In Search of Structural Change and Perpetual Growth in Ethiopia: Examining Alternative Sectoral Growth Drivers for Reaching Middle Income Country Status

Zerayehu Sime Eshete, and Peter Kiko Kimuyu

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ABSTRACT

This study examines the impacts of alternative sectoral drivers on economy wide growth, structural change and household welfare in Ethiopia. We use sectoral growth accounting approach and vector autoregressive model that incorporates exogenous variables in order to calibrate the induced sectoral total factor productivity growths. We then introduce the calibrated sectoral total factor productivity in the dynamic computable general equilibrium model that uses the Social Accounting Matrix 2006. We find that economic openness, imported capital goods and service, and service liberalization are the positive drivers and enablers of sectoral total factor productivity for agriculture, industry and service sector respectively. The simulation results show that openness induced agricultural total factor productivity highly improves the welfare of households as compared to other growth scenarios. The liberalization induced total factor productivity in the service sector is also more efficacious in terms of enhancing the growth rate of the economy. The imported capital goods induced industrial total factor productivity is also better in fostering structural change of the economy. However, the broad-based growth option that combines the induced total factor productivity of all sectors enables the economy to achieve more sustainable growth, rapid structural change and welfare gain at the same time. In all options, the country will not cross the threshold level of middle income country status by 2025. The study therefore suggests the need to undertake a series of economic policy revisions and launch industrialization-centered broad-based growth strategies. This is also need for the government to be actively involved particularly in the area of manufacturing. We also recommend that foreign trade openness, service trade liberalization, and imported capital goods and services should receive special attention for driving sectoral total factor productivity. We also recommend that the government gives more emphasis to enhancing total factor productivity to complement factor accumulation in search of perpetual growth and economic transformation.

Key words: - ***Induced sectoral TFP; Broad-based growth options; Sector-specific growth options; Structural change process; recursive Dynamic CGE model; and middle-income country status***

Introduction

Indeed, the world economy has been growing with an intensive complexity and interdependence in response to multifaceted globalization and ICT development. As a result, the world political and economic landscape has been dramatically changed and paved a way to foster structural change in developed and emerging economies. For instance, the Chinese economy that had a per capita income of 175 (constant 2000 USD price) in 1979 performed an astonishing economic growth rate with per capita income of 4428 in 2010, becoming the second largest world economy. This is mainly driven by the economic transformation towards an industrial economy and an unremitting upgrading in a manufacturing sector (WB, 2011).

Most developing and African countries in particular, on the contrary, have faced a daunting challenge and suffered erratic growth, bogging down in the mire of abysmal poverty. In 2010, around 48.5 percent of SSA population is below poverty line and forced to live in terrible life. This is attributed to the lack of perpetual growth and structural change as it is evidenced by the performance of the SSA countries that took a share of only 0.7 percent of the world manufacturing value-added and accounted for 1.3 percent of the world GDP in 2009 (WB, 2011). The Ethiopian economy in this regard accounted for only 1.4 percent of manufacturing value-added and 3.1 percent of the GDP of SSA, revealing manufacturing is the neglected sector and below the performance of SSA (WB, 2011).

Manufacturing in Ethiopia remains stagnant in terms of share in GDP, structure, employment, and technological content (Demeke *et al.*, 2003). In 2011, the share of manufacturing in GDP accounts for only 5 percent while agriculture and service accounted for 41% and 45 percent of GDP, respectively. Out of the manufacturing composition, the share of food and beverage decreased overtime and accounted for 40 percent while that of other manufacturing concomitantly increases and accounted for 40 percent in 2008. The manufacturing sector as a whole was largely limited to ordinary agro-processing activities and production of basic consumer goods, limiting the multiple role of manufacturing in the economic transformation of the Ethiopian economy. Moreover, both agriculture and service are not in a position to pass through substantial economic transformation. Agriculture is dominated by the smallholders who cultivate less than 0.5 ha on average and produce basic staples for subsistence (Hassan, 2006). The service sector by itself is characterized by traditional activities in the absence of innovation

and ICT development. Instead of shifting towards industrial sector, the Ethiopian economy shifting towards the service sector that takes the leading share in GDP (45 percent), growth rate (58percent), capital investment (46percent) and public expenditure (75percent) in 2010/11(NBE, 2011). However, the service sector was dominated by domestic trade, hotels and real estate business (55 percent) in 2010. Many suspect that productivity and per capita income will be limited overtime as the share of the primary service sector increases. This is because of weak sectoral linkage and labour-intensive nature of service activities. As a result, this shift will constitute a structural change burden as explained by Baumol's disease (Baumol, 1967).

There are also two basic problems associated with the scanty share of manufacturing: the first one is the lack of adequate investment (factor accumulation) due to policy and non-policy barriers. For instance, 83 percent of the total number of licensed projects in 1992-2010 and 87 percent of total capital investment demand were not implemented even if investors issue licenses. Rather, they trapped at pre-implementation process (EIA, 2010). The second one is the inexistence of stable and positive sectoral total factor productivity. The growth rate of sectoral TFP is negative and erratic on average regardless of economic sectors over the period 1972-2011. However, it was positive in agriculture sector during pro-poor regime (2001-2011) and in industry sector during more of reform regime (1992-2000). However, the growth rate of TFP in service sector has not been positive since the onset of market-oriented economy in 1991 while more investment resources are channeled to it. Such negative TFP growth affects economy wide growth rate and structural change process. This inherently slows down the country's pace towards the middle-income country status by 2025, which will require Ethiopia to triple its per capita GDP from the current level of USD 358. Some comparators reach the middle income country status by growing 7 to 11 percent annually within 8 to 13 years. There is an intensive and hot political debt regarding alternative sectoral growth options in the sphere of reaching a middle-income country status in Ethiopia by considering different economic sectors grow at different uneven growth rate. However, the debate does not derive from a rigorous analysis and holistic economy-wide approach. It is rather affiliated with politics. Therefore, the paper investigates the impacts of alternative sector growth drivers and enabler that foster sector TFP in the search of perpetual growth and structural change for reaching middle income country status by 2025. It employs growth accounting approach, VARX model and recursive dynamic CGE model based on SAM 2006.

Macroeconomic Performance and Political Regimes

The Ethiopian economy has been growing with different fashions depending on economic policies undertaken by the ruling governments at their times. During the 1980s socialist regime, the economy grew by 2.3 percent while the population grew by 3.2 percent on average. In effect, the per capita real GDP deteriorated overtime and was equal to USD 133 annually, accompanied with a negative 0.8 percent growth rate on average (WB, 2011). The economic doctrine changed to make the economy more market oriented in the context of neo-liberalization in 1991. The government also launched ADLI in 1994, which gives more emphasis to small landholders[1]in order to achieve broad-based economic growth and industrialization (MOFED, 2005 and Tadele, 2008). The government shifted its policy towards a pro-poor growth strategy in 2001 and state development program in 2005. As a result, the average real GDP exhibits a progressive performance and grows by more than 8 percent, making the per capita income to grow to USD 358 in 2010. On top of this, the share of agriculture in 2010 accounted for 48% of GDP, followed by the service sector (38 percent), and then the industrial sector (14 percent). The service sector seems take the leading position in the near future (NBE, 2011).

A stable macro economy and well functioning markets are important factors for perpetual growth and structural change. As the three gaps macroeconomic model explained, the existence of chronic domestic resource gap (saving-investment), foreign resource gap (import-export), and fiscal gap (tax-expenditure) causes macroeconomic imbalance and puts pressure on the function of markets. Looking at Table 1, the investment saving gap gets narrowed from 10 to 4 percent of GDP across the regimes. However, the fiscal gap is not very wide as compared to saving-investment gap. The foreign currency earned from the export is lower than the expense incurred on import, leading to an increase in the trade gap from 5 to 18 percent of GDP. This gaps place an adverse effect on economic growth and transformation.

Comparing with comparators, the Ethiopian economy saving of 19 percent in 2001-2010 is lower than the performance in other countries such as Angola (25%), Vietnam (24%), Zambia (31%), Botswana (32%), Malaysia (30%), Thailand (31%), Brazil (22%) and China (38%) - at their respective ending years of transition periods (WB, 2011).

[1] They produce more than 90% of agricultural output and cultivate close to 95% of cropped land.

Table 1: Major Macroeconomic Performance Indicators

Major Macroeconomic Indicators	Part of Socialist Regime (1980-1990)	Neo-Liberalization Regime (1991-2000)	Pro-Poor growth Regime (2001-2010)
Real GDP growth rate (%)	2.3	3.0	8.5
Nominal GDP per capita, USD	225.9	162.9	219.7
Structure of GDP (%)			
Agriculture, value added	56.30	58.00	46.05
Industry, value added	11.58	10.29	13.19
Manufacturing, value added	4.89	4.51	5.07
Services, value added	32.12	31.71	40.76
Total investment(% of GDP)	16.2	15.0	23.3
Gross national savings (% of GDP)	6.8	10.1	19.7
Government revenue(% of GDP)	14.4	13.7	18.4
Government expenditure(% of GDP)	18.5	18.7	21.9
Grant, excluding technical support (USD)	0.30	0.54	1.96
Broad Money (% of GDP)	20.0	29.7	38.6*
Total Reserve (in months of Import)	2.3	4.3	3.05*
Inflation rate	5.2	7.5	11.1
Total Export (percent of GDP)	6.5	8.7	12.7
Total Import (percent of GDP)	11.6	16.4	30.4

Source: WB Report 2011, and IMF Report 2012, online database

N.B: *data for both broad money and total reserve presented here up to 2008 and 2009 respectively. The classification of the regimes is presented according to the Ministry of Finance and Economic Development.

In addition this macroeconomic gap, macroeconomic instability becomes a daunting challenge and adversely affects investment climate and thereby economic growth. The recent inflationary spiral unprecedentedly increased despite good harvest of agricultural produce. The general inflation reached 37.2% as of September 2008 while food inflation was 51.8% (CSA, 2008; NBE 2007 and NBE, 2011). The country's gross official reserve exhibited a declining trend and dwindled to cover only 3.6, 2.3 and 2.2 months of imports as of June 2005, 2006, and 2007, respectively. The reserve position was 5 weeks of import coverage in December 2008 and created a deadlock situation especially for investment activities (Kagnew and Zerayehu, 2009). The recent macroeconomic instability continues to challenge the ongoing investment. The monetary authority attempted to curb this macroeconomic instability. However, the monetary policy's speed of adjustment towards the long run equilibrium is very low (Zerayehu, 2006).

Theoretical Framework

Structural change is defined as a dynamic process of change in sectoral relative contributions to GDP in which the share of industry (manufacturing) in GDP rapidly increases and the agricultural share in GDP concomitantly declines in a non-linear pattern. Amidst, the contribution of services in GDP begins to grow. This dynamic process continues until the share of manufacturing takes the leading position (Kuznets, 1966; Chenery and Taylor, 1968; Kongsamut et al., 1997; and ECA 2011). This structural shifts causes economy to have higher productivity, higher earnings, integrated industrial products, product sophistication and output diversification, relatively low risk (volatility and vulnerability), and widen employment creation.

There are different ways to excel the share of manufacturing in GDP. Some scholars propose agricultural led industrialization approach. This approach considers growth in agriculture ignites sustained overall economic growth and structural change. The advocates of this idea claim a justification of historical success events during the industrial revolution in Europe (Dercon and Zeitlin, 2009). The argument in favor of agriculture led industrialization also considers: providing food and ensuring food security prior to industrialization, supplying materials for basic needs and industrial products, creating more employment and foreign currency earnings. Moreover, the agricultural sector is more of labor and land intensive so that it considers the country's resource-based comparative advantage.

Other economists and policy makers believe that service sector is responsible for structural change when factors are accumulated with increasing TFP towards service sector, calling service led industrialization. Note that both agricultural and service led industrialization approaches are an indirect approach as its outcomes depend on the degree of sectoral linkage and dependence with industry sector. The advocates of service led growth arguing the traditional thinking about service sector. Traditionally, the service sector is perceived as less innovative. However, since the introduction of ICT and innovation in service sector leads to a higher efficiency and performance. The rationale for this approach relies on the role of the service in building human capital, advancing information technology, creating demand, and facilitating transport system. They also argue that many service activities do not require high fixed asset investment to get started (Cristina, 2007).

In contrast, the other group of economists recommends a direct approach that advocates boosting up industrial investment and TFP in search of sustainable growth and structural change. They argue against the other approach by evoking the existence of weak sectoral linkage and responsiveness among economic sectors so that they believe that both agriculture and service are impotent to increase the share of manufacturing in GDP and thereby structural change. This implies that majority of agriculture and service activities by themselves are not capable of passing through innovative methods of production with technological change. They rather remain in traditional way of producing primary commodities, and exposing the economy to structural change burden in response to the lead share of service in GDP (Szirmai, 2009). Therefore, according to the advocates of this approach, it is the manufacturing sector that is capable of generating higher productivity, economies of scale, technological advance, capacity to diffuse, and multiplier, linkage and spill-over effects (Szirmai, 2009 and Rodrik, 2006).

On top of this debate, a large number of economists arguing against treating each sector separately. Rather, they strongly argue for combining economic sectors in order to speed up industrialization by taking the advantage of sectoral reinforcements, interactions and complementarities among sectors. This argument paves a way to multi-sector growth options in the way of combining factor accumulation and factor productivity of two or more sectors. In addition to whether direct or indirect approach, and single or multiple sector growth options, the main puzzling question is that how developing countries in general and Ethiopia in particular can achieve dynamic structural change for sustaining perpetual change. This issue has not yet been solved since the origin of economics although scholars are convinced structural change is a requisite for perpetual growth (Quesnay, 1758 and Ricardo, 1817). This implies that sustainable economic growth cannot be possible without structural change (Schumpeter, 1939 and Pasinetti, 1981). In this context, there are therefore two basic frameworks of structural change process and perpetual economic growth at sectoral level. The factor accumulation framework was advocated by Rostow (1956), Lewis (1954), Fei and Ranis (1964) and Jorgenson (1961) and does not have a permanent effect on growth due to its nature of diminishing return to scale, calling for an increasing sectoral TFP that comprises changes in technology, technical efficiency, allocative efficiency, economies of scale effects, and the like in search of perpetual growth and rapid structural change (William and Ross, 2001). The endogenous growth model in this aspect discovers new idea, knowledge, innovation, public infrastructure, Technology-led productivity,

forward and backward linkages that triggering dynamic transformation (Romer, 1990; Lucas, 1988; Grossman and Helpman, 1991; Aghion and Howitt, 1992; Barro, 1990; Stephen, 2001and Schultz 1964). The creation of knowledge and innovation proxied by research and development, transfer of innovation proxied by importation of capital goods and service, and absorptive capacity proxied by human capital and infrastructural development are worth mentioning determinants of sectoral TFP (Anders, 2007; Chen and Dahlman, 2004; Mayer, 2001; Ngai, 2004; Nelson and Phelps, 1966; and Benhabib and Spiegel, 1994).

Country Experiences

The per capita growth rate of the globe was 0.05 percent on average in the 18th century, and grew approximately by 1 percent in the 19th century. Following the industrial revolution, countries have an opportunity to improve their economic performance and structural change with which the per capita growth rate tended to be around 2 percent on average in the 20th century (Lin, 2012). According to a report by the ECA, African economies reflect a decreasing share of agriculture with stagnant share on manufacturing. Only few African countries have recorded sustained growths over the period 1970–2007, of which only Tunisia actualizes structural transformation (ECA, 2011).

Some countries have crossed the threshold of the middle-income country status with a significant structural change while others joined the middle-income status without structural change in their economies. Others, resource-rich countries like Angola, Botswana, Zambia, and Equatorial Guinea joined the middle income country status without securing structural change. On the other hand, Cape Verde that had limited natural resources has joined the middle country status by improving the tourism services with an active role of the government (WB, 2011). In nutshell, most of the African countries export primary commodities with limited diversification in production and input use as well as unskilled labour. The share of manufactures in GDP, in Africa, remained low and constant in 1995-2004, and far below the average of its developing country (Ron and Hannah, 2011). We focus on ten countries since these countries, whose detailed are presented below, have similar features with Ethiopian economy.

Growth and Per capita Income during Transition:

Looking at Table 2, Angola, Botswana and Vietnam have taken 10 years to reach the middle income status. Their respective average annual growth rates were 7.1 percent, 11.2 percent, and 7 percent during transition, respectively. During such transitions, the average per capita income grew above 10 percent. Conversely, the contribution of sub-sectors to these growth rates is different among countries depending on their natural resources and comparative advantage. In Angola, the average GDP growth of the agriculture was 11.7 percent, followed by the industry (8.5 percent) and service (2.9 percent). However, in Vietnam, manufacturing took the lead (by 11.2 percent) during the transition period while the agriculture and services grew by 4 percent and 6.5 percent, respectively. The per capita income also grows by double digit in the reference countries. Nonetheless, it grows less than 10 percent in Ghana, Sri Lanka and Thailand. In the case of Botswana, the per capita GDP was around USD 77 in 1966. Natural resources especially diamonds are the main factor that enables the country to join the middle-income status. However, diversification is a daunting challenge in improving the level of poverty (Leith, 2005).

Table 2:- The Economic Growth and Sector Contribution in Reference Countries

No.	Comparators	Initial Year	End Year	Years elapsed	Average Annual Growth rate during Transition					
					Based on Current USD		Based on Constant USD in 2000			
					GDP	PCI	Agric.	Industry	Manuf.	Service
1	Angola	1994	2004	10	15.4	11.9	11.7	8.5	7.0	2.9
2	Vietnam	1998	2008	10	11.9	10.6	4.0	9.4	11.2	6.5
3	Ghana	1978	2010	32	8.6	5.8	NA	NA	NA	NA
4	Zambia	2002	2010	8	19.3	16.5	1.0	9.8	5.3	6.0
5	Botswana	1974	1984	10	16.6	12.4	-2.9	17.5	11.6	8.4
6	Sri Lanka	1984	2004	20	6.9	5.8	1.4	5.4	6.5	5.0
7	Malaysia	1968	1977	9	15.6	12.8	5.1	8.1	12.1	9.2
8	Thailand	1975	1988	13	11.6	9.2	4.2	9.2	8.2	7.2
9	Brazil	1967	1975	8	18.6	15.8	4.5	10.4	NA	10.7
10	China	1992	2001	9	13.2	12.4	3.8	13.1	12.5	11.1

Source: Own computation based on WDI data base, online version

N.B:- Initial year represents year when the per capita income reached around Ethiopia's performance (USD 356). End year denotes for a year when comparators join the middle-income country status. Year Elapsed represent the number of years required to reach the middle-income country status. Besides, PIC stands for per capita income

The Chinese economy was poor in performance in the late 1970s. However, the government committed to achieving sustainable growth and rapid structural change and joining the middle income country status in 2001. The Chinese economy grows by 10 on average during the transition and became the second-largest world economy in 2010. Interestingly, the demand for copper from China and India creates a wide opportunity for Zambia which supplies an enormous amount of extracted copper. This helps Zambia for reaching the middle income status. Besides, Brazil from South America and Malaysia and Thailand from Asia took 8-12 years to reach the middle income country status with an average GDP growth rate of above 7 percent (Table 2).

Structure of GDP:

The contribution of agriculture to GDP declines while the industry relatively increases in the reference countries, except Angola. However, the share of services in total GDP declined in Vietnam, Zambia, Botswana, Malaysia, and Brazil. Experience from non-African countries shows that the manufacturing sector plays a pivotal role and became a gear shifter for economic transformation. Regarding the aforementioned African countries, the share of manufacturing in total GDP decreased by 2 percent on average. The contribution of agriculture to GDP in Botswana shrinks significantly from 29.9 percent to 7.6 percent due to the sharp rise in mining.

Table 3:- Structure of GDP in the Reference Countries

No.	Comparators	Structure of GDP							
		Agri. (1)	Agri. (2)	Ind. (1)	Ind. (2)	Manuf. (1)	Manuf. (2)	Service (1)	Service (2)
1	Angola	6.6	8.6	66.9	66.1	4.9	3.9	26.5	25.3
2	Vietnam	25.7	22.2	32.4	39.8	17.1	20.3	41.9	38.0
3	Ghana	65.0	30.2	12.8	18.6	9.2	7.9	22.2	51.2
4	Zambia	22.0	18.9	25.9	37.2	11.5	9.15	52.1	43.9
5	Botswana	29.9	7.6	33.6	57.3	7.2	5.5	36.5	35.1
6	Sri Lanka	28.6	12.5	26.3	28.6	14.9	18.7	45.1	58.9
7	Malaysia	28.4	26.5	25.3	36.0	10.7	19.2	46.3	37.5
8	Thailand	27.0	16.0	25.7	34.5	18.6	25.8	47.3	49.5
9	Brazil	15.1	12.0	33.8	40.1	26.0	30.2	51.1	47.9
10	China	21.7	14.3	43.0	45.1	32.7	31.6	35.3	40.6

Source: Own computation based on World Development Indicator, online version

N.B:- (1) and (2) represent the initial year and the last year during transition.

The two countries that took relatively long time to join middle-income status are Ghana and Sri Lanka, taking 32 and 20 years from the position where Ethiopian existing (USD 358) in 2010. The growth rates of real GDP and per capita income accounted for nearly 4 percent and 5.8 percent during the transition period, respectively. However, manufacturing accounted for 7.9 percent and 18.7 percent for Ghana and Sri Lank, respectively, indicating that the Sri Lanka's economy has almost structurally shifted while the Ghanaian economy has not.

Structure of Merchandise Export:

Growth in exports is typically faster than economic growth in most developed countries. This reflects the importance of external demand in growth accelerations and structural change since it allows production growth to exceed growth in the domestic demand. Looking at the structure of merchandise export, it has four categories according to the World Bank classification. The share of agriculture in export tends to decline during the transitions in non-African countries. However, the export market still dominated by the primary commodities with a deteriorating terms of trade. For instance, export share of agriculture accounts for 5.3 percent and 60 percent in China and Ghana, respectively. As can be seen Table 4, the structure of the export of most of the reference countries also changed during their transitions. Except Vietnam, the share of agricultural exports in total merchandise exports declines.

Table 4:- Structure of Merchandise Export in the Reference Countries

No.	Comparators	Structure of Merchandise Export							
		Agri. (1)	Agri. (2)	Ind. (1)	Ind. (2)	Manuf. (1)	Manuf. (2)	Service (1)	Service (2)
1	Angola	NA	NA	NA	NA	NA	NA	NA	NA
2	Vietnam	30.7	20.0	1.8	2.9	25.9	22.0	41.6	55.1
3	Ghana	76.6	60.6	6.3	6.9	16.0	11.9	1.1	20.6
4	Zambia	9.4	5.5	5.0	0.9	71.2	87.4	14.4	6.2
5	Botswana	NA	NA	NA	NA	NA	NA	NA	NA
6	Sri Lanka	52.8	20.6	10.7	2.2	9.9	3.3	26.6	73.9
7	Malaysia	10.5	19.1	50.1	38.6	33.6	27.3	5.7	15.0
8	Thailand	62.7	37.0	12.3	8.0	10.4	3.5	14.6	51.5
9	Brazil	68.0	54.0	13.6	3.8	8.6	17.0	9.8	25.2
10	China	11.3	5.3	2.2	0.8	8.2	5.3	78.3	88.6

Source: Own computation based on World Development Indicator, online version

N.B:- (1) and (2) represent the initial year and the ending year of the transition, respectively

In Malaysia, the share of agricultural raw material in the total merchandise export constitutes the lion-share of 50 percent at the beginning of the transition and declined to 38 percent at the end of the transition period with a concomitant increase in manufacturing share, a promising attempt to structural change. The share of manufacturing in the total merchandise export takes the lion's share of 88 percent, 73 percent, 55 percent, and 51 percent in China, Sri Lanka, Vietnam, and Thailand, respectively. The share of manufacturing in export increases, in all comparators, during the transition. Exceptionally, it declines from 14 percent to 6 percent in Zambia as the government pays more attention to exploiting copper that takes the lion-share.

Structure of Demand:

It is one of the stimulating factors to have a sustaining long run economic growth and structural change. Household final consumption expenditure as a share of GDP takes the lion's share in all the reference countries, except Vietnam and Botswana, at the ending year of transition (Table 5).

Table 5:- Structure of Demand in Reference Countries

Comparators	Structure of Demand (%)											
	HH (1)	HH (2)	GG (1)	GG (2)	GC (1)	GC (2)	Ex (1)	Ex (2)	Im (1)	Im (2)	GS (1)	GS (2)
Angola	33.8	NA	40.1	NA	16.6	9.1	85.3	69.6	75.8	53.7	26.10	25.0
Vietnam	70.6	69	7.6	6.1	29.0	39.7	44.8	77.9	52.1	93.1	21.7	24.5
Ghana	84.6	79	11.3	11.2	5.38	22.4	8.3	25.3	9.60	38.4	4.0	9.2
Zambia	80.3	55	11.8	13.2	21.9	22.4	27.7	44.1	41.7	35.0	7.8	31.4
Botswana	58.7	42	17.2	25.0	40.9	60.8	40.9	60.8	64.8	57.9	24.0	32.2
Sri Lanka	72.3	71	7.7	12.6	25.8	24.7	28.8	35.3	34.7	44.1	19.8	15.9
Malaysia	63.7	53	14.7	16.2	18.3	23.2	39.4	47.3	36.1	42.7	21.5	30.3
Thailand	67.6	58	10.3	10.0	26.7	32.6	18.4	33.0	22.9	34.4	22.1	31.2
Brazil	71.5	66	11.5	10.6	16.9	26.8	5.7	7.50	5.7	11.5	16.9	22.8
China	45.7	45	15.6	15.9	37.4	36.3	18.6	22.6	17.5	20.4	38.6	38.3

Source: Own computation based on World Development Indicator, online version

N.B:- (1) and (2) represent the initial year and the last year of the transition, respectively. Besides HH represents household, GG for general government, GC for general capital formation, EX for export, IM for import, GS for gross saving

Next to that, gross saving in China, gross capital formation in Brazil, import in Ghana, Vietnam, Botswana, Thailand and Sri Lanka, export of goods and service in Malaysia and Zambia takes the second lead at the end of the transition period. The gross saving as a share of GDP in all

reference countries was 20 percent, on average, at the beginning and grew to 26 percent at the end of the period. Ghana and Sri Lanka are a bit far away and below this average, accounted for 9 percent and 16 percent of the ending year, respectively. The average of general government consumption expenditure for all the reference countries also accounted for 15 percent at the beginning and reduced to 12 percent at the end of the transition.

On top of this empirical evidence, some countries that joined the middle income country status slide back to the low-income country group. 25 countries in this regard moved back to lower-income country over the period 1978-2003, claiming that they were not structurally transformed (Seth, 2012). Therefore, they have faced problems of the vagary of nature, substantial drop in commodity prices, war and internal conflict, and depletion of resources. The structure of exports has also undiversified and concentrated on primary commodities (Breisinger et al. 2008). Because of this, the speed of structural transformation varies across countries and over time. In the pace of transformation, for instance, the speed of transformation in China is 2.4 and 72.6 times that of in Malaysia and Ghana economy, respectively, in 1962–2000. This Chinese experience gives a good lesson for other developing countries regarding diversification and promotion of export goods and service (Thaddee et al., 2009). In summary, experiences from non-African countries show that they experienced a structural change during their transition while African countries meet the requirement without significant structural change in their economies. The African experience has faced major challenges in diversification and industrialization (Ajakaiye and John, 2011).

Methodology

The study uses three stages methodological approaches in order to analyze the impact of the induced sectoral TFP growths on economy wide growth, structural change process and household welfare in Ethiopia. The first stage is that the study employs sectoral growth accounting approach so as to estimate sectoral TFP growth rates for agriculture, industry and service sector. This is based on Solow residual methods as presented below.

$$g_{TFP} = g_Y - (\alpha . g_L + \beta . g_K + \gamma . g_N) \quad \ldots\ldots (1)$$

Note that g_{TFP}, g_Y, g_L, g_K, and g_N represents the growth rate of TFP, labour, capital and cultivated land respectively. The last term is included only for estimating agricultural TFP. The parameters $\alpha, \beta, and\ \gamma$ measure factor income share of labour, capital and cultivated land respectively. This assumption implies that the coefficients that are the output elasticities are equal to the factor income share. The study picks up the national income account of year 2006 in order to calculate the factor income share (Table 6). This helps to have a consistent base with the SAM 2006 for recursive dynamic CGE model.

Table 6:- Sectoral Factor Income shares using 2006 National Income Account

Factors of Production	Sectoral Factor Income Share		
	Agriculture	Industry	Service
Labour	0.754	0.3405	0.23
Capital	0.102	0.6595	0.77
Land	0.144	-	-

Source: Ethiopian SAM 2006

The second stage also indicates that, using the estimates of sectoral TFP growths, the study uses VARX model in order to estimate the determinants of sectoral TFP growth, respectively. Note that the VARX model has a comparative advantage over the VAR model. The VAR model consists of all dependent variables and is used for forecasting purpose whereas the VARX model contains both endogenous variables and exogenous variables included in the model allowing articulation of policy prescription. Regardless of the sector, the broad source of the TFP growth is innovation (knowledge creation) in a domestic economy and technology transfer (absorption and transmission of knowledge) from abroad. Many studies show that research and development (R&D) serve as a proxy for knowledge creation and point out its long relationship with the TFP growth rate (Chen and Dahlman, 2004). The technology created abroad crosses the national border and is principally transferred to the domestic economy through importation of technology (Keller and Yeaple, 2003; Mayer, 2001). Such channels, in turn, depend on the nature of imported technology and barriers during technology transfer. Trade barriers and capacity barriers are worth mentioning in this regard (Ngai, 2004). In most developing countries, capacity and trade barrier is broadly explained in terms of openness of the economy and service trade liberalization in order to addressing the limitations associated with both external economy and domestic economy, respectively. On top of this foreign trade, domestic service trade restriction

causes poor productivity and slows down economic growth overtime (Asghar, 2007). The level of human capital development can address the constraints associated with the innovative and absorptive capacity (Nelson and Phelps, 1966; Benhabib and Spiegel, 1994). In addition to human capital, Easterly and Rebelo (1993) proposes infrastructural development as one of the key factors responsible for capacity constraints. Both primary school enrollment and road network human capital are proxy variables for human capital and infrastructural development, respectively. The endogenous growth model also explicitly takes in to account both accumulation of human capital and physical capital in terms of infrastructure in order to explain the international variation in growth rates across countries (Romer, 1990). The stability of macroeconomic performance has its own implication on the TFP growth. Therefore, equation 2 presented below gives the final model of TFP at the aggregate level.

$$g_{TFP} = f(R\&D, imported\ capital\ goods, opennes, service\ trade\ liberalization, human\ capital, infrastructure, inflation) \quad \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

On the basis of the aggregate TFP growth model, the study then drives sectoral TFP growth models for the agriculture, industry and services. Following the flow of inputs and outputs among sectors in terms of investment and consumption, the study adds the lag of sectoral TFP growths in order to capture the interactions of sectoral TFP among the three sectors. This makes the model to have two broad components such as dependent interactive variables and exogenous variables. Such incorporation of sectoral interaction in the model claims the VARX model. The VARX model refers to a VAR that contains dependent variables that interact with each other and the exogenous variables. This allows the lag values of the sectoral TFP growths in order to build the model of sectoral productivity dynamics.

Note that sectoral TFP is expressed in terms of growth rates for two reasons. As an outcome, the sectoral growth accounting approach produces a growth rate of sectoral TFP. On the other hand, the dynamic CGE model requires TFP in terms of growth rate as an input. These two facts require that the most explanatory variables be expressed in terms of growth rate for securing uniformity, stationarity and robust diagnostic test.

Therefore, the final VARX model for each sector is presented as below.

For the agriculture:

$$g_{TFPA} = f(g_{LTFPA}, g_{LTFPI}, g_{LTFPS}, g_{ard}, g_{imc}, g_{pep}, g_{nwr}, opp, lr, inf) \quad \text{...} (3)$$

For the industry:

$$g_{TFPI} = f(g_{LTFPA}, g_{LTFPI}, g_{LTFPS}, g_{ard}, g_{imc}, g_{pep}, g_{nwr}, opp, lr, inf) \quad \text{...} (4)$$

For the service:

$$g_{TFPS} = f(g_{LTFPA}, g_{LTFPI}, g_{LTFPS}, g_{ard}, g_{imc}, g_{pep}, g_{nwr}, opp, lr, inf) \quad \text{...} (5)$$

Where g_{TFPA} = TFP growth rate for agriculture; g_{TFPI} = TFP growth rate for industry; g_{TFPS} = TFP growth rate for service; g_{LTFPA} = lag values of TFP growth rate for agriculture; g_{LTFPI} = lag value of growth rate for industry; g_{LTFPS} = lag value of growth rate for service; g_{imc} = growth rate of imported capital goods g_{ard} = growth rate of government expenditure for agricultural R&D ; g_{pep} = growth rate of pupils in primary school; g_{nwr} = growth rate of road net works in kilometers ; opp = openness of the economy; lr = service trade liberalization index proxied by private credit per GDP; $\inf$ = inflation.

The third stage is the study picks up some of positive statistically significant explanatory variables in order to calibrate the induced sectoral TFP growths for the dynamic CGE model. In this case, it investigates openness induced agricultural TFP, imported capital goods induced industrial TFP and liberalization induced service TFP are worth mentioning and incorporated in the CGE model. Many researchers use a number of methodologies in order to analyze the impact of alternative sectoral TFP growth options on economy-wide growth and structural change process. The study, however, uses the dynamic CGE model in order to capture the two broad sources of growth- factor accumulation and TFP in base-run and simulation scenarios respectively. The dynamic CGE model considers the entire economy in the sense of general equilibrium and enables comparison of the benchmark and counterfactual policy scenarios. It also runs simulation for economy-wide impacts of exogenous shocks and assesses the welfare effect based on the household survey. Besides, it incorporates the dynamic nature of structural change and market interactions and feedbacks. Exceptionally, it produces disaggregated results at micro-level and/or aggregated at macro-level. The specification of CGE model in the study follows the model

developed by Sherman Robinson and his colleagues in 2002. It considers the neoclassical-structuralist tradition in order to address the structural features of Ethiopia: home-consumed commodities and transaction costs of import, export and domestic trade.

The recursive dynamic CGE is calibrated to SAM 2006 that comprises database that shows the flow of economic resources and transactions among economic agents. The Ethiopian SAM 2006 consists of 47 activities disaggregated to 14 agricultural, 19 industrial, 1mining and 13 service sub-activities. It has also 93 commodities disaggregated to 25 agricultural, 27 industrial, 3 mining and 38 service sub-commodities (EDRI, 2009). To account for the variations in factors of productions, labor disaggregated into agricultural labor, administrative workers, professional workers, non-agricultural unskilled workers, and non-agricultural skilled workers. Capital is also disaggregated into the land for rural poor, land for rural non-poor, livestock for rural poor, and livestock to rural non-poor and non-agricultural capital. There is one marketing margin account which records the sum of trade and transport margins and five factor accounts. Both capital and labor are considered mobile across the economic sectors. The SAM also consists of institutions of households, private enterprises, the government, and the rest of the world. Households are disaggregated into rural poor, rural non-poor, urban poor, and urban non-poor. The SAM also presents a detailed tax system: nine types of direct taxes and eight indirect commodity taxes.

As the CGE model capture both factor the dynamism of factor accumulation and TFP, the base-run scenario assumes dynamics of factor accumulation and considers the growth rate of total labor supply is consistent with the projected annual population growth of 2.4 percent. The average annual growth rate of agricultural land across the modeled period is 3.1 percent. Capital accumulation is an endogenous outcome of savings and investments and assumed to increase by 11.5 percent with 5 percent depreciation rate (NBE, 2010 and WB, 2011).

The simulation scenario that captures the dynamics of sectoral TFP considers uneven growth rate of TFP across sectors of agriculture, industry and service. In order to calibrate the sectoral TFP growth rates, the study uses estimates of sectoral TFP growth derived by sectoral growth accounting approach and also considers the experiences of some countries that joined the middle income country status and have relevant experience for Ethiopia. Based on the estimate and experiences of developing countries that have similar experience with Ethiopia, the study

assumes that agricultural TFP grows by 2.6 percent, industrial TFP grows by 3 percent, and service TFP grow by 2 percent. These sectoral TFP growths are not free; rather they are induced by openness, imported capital goods and service, and liberalization for agriculture, industry and service with their respective coefficients, respectively. The coefficient that shows the relationship between openness and agricultural TFP growth is 0.004[2] and that of between industrial TFP and imported capital goods and service is 0.54[3]. The estimate of coefficient that measures the impact of liberalization on service is 0.035[4]. Note that openness, imported capital goods and liberalization are positive statistically significant explanatory variables from the determinants of sectoral TFP growth in Ethiopia. For all the details, have a look a paper entitled modeling the dynamics of sectoral TFP growth in Ethiopia.

Simulations Results and Analysis of Sectoral Growth Options

In the dynamics of sectoral TFP growth in Ethiopia, openness to economy, imported capital goods and service, and liberalization index are statistically significant and have positive impacts on sectoral TFP in agriculture, industry and service, respectively. Based on this finding, the study presents the simulation results of the impact of induced sectoral TFP growth on economy wide growth and structural change as well as welfare improvement by 2025. The resultant simulation effects depend on the actual performance of the economy in the base year as well as the structural and institutional nature of the economy.

6.1 Impacts on GDP Compositions and Per Capita Income:

Table 7 gives the results of the impact of sector-specific and broad-based growth options on GDP growth rate, sectoral contribution to GDP growth rate and per capita income. The base-run scenario that considers an increase in factor accumulation overtime reflects the growth rate of GDP that was 7 percent in the initial year declines to around 6.2 percent in 2025. This prediction almost matches with the IMF projection over the middle-term period of 2011-2016. This is

[2] In order to have the agricultural TFP growth of 0.026, the required level of openness must have an increment of 7.7 in terms of ratio. In other word, an increase of 7.7 in openness ratio translates to 0.026 agricultural TFP growth rate.

[3] The imported capital good induced TFP growth rate of 3 percent in industry requires an increase of 5.6 percent in the importation of capital goods given the elasticity coefficient. In other word, a growth rate of 5.6 percent in imported capital goods causes the TFP in the industry to grow by 3 percent.

[4] Given the coefficient estimated in VARX model, the service TFP growth rate of 0.02 requires a service liberalization index[4] of 0.57

mainly due to macroeconomic imbalance, marginal role of private sector, extensive public expenditure risks, erratic TFP growth, highly restrictiveness service trade (IMF, 2012). The contribution of agriculture and industry to GDP growth rate reduces while the service sector accounts for the lion's share, which is 58 percent, of GDP growth rate in 2025.

Table 7:- Impacts of Alternative Sectoral Growth Options on GDP and Per capita income

Alternative Growth Options	GDP Growth rate	Sectoral Contribution to GDP Growth rate by				Per Capita Income
		Agri.	Industry	Manuf.	Service	
Initial Values in 2006	7.0	3.0	0.82	0.26	3.17	294
Base –Run Scenario	6.2	1.08	0.86	0.25	3.63	599
Sector-Specific Growth Options						
Openness induced agricultural TFP (I)	6.7	1.93	0.86	0.26	3.56	701
Imported capital induced industrial TFP (II)	6.5	1.05	1.22	0.51	3.69	624
Liberalization induced service TFP (III)	8.0	1.08	0.97	0.19	4.30	692
Broad-Based Growth Options						
Combining I+ II growth option	7.1	1.81	1.31	0.59	4.02	731
Combining I+ III growth option	8.4	1.59	0.98	0.21	5.82	801
Combining II+ III growth option	8.3	0.87	1.19	0.33	6.25	725
Combining I+II+III growth option	8.7	1.52	1.29	0.42	5.91	839

Source:-Author's estimation based on dynamic CGE model

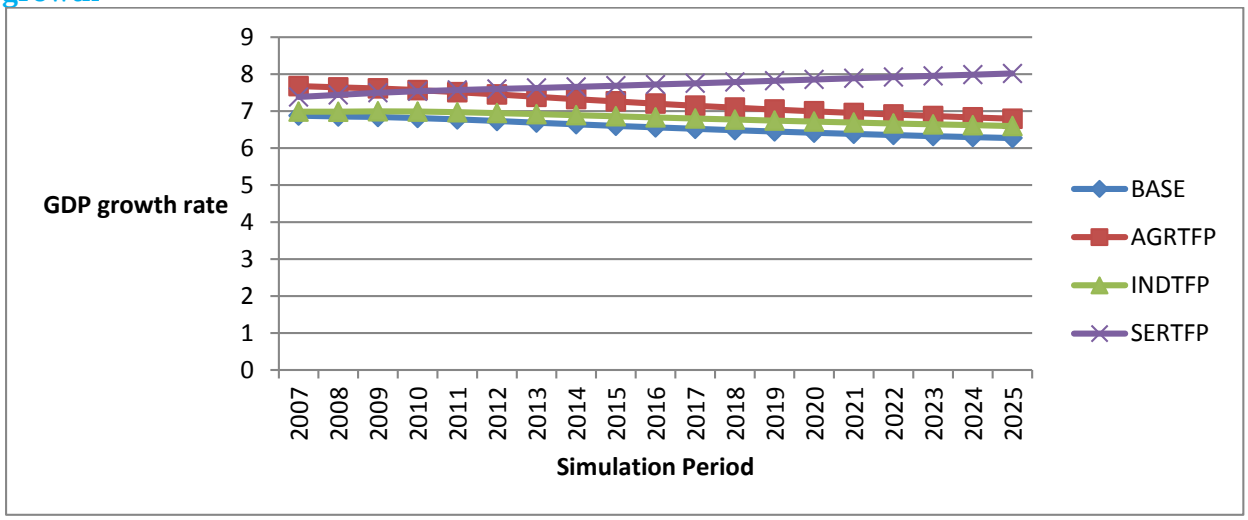
The Ethiopian economy constantly tends to shift towards service sector if it keeps going on the current path despite the government repeatedly announcing agricultural led industrialization economy. A larger share of service sector in GDP growth rate likely leads to the problems of structural change burden- of which declining growth trend and poor productivity is a clear manifestation. Considering the population growth rate of 2.4 percent, the per capita income, as measured in the 2006 USD price, increases from USD 294 in 2006 to USD 599 in 2025 in the base-run scenario. This tells that Ethiopia will not join the middle-income status by 2025 if the economy keeps going on the current path.

The simulation scenarios based on the counterfactual equilibrium project that an increase in sectoral TFP induced by openness, imported capital and liberalization enables the economy to grow faster. Especially, inducing service TFP earns the highest growth rate as compared to other options in sector-specific growth options due to the fact that the service sector already accounted the largest share in terms of GDP composition, contribution to GDP growth rate and investment. Therefore, an increasing TFP causes economy wide growth rate to soar up at higher rate. The broad-based growth options in general and combining all the three sectors in particular generate a remarkable performance over the sector-specific growth options in the simulation period. This

implies that combining sectoral TFP growths together create reinforcement, synergy, and complement the performance of sector-specific growth options in the sense of strengthen sectoral linkages. In terms of contribution to growth rate, the service sector keeps sharing the largest growth rate of GDP in all simulation scenarios. This indicates that the highly service sector dependent economy possibly encounters structural change burden overtime as service sector by itself is dominated by non-innovative and technological advancement activities. On top of this, it is only industry centered growth option that has a positive impact on the contribution of manufacturing to growth rate, reflecting the existence of negative repercussion on the share of manufacturing no matter how service TFP increases in both sector-specific and broad-based growth options. Regarding per capita income, it also varies under each simulation scenario of growth options and far away from the base-run scenario. However, it is only the broad-based growth option of combining all the three sectors that generates the highest per capita income, but does not enable the country to join the middle income group by 2025.

Figure1shows the possible evolution of GDP growth rate in response to change in sector-specific TFP growths. Except liberalization induced service TFP growth, all accelerating growth strategy of sector-specific TFP growths shows a negative trend of GDP growth overtime. This is due to the dominance of service sector over economy emanated from factor accumulation (investment), not from enhancing sectoral TFP growth. Therefore, increasing liberalization induced service TFP can rescue the declining trend of GDP growth in other options.

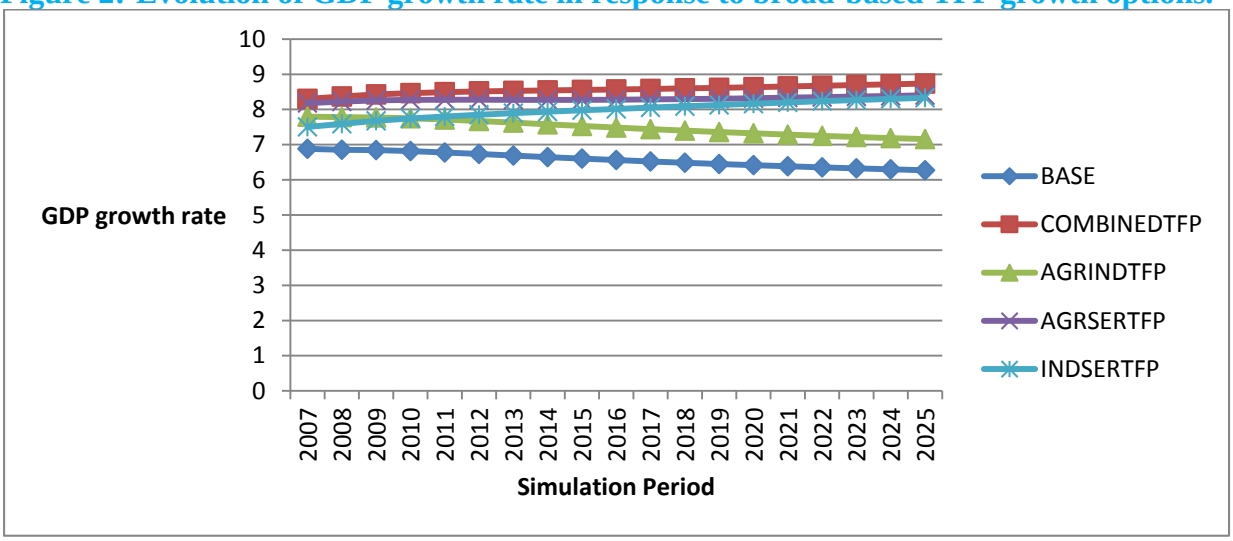
Figure 1:-Evolution of GDP growth rate in response to change in sector-specific TFP growth



Source:-Author's simulation based on dynamic CGE model

Unlike the sector-specific growth options, the time path of GDP growth rate in broad-based growth options at least shows a stable growth rate path. A growth strategy of combining all the three sectors generate an increasing trend of GDP overtime and conclusively reverses the current GDP growth rate that shows a declining trend overtime. As part of the combined TFP growth option, the increase in TFP growth rate of the service sector minimizes the productivity problem of the sector and accelerates the overall economic growth rate (Figure 2).

Figure 2:-Evolution of GDP growth rate in response to broad-based TFP growth options.



Source:-Author's estimation based on the dynamic CGE mode

In terms of time horizon, service-included broad-based growth options show an increasing trend of GDP growth rate both in the long and short runs. On the contrary, service-excluded broad-based growth options make the entire economy growth rate to decline in the short- and long-runs. One of the key points in this regard is that the service trade with more of liberalization positively and significantly influence service TFP and thereby increases economy wide growth, rescuing the declining trend of growth in the simulation period.

In addition to analyzing the impacts on sectoral composition of GDP, the study also examines the impacts of alternative sectoral growth options on factor composition of GDP. In the initial year 2006, the aggregated economy was labour intensive with about 49.3 percent (USD 60.29 billion) of the value added being paid to labour while 39.2 percent goes to capital in 2006. The base-run

simulation scenario that accounts for only factor accumulation points out that the labour income keeps obtaining the largest share (50.8 percent) out of the value added (Table 8).

Table 8:-Impacts of Alternative Sectoral Growth Options on Factor Composition of GDP (In USD Billion)

Alternative Growth Options	GDP	Factor Contribution to GDP			
		Labour	Land	Livestock	Capital
Initial Values in 2006	122.21	60.29	8.46	5.47	47.99
Base –Run Scenario Value	449.36	230.71	30.30	14.06	174.29
Sector-Specific Growth Options					
Openness induced agricultural TFP (I)	501.53	262.57	34.05	16.90	188.00
Imported capital induced industrial TFP (II)	472.59	244.55	32.81	14.37	180.84
Liberalization induced service TFP (III)	533.08	268.38	34.86	15.57	214.25
Broad-Based Growth Options					
Combining I+ II growth option	530.93	278.46	36.75	16.67	199.03
Combining I+ III growth option	597.30	304.99	38.51	15.50	235.29
Combining II+ III growth option	563.72	286.08	38.35	16.01	223.26
Combining I+II+III growth option	635.29	326.22	42.57	18.48	248.01

Source:-Author's simulation based on dynamic CGE model

All sector-specific and broad-based growth options positively influence the factor composition of GDP and the growth rate of factor income in the simulation period. However, the structure of factor income is almost the same across the scenarios as dominated by labour and then capital. This meant that the owner of labour and capital receive the largest income share, but that of livestock is scanty though Ethiopia accounts for the largest number of livestock in Africa and generates around 10 percent of export income in 2006.

6.2 Impacts on Structure of Economy

Under this section, we present both the structure of demand and the supply side of the economy. Assuming the economy keeps going on the current growth path, the base-run scenario shows that the share of agriculture declines while the service sector concomitantly increases, leaving industry in general and manufacturing in particular with the marginal share in GDP (Table 9). In the alternative scenarios, it is only enhancing industrial TFP, which is induced by imported capital goods and service induced, is capable of generating a positive influence on the share of manufacturing in GDP, reflecting a promising and positive implication for structure change. The other two sector-specific growth options negatively influence the structural change process as they have weak sectoral linkage effects on manufacturing. Regarding the broad-based growth

options, except a growth strategy of combining agriculture and service, all combinations of sectoral TFP growths positively influence the structural change process. Agriculture sector concomitantly declines even in the simulation of broad-based growth option. However, the service sector remains the dominant sector in terms of GDP structure and growth rate, pushing the economy into structural change burden. This reflects the facts that the production sectors (agriculture and industry) are more preferable in order to have rapid structural change process, but boosting the service sector is a factor that undermines the economic transformation process.

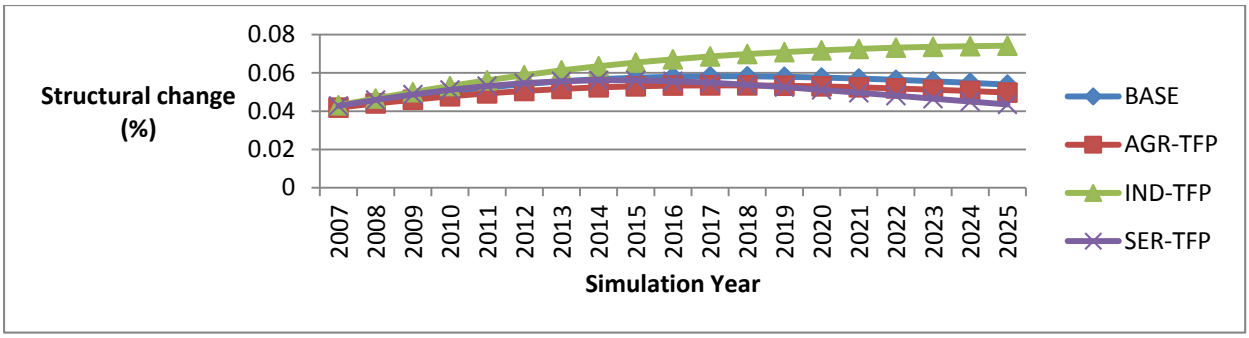
Table 9:-Impacts of Broad-based TFP growth options on the Structure of the supply (%)

Alternative Growth Options	Impacts of Alternative Sectoral Growth Options on the Structure of GDP			
	Agriculture	Industry	Manufacturing	Service
Initial share in 2006	48.09	11.49	3.95	40.41
Base –Run Scenario	29.66	14.80	5.39	55.53
Sector-Specific Growth Options				
Openness induced agricultural TFP (I)	36.12	13.73	4.97	50.14
Imported capital induced industrial TFP (II)	28.36	17.31	7.41	54.31
Liberalization induced service TFP (III)	24.21	13.89	4.34	61.88
Broad-Based Growth Options				
Combining I+ II growth option	24.06	16.67	7.35	49.26
Combining I+ III growth option	29.79	13.23	4.18	57.00
Combining II+ III growth option	23.19	15.92	5.90	60.88
Combining I+II+III growth option	28.23	15.66	6.09	56.09

Source:-Author's estimation based on the dynamic CGE model

The manufacturing even with the small share in GDP holds the potential of transforming the structure of the economy. Looking at figure 3, imported capital goods induced industrial TFP growth positively influences the structural change process while increasing liberalization induced service TFP erodes the structural change process of the economy. An increasing TFP in both service and agriculture tend to show an increasing trend in short run, but their effects on the structural change becomes negative in long run. Accelerating TFP growth in industry, however, positively influences structural change in long- and short-run.

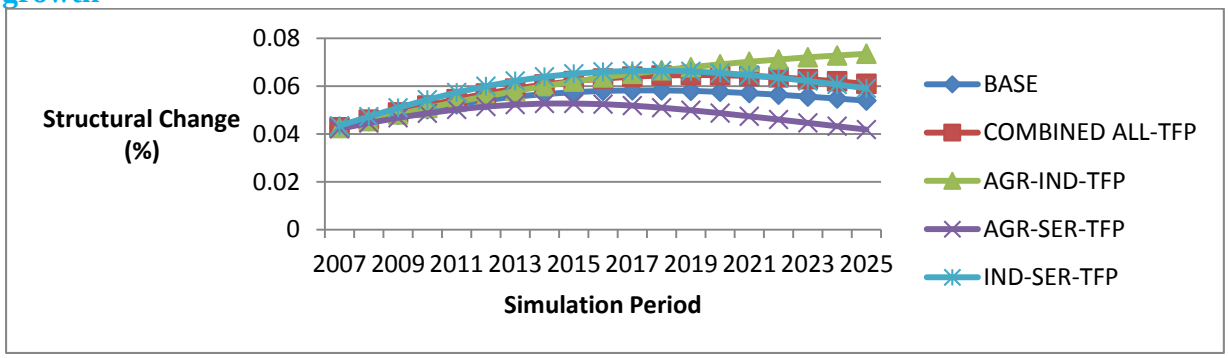
Figure 3:-Evolution of the structural change in a response to change in sector-specific TFP



Source:-Author's simulation based on dynamic CGE model

Regarding broad-based growth options, it is only the growth option of accelerating agricultural and industrial TFP growths that positively and consistently influence the structural change process of the economy overtime both in short run and long run (Figure 4). However, all other growth options positively affect the structural change process in short run and then negatively in the long run. This is attributed to the sizeable service sector which forces the economy to generate structural change burden.

Figure 4:-Evolution of the structural change in a response to change in broad-based TFP growth



Source:-Author's estimation based on the dynamic CGE mode

Attention should be given to services as it has a dominant share in sectoral growth rates and in contribution to economy wide growth rates. Increasing TFP in services, therefore, manages to reverse the declining trend of the growth path of the economy. However, it negatively influences the share of manufacturing in GDP and the structural change process even in the case of increasing TFP in services. The critical message from this finding is that the service sector has weak sectoral linkage with industrialization and is confined within the traditional service activities. From the sector-specific growth options, there is a clue that the direct approach has better impact on the structural change process than the indirect (sectoral linkage) approach.

On top of the structure of GDP, the structural of aggregate demand is heavily dominated by private consumption demand and then import regardless of the growth scenarios. Openness induced agricultural TFP, and accelerating growth by combining agriculture and industry negatively affects the share of export and import demand in aggregate demand. This implies that the more increase in agricultural TFP enables domestic consumers to switch from consuming imported goods and service, leading private consumption demand to increase. Moreover, importations of capital goods and service as well as reducing service trade barriers improve factor productivity and efficiency, boosting up international competitiveness (Table 10).

Table 10:-Impacts of Broad-based TFP growth options on the Structure of aggregate Demand (%)

Alternative Growth Options	Major Aggregated Demand Composition		
	Private Consumption Demand	Export Demand	Import Demand
Initial Values	86.7	12.6	-35.5
Base –Run Scenario	94.6	39.4	-48.7
Sector-Specific Growth Options			
Openness induced agricultural TFP (I)	95.3	35.6	-43.6
Imported capital induced industrial TFP (II)	94.8	41.7	-50.6
Liberalization induced service TFP (III)	95.2	47.7	-55.7
Broad-Based Growth Options			
Combining I+ II growth option	96.2	38.3	-46.0
Combining I+ III growth option	97.2	43.3	-51.2
Combining II+ III growth option	96.2	49.3	-57.1
Combining I+II+III growth option	96.7	44.4	-57.2

Source:-Author's estimation based on the dynamic CGE mode

6.3 Impacts on Institutional Income and Household welfare

All alternative accelerating growth options positively influence the growth rate of institutional income (Table 11). Accelerating growth of TFP by combining all the three sectors generates the highest income growth rate across all types of institutions. The public enterprise also receives a higher annual income growth compared to the total household in all scenarios given its small value in initial year. The rural households are benefited more than urban households in all growth options in terms of growth rate.

Table 11:-Implications of Alternative Sectoral Growth Options on Institutional income

Alternative Growth Options	Impacts Alternative Sectoral Growth Options on the Growth Rate of Institutional Income					
	ENT	HHD	HHD-RURP	HHD-RURN	HHD-URBP	HHD-URBN
Initial Values(in billions)	1.32	133.02	24.84	73.14	5.0	30.04
Base –Run Scenario Value (in billions)	18.25	447.25	86.92	256.4	15.29	88.54
Sector-Specific Growth Options (%)						
Openness induced agricultural TFP (I)	10.8	11.4	12.9	11.3	11.9	10.1
Imported capital induced industrial TFP (II)	5.3	4.9	6.3	5.0	4.8	4.1
Liberalization induced service TFP (III)	30.2	17.2	16.4	18.1	14.4	15.9
Broad-Based Growth Options (%)						
Combining I+ II growth option	19.6	17.5	19.0	17.6	17.7	15.5
Combining I+ III growth option	46.4	31.2	31.5	32.0	28.6	28.8
Combining II+ III growth option	37.3	23.8	23.4	24.9	20.8	21.4
Combining I+II+III growth option	56.4	39.3	39.9	40.4	36.4	35.9

Source:-Author's estimation based on dynamic CGE model

In the base-run scenario, the rural non-poor households accounts for the lion's share (around 55 percent) of the institutional income. The rural poor and urban non-poor subsequently take about 18 percent. However, the firms and the urban poor account for scanty share ranging within 3 to 5 percent. Given its highest values in the base-run scenario, the rural non-poor that accounts for 42 percent of the population receive the highest income from the policy of simulating the sectoral TFP growth. This reflects that accelerating sectoral TFP growth options benefits the majority of the population. In other words, 42 percent of the population (rural non-poor) receives about 55 percent of the total institutional income, and 35 percent of the population (rural poor) also obtains around 18 percent of the institutional income. However, the urban poor that accounts for 12 percent of the population receive 18 percent of the income.

By considering change in income, price and utility of household, it is possible to calculate welfare gain and loss in order to assess how the alternative sectoral growth options benefit each segment of the household and to know the trickledown effect of sectoral policy in Ethiopia. Welfare refers to social wellbeing of all the people in terms of utility. The CGE model uses a technique of the Equivalent Variation (EV) in order to measure welfare change in terms of change in utility that arises from policy shocks. The EV in this regard considers the change in

price and income between the base year price and the current year price, which means year 2006 and 2025 in the CGE model. A positive EV indicates the existence of welfare gain due to policy change and negative EV implies loss of welfare (Table 12).

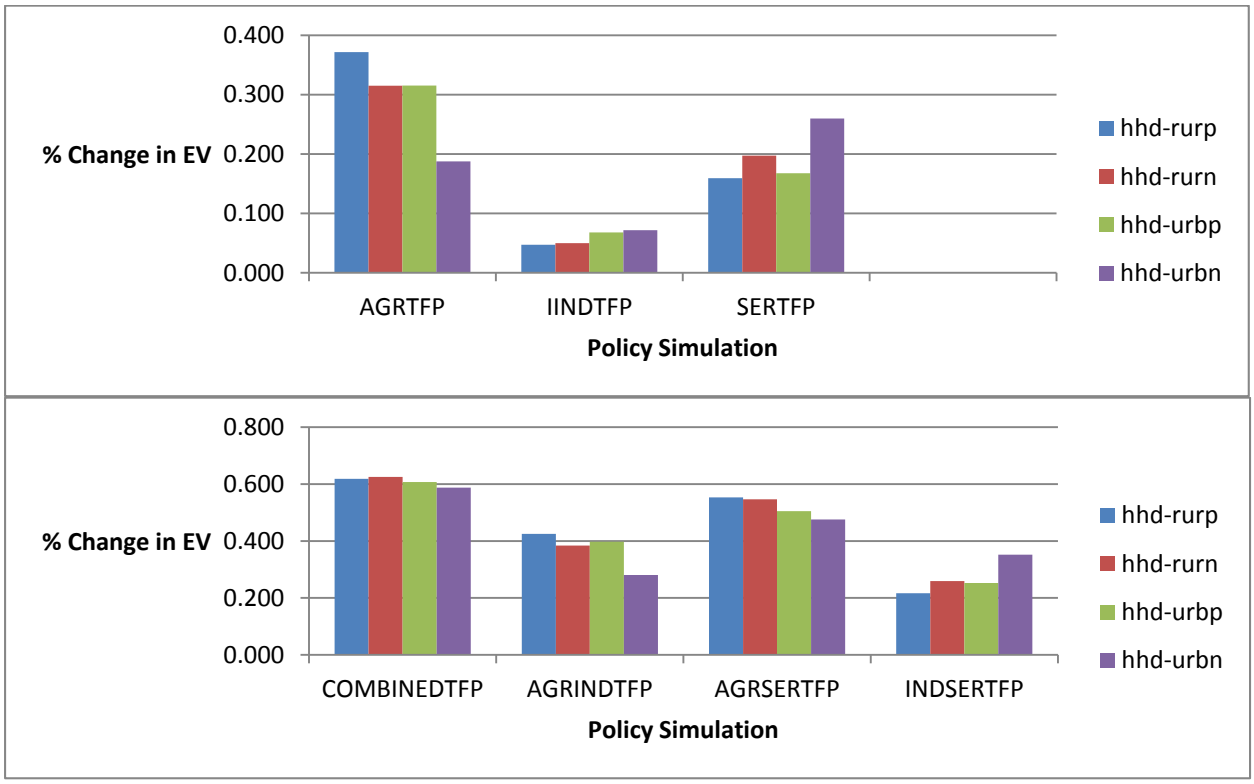
Table 12:-Welfare status in response to the Induced Sectoral TFP growth

	EV value in alternative scenarios of change in sectoral TFP growths			
Alternative Growth Options	HHD-RURP	HHD-RURN	HHD-URBP	HHD-URBN
Base –Run Scenario Value	0.030	0.101	0.006	0.037
Sector-Specific Growth Options				
Openness induced agricultural TFP (I)	0.045	0.142	0.008	0.045
Imported capital induced industrial TFP (II)	0.034	0.114	0.006	0.040
Liberalization induced service TFP (III)	0.038	0.129	0.007	0.047
Broad-Based Growth Options				
Combining I+ II growth option	0.047	0.150	0.009	0.048
Combining I+ III growth option	0.051	0.168	0.009	0.056
Combining II+ III growth option	0.040	0.137	0.008	0.051
Combining I+II+III growth option	0.054	0.176	0.010	0.060

Source:-Author's estimation based on dynamic CGE model

All alternative sectoral growth options improve the welfare of each segment of household in response to change in alternative induced sectoral TFP growths. Nonetheless, the rural non-poor households that account for 42 percent of the population receive the higher welfare gain comparing with other segments of the households. Following this, the urban non-poor households that account for 12 percent of the population receives welfare gain. The rural poor that accounts for 35 percent of the population obtain considerable welfare gain due to the change in the induced sectoral TFP growths. In terms of percentage growth rate, Figure 5 reveals that the percentage change in EV values in response to the shock in sectoral TFP growths as compared to the base-run scenario. All the percentage change is positive as compared to the base-run scenario. This indicates that all scenarios improve the welfare of each segment of the households. In particular, the accelerating growth strategy of combining TFP growths generates the highest percentage increase in EV. The welfare of rural poor is lower in the growth strategy of combining industry and service TFP growths, indicating that changes in agricultural TFP are essential elements and plays a pivotal role to improve the welfare of rural poor.

Figure 5:-The Percentage of EV in response to the change in alterative sectoral TFP growths



Source:-Author's Estimation based on dynamic CGE model

Conclusion and Policy Implications

Erratic economic growth and sluggish structural change process are the main daunting challenges in Ethiopia, heavily attributing to negative TFP growth rate on average. In particular, the service sector is worst in this regard as it heavily dominates the structure of the economy. However, the service sector itself is dominated by the share of domestic trade and real estate business. With other factors, this leads to erratic growth and structural change burden that persistently slows down the country's pace towards reaching the middle-income country status by 2025.

The study then examines the impact of induced sectoral TFP growth on economy wide growth and structural change process using dynamic CGE model that incorporates the coefficient that capture the effect of openness, imported capital goods and service and liberalization on TFP

growth in agriculture, industry and service sectors. The simulation scenario that accounts for the dynamics of induced sectoral TFP based on counter-factual equilibrium points out that all alternative sectoral TFP growth options positively influence economy wide growth rate, per capita income and welfare. However, it is only industry-centered sectoral growth options that have positive impacts on structural change process. In all measurements, the broad-based TFP growth options generate the highest remarkable performance as compared to the sector-specific growth options. None of the sector-specific and broad-based growth options also enable the economy to cross the threshold of middle-income requirement by 2025. However, all scenarios of growth options improve the welfare of the society in which openness induced agricultural TFP highly improvement the household welfare.

Based on the findings, the study recommends the broad-based growth options that generate higher economic performance over sector-specific growth options so that the government could redirect the policy paradigm of sector-specific (ADLI) towards the broad-based growth options. Out of the various combinations of sectors, a growth strategy that combines all the three sectors centering on earns industry is suitable growth policy in search of sustainable growth and rapid structural change as well as welfare improvement. This is because of the combined effect of openness induced agricultural TFP that improves the welfare of household, and liberalization induced service TFP that causes sustaining growth, and imported capital induced industrial TFP that positively influence structural change process.

Limitations of the Study and Issues for further Study

The study has some limitations in connection with data, assumptions of CGE, and the future potential of the country in projection. Regarding the data, data for the disaggregated capital formation and non-agricultural labour force is not available at sectoral level. Therefore, the study attempted to decompose the aggregated gross capital formation based on the sectoral composition of government capital expenditure as government accounts for the lion's share in national investment. Similarly, it tried to decompose the non-agricultural labour force into service and industrial labour force based on the structure of employment as indicated in the labour force survey in 2005. Moreover, calculating techniques and decomposing gross capital formation for each sector may require further research.

As the CGE model calibrated to the SAM 2006, the production technology is assumed the same over time as year 2006. The CGE model also assumes constant return to scale technology to factors of production and considers fixed relation coefficient between output and intermediate inputs. These assumptions do not allow the model to capture the nature of an increasing return to scale technology. The SAM 2006 was prepared based on government data and is likely to be exposed to some sort of political influence. Moreover, we do not have an updated SAM that reflects the current economic performance of the Ethiopian economy so that using old SAM 2006 may have its own effects on simulation results. Finally, the CGE model the study uses does not fully capture the future new opportunities of investment and threats of wars in the simulation period. For instance, the country has been building a big hydroelectric dam, which can generate 5000 MW, on the Blue Nile River. In addition, the possibility of oil discovery is also one of the prospects of the country faces in the future.

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