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WIDER Working Paper 2015/154

Ethiopia – an agrarian economy in transition

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December 2015

In partnership with

Development Policy Research Unit

Africa Growth Initiative at Brookings

Abstract: Ethiopia has experienced rapid economic growth since 2005. Real gross domestic product (GDP) grew at an average rate of 10.5 per cent per annum for the period between 2004–05 and 2013–14. Public investment in key infrastructure and interventions in the agriculture sector have made important contributions to GDP growth. This growth has been accompanied by a process of capital deepening and signs of structural shift away from traditional and primary sectors towards secondary and tertiary sectors. Both processes of high growth and structural shift have important implications for poverty reduction and income distribution. One potential channel through which these influences work is the labour market. The indications of structural transformation that Ethiopia has shown in the last decade, including a continuous decline in the role of agriculture and rise in that of services, have led to reallocation of jobs and labour from low-productivity agriculture to more productive industrial—in particular the construction sub-sector—and service sectors. The rise in total factor productivity, overall increase in labour force participation rate, and fall in the labour share of the agriculture sector are indicative of the nature and extent of structural shift in the Ethiopian economy. A more durable shift of economic activities towards the manufacturing sector is expected to follow the rising trend in investment in the sector. This study explores the impact of the high economic growth and slow but unmistakable structural change on a number of economic outcomes working through the labour market. The growth opportunities and challenges of the Ethiopian economy are also discussed.

Keywords: economic growth, structural transformation, labour market, Ethiopia
JEL classification: I25, O10, O12

Acknowledgements: We thank Haroon Bhorat for his valuable comments and suggestions on a previous version of this paper. The paper has also benefited from the comments of participants of the authors' workshops on 'Understanding the African Lions'. Any errors are the responsibility of the authors.

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This study has been prepared within the UNU-WIDER project on 'Macro-Economic Management (M-EM)' as part of the Institute's collaboration with the Brookings Institution and the Development Policy Research Unit (DPRU) at the University of Cape Town on 'Understanding the African Lions: Growth Traps and Opportunities in Six Dominant African Economies'.

ISSN 1798-7237 ISBN 978-92-9256-043-0 https://doi.org/10.35188/UNU-WIDER/2015/043-0

Typescript prepared by Ayesha Chari for UNU-WIDER.

UNU-WIDER gratefully acknowledges the financial contributions to the research programme from the governments of Denmark, Finland, Sweden, and the United Kingdom.

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1 Introduction

Ethiopia has experienced rapid economic growth since 2005, with gross domestic product (GDP) growing at an average rate of 10.5 per cent per annum in real terms for the period between 2004–05 and 2012–13 (Ministry of Finance and Economic Development, MoFED 2013). This makes Ethiopia one of the fastest growing countries in the world. The rapid economic growth has a multifaceted effect on a number of social, economic, and political domains. Considering 2015 is the year the first Growth and Transformation Plan (GTP)—the country's comprehensive five-year development plan with targets aligned to the aim of achieving middle-income status by the mid-2020s—ends, it is a good time to explore the pattern of economic growth in Ethiopia and the relevant growth opportunities and challenges.

Available evidence suggests that economic growth in Ethiopia has been accompanied by signs of a structural shift away from traditional and primary sectors and towards secondary and tertiary ones. For instance, the pace of output growth has been decreasing in agriculture whereas growth rates of industrial and service sectors have been increasing. As a result, the share of agriculture in GDP is now comparable to that of the service sector—a significant change from a couple of decades ago.

Both economic growth and structural shifts have important implications for poverty reduction and income distribution. Labour market outcomes are a major potential avenue through which these influences take place. The high rate of public investment in infrastructure has generated growth in construction and related industries and triggered growth in other sectors through linkage effects. There are three major channels through which the process is believed to have influenced income distribution in the country. First, investment on infrastructure and buildings led to higher employment of urban youth and rural migrants in construction and allied sub-sectors. Second, partly caused by this expansion of employment, the demand for goods and services increased. This is particularly significant to the agricultural sector, thereby leading to terms of trade improvements in favour of the sector. Policy responses to these pressures aimed to raise productivity in agriculture and include the expansion of the agricultural extension system. Structural change formed the third channel.

