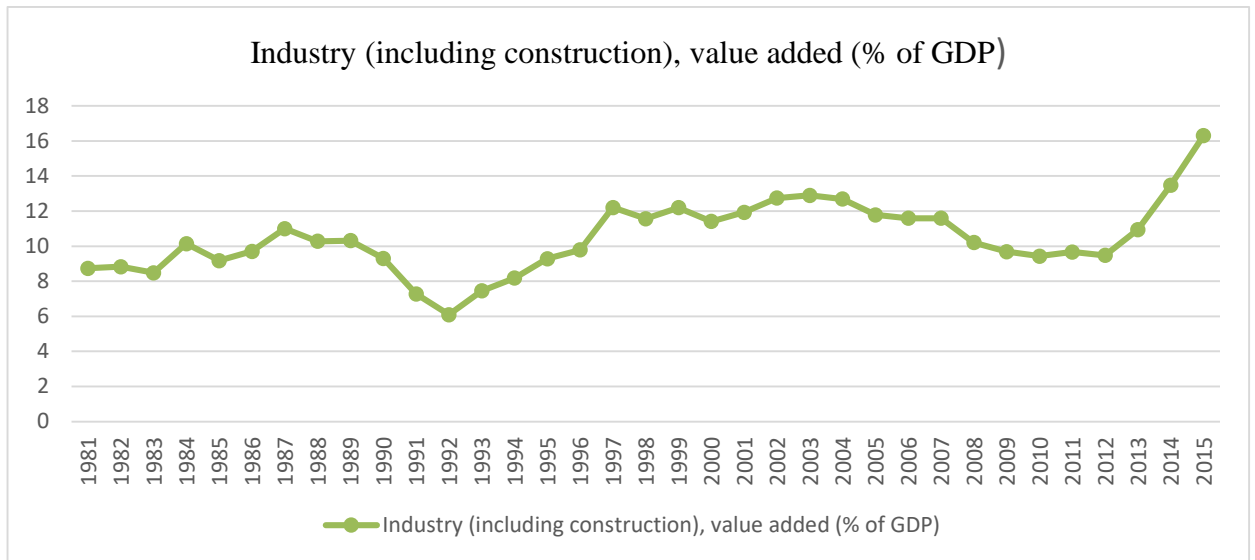
Figure 4.3 Agriculture, Forestry, and fishing, value added (% of GDP) Ethiopia (1981- 2015)



4.4.2. Industry (% of GDP)

Figure 4.4 presents data on the share of industry in total GDP for the period 1981-2015. As shown in figure 4.4 the industry shares of GDP doubled over the study period. Looking the data during the first GTP period, the data showed that the share of agricultural value added has declined from 9.4 % in 2010 to 16 % in 2015.

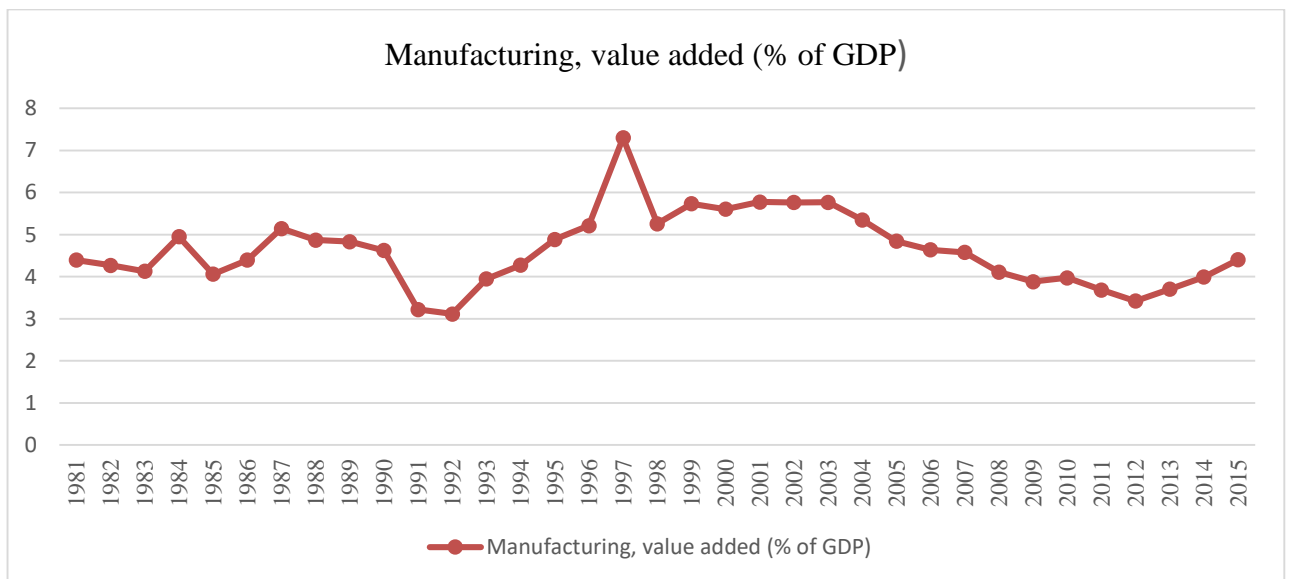
Figure 4.3 Industry, (Including construction) value added (% of GDP) Ethiopia 1981-2015



4.4.3. Manufacturing (% of GDP)

Figure 4.5 presents data on the share of manufacturing in total GDP for the period 1981-2015. As shown in figure 4.5 the manufacturing shares of GDP stagnated over the study period. One of the striking feature of the manufacturing is that it has reached as high as 7 % in 1997. Looking the data during the first GTP period, the data showed that the share of agricultural value added has declined from 3.9 % in 2010 to 4.4 % in 2015.

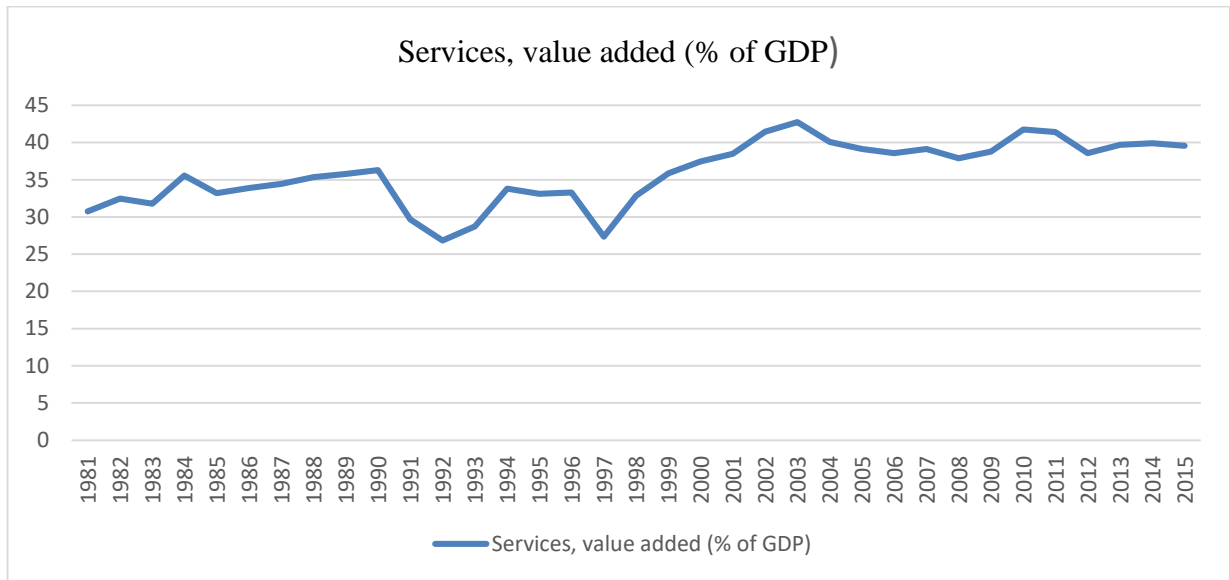
Figure 4.5 Manufacturing, Value added (% of GDP) in Ethiopia 1981-2015



4.4.4. service (% of GDP)

Figure 4.6 presents data on the share of manufacturing in total GDP for the period 1981-2015. As shown in figure 4.6 the service shares of GDP increased from 30 % in 1981 to 39 % in 2015 over the study period. However, looking the data during the first GTP period, the share of service sector declined from 41.7 % in 2010 to 39 % in 2015.

Figure 4.6 Services, Value added (% of GDP) in Ethiopia 1981-2015



Chapter Five

5. Results and Discussion

5.1 Trends in Structural Transformation Africa

This chapter contains descriptive analysis of the trends in Africa. The data area obtained from WB-WDI and covers 48 countries. Under the descriptive statistics the trends and overall performances of the variables of interest are presented. The statistical tools such as tables and graphs are used to describe the variables used in the model.

To gauge the trends of structural transformation in Africa, this study employed annual time series data covering the period from 1981 to 2015. The variables under consideration are GDP per capita, Agriculture share of GDP, Manufacturing share of GDP, Industry share of GDP and Service share of GDP. All variables are measured in constant US\$ 2010. They are all expressed in USD to make uniform (Allow summation and comparison) the currency of the 48 countries.

Table 5.1: Summary of results of descriptive statistics, 1981-2015 Africa

Date: 05/11/19 Time: 05:59					
Sample: 1981 2015					
	Service	Manufacturing	GDP per capita	Industry, Including construction	Agriculture, including forestry
Mean	44.50506	10.54288	1852.514	23.85247	25.78134
Median	44.60291	10.57447	1731.919	23.70026	26.84808
Maximum	47.70636	11.81103	2530.490	26.27028	29.50990
Minimum	42.19726	9.551177	1490.963	21.73834	21.31401
Std. Dev.	1.355358	0.631909	358.1222	1.275081	2.685183
Skewness	0.234588	0.286761	0.727288	0.276228	-0.312897
Kurtosis	2.381384	2.211179	1.969469	2.123228	1.653759
Jarque-Bera	0.879102	1.387118	4.634272	1.566159	3.214141
Probability	0.644326	0.499794	0.098555	0.456997	0.200474
Sum	1557.677	369.0010	64837.99	834.8363	902.3468
Sum Sq. Dev.	62.45787	13.57652	4360552.	55.27829	245.1470
Observations	35	35	35	35	35

Source: Author's computation using data from WB-WDI, 1981-2015

As we see from table 4.1, in the observed period, in Africa, the share of service sector in GDP, which accounts 44.5 %, is higher than agriculture, industry and manufacturing. Following the service sector, the share of agriculture sector share in GDP accounts 25.7 %. The descriptive result showed the share of manufacturing and industry in GDP is lower for the observed period, accounts

10.54 %. In the study period, Liberia has recorded lowest share of manufacturing in the GDP, 4 %. Country with the lowest share of agriculture in their GDP is Botswana, which is 4.1 %. Where as countries with the highest share of agricultural value added in their GDP are Guinea-Bissau and Ethiopia which is 47 %.

Table 5.2: Correlation matrix

	Agriculture	GDP per Capita	Industry	Manufacturing	Service
Agriculture	1.000000	-0.952763	-0.791875	0.643631	-0.677590
GDP per Capita	-0.952763	1.000000	0.753747	-0.720366	0.700936
Industry	-0.791875	0.753747	1.000000	-0.402343	0.173375
Manufacturing	0.643631	-0.720366	-0.402343	1.000000	-0.704613
Service	-0.677590	0.700936	0.173375	-0.704613	1.000000

Source: Author’s computation using data from WB-WDI, 1981-2015

Table 4.2 shows the correlation matrix for all pairs of variables used for trend analysis. Consistent with the stylized facts of structural transformation, the relationship between the value added share of agricultural and the GDP per capita is negative and strongly significant, with a correlation of -0.95.

Where as service value added and industry share are positively correlated with GDP per capita. As discussed in the literature review section of this study, the positive association can be explained by the multi-sector general equilibrium models which focus on preferences or “demand” factors, with income effects driving the process of structural transformation (Echevarria, 1997, 2000; Bopport, 2011; Kongsamut et al., 2001).

There also exists a strong positive association between GDP per capita and the share of industry, with a correlation of 0.75. The matrix also shows that there is a clear negative relation between the share of agricultural value added and GDP per capita.

5.2 Sector Share of GDP

5.2.1 Agricultural share (% of GDP)

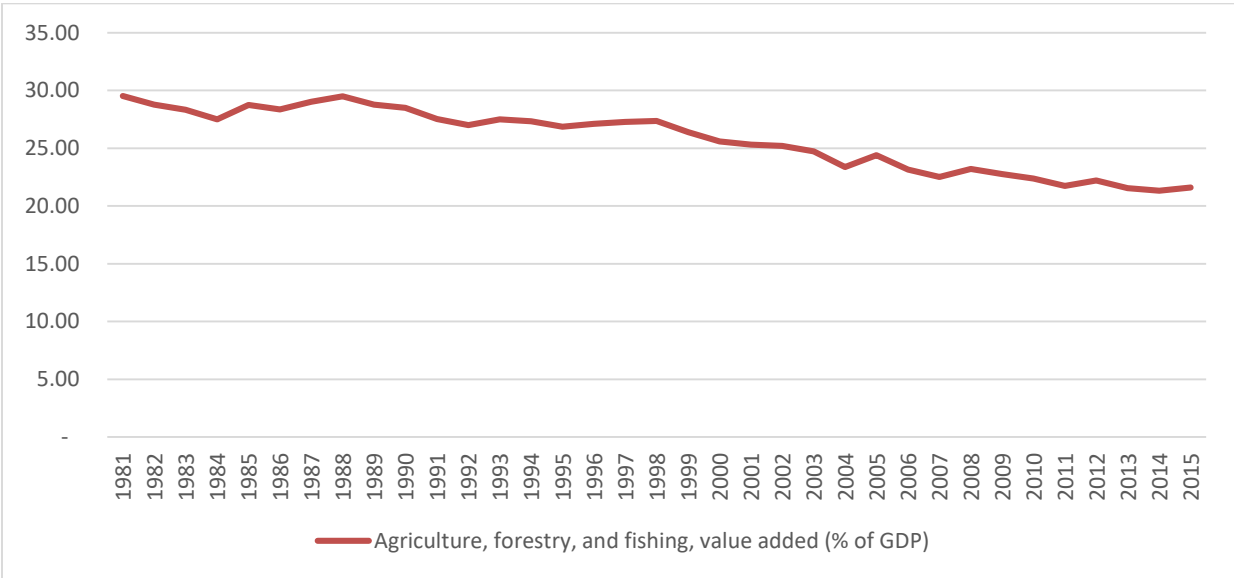
Figure 4.1 presents data on the share of agricultural value added in total GDP. As shown in figure 4.1 the agricultural share of GDP for the whole Africa (48 countries) declined sharply from 29.1 % in 1981 to 21.60 % in 2015. This pattern reflects the classis Lewis-type dual economy model, where workers moved out of (subsistence or traditional) agriculture and are absorbed in modern

manufacturing (Lewis, 1954). Consistent with stylized facts of structural transformation, for the whole Africa, there is a clear negative relation between the share of agricultural value added and GDP per capita. The average GDP per capita increased from \$1,614.04 in 1981 to \$ 2504 in 2015.

Looking the performance of some African country, however, interesting differences in the relation between sectoral shares and real GDP per capita can be inferred. For example, in case of Ghana, the share of agriculture in 1981 was 53 % and in 2015 it dropped to 20 %. The agriculture shares of Ghana and Ethiopia in 1981 was almost the same (53 %) but Ghana managed to reduce the share to 20 % compared to Ethiopia which is 36 %.

Another interesting difference that Lesotho remarkably reduced the share of agriculture from 27 % in 1981 to 4 % in 2015. The data showed remarkable differences in country performance but when the continent taken as whole, the decline in share of agriculture is 35 % in the span of 35 years.

Figure 5.1: Agriculture, forestry, and fishing, value added (% of GDP), Africa (1981-2015)



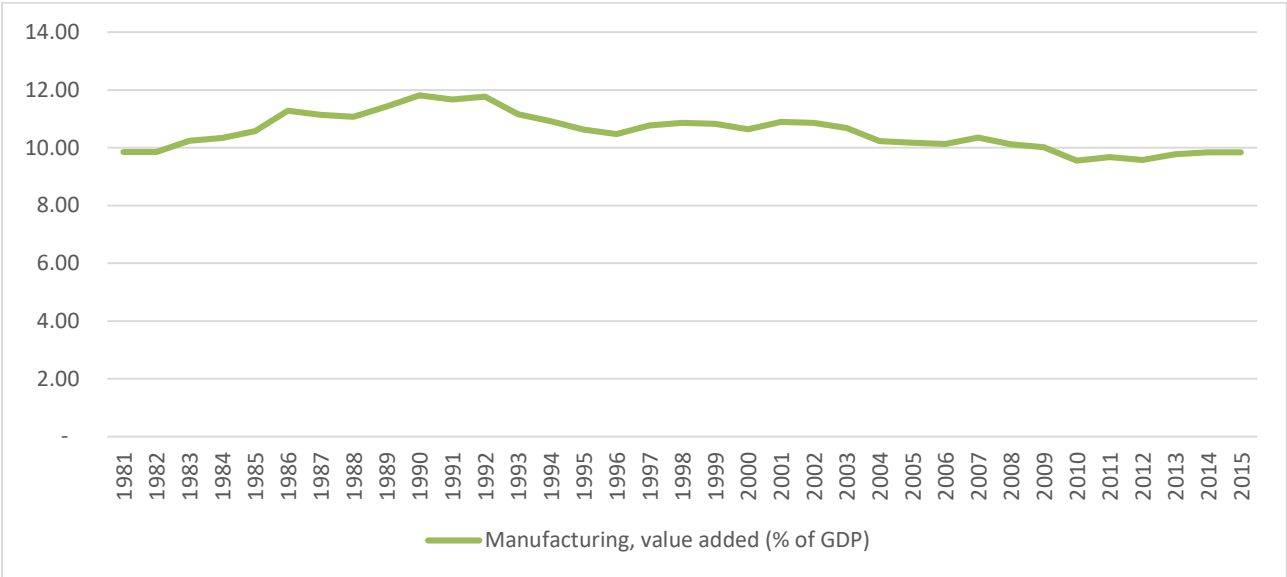
Source: Author’s Computation Using WB-WDI data for 48 Countries – MS-Excel

5.2.2 Manufacturing share (% of GDP)

Figure 2 presents the share of manufacturing in total GDP for the study period for 48 countries. Despite the aspiration of African to industrialize, the share of manufacturing for the continent as a whole stagnated, 9.85 % in 1981 to 9.84% in 2015. As with the agricultural value added share,

there is remarkable difference among African countries. In the case of manufacturing, for example, Gabon increased its share of manufacturing by four fold, 4 % in 1981 to 16 % in 1981. Whereas Zambia registered a declining share of manufacturing, 17.7% in 1981 declined to 7.5 in 2015. Even if manufacturing stagnated for the continent as a whole, but individual African countries exhibited different trends: some registered an increasing trend; few registered even declining trends; and some remained stagnant.

Figure 5.2: Manufacturing, value added (% of GDP), 1981-2015, Africa



Source: Author’s Computation Using WB-WDI data for 48 Countries – MS-Excel

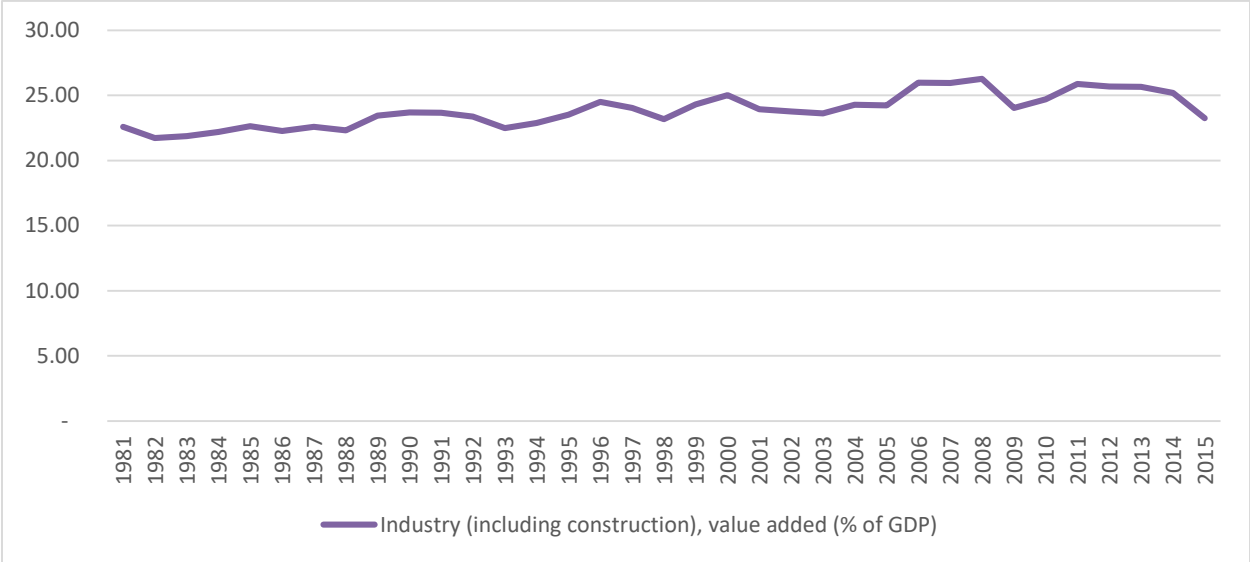
5.2.3 Industry Share (% of GDP)

Figure 4.3 presents the share of industry in total GDP. As with the manufacturing, the industry shares of GDP almost stagnated, increased marginally from 22.60 % in 1981 to 23.25 % in 2015. The highest increase is recorded by Ethiopia, 86 %, followed by Benin 59 % over the study period. And the lowest decline is recorded for Sierra Leone, that is a 74 % decline in the share of manufacturing from what it was in 1981. Like wise in Nigeria, the share of industry in 1981 was 39.24 % but this number has dropped to 20.16 % in 2015 which is 48 % reduction.

Like the manufacturing sector, the increased in industry share is not uniform through out the continent. Some African countries indeed showed an increase in the share of their industry such as Uganda, Ethiopia, Senegal, Lesotho. Whereas in some African countries the share of industry

declined over the study period. Nigeria, south Africa, and Togo are countries that experienced declining of the industry share in the total GDP.

Figure 5.3: Industry (including construction), value added (% of GDP), 1981-2015, Africa.



Source: Author’s Computation Using WB-WDI data for 48 Countries – MS-Excel

5.2.4 Service share (% of GDP)

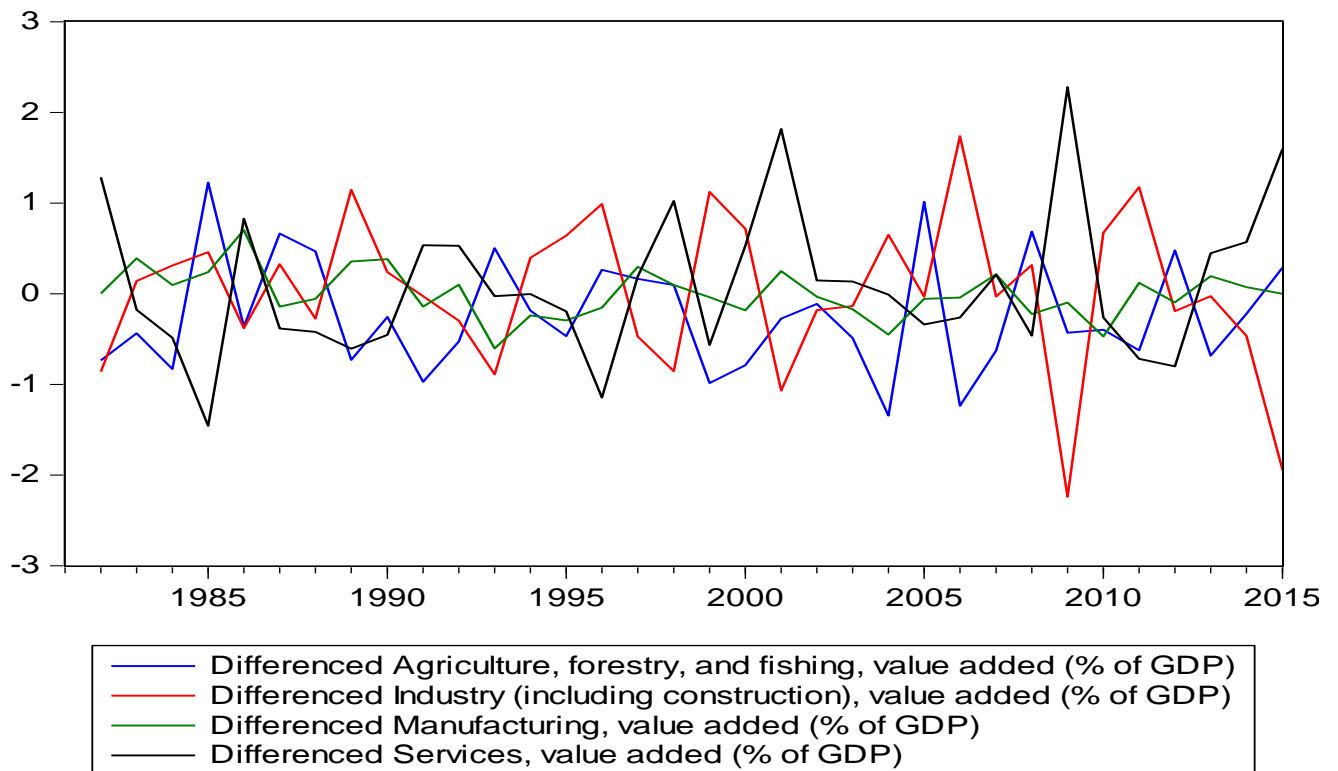
As shown in figure 4.4, the share of service increased from 44.3 % in 1981 to 47.7% in 2015. For the continent as whole the service sector increased by 7.48 % over the study period. Like other economic activities, there is remarkable difference among African countries. The highest increase in service sector is recorded by Burundi, increased by 106 % over the study period. In Ethiopia service sector has increased by 28 % over the study period. The data revealed that, in Ethiopia, the service sector outpaced the manufacturing sector.

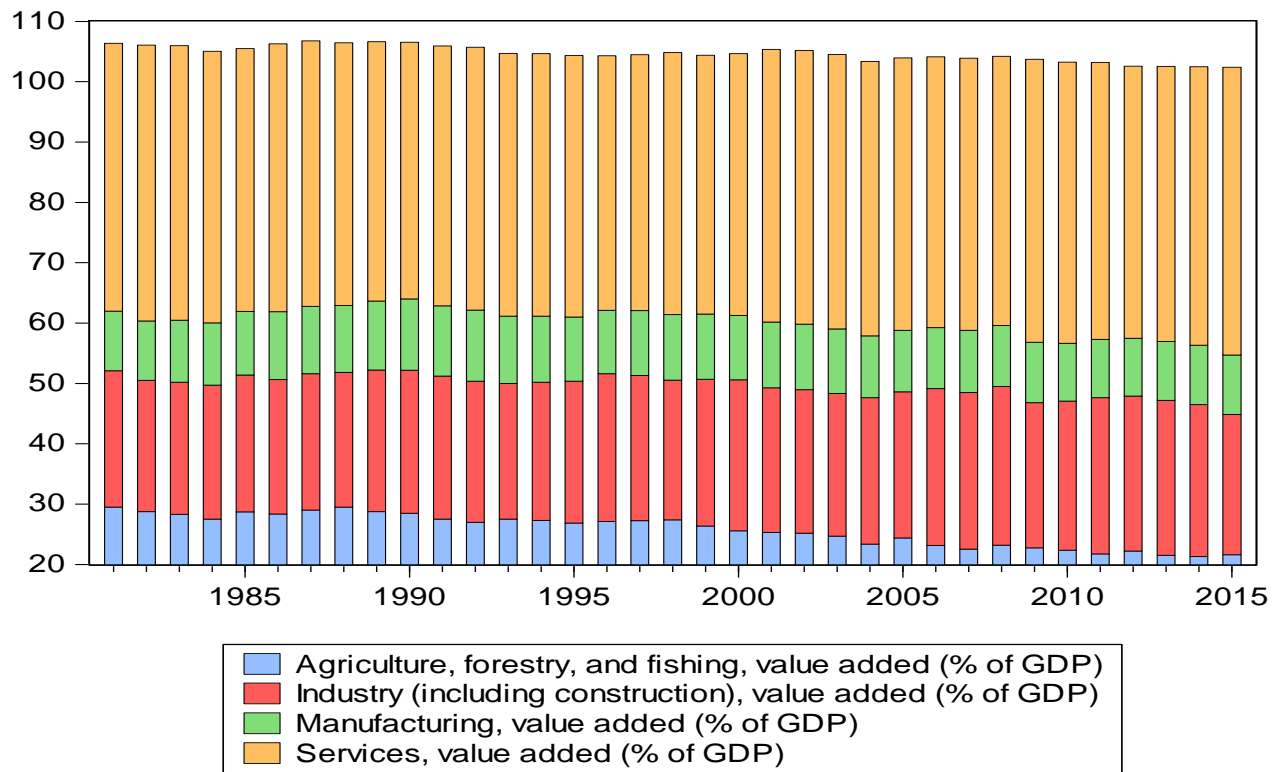
Figure 5.4: Service, value added (% of GDP), Africa, 1981-2015.



Source: Author's Computation Using WB-WDI data for 48 Countries – MS-Excel

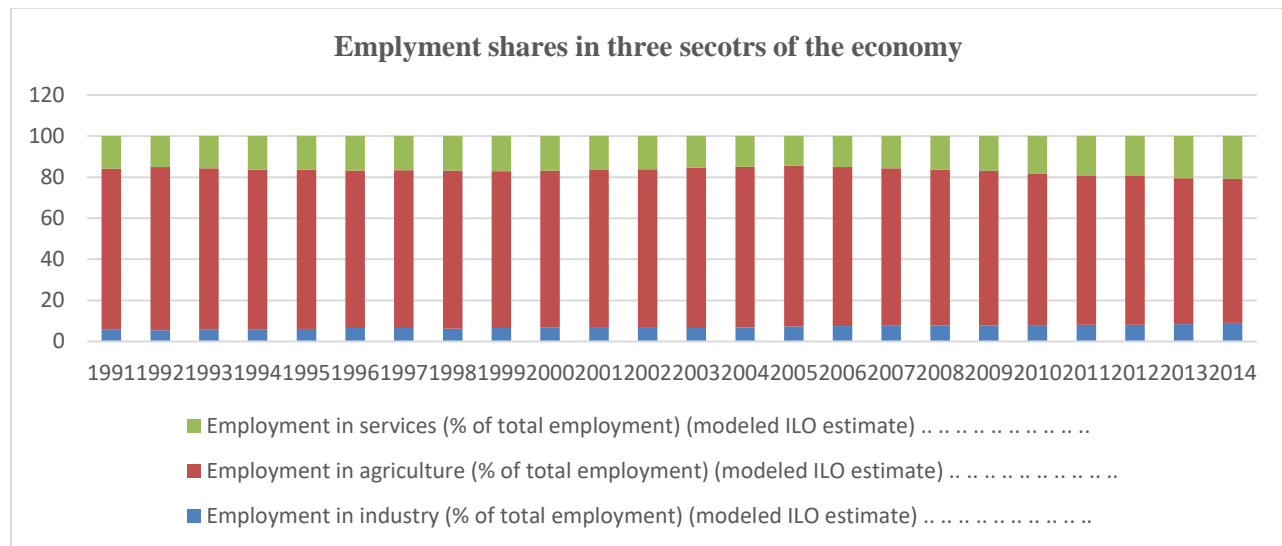
Figure 5.5: % Share of the agriculture, industry, manufacturing and service, Africa, 1981-2015.





5.3. Employment share

Figure 5.6: % Share of employment in agriculture, industry, manufacturing and service, Africa, 1991-2014.



Source: Author's Computation Using WB-WDI data for 48 Countries – MS-Excel

As we see from the figure 5.6, employment data is used to complement the GD data, agriculture remains the largest employer of the African economy. The figure shows that the pace of structural transformation is slow as evidenced by the high share of employment in the agriculture sector.

5.4 Econometrics Results

Prior to conducting the econometric analysis, the necessary tests have been carried out. In this study; important test such as stationary tests, diagnostic tests and bound test have been performed. After passed the necessary tests both the long and short run models are estimated using ARDL and Error Correction respectively. After estimation has been made the interpretation and discussion are given based on the model results.

5.4.1 Unit Root test

It well known that most time series data are trended, either upward or downward, and therefore in most cases time series data non-stationery in their level, contains unit root. And if non-stationary properties of a time series data are not corrected, it would result in the problem of spurious regression (false relationships among the variables). So before utilizing the data in estimating ARDL, it is imperative to check the time series properties of each series.

Thus in order to determine the degree of integration, and make the data stationery, a unit root test has been performed using the standard Augmented Dickey Fuller (ADF) test. Even though the ARDL approach to co-integration does not require pre-testing of the variables, it is vital to note that the ARDL approach for integration needs that the variables under consideration should be either integrated of order zero or integrated of order one (i.e. $I(0)$ or $I(1)$) or their combination. So, in order to make sure the variables are either $I(0)$ or $I(1)$ unit root test was performed using the ADF approach.

The approach, as a rule, when the ADF test statistic is larger than the critical value in absolute terms and lower, Mackinnon (1996) one sided p values, the null hypothesis of unit root test is rejected; and if the absolute value of ADF test statistic is lower than that critical values or higher Mackinnon (1996) one sided p values, we fail to reject the null hypothesis.

All data's entered into the regressions model are transformed into logarithmic form and the studier plotted the data using the time series graphs before conducting unit root test. Such a plot gives an initial clue about the likely nature of the time series. The lag length for each variable is

automatically selected by Akaike Information Criteria (AIC) and both intercept and trend are included in the test equation for all variables.

The result of unit root test is presented as follows:

Table 5.3 Summary of the ADF unit root test result

No	Variable	Test statistics under different assumptions		Order of Integration
		Constant	Constants and trends	
1	LNST	1.554961	-0.354582	I (1)
	DLNST	-3.357881**	-6.495788***	
2	LNAGRISHARE	0.934456	-1.160560	I(1)
	DLNAGRISAHRE	-2.177531	-4.350059***	
3	LNFTL	-0.625108	-3.344905*	I(1)
	DLNFTL	-2.248823	-4.048094**	
4	LNGCF	2.309327	-2.135252	I(1)
	DLNGCF	-7.626205***	-4.841584***	
5	LNTRO	-0774590	-4.943685***	I(0)
	DLNTRO	-2.838032*	-2.506958	
6	LNURB	0.765889	-3.719100**	I(0)
	DLNURB	-1.187810	-1.274589	
7	LNGDPPC	1.914744	0.401497	I (1)
	DLNGDPPC	-1.778833	-3.221728*	

Source: Authors calculation, EVIEWS 9 result Note *** ** * represent significance level at 1%, 5 % and 10 % respectively. L= represents logarithm.

Table 5.1 shows the results of ADF for unit root. The test was done for two alternative specifications. First it is tested with constant but no trend and then it is tested with constant and trend. All variables are in logarithmic forms. D= represents the first difference and all the others are variables mentioned in chapter three.

Note that the rejection of the null hypothesis is based on Mackinnon (1996) critical values. Akaike Information Criteria (AIC) is used to determine the lag length while testing the stationarity of all variables. The sign ** and *** indicates the rejection of the null hypothesis of non-stationary at 5 % and 1 % significant level respectively. The results from this test show that five of the variables are non-stationary in their levels (for both types of specifications). However, trade openness and urbanization are stationary in their level with intercept and trend specification. The results indicate that, with intercept and trend all the variables are I (1) and two variable I (0). Hence possible to formulate the ARDL model.

5.4.2 Var Lag length section

Table 5.4 Results of the Var Lag length selection

VAR Lag Order Selection Criteria						
Endogenous variables: DLNST DLNFTL DLNAGRSHARE DLNGDPPC DLNGCF LNTRO LNURB						
Exogenous variables: C						
Date: 07/07/19 Time: 01:52						
Sample: 1981 2015						
Included observations: 32						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	257.5824	NA	3.72e-16	-15.66140	-15.34077	-15.55512
1	443.9351	279.5290*	7.51e-20	-24.24594	-21.68090*	-23.39570*
2	504.5048	64.35533	5.89e-20*	-24.96905*	-20.15960*	-23.37485
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Before going to estimate, it is important to determine an optimal lag order prior to the test. The optimal lag order is determined with the sequential modified Likelihood Ratio test statistics [LR], the Final Prediction Error [FPE], the Akaike Information Criterion [AIC], the Schwarz Information Criterion [SIC], and the Hannan-Quinn Information Criterion [HQ]).

As shown in the above Table; LR, FPE, AIC, SC and HQ suggest an optimal lag of 2. Thus one can easily have observed that the optimal lag order selection criteria suggest the AIC.

5.4.3 Model Diagnostic test

Prior to conducting analysis, diagnostics and stability tests have been undertaken in order to check the verifiability of the estimated long run model. In this study, diagnostic tests such as Serial correlation test (Brush & Godfray LM test), Normality (Jaque-Bera test), and Heteroscedasticity

test. In addition to the above diagnostic tests, the stability of long run estimates has been tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test. Such tests are recommended by Pesaran et al. (2001). In order to reject or accept the null hypothesis, we can decide by looking the p-values associated with the test statistics. That is the null hypothesis is rejected when the p-value are smaller than the standard significance level (I.e. 5%).

Table 5.5 Diagnosis test result, heteroscedasticity

Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.703240	Prob. F(13,18)	0.7380
Obs*R-squared	10.77837	Prob. Chi-Square(13)	0.6294
Scaled explained SS	3.367911	Prob. Chi-Square(13)	0.9962

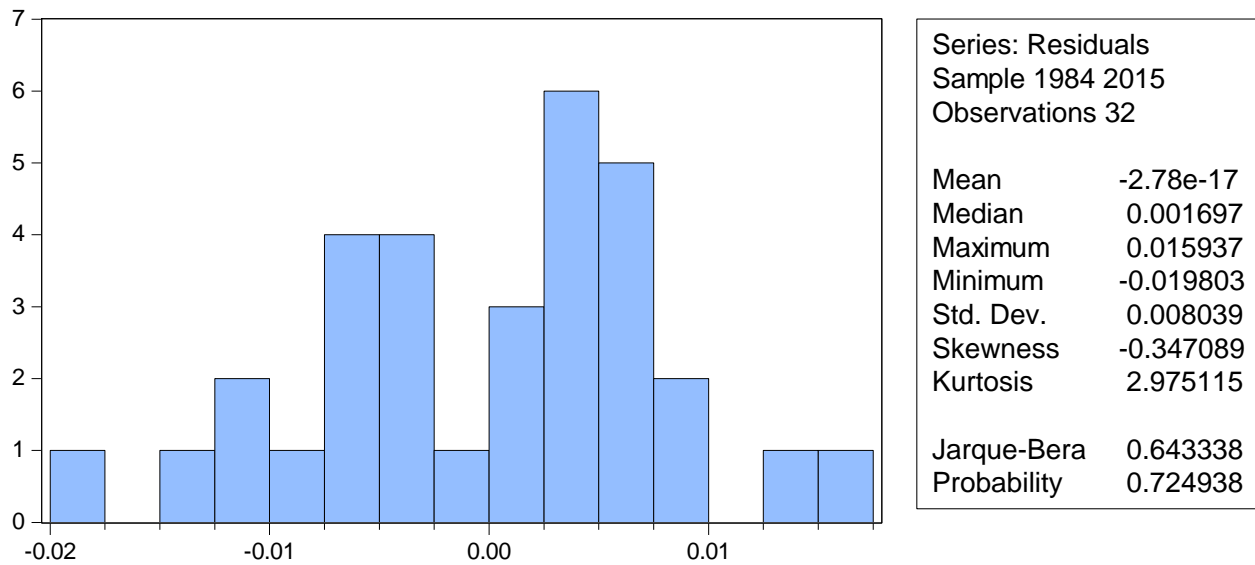
The **first** diagnostic test deals about the variance nature of the residual i.e. heteroskedasticity test. The null hypothesis is constant variance of the residual or homoskedasticity. As we observed from the above table (5.2) the p-value of the test statistic is higher than the associated significance level (i.e. $0.7690 > 0.05$), then we fail to reject the null hypothesis.

Table 5.6 Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.643727	Prob. F(1,23)	0.2126
Obs*R-squared	2.201087	Prob. Chi-Square(1)	0.1379

The second diagnostic test, Serial Correlation test, answers the question is there an interdependence/correlation between two and more residuals and the null hypothesis of no serial correlation is failed to reject as per Breusch God Fray LM test for the reason that the p-values associated with test statistics is greater than the standard significance level (i.e. $0.1379 > 0.05$). This implies that there is no problem of autocorrelation problem in the model.

The third diagnostic test is about the Normality test. As the result indicates that we could not reject the null hypothesis which says that the residuals are normally distributed, for the reason, that the p-value associated with the Jarque-Berra normality test is larger than the standard significance level (I.e. $0.73 > 0.05$).

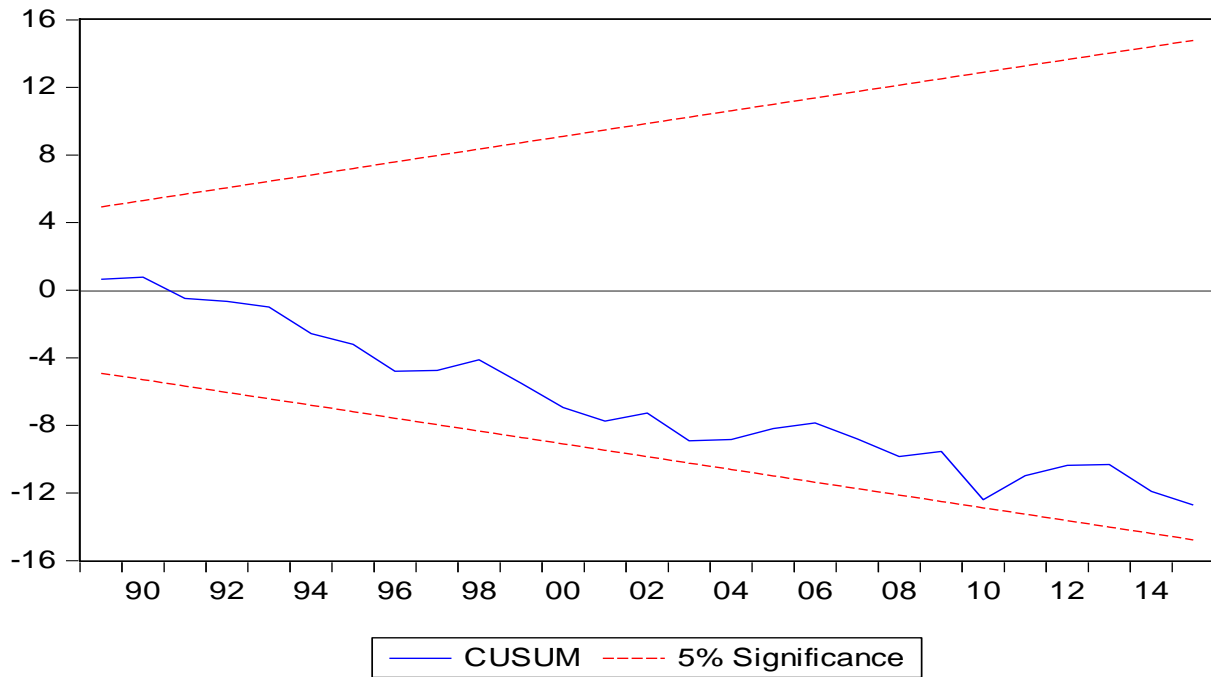


5.4.4 Model Stability Test

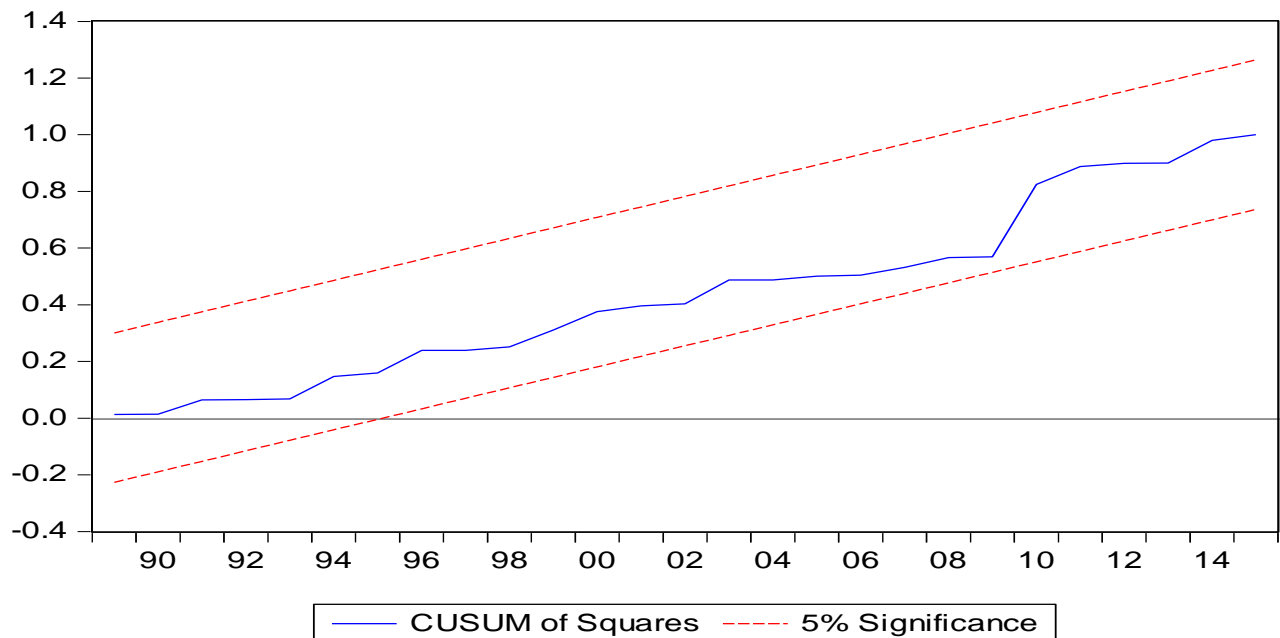
The stability of the model is detected by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. As can be seen from the first figure, the plot of CUSUM test did not cross the critical limits. Similarly, the CUSUMSQ test shows that the graphs do not cross the lower and upper critical limits. So, it can be concluded that long run estimates are stable and there is no any structural break. Hence the results of the estimated model are reliable and efficient. In addition to the model stability 98.5 percent of the model have been explained by the regressors.

Figure 5.5: Testing parameter stability using CUSUM and CUSUMSQ test

Plot of Cumulative Sum of Recursive Residuals (A)



Plot of Cumulative Sum of Recursive Residuals (b)



5.4.5 Structural Break- Chow Test

The presence of structural breaks in the dependent variable determines the specification of the estimated regression model. This implies that the values of the parameters of the model do not remain the same through the entire sample period (Gujarati, 2004). To find out if structural break has occurred the study conducted Chow Test, which it is hypothesized that there is a structural break due to a policy change in Ethiopia in the tested date.

The Chow test was performed as follows;

- Knowing the break date/s.
- Plot the graph of the series.
- Plot the CUSUMSQ.
- Uses the F-Statistic: if it is significant the null hypothesis of no break is rejected and if not significant fail to reject the null hypothesis of no break.
- Verify by taking the plot of the CUSUMSQ and you will that the plot deviates out of the 5 % significance level boundary.

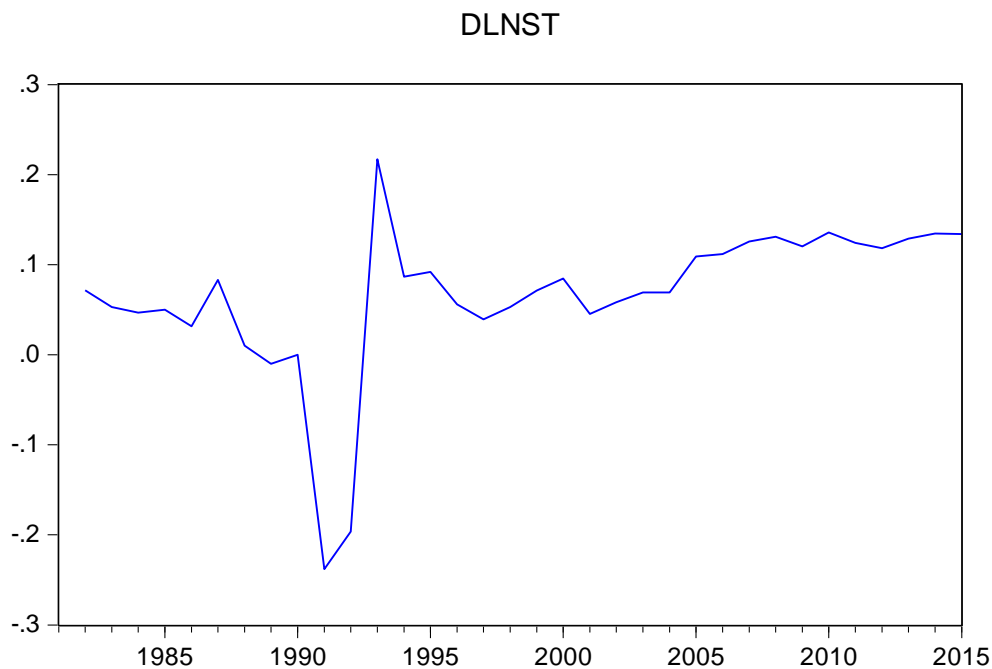


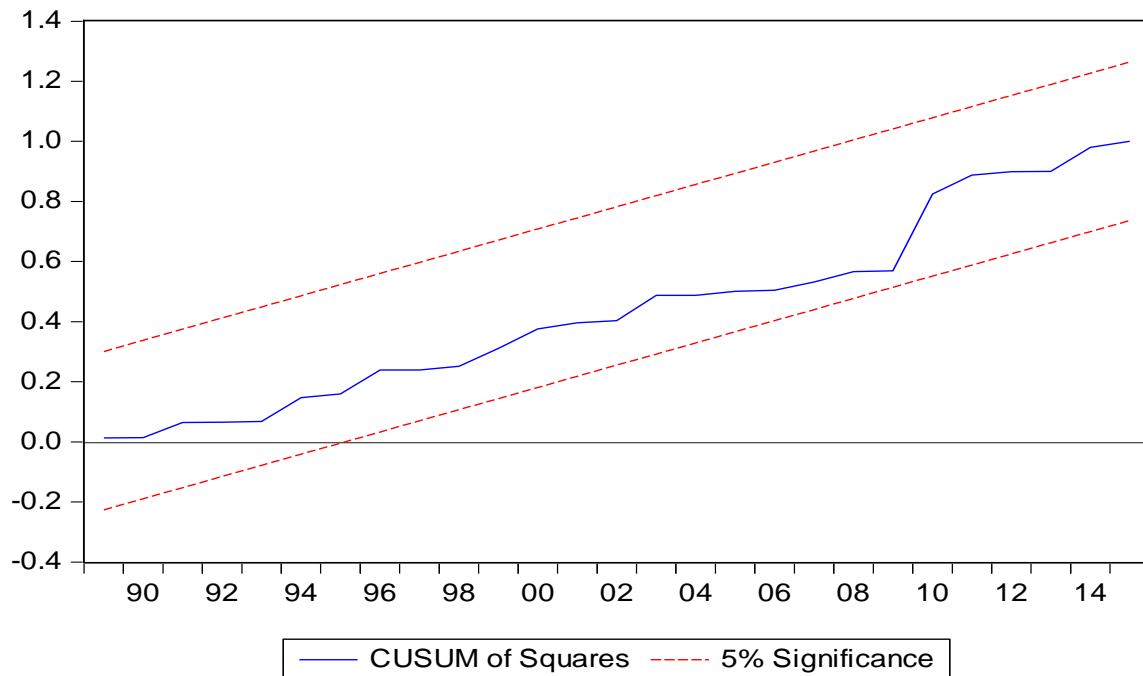
Fig 5.6 Plot of structural breaks points

Figure 5.6 shows that there is a structural break in 1992 as shown as sharp increases in the series. However, the chow test presented in table 5.5 indicated that the F- static is not significant and we fail to reject the null hypothesis of no break. Furthermore, the absence of structural breaks is verified by CUSUMSQ test presented in figure 5.7. The plot of the CUSUMSQ shows that no deviation out of the 5 % significance level boundary.

Table 5.7 Results of Chow break point test

Chow Breakpoint Test: 1992			
Null Hypothesis: No breaks at specified breakpoints			
Varying regressors: All equation variables			
Equation Sample: 1982 2015			
F-statistic	1.538552	Prob. F(7,20)	0.2112
Log likelihood ratio	14.64732	Prob. Chi-Square(7)	0.0408
Wald Statistic	10.76987	Prob. Chi-Square(7)	0.1490

Table 5.5 Results of CUSUMSQ plot test



5.5. Long Run ARDL Bounds Tests for Co-integration

After checking the stationarity of the variables, the next step is checking the bound test for co-integration. The first task in the bounds test approach to co-integration is estimating the ARDL model using the appropriate lag length selection criteria.

The F-test through the Wald test (Bound test) is performed to check the joint significance of the coefficients specified in equation (3). The Wald test is conducted by imposing restrictions on the estimated long run coefficients of structural transformation, agricultural value added, urbanization, gross capital formation, fixed telephone line, trade openness (provided by export of goods and services), and GDP per capita. The computed F-statistics value is compared with the lower bound and upper bound critical values.

As it is depicted below, table 5.4, the calculated F-statistics i.e. 3.658644 is higher than the upper bounds of the critical values at 5 % significance levels. This implies that we reject the null hypothesis of no con-integration at 5 % significance levels and we should accept the alternative hypothesis there is long run relationships.

Table 5.8 Results of the bound test

ARDL Bounds Test					
Date: 07/07/19 Time: 01:54					
Sample: 1984 2015					
Included observations: 32					
Null Hypothesis: No long-run relationships exist					
Test Statistic	Value	k			
F-statistic	3.658644	6			
Critical Value Bounds					
Significance	I0 Bound	I1 Bound			
10%	2.12	3.23			
5%	2.45	3.61			
2.5%	2.75	3.99			
1%	3.15	4.43			

5.6. Long run ARDL model Estimation

After testing the bound test for co-integration the next step is long run model estimation. The results of the bound test indicate the existence of a long run relationship between dependent variable (structural transformation) and the chosen repressors (gross capital formation, agricultural value added, gdp per capita, trade openness, network, and urbanization) The estimated long run ARDL model is presented in table 4.6 below.

Table 5.9: Estimated Long Run Coefficients using the ARDL Approach methods (1, 0, 1, 0, 0, 0, 0) selected based on Akaike Information Criterion.

Long Run Coefficients, Dependent Variable is LNST			
Variable	Coefficient	Std. Error	T- ratio [Prob.]
DLNFTL	0.015284	0.023858	0.640624 [0.5298]
DLNAGRSHARE	-1.264458	0.051439	-24.5817 [0.0000]
DLNGDPPC	1.143701	0.051025	22.41452 [0.0000]
DLNGCF	0.070605	0.006964	10.13857 [0.0352]
LNTRO	-0.009373	0.005617	-1.66868 [0.1125]
LNURB	-0.031732	0.026277	-1.2076 [0.2428]
C	0.350726	0.083741	6.57654 [0.0006]

Source: Authors' computation EVIEWS 9 ***, **, * indicates statistical significant at 1%, 5% and 10%, respectively.

The result of Table 5.5 indicates that all the variables, except trade openness and urbanization, have the expected signs. As discussed in the theoretical and empirical literature parts, Gross capital formation, GDP per capita and Network index (proxied telephone subscriber) have positive effect on structural transformation whereas the share of agricultural value added have a negative effect in structural transformation.

As the long run estimated result of the above table showed, GDP per capita has a positive association with structural transformation and statistically significant at 1 percent significance level. The result is consistent with the theory and empirical studies on structural transformation which states that higher GDP per capita formation is a driver of structural transformation.

Consistent with the findings of Era Dabla-Norris, Alun Thomas, Rodrigo Garcia-Verdu, Yingyuan Chen (2013), the relationship between the share of agricultural value added and the log of Structural transformation is negative and strongly significant.

Next to GDP per capita, gross capital formation is positively associated with structural transformation and statistically significant at 5 %. The findings of this study showed that Gross capital formation in Ethiopian does have a positive effect on structural formation and this is consistent with many studies and theories of structural transformation. Nickell et al. (2008), examined the role of capital endowment (as measured by the log of the real capital stock) in driving changes in the production structure of countries. They find that a higher capital stock is negatively and significantly associated with agricultural and services shares and is positively and significantly associated with the manufacturing share. Their result is suggestive of the importance of capital stock for manufacturing performance.

Since we have specified the model in a log-linear form, the coefficients can be interpreted as elasticity with respect to Structural transformation. The coefficient of GDP per capita (GDPPC) is 1.14. This indicates that, during the study period, holding other things constant, a one percent change in GDP per capita brought a 1.14 percent change in structural transformation during the study period.

Regarding network index, the result showed that there is a positive association though insignificant at 1 & 5 % level of significance. Era Dabla-Norris et al., (2013), results suggest that reforms in the distribution sectors (telecommunication and electricity), particularly in countries with high services shares, can have a significant positive effect on productivity growth in the sector.

Regarding trade openness, proxied by the total exports of goods and services, there is a negative relationship. This negative association might be caused as a result of high proportion non-value added export or export of primary agricultural products. Duarte and Restuccia (2010) provide preliminary evidence which shows that trade openness is strongly correlated with industry productivity but less so with services productivity.

Another study by Badibanga, Diao, Roe, & Somwaru (2009) shows that the transformation of the Ghanaian economy is far behind in new product content and increasing value. This is because agricultural and other primary products dominate the export profile and the economic structure of Ghana. Similarly, a study by Era Dabla-Norris, Alun Thomas, Rodrigo Garcia-Verdu, Yingyuan Chen (2013) reveals that trade openness is associated with a higher agricultural share and is positive and significant at various points in the services share distribution in the pre-1992 period, but only for low values of manufacturing shares.

The other reason behind insignificant result might be associated with huge gap resource balance (17.8% as ratio to real GDP), which indicates that exports of goods and services have insignificant effect to drive structural transformation. This result also confirmed by MoF particularly during 2011/12 and 2012/13 despite it was expected to play an important role in accelerating the structural transformation during the GTP period.

The urbanization proxied by, total population living in urban areas, has a negative relationship with structural transformation. Historically, urbanization has had a close association with structural transformation this result is inconsistent with theories and empirical evidences. But in the study period urbanization may not be accompanied by the concentration of skilled human power in cities, crucial for industry and manufacturing sectors growth. So the unexpected sign could be as a result of the wrong direction of urbanization in Ethiopia which is characterized by concentration of unskilled labor as opposed to skilled labor. For example, according to Jedwab (2013), most developing countries, especially in Asia have urbanized with structural transformation and resource-rich developing countries, especially in Africa, have experienced urbanization without structural transformation. In Africa, thus, the processes of urbanization and structural transformation are disconnected. Contrary to the standard theories of structural transformation, Africa did not urbanize following a green revolution or an industrial revolution, but Africa's urbanization is because of natural resource exports (Gollin, Jedwab, & Vollrath, 2016).

Finally, the long run estimated model presented as follow with figures in the parenthesis indicates calculated t-value.

$$\begin{aligned}
 LRST = & 0.551 + 1.144 LGDPPC + 0.015LNFTL - 0.009LTRO - 0.032LNURB + 0.071GCF - \\
 & 1.264LNAGRI \\
 & (4.118) \quad (22.41) \quad (0.641) \quad (-1.669) \quad (-1.207) \quad (10.14) \quad (-24.58)
 \end{aligned}$$

5.7. Short run error correction model

After the acceptance of long run coefficients of the structural transformation equation the short run Error Correction Model (ECM) is estimated. ECM indicates the speed of adjustment to restore

equilibrium in the dynamic model. It is one lagged period residual obtained from the estimated dynamic long run model. The coefficient of error correction term indicates how quickly variables converge to equilibrium. Moreover, it should have a negative sign and statistically significant at standard significant level. (I.e. p- value should less than 0.05).

Table 5.10 Results of short run model

ARDL Co-integrating And Long Run Form			
Dependent Variable: DLNST			
Selected Model: ARDL(2, 0, 2, 2, 0, 0, 1)			
Date: 07/07/19 Time: 01:55			
Sample: 1981 2015			
Included observations: 32			
Co integrating Form			
Variable	Coefficient	Std. Error	T-Ratio [Prob.]
D(DLNST(-1))	0.429728	0.216853	1.981656 [0.0630]
D(DLNFTL)	-0.026489	0.042326	-0.62583 [0.0393]
D(DLNAGRSHARE)	-1.309498	0.053103	-24.6596 [0.0000]
D(DLNAGRSHARE(-1))	0.457533	0.282566	1.619208 [0.1228]
D(DLNGDPPC)	1.169521	0.049532	23.61142 [0.0000]
D(DLNGDPPC(-1))	-0.467921	0.242238	-1.93166 [0.0693]
D(DLNGCF)	0.31838	0.012249	1.500531[0.0308]
D(LNTRO)	-0.016245	0.010547	-1.54025 [0.1409]
D(LNURB)	-1.964528	0.887307	-2.21403 [0.0400]
CointEq(-1)	-1.733086	0.331911	-5.22154 [0.0001]

$$\text{Cointeq} = \text{DLNST} - (-0.65312 \cdot \text{DLNFTL} - 1.2645 \cdot \text{DLNAGRSHARE} + 1.1437 \cdot \text{DLNGDPPC} + 0.0106 \cdot \text{DLNGCF} - 0.0094 \cdot \text{LNTRO} - 0.0317 \cdot \text{LNURB} + 0.3507)$$

Source: Authors' computation EVIEWS 9 ***, **, * indicates statistical significant at 1%, 5% and 10%, respectively.

The error correction coefficient, estimated at -0.65312 is highly significant, has the correct negative sign, and imply a very high speed of adjustment to equilibrium. According to Bannerjee et al. (2003) as cited in Kidanemarim (2014), the highly significant error correction term further confirms the existence of a stable long-run relationship. Moreover, the coefficient of the error term (ECM-1) implies that the deviation from long run equilibrium level of real GDP in the current period is corrected by 65.3 % in the next period to bring back equilibrium when there is a shock to a steady state relationship.

As Chandran et al. (2010), which is quoted in Tsadkan (2013), the long run effect of the model can be captured by the error term (ECM). Thus, in the long run LGCF, LGDPPC, LAGRI, and LURB, granger cause LST (i.e. unidirectional causality).

From the above table 5.5, similar to the long run result, Gross capital formation, GDP per capita and Network index (proxied telephone subscriber) have positive effect on structural transformation and statistically significant at 1 % percent significance level in the short run, except the Network index (proxied telephone subscriber). As a result, a one percent increases in gross capital formation will result in 0.35 percent increase in structural transformation. Similarly, a one percentage increase in GDP per-capita will result in 1.16 percent increase in structural transformation.

Urbanization that was insignificant in the long run appeared to be significant in the short run.

On the other hand, total exports of goods and service remained insignificant and negative both in the long and short run. Like the long run, the share of agricultural value added variable has shown a negative sign and is statistically significant. Similar to the long run effect, GDP per capita variable is found to have a positive relationship with structural transformation.

From this we can understand that under the study period, whether in the long run or in the short run, trade openness is negatively associated with structural transformation.

Chapter Six

6. Conclusion and Policy Recommendation

6.1 Conclusion

As mentioned throughout this study, there is little doubt that transforming economic structures is a necessary precondition for economic and social development. Historically, many countries were able to rapidly raise living standards by reallocating resources from traditional activities – such as subsistence agriculture – towards higher-productivity sectors – such as manufacturing and modern services. Not only does structural change stimulate economic growth, it can also lead to a more inclusive and sustained growth path.

This study uncovered evidence of the determinants of structural transformation in Ethiopia for the period 1981-2015. The study also analyzed the trends of structural transformation in Africa for the same period.

In this study, the long and short run relationships between structural transformation and other economic variables (gross capital formation, urbanization, Network index (proxied telephone subscriber), share of agricultural value added, gdp per capita, and trade openness) have been investigated using Autoregressive Distributive Lag (ARDL) method to co-integration and error correction.

Before applying the ARDL model, however, all variables are tested for their time series properties (stationary properties) using ADF. ADF test result shows two variables (i.e. trade openness and urbanization) are stationary at level and the remaining variables are stationary at their first difference. The result warrants the use of ARDL method. Furthermore, in order to make the estimators efficient model diagnostic tests have been performed. Accordingly, the result shows that no evidence of heteroskedasticity problem, no serial correlation and the residuals are normally distributed.

The presence of long run relationships is tested by using bound test. The result revealed that Calculated F-statistics is greater than the upper bound critical value at standard significance level. As a result, the null is rejected which says there is no long run relationship between the dependent

and independent variables. After checking all the necessary tests and accepting the results, the long run ARDL model and short run error correction model have been estimated.

The results of the model have shown that that gross capital formation, share of agricultural value added, and GDP per capita are statistically significant both in the long and short run. The network index (proxied by telephone subscriber) is associated positively in both the long and short run. However, it is significant in the short run. As seen from the finding part a one percent increases in gdp will increase structural transformation by 1.143 percent and 1.16 percent in the long and short run respectively during the study period.

The result also revealed that a one percent increase in agricultural value added will decrease structural transformation by 1.26 percent and 1.3 percent in the long and short run respectively. Similarly, one percent increase in Network index (proxied telephone subscriber) will result in an increase of structural transformation by 0.43 percent and 0.01 percent in the short and long run respectively during the study period.

Trade openness does have unexpected sign and insignificant. Urbanization has negative sign and significant in the short run. A one percent increase in urbanization will lead to decrease in structural transformation by 1.196 percent. The short run error correction model (ECM) formulation reveals that there is convergence towards equilibrium in the long run and the adjustment is fairly strong (65%) per annum and statistically significant.

Generally, the African economies experienced a decreasing share of agriculture with a stagnant share on manufacturing and increasing the share of the service sector. However, when it comes to structural change, only a few African countries have recorded sustained economic growths and structural changes. The trend data showed that the share of service sector in GDP, which is 44.5 %, is higher than agriculture, industry and manufacturing. The agriculture sector share in GDP is 25.7 %. The trend data also showed that share of manufacturing and industry in GDP is lower for the observed period, which leads to the conclusion that the pace of structural transformation is lower in Africa. Consistent with the stylized facts of structural transformation, the relationship between the share of agricultural and the GDP per capita is negative and strongly significant, with a correlation of -0.95. There also exists a strong positive association between GDP per capita and the share of industry, with a correlation of 0.75. The matrix also shows that there is a clear negative relation between the share of agricultural value added and GDP per capita. The agricultural share

of GDP for the whole Africa (48 countries) declined sharply from 29.1 % in 1981 to 21.60 % in 2015. This pattern reflects the classic Lewis-type dual economy model, where workers moved out of (subsistence or traditional) agriculture and are absorbed in modern manufacturing (Lewis, 1954).

Consistent with the theories of structural transformation, for the whole Africa, there is a clear negative relation between the share of agricultural value added and GDP per capita. The average GDP per capita increased from \$1,614.04 in 1981 to \$ 2504 in 2015.

Looking at the performance of individual African country, however, interesting differences in the relation between sectoral shares and real GDP per capita can be inferred. For example, in case of Ghana, the share of agriculture in 1981 was 53 % and in 2015 it dropped to 20 %. The agriculture shares of Ghana and Ethiopia in 1981 was almost the same (53 %) but Ghana managed to reduce the share to 20 % compared to Ethiopia which is 36 %.

6.2 Policy recommendation

Based on the finding of the study, the following policy recommendation made:

- Since increasing share of agriculture has negative association with structural transformation, policy aimed at encouraging the development of non-agricultural sector are recommended.
- With regard to physical capital, the positive signs suggest that infrastructure development can accelerate structural change. Thus rapid capital accumulation is recommended.
- Investment on network infrastructures such as telecommunication are facilitators of structural transformation. So investments in network infrastructure is recommended.
- Higher GDP per capita is crucial to accelerate the structural transformation. So policy aimed at increasing per-capita is recommended because increased gdp is crucial to create demand for industrial and service goods which in turn accelerate the structural transformation.
- Export of primary agricultural commodities is negatively associated with structural transformation. Therefore, special emphasis and treatment on the sector to develop it from its infant stage and save foreign currencies.

- Urbanization appears is not contributing to structural transformation. This might be owing to the limited supply of skilled human power capable of driving the industry and manufacturing sector. To do that the current urban areas, characterized by slums where most people are not getting enough basic services such as housing, schools, health etc, should be transformed.
- Finally, it is highly recommended for students and academicians to investigate the facilitating and obstructing factors of structural transformation. This area is not well studied in Ethiopia.

Future research suggestions

- Several variables within the human capital and physical capital dimensions appear to be strong contenders for inclusion – especially since they do not seem to contain high-leverage or influential observations.
- Due to many omitted variables, the study did not include education variables despite the presence of many empirical studies that suggest that improved skills and knowledge enable workers to move to more productive jobs (or even create these jobs through enhanced entrepreneurial skills).
- Likewise, in some studies coefficient on life expectancy suggests that a healthier workforce may also contribute to structural change.
- Urbanization historically associated with structural transformation, and hence studies about making urbanization contribute to structural transformation is an interesting areas of research.
- Connecting smallholders to global value chain is thought to bring rapid structural transformation which in turn drive structural transformation. In this regard, the role of mobile phones can be studied in terms of facilitating structural transformation.
- Macroeconomic, country fundamental and policy variables that are not covered in this study such as exchange rate, arable land, control of corruption, voice and accountability, governance index, political regime, regulatory quality, rule of law can be an interes research topics.

Chapter Seven

7.REFERENCES

Abraham, Katharine and Larry Katz, “Cyclical Unemployment: Sectoral Shifts or Cyclical Unemployment?” *Journal of Political Economy*, 1986, 94, 507–522.

Alemayehu Geda 2005. ‘Macroeconomic Performance in Post-Reform Ethiopia’ *Journal of Northeast African Studies*, 8(1): 159-185.

Alemayehu Geda, John Weeks, Daniel Zerfu and Dawit Weldeyesus 2004. ‘Source of growth in Ethiopia’ A Policy Research Paper for Ministry of Finance and Economic Development, Addis Ababa.

Badiane, O. 2011. *Agriculture and Structural Transformation in Africa*. Stanford Symposium Series on Global Food Policy and Food Security in the 21st Century. Center on Food Security and the Environment. Stanford, California: Stanford University.

Bah, El-hadj (2011), “Structural Transformation Paths Across Countries,” *Emerging Markets Finance and Trade*, May-June 2011, Vol. 47, Supplement 3, pp. 5-19.

Bernstein, Jeffrey R., and David E. Weinstein (2002), “Do endowments predict the location of production? Evidence from national and international data,” *Journal of International Economics* Vol. 56, pp. 55-76.

Buera, Francisco J., and Joseph P. Kaboski (2012a), “The Rise of the Service Economy,” *American Economic Review*, Vol. 102, Issue 6, pp. 2540-2569.

Bates, Robert H., and Steven A. Block (2013). ‘Revisiting African Agriculture: Institutional Change and Productivity Growth’. *The Journal of Politics*, 7(2): 372-84.

Binswanger-Mkhize, H. P., A. F. McCalla, and P. Patel. 2010. “Structural Transformation and African Agriculture.” *Global Journal of Emerging Market Economies* 2: 113–52.

Chenery, H. and L. Taylor (1968) 'Development Patterns: Among Countries and Over Time', *The Review of Economics and Statistics*, 50(4): 391-416.

CSA. (2005). *The 2005 National Labor Force Survey Report*. Addis Ababa, Ethiopia.: Central Statistical Agency.

Dabla-Norris, E., A. Thomas, R. Garcia-Verdu and Y. Chen (2013), ‘Benchmarking Structural Transformation Across the World’, *IMF Working Paper WP/13/176*.

de Vries, G., Timmer, M., & de Vries, K. (2015). Structural transformation in Africa: Static gains, dynamic losses. *Journal of Development Studies*, 51, 674–688.

Dorosh, P., Schmidt, E., & Shiferaw, A. (2012, Fall). Economic Growth without Structural Transformation: The Case of Ethiopia. *Journal of African Development*, 14(2), 7-40.

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

Eberhardt, M. and F. Teal (2013) 'Structural Change and Cross-Country Growth Empirics', *The World Bank Economic Review*, 27(2): 229–271

Ethiopia, Ministry of Finance and Economic Development (2010). Growth and Transformation Plan 2010/11-2014/15, Vol. I (main text). Addis Ababa

EEA. (2014). Report on the Ethiopian Economy. Addis Ababa, Ethiopia: Ethiopian Economic Association.

Ethiopia, Ministry of Finance and Economic Development (2016). Growth and Transformation Plan 2010/15-2019/19, Vol. II (main text). Addis Ababa.

Ethiopia, Ministry of Finance and Economic Development (2014). Ethiopia: An Assessment of Macroeconomic Developments (1992-2012). Addis Ababa.

Ethiopia, Central Statistical Agency (2012). Statistical Report on the 2012 Urban Employment-Unemployment Survey. Addis Ababa.

Gebregziabher, F. (2014). The long-run macroeconomic effects of aid and disaggregated aid in Ethiopia. *Journal of International Development*, 26(4), 520-540.

Herrendorf, B., R. Rogerson and A. Valentinyiet (2014) 'Growth and Structural Transformation' in P.Aghion and S. Durlauf (eds.), *Handbook of Economic Growth*, vol. 2, pp. 855–941

ISIC. (2002). International Standard Industrial Classification of All Economic Activities (ISIC) Revision 3.1. New York: United Nations Publication.

Jedwab, R. (2013). Urbanization without Structural Transformation: Evidence from Consumption Cities in Africa. Unpublished manuscript, Department of Economics, George Washington University.

Kuznets, S. (1966) *Modern Economic Growth*, New Haven: Yale University Press.

Kuznets, S. (1966). *Modern Economic Growth*. *The American Economic Review*, 63(3), 247–258.

Kuznets, S. (1973). Modern Economic Growth: Findings and Reflections. *The American Economic Review*, 63(3), 247-258.

Lin, J. Y. (2012). From Flying Geese To Leading Dragons: New Opportunities and Strategies for Structural Transformation in Developing Countries¹. *Global Policy*, 3(4), 397-409.

Martins, P. (2014, January). Structural Change in Ethiopia: An Employment Perspective. The World Bank, Policy Research Working Paper, pp. 1-42.

McMillan, M. and D. Headey (2014) 'Introduction – Understanding Structural Transformation in Africa', *World Development*, 63: 1–10.

McMillan, M. and K. Harttgen (2014) 'What is Driving the African Growth Miracle?', NBER Working Paper No. 20077.

McMillan, M., D. Rodrik and C. Sepúlveda (2017) 'Structural Change, Fundamentals, and Growth: A Framework and Case Studies', NBER Working Paper No. 23378.

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

McMillan, M., D. Rodrik and I. Verduzco-Gallo (2014) 'Globalization, Structural Change, and Productivity Growth, with an Update on Africa', *World Development*, 63: 11–32

Roncolato, L. and D. Kucera (2014) 'Structural Drivers of Productivity and Employment Growth: A Decomposition Analysis for 81 Countries', *Cambridge Journal of Economics*, 38(2): 399–424.

Shorrocks, A. (2013) 'Decomposition Procedures for Distributional Analysis: A Unified Framework Based on the Shapley Value', *The Journal of Economic Inequality*, 11(1): 99–126.

Syrquin, M. and H. Chenery 1989. 'Three decades of industrialization', *World Bank Economic Review*.

Timmer, Peter C., "The Agricultural Transformation," in "Handbook of Development Economics," Vol. 1, Amsterdam and New York: North Holland, 1988, chapter 8, pp. 275–331.

Timmer, C. Peter (1988). 'The Agricultural Transformation'. In, Hollis Chenery and T.N. Srinivasan (eds), Handbook of Development Economics, Volume 1. Amsterdam: North Holland.

List of Appendices

VAR Lag Order Selection Criteria

Endogenous variables: DLNST DLNFTL DLNAGRSHARE DLNGDPPC DLNGCF LNTRO LNURB

Exogenous variables: C

Date: 07/07/19 Time: 01:52

Sample: 1981 2015

Included observations: 32

Lag	LogL	LR	FPE	AIC	SC	HQ
0	257.5824	NA	3.72e-16	-15.66140	-15.34077	-15.55512
1	443.9351	279.5290*	7.51e-20	-24.24594	-21.68090*	-23.39570*
2	504.5048	64.35533	5.89e-20*	-24.96905*	-20.15960	-23.37485

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Dependent Variable: DLNST

Method: ARDL

Date: 07/07/19 Time: 01:54

Sample (adjusted): 1984 2015

Included observations: 32 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): DLNFTL DLNAGRSHARE

DLNGDPPC DLNGCF LNTRO LNURB

Fixed regressors: C

Number of models evaluated: 1458

Selected Model: ARDL(2, 0, 2, 2, 0, 0, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLNST(-1)	-0.303358	0.206724	-1.467455	0.1595
DLNST(-2)	-0.429728	0.216853	-1.981650	0.0630
DLNFTL	-0.026489	0.042326	-0.625828	0.5393
DLNAGRSHARE	-1.309498	0.053103	-24.65976	0.0000
DLNAGRSHARE(-1)	-0.424383	0.281607	-1.507004	0.1492
DLNAGRSHARE(-2)	-0.457533	0.282566	-1.619210	0.1228
DLNGDPPC	1.169521	0.049532	23.61157	0.0000
DLNGDPPC(-1)	0.344691	0.236872	1.455180	0.1628
DLNGDPPC(-2)	0.467921	0.242238	1.931661	0.0693
DLNGCF	0.018380	0.012249	1.500558	0.1508
LNTRO	-0.016245	0.010547	-1.540178	0.1409
LNURB	-1.964528	0.887307	-2.214035	0.0400
LNURB(-1)	1.909533	0.902610	2.115569	0.0486
C	0.607838	0.193770	3.136904	0.0057
R-squared	0.991704	Mean dependent var		0.065414
Adjusted R-squared	0.985712	S.D. dependent var		0.088257
S.E. of regression	0.010550	Akaike info criterion		-5.965829
Sum squared resid	0.002003	Schwarz criterion		-5.324569
Log likelihood	109.4533	Hannan-Quinn criter.		-5.753270
F-statistic	165.5115	Durbin-Watson stat		2.527995
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test

Date: 07/07/19 Time: 01:54

Sample: 1984 2015

Included observations: 32

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	3.658644	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Test Equation:

Dependent Variable: D(DLNST)

Method: Least Squares

Date: 07/07/19 Time: 01:54

Sample: 1984 2015

Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DLNST(-1))	0.326941	0.223600	1.462168	0.1609
D(DLNAGRSHARE)	-1.300882	0.057626	-22.57462	0.0000
D(DLNAGRSHARE(-1))	0.338062	0.302196	1.118682	0.2780
D(DLNGDPPC)	1.158918	0.055199	20.99509	0.0000
D(DLNGDPPC(-1))	-0.339359	0.251877	-1.347320	0.1946
D(LNURB)	-1.574944	0.662959	-2.375630	0.0288
C	0.429320	0.219555	1.955410	0.0662
DLNFTL(-1)	-0.025321	0.030953	-0.818046	0.4240
DLNAGRSHARE(-1)	-1.989808	0.475883	-4.181301	0.0006
DLNGDPPC(-1)	1.768440	0.410672	4.306210	0.0004
DLNGCF(-1)	-0.011797	0.013392	-0.880880	0.3900
LNTRO(-1)	-0.006649	0.013210	-0.503360	0.6208
LNURB(-1)	-0.076837	0.053585	-1.433919	0.1687
DLNST(-1)	-1.586544	0.343474	-4.619114	0.0002
R-squared	0.991740	Mean dependent var		0.002540
Adjusted R-squared	0.985775	S.D. dependent var		0.091891
S.E. of regression	0.010960	Akaike info criterion		-5.889538
Sum squared resid	0.002162	Schwarz criterion		-5.248279
Log likelihood	108.2326	Hannan-Quinn criter.		-5.676979
F-statistic	166.2489	Durbin-Watson stat		2.511577
Prob(F-statistic)	0.000000			

ARDL Cointegrating And Long Run Form
 Dependent Variable: DLNST
 Selected Model: ARDL(2, 0, 2, 2, 0, 0, 1)
 Date: 07/07/19 Time: 01:55
 Sample: 1981 2015
 Included observations: 32

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DLNST(-1))	0.429728	0.216853	1.981650	0.0630
D(DLNFTL)	-0.026489	0.042326	-0.625828	0.0393
D(DLNAGRSHARE)	-1.309498	0.053103	-24.659765	0.0000
D(DLNAGRSHARE(-1))	0.457533	0.282566	1.619210	0.1228
D(DLNGDPPC)	1.169521	0.049532	23.611572	0.0000
D(DLNGDPPC(-1))	-0.467921	0.242238	-1.931661	0.0693
D(DLNGCF)	0.018380	0.012249	1.500558	0.1508
D(LNTRO)	-0.016245	0.010547	-1.540178	0.1409
D(LNURB)	-1.964528	0.887307	-2.214035	0.0400
CointEq(-1)	-1.733086	0.331911	-5.221544	0.0001

Cointeq = DLNST - (-0.65312*DLNFTL -1.2645*DLNAGRSHARE +
 1.1437*DLNGDPPC + 0.0106*DLNGCF -0.0094*LNTRO -0.0317
 *LNURB + 0.3507)

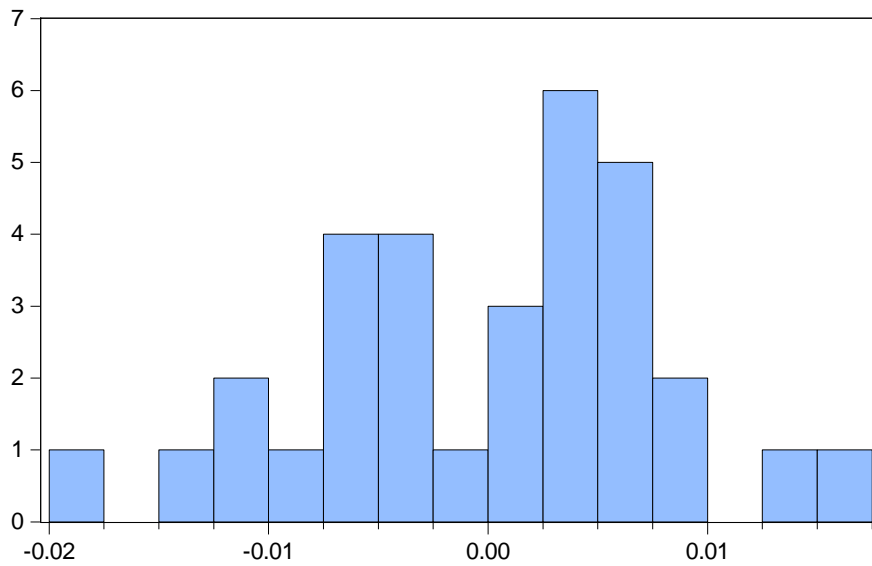
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNFTL	-0.015284	0.023858	-0.640620	0.5298
DLNAGRSHARE	-1.264458	0.051439	-24.581781	0.0000
DLNGDPPC	1.143701	0.051025	22.414655	0.0000
DLNGCF	0.010605	0.006964	1.522837	0.0352
LNTRO	-0.009373	0.005617	-1.668750	0.1125
LNURB	-0.031732	0.026277	-1.207624	0.2428
C	0.350726	0.083741	4.188231	0.0006

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.703240	Prob. F(13,18)	0.7380
Obs*R-squared	10.77837	Prob. Chi-Square(13)	0.6294
Scaled explained SS	3.367911	Prob. Chi-Square(13)	0.9962

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	6.231433	Prob. F(2,16)	0.0100
Obs*R-squared	14.01165	Prob. Chi-Square(2)	0.0009



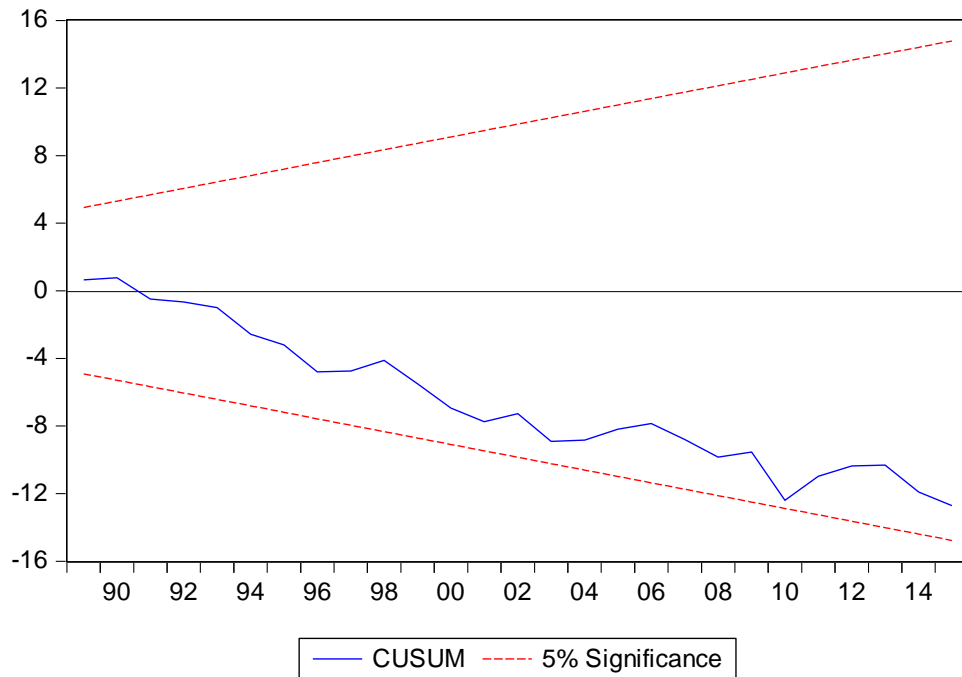
Series: Residuals	
Sample 1984 2015	
Observations 32	
Mean	-2.78e-17
Median	0.001697
Maximum	0.015937
Minimum	-0.019803
Std. Dev.	0.008039
Skewness	-0.347089
Kurtosis	2.975115
Jarque-Bera	0.643338
Probability	0.724938

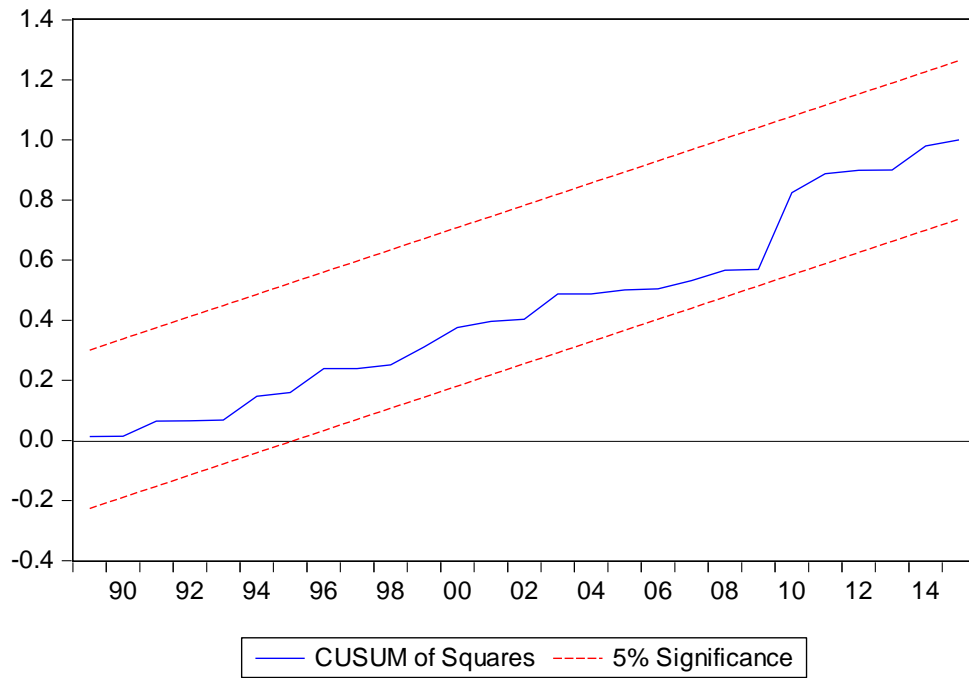
Model Stability Test

Dependent Variable: DLNST
 Method: Least Squares
 Date: 07/07/19 Time: 01:58
 Sample (adjusted): 1982 2015
 Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.300582	0.107559	2.794572	0.0094
DLNFTL	0.032445	0.024749	1.310984	0.2009
DLNAGRSHARE	-1.318308	0.050194	-26.26406	0.0000
DLNGDPPC	1.107111	0.042295	26.17598	0.0000

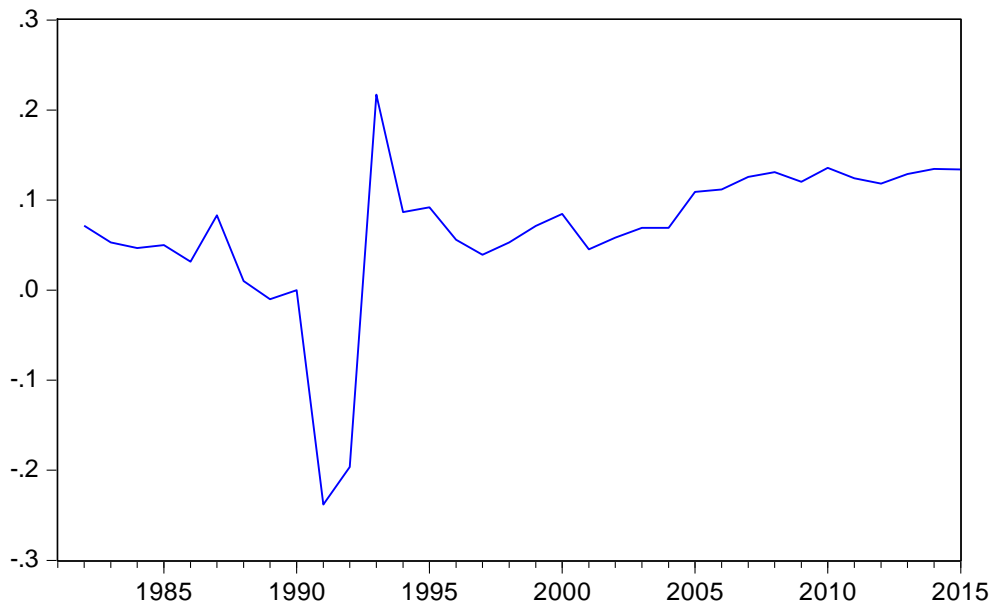
DLNGCF	0.013423	0.010176	1.319123	0.1982
LNTR0	-0.006515	0.007830	-0.832120	0.4126
LNURB	-0.047559	0.035461	-1.341173	0.1910
R-squared	0.985968	Mean dependent var	0.065225	
Adjusted R-squared	0.982849	S.D. dependent var	0.085575	
S.E. of regression	0.011207	Akaike info criterion	-5.963308	
Sum squared resid	0.003391	Schwarz criterion	-5.649057	
Log likelihood	108.3762	Hannan-Quinn criter.	-5.856139	
F-statistic	316.1842	Durbin-Watson stat	2.108641	
Prob(F-statistic)	0.000000			





Structural Break Test: CHOW TEST

DLNST



Chow Breakpoint Test: 1992
 Null Hypothesis: No breaks at specified breakpoints
 Varying regressors: All equation variables
 Equation Sample: 1982 2015

F-statistic	1.538552	Prob. F(7,20)	0.2112
Log likelihood ratio	14.64732	Prob. Chi-Square(7)	0.0408
Wald Statistic	10.76987	Prob. Chi-Square(7)	0.1490

DLNST DLNFTL DLNAGRSHARE DLNGDPPC DLNGCF LNTRO LNURB

Results of Unit Root Test:ADF

Null Hypothesis: LNST has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.554961	0.9991
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNST has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 4 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.354582	0.9848
Test critical values:		
1% level	-4.296729	
5% level	-3.568379	
10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNST) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.357881	0.0201
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNST) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 8 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.495788	0.0001
Test critical values:		
1% level	-4.374307	
5% level	-3.603202	
10% level	-3.238054	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNAGRSHARE has a unit root

Exogenous: Constant

Lag Length: 6 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.934456	0.9945
Test critical values:		
1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNAGRSHARE has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 6 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.160560	0.8994
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNAGRSHARE) has a unit root
 Exogenous: Constant
 Lag Length: 5 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.177531	0.2183
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNAGRSHARE) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 6 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.350059	0.0098
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNFTL has a unit root

Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.625108	0.8515
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNFTL has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 2 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.344905	0.0772
Test critical values:		
1% level	-4.273277	
5% level	-3.557759	
10% level	-3.212361	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNFTL) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.248823	0.1939
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNFTL) has a unit root
 Exogenous: Constant, Linear Trend

Lag Length: 8 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.048094	0.0201
Test critical values:		
1% level	-4.374307	
5% level	-3.603202	
10% level	-3.238054	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNGCF has a unit root

Exogenous: Constant

Lag Length: 5 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	2.309327	0.9999
Test critical values:		
1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNGCF has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.135252	0.5087
Test critical values:		
1% level	-4.252879	
5% level	-3.548490	
10% level	-3.207094	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNGCF) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.626205	0.0000
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNGCF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.841584	0.0030
Test critical values:		
1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNTRO has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.774590	0.8135
Test critical values:		
1% level	-3.639407	
5% level	-2.951125	
10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNTRO has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.943685	0.0025
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNTRO) has a unit root

Exogenous: Constant

Lag Length: 7 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.838032	0.0668
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNTRO) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 7 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.506958	0.3223
Test critical values:	1% level	-4.356068	
	5% level	-3.595026	
	10% level	-3.233456	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNURB has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.765889	0.9918
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNURB has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 8 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.719100	0.0389
Test critical values:		
1% level	-4.356068	
5% level	-3.595026	
10% level	-3.233456	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNURB) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.187810	0.6678
Test critical values:		
1% level	-3.646342	
5% level	-2.954021	
10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNURB) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.274589	0.8768
Test critical values:		
1% level	-4.262735	
5% level	-3.552973	
10% level	-3.209642	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNGDPPC has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.914750	0.9997
Test critical values:		
1% level	-3.639407	
5% level	-2.951125	
10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNGDPPC has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 5 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.401501	0.9983
Test critical values:		
1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNGDPPC) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.778831	0.3835
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNGDPPC) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 4 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.523345	0.0555
Test critical values:	1% level	-4.309824	
	5% level	-3.574244	
	10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNMR has a unit root

Exogenous: Constant

Lag Length: 6 (Automatic - based on AIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.313802	0.0002
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNMR has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 6 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.997202	0.1505
Test critical values:		
1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNMR) has a unit root
 Exogenous: Constant
 Lag Length: 6 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.782381	0.3807
Test critical values:		
1% level	-3.699871	
5% level	-2.976263	
10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNMR) has a unit root
 Exogenous: Constant, Linear Trend
 Lag Length: 5 (Automatic - based on AIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	3.190491	1.0000
Test critical values:		
1% level	-4.323979	
5% level	-3.580623	
10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Correlation Matrix

	AGRICULTURE_FORESTRY_A	GDP_PER_CAPITA_CONSTANT	INDUSTRY_INCLUDING_CONS	MANUFACTURING_VALUE_ADD	SERVICES_VALUE_ADDED
AGRICULTURE_FORESTRY_A	1.000000	-0.952763	-0.791875	0.643631	-0.677590
GDP_PER_CAPITA_CONSTANT	-0.952763	1.000000	0.753747	-0.720366	0.700936
INDUSTRY_INCLUDING_CONS	-0.791875	0.753747	1.000000	-0.402343	0.173375
MANUFACTURING_VALUE_ADD	0.643631	-0.720366	-0.402343	1.000000	-0.704613
SERVICES_VALUE_ADDED	-0.677590	0.700936	0.173375	-0.704613	1.000000

Raw data entered into EXCEL for Trend analysis of 48 Africa Countries (1981-2015): Data Constructed from WDI

Year	Agriculture, forestry, and fishing, value added (% of GDP)	Manufacturing, value added (% of GDP)	Industry (including construction), value added (% of GDP)	Services, value added (% of GDP)	GDP per capita (constant 2010 US\$)
1981	29.51	9.85	22.60	44.39	1,614.04
1982	28.77	9.85	21.74	45.67	1,560.34
1983	28.34	10.24	21.88	45.49	1,544.81
1984	27.51	10.34	22.19	45.00	1,566.50
1985	28.73	10.57	22.65	43.55	1,567.89
1986	28.36	11.28	22.27	44.37	1,534.64
1987	29.03	11.13	22.59	43.99	1,490.96
1988	29.49	11.08	22.32	43.57	1,515.41
1989	28.76	11.43	23.46	42.96	1,553.69
1990	28.50	11.81	23.70	42.51	1,570.78
1991	27.53	11.67	23.67	43.04	1,578.90

Year	Agriculture, forestry, and fishing, value added (% of GDP)	Manufacturing, value added (% of GDP)	Industry (including construction), value added (% of GDP)	Services, value added (% of GDP)	GDP per capita (constant 2010 US\$)
1992	27.00	11.77	23.37	43.57	1,537.63
1993	27.51	11.16	22.48	43.54	1,523.66
1994	27.32	10.92	22.88	43.54	1,514.39
1995	26.85	10.63	23.52	43.34	1,544.83
1996	27.11	10.47	24.51	42.20	1,598.14
1997	27.27	10.77	24.03	42.39	1,694.16
1998	27.37	10.86	23.18	43.41	1,731.92
1999	26.38	10.82	24.30	42.84	1,734.30
2000	25.59	10.64	25.02	43.37	1,735.68
2001	25.32	10.89	23.95	45.19	1,789.14
2002	25.20	10.86	23.77	45.33	1,830.75
2003	24.72	10.68	23.63	45.47	1,854.96
2004	23.37	10.23	24.28	45.46	1,966.39
2005	24.38	10.17	24.25	45.12	2,056.93
2006	23.15	10.13	25.99	44.86	2,129.21
2007	22.52	10.35	25.96	45.07	2,247.07
2008	23.20	10.12	26.27	44.60	2,311.50
2009	22.77	10.02	24.03	46.88	2,280.57
2010	22.37	9.55	24.70	46.62	2,288.09
2011	21.74	9.67	25.88	45.90	2,365.98
2012	22.22	9.58	25.68	45.10	2,471.30
2013	21.54	9.77	25.65	45.54	2,498.83
2014	21.31	9.84	25.19	46.11	2,530.49
2015	21.60	9.84	23.25	47.71	2,504.12

Real Data entered in EVEIWS-Regression analysis: Seven Variables (one dependent)

Ethiopia

Year	Structural Transformation (LCU) – sum total non-agriculture	Urbanization (% age share of urban population)	GDP per capita (constant LCU)	Fixed telephone subscriptions (per 100 people)	Trade openness (LCU) ETB	GCF (ETB)	Share of Agriculture, forestry, and fishing, value added (constant LCU)
1981	94,484,448,179.15	10.61	6,706.71	0.19	8,778,000,000.00	22,075,000,000.00	61.01476034
1982	101,497,116,846.01	10.813	6,582.87	0.20	9,227,000,000.00	21,632,000,000.00	58.52657152
1983	107,000,689,176.67	11.02	6,911.14	0.22	10,136,000,000.00	28,003,000,000.00	60.4232628
1984	112,104,696,205.20	11.232	6,504.83	0.23	7,007,000,000.00	16,067,000,000.00	56.0764015
1985	117,850,608,493.76	11.453	5,598.36	0.23	8,890,000,000.00	27,052,000,000.00	49.11285401
1986	121,643,209,385.94	11.679	5,946.80	0.24	8,925,000,000.00	29,350,000,000.00	52.14156408
1987	132,187,578,251.55	11.909	6,557.31	0.24	8,708,000,000.00	38,448,000,000.00	54.06210677
1988	133,538,364,868.84	12.143	6,379.31	0.24	9,809,000,000.00	27,202,000,000.00	53.44817486
1989	132,190,194,395.75	12.38	6,147.38	0.25	8,693,000,000.00	24,516,000,000.00	53.93218998
1990	132,206,463,296.41	12.621	6,101.24	0.26	6,023,000,000.00	19,684,000,000.00	55.23875117
1991	104,196,626,000.00	12.867	5,468.51	0.27	4,727,000,000.00	16,755,000,000.00	61.6053022
1992	85,624,207,100.00	13.116	4,817.62	0.25	9,784,000,000.00	29,027,000,000.00	65.77653935
1993	106,392,950,100.00	13.37	5,258.84	0.25	13,585,000,000.00	31,469,000,000.00	62.24525883
1994	116,034,163,700.00	13.627	5,240.76	0.25	18,188,000,000.00	35,958,000,000.00	59.55817738

Year	Structural Transformation (LCU) – sum total non-agriculture	Urbanization (% age share of urban population)	GDP per capita (constant LCU)	Fixed telephone subscriptions (per 100 people)	Trade openness (LCU) ETB	GCF (ETB)	Share of Agriculture, forestry, and fishing, value added (constant LCU)
1995	127,218,024,800.00	13.827	5,379.56	0.25	18,233,000,000.00	40,856,000,000.00	58.22572026
1996	134,548,431,000.00	14.006	5,859.37	0.25	23,648,000,000.00	43,065,000,000.00	60.65190038
1997	139,961,029,500.00	14.186	5,862.50	0.26	22,789,000,000.00	42,821,000,000.00	60.18278902
1998	147,558,350,700.00	14.369	5,495.94	0.26	21,449,000,000.00	44,834,000,000.00	56.43548954
1999	158,476,607,700.00	14.553	5,614.60	0.30	24,120,000,000.00	44,108,000,000.00	55.49978783
2000	172,464,069,700.00	14.74	5,785.76	0.35	26,047,000,000.00	50,746,000,000.00	54.14988459
2001	180,439,938,600.00	14.927	6,087.21	0.41	27,828,000,000.00	57,705,000,000.00	55.30639253
2002	191,261,613,000.00	15.118	6,003.67	0.50	28,767,000,000.00	51,975,000,000.00	53.39178817
2003	204,969,912,300.00	15.31	5,708.09	0.56	36,607,000,000.00	70,590,000,000.00	48.89759148
2004	219,658,811,100.00	15.504	6,302.19	0.65	41,452,000,000.00	70,671,000,000.00	51.08023819
2005	244,971,133,900.00	15.7	6,853.92	0.80	42,057,000,000.00	83,053,000,000.00	51.52857955
2006	273,917,425,800.00	15.899	7,391.93	0.92	43,058,000,000.00	81,227,000,000.00	51.32503513
2007	310,643,852,200.00	16.116	8,020.11	1.09	42,800,000,000.00	90,924,000,000.00	50.43688105
2008	354,133,062,000.00	16.51	8,652.02	1.08	42,854,000,000.00	100,416,000,000.00	48.96975616
2009	399,470,216,700.00	16.91	9,167.71	1.07	62,644,000,000.00	122,967,000,000.00	47.50174049
2010	457,599,796,200.00	17.319	10,049.30	1.04	85,955,000,000.00	140,904,000,000.00	45.36734826
2011	518,036,853,500.00	17.735	10,881.80	0.92	102,887,000,000.00	181,854,000,000.00	44.43378411
2012	583,094,361,300.00	18.16	11,516.23	0.86	107,969,000,000.00	200,122,000,000.00	42.70664853
2013	663,409,829,900.00	18.575	12,406.96	0.80	122,632,000,000.00	281,786,000,000.00	41.23411622
2014	759,009,825,300.00	18.998	13,331.30	0.84	59,860,000,000.00	296,901,000,000.00	39.27227436
2015	867,909,659,400.00	19.428	14,347.45	0.89	59,726,000,000.00	311,484,000,000.00	37.5632502