As a consequence of the changes noted above, the role of agriculture has decreased continuously in the face of an increasing role of the service and construction sectors, and this has led to reallocation of jobs and labour from the low-productive agriculture sector to the high-productive service sector. Historical evidence shows that this type of labour reallocation is vital for more secure employment and higher living standards. The nation's effort following these changes is to diversify the shift of economic activities towards the manufacturing sector to ensure more durable jobs and sustainable growth. This is the focus of the second phase of the GTP that began in late 2015.

Another aspect of sectoral reallocations is their potential to engender more unequal outcomes. The possibility of this out-turn is not small since the jobs created in the service sector are, on average, relatively more knowledge-intensive and higher paying. The earnings gap between skilled and unskilled workers in Ethiopia can thus widen. This is obviously an empirical question. In this study, we, accordingly, attempt to collate and analyse the relevant evidence, such as within- and between-sector employment shifts, to ascertain whether economic growth and structural change in Ethiopia are pro-poor. Moreover, the study explores related social and economic changes that have affected employment of both skilled and unskilled workers in Ethiopia, including population growth and its demographic structure, the expansion of

education, returns to education, and the role of the public sector and social protection programmes in employment.

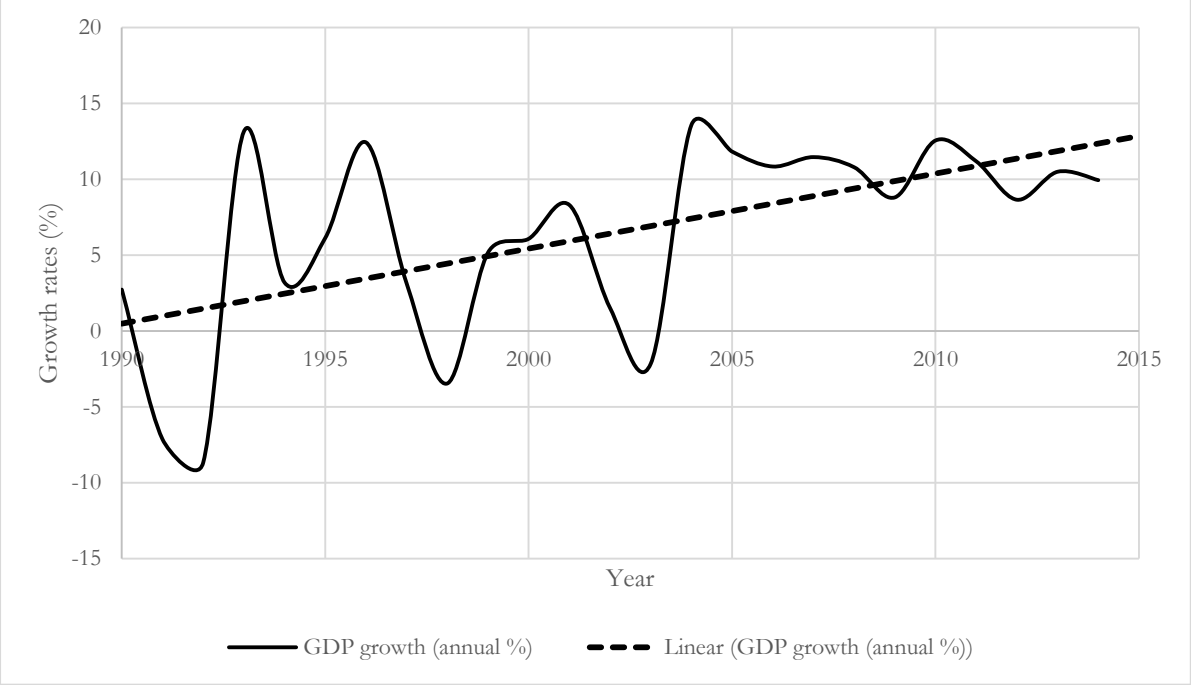
The remainder of this paper is organized as follows. Section 2 discusses the pace and sources of economic growth in Ethiopia, which has been observed since the mid-1990s. Section 3 considers the status of structural transformation in Ethiopia. Demographic conditions and human capital development in the country are considered in Section 4, whereas Section 5 explores the effect of the economic growth on the labour market. The final section concludes.

2 Background

2.1 Trends in economic growth in Ethiopia

After being stagnant for many decades, Ethiopia's economy has experienced robust and continuous growth over the last decade since 2005. Figure 1 shows trends in GDP growth in Ethiopia since 1990.[1] As can be seen in the figure, in the 1990s, GDP growth in Ethiopia was not only low on average, it was also highly volatile, with both high positive and negative growth rates throughout the decade. The outcome reflected a combination of factors including recovery from a lengthy civil war, war with Eritrea (towards the end of the decade), and volatile weather combined with heavy reliance of Ethiopian agriculture on rainfall and its very large contribution to total GDP.

Figure 1: Gross domestic product (GDP) growth in Ethiopia (1990–2014)



Source: Authors' computation using data from the World Development Indicators (WDI) database (World Bank 2015b).

Since the mid-2000s, on the contrary, Ethiopia has enjoyed accelerated and sustained economic growth for more than a decade now, where growth rates exceeded global averages. Indeed, it has

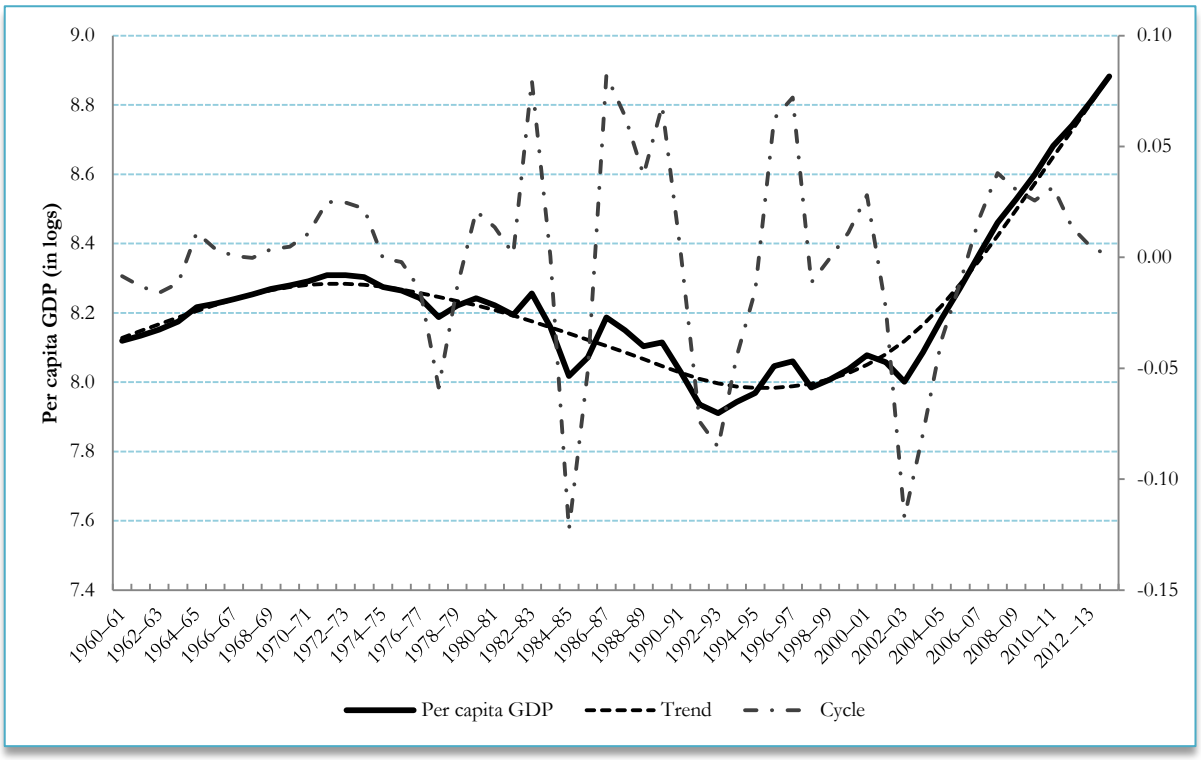
[1] Analogous patterns emerge from the data of the Ministry of Finance and Economic Development. The corresponding chart is available from the authors upon request.

become one of the fastest growing countries in the world along with some Asian countries. Even during the global economic recession that began around 2008, Ethiopia continued to grow steadily.

In addition to favourable weather conditions for agriculture, a set of factors has contributed to the economic growth in Ethiopia. Conducive government policies, including large market reforms in the 1990s, are a vital and defining element of this set. Improvements in access to basic services (such as health and education) and heavy investment in infrastructure (such as roads and telecommunications) have also significantly helped by addressing critical bottlenecks. Overall growth has also been symbiotically accompanied by greater commercialization of agriculture and private sector development, more broadly.

An important attribute of this high growth episode is that it has been resilient to various shocks such as drought and international economic crisis. This is contrary to the historical susceptibility of the economy to such shocks: war in the 1990s and very early 2000s and drought in 1975, 1985, 1997, and 2003 have had adverse effects on the Ethiopian economy (see Figure 2).

Figure 2: Sustained growth in per capita GDP (Hodrick–Prescott decomposition)



Source: Authors' calculations using data from the Ministry of Finance and Economic Development (MoFED 2013).

2.2 Sources of growth

This section explores the sources of aggregate and sectoral growth using Solow decomposition analysis. Such growth decomposition has a long history stretching back to Solow (1957).[2]

[2] For further details, see Barro (1998) among others. Also see World Bank (2015c) for a more detailed examination of the growth performance of the Ethiopian economy during 2004–14, and Bachewe et al. (2015) specifically for the agricultural sector.

Table 1 reports half-decade averages for GDP growth and the part of that growth which originated in increased use of labour and capital as well as changes in total factor productivity (TFP).[3] The acceleration of GDP growth after 2004 is clear. Perhaps not surprisingly, the contribution of all factors can be noted to increase in later years. Labour (employment expansion) continues to be an important source of growth. Interestingly, the role of labour quality improvements (changes in labour composition) has edged upwards again, although from a very low base and it is still small. This is most likely linked to the expansion in education and elements of structural change outlined later. The importance of capital as a source of growth is also growing. Aggregates of capital–labour and capital–output ratios have been increasing (Figure 3). There is also some micro evidence suggesting capital intensity is rising and, more specifically, generating discernible productivity differentials in industry. Finally, consistent with Ethiopia's significant exposure to shocks in the past, changes in TFP were negative or low as a source of growth up to 2004. In contrast, they have been the largest contributor during the decade up to 2014. Nevertheless, TFP growth and its share in GDP growth appear to diminish slightly in the last half-decade (2010–14), perhaps indicative of things to come.

Table 1: Aggregate growth accounting

Period	GDP growth (%)	Contribution of employment growth in GDP growth (%)	Contribution of labour composition growth in GDP growth (%)	Contribution of non-ICT capital services growth in GDP growth (%)	Total factor productivity growth (%)
1990–94	–1.23	0.96	0.03	1.01	–3.23
1995–99	4.37	1.49	0.02	2.42	0.43
2000–04	4.00	1.39	0.01	1.88	0.72
2005–09	9.80	2.01	0.00	3.10	4.69
2010–14	9.51	2.07	0.06	3.42	3.96

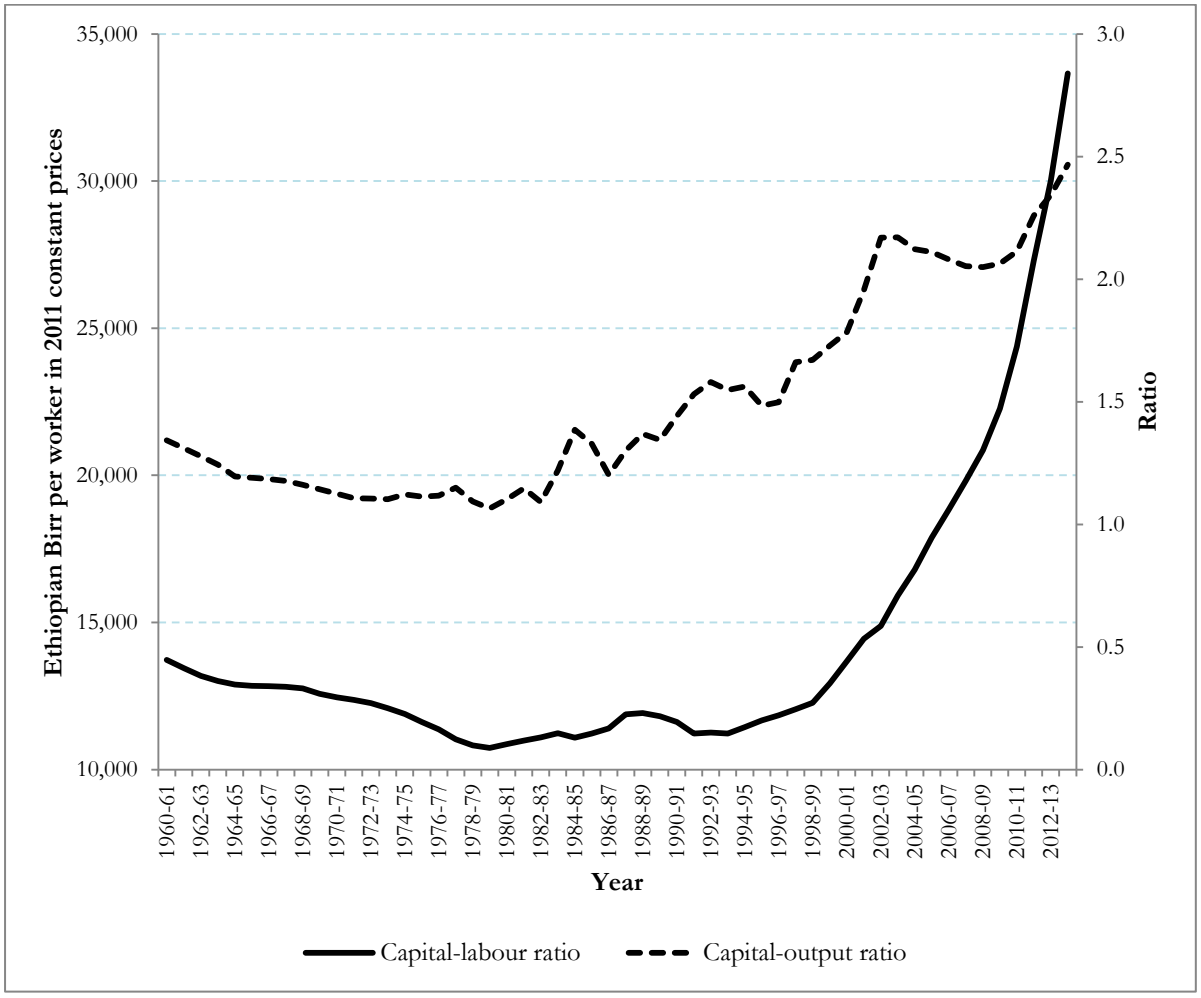
Note: ICT, information and communication technologies.

Source: Authors' computation using country details data from the Total Economy Database™ (TCB 2015b).

Finally, a comparison across the African Lions—the six large and rapidly growing African economies—reveals broad similarity among them regarding the role of employment expansion as a source of growth over the two and a half decades since 1990. Whereas Ethiopia and Mozambique show comparable contributions from non-ICT (information and communication technologies) capital and TFP growth, South Africa, not surprisingly, is a clear outlier.

[3] This analysis uses the Total Economy Database™ to enhance cross-country comparisons (see TCB 2015a). Analogous results were obtained using data from MoFED (see Appendix Table A1 for complete data).

Figure 3: Signs of capital deepening—increasing capital–labour and capital–output ratios



Source: Authors' computations using data from MoFED (2013).

3 Status of structural transformation in Ethiopia

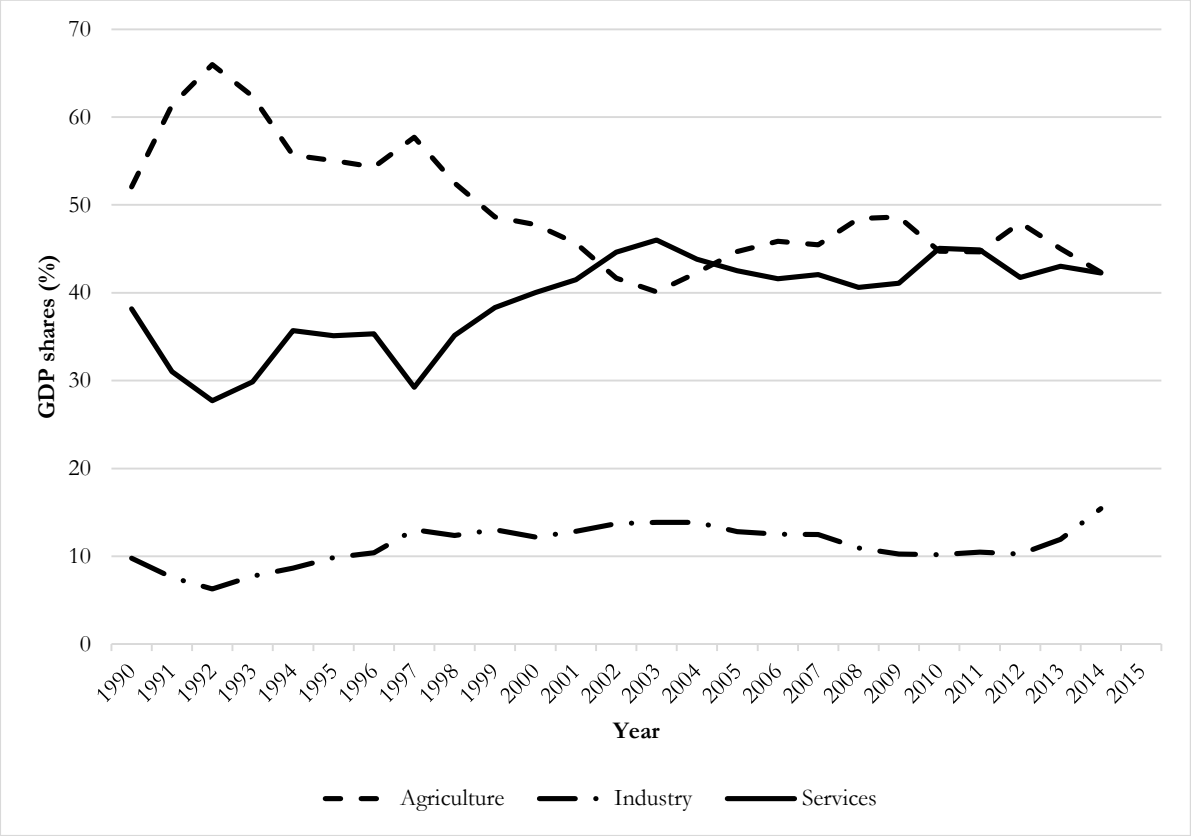
Studies on structural transformation (Chenery 1960, 1986; Syrquin 1988) have documented that capital accumulation (both physical and human), high rate of growth in per capita income, and a shift in economic activities from sectors of low productivity to sectors of high productivity are key signs of structural transformation. Ethiopia has been exerting efforts in laying foundations to transform its economy in the two decades since the mid-1990s. The most noticeable endeavours that have been rewarded with a high rate of economic growth took place under the country's 'Plan for Accelerated and Sustained Development to End Poverty' (PASDEP) spanning the period from 2005–06 to 2009–10, and the GTP that has been in place since 2010–11 (see Figure 1 for trends in economic growth in Ethiopia).

The country's public investment in economic and social infrastructure and its intervention in the rural economy have been paying off both in terms of accumulations and in the form of high economic growth. For instance, the rate of gross capital formation expanded from 27.5 per cent in 2010 to 40.3 per cent in 2014. Efforts in domestic resource mobilization resulted in a significant increase in the rate of gross domestic saving from 7.6 per cent in 2010 to 22.5 per cent in 2014.

The process of accumulation seems to have succeeded on two counts: first, the country has developed a relatively better capability in terms of physical infrastructure and human capital; second, the process of accumulation in the infrastructure sector has generated high growth in per capita income. The Ethiopian economy has grown at an average rate of 11 per cent over the period 2005–14.

Nevertheless, there are challenges to be tackled to ensure that such changes are accompanied by shifts in sectoral proportions in terms of factor use and contribution to GDP. The share of agricultural value added in GDP has declined by about 10 percentage points between 1990 and 2014 (from 52 to 42 per cent; see Figure 4).

Figure 4: Percentage sectoral shares of GDP (1990–2014)



Source: Authors' calculations using data from the WDI database (World Bank 2015b).

Moreover, measures of sectoral contributions to GDP growth reveal that the role of agriculture, which jointly led the growth momentum with the service sector during the period of PASDEP, has declined during the first phase of the GTP. The industrial sector, which had a declining contribution to growth during PASDEP, has reversed its momentum and doubled its contribution to growth during the first phase of the GTP. The changes in the growth contributions of sub-sectors also corroborate the fact that changes in the structure of the economy are occurring across sectors, from agriculture to service and construction. Crop production, traditionally a dominant contributor, has been overtaken by construction and wholesale and retail trade sub-sectors. The increase in the industrial sector's contribution to growth has largely originated in the construction sub-sector.[4]

[4] These are authors' computations from MoFED (2013). The tables and charts summarizing the details of these trends were excluded for the sake of brevity. They can be obtained from the authors upon request.

If the process of structural transformation in the Ethiopian economy has to be judged by the historical patterns of industrialization, there is still a lot to be done. The process that earned the nation an 11 per cent growth in GDP and a 40 per cent rate of gross capital accumulation was not accompanied by a substantial change in the share of the manufacturing sector in the economy. About 70 per cent of the decline in GDP share of agriculture was accounted for by the service sector with the remaining 30 per cent going to the construction sector. In contrast, the share of the manufacturing sector in GDP hovered around 4.4 per cent in 2013–14, which was only 0.2 percentage points higher than its share in 2005.

Many studies (Bigsten and Gebreyesus 2007; Siba 2011; Sutton and Kellow 2010; Söderbom et al. 2006) identify, among others, limited access to credit, declining returns to capital, and limited backward and forward linkages as important constraints faced by the manufacturing sector in Ethiopia. Söderbom et al. (2006) also hint at the limits to saving and re-investment originating in consumption needs of owners' households as another growth-restricting possibility.

Manufacturing firms also rely heavily on imported raw materials, which generally does not play to their advantage given the limited availability of foreign exchange and lack of access to adequate credit—particularly for small- and medium-sized firms. There is also lack of appropriately skilled manpower to support the production of high-quality manufacturing goods.[5]

The Ethiopian government has made the growth of the manufacturing sector a major focus of its second and subsequent five-year development plans. It actively encourages the private sector to diversify activities from localized services to manufacturing by attempting to addresses some of the key bottlenecks identified earlier. In this regard, the considerable public investments in infrastructure capabilities are likely to support industrial expansion. Perhaps reflecting this collection of positive factors, the manufacturing sector had an encouraging performance with its value added growth at an annual average of 17.2 per cent between 2010 and 2014.

4 Human capital development in Ethiopia

Investment in human capital, in particular in education and health, has been one of the important pillars of intervention by the Ethiopian government to foster long-term capabilities of the country and to deal with rampant poverty. Policies and social mobilization in these sectors have paid off in the form of improvements in the stock of human capital, better livelihood, and reduced poverty. The key outcome of social sector endeavours, including child and maternal care as well as family planning, is the reduction in mortality and fertility rates. If effectively utilized, these endeavours are expected to result in yet another opportunity for Ethiopia's economic growth in the form of demographic dividend.

4.1 Population growth and the demographic dividend

With a population close to 100 million, Ethiopia is the second most populous country in Africa; only Nigeria has a larger population. The country is also characterized by a high, although falling, fertility rate. As a result, Ethiopia's population is expected to grow at a high rate in the coming decades. The link between population dynamics and economic growth is complicated. It depends on the size of the population, its age structure, the speed with which both are changing, and the policy response of governments to these changes (Bloom et al. 2003; Drummond et al. 2014).

[5] See World Bank (2015a, 2015c) for detailed exploration of the prospects and challenges of manufacturing sector development in Ethiopia.

The demographic transition in the form of declining mortality and fertility rates leads to longer life expectancy and bigger working-age population. The former encourages investment in education and health in general, but particularly of children. The change in the age structure in favour of the working-age segment promotes savings, higher female labour force participation, and even lower fertility rates (Bloom et al. 2003). Moreover, the rise in the share of working-age population can lead to increased labour supply, lower dependency ratio, higher savings and investment, and larger output (Bloom et al. 2003; Drummond et al. 2014; Gribble and Bremner 2012). This potential for higher growth constitutes the demographic dividend. Appropriate government policies are required to realize this potential and avoid the possible negative effects of rapid population changes.

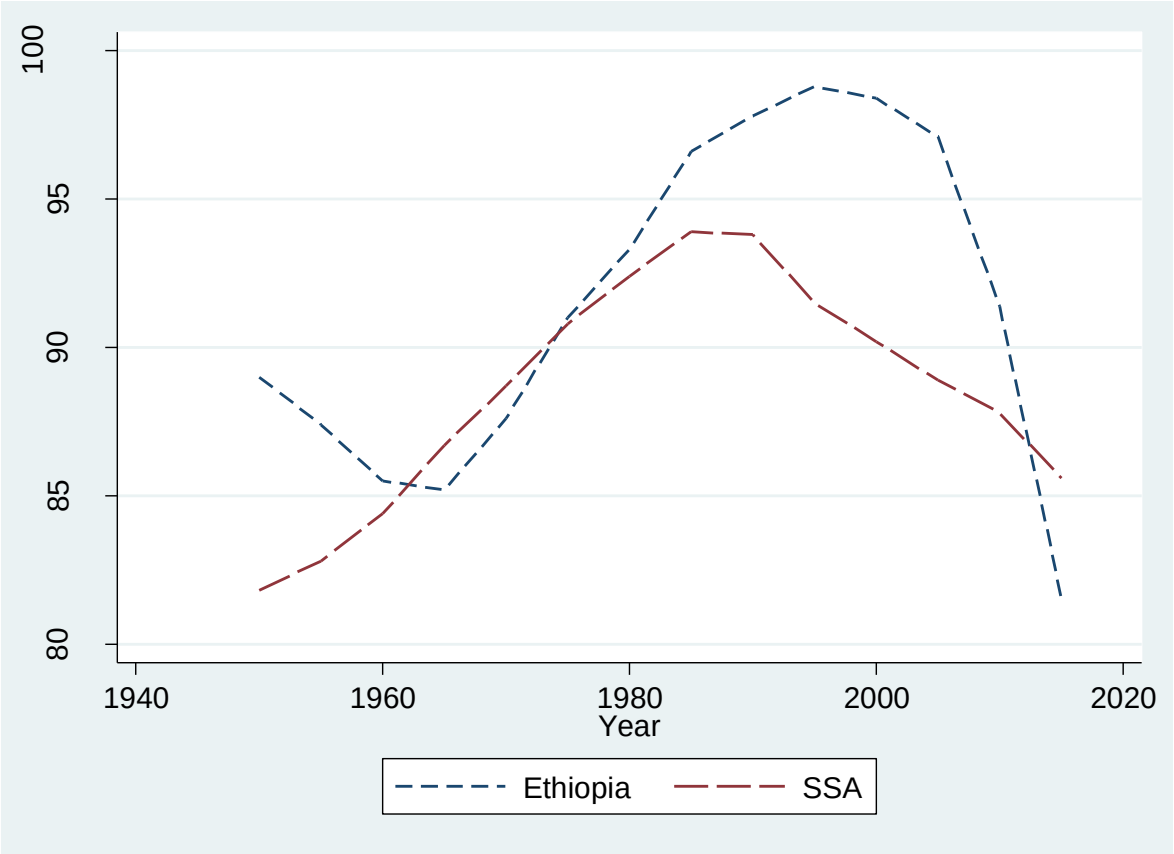
Data from the 2012 Inter-Censal Population Survey in Ethiopia show that the national average fertility rate has decreased from 6.2 per cent in 2007 to 4.6 per cent in 2012, a 26 per cent fall (CSA 2013). The onset of the decline in fertility rate, the second phase of demographic transition, has followed the decline in overall mortality rates, the first stage of demographic transition. This implies that Ethiopia is on the right track to start enjoying demographic dividend, in part through a growing labour force.

There are some indications that this may have started, although slowly. Fertility rates in Ethiopia are likely to remain high and, as a result, the country's population is expected to grow at a fast pace in the coming decades. However, the age structure of the population will continue to change as fertility rate is projected to continue declining. The Ethiopian Central Statistical Agency (CSA), for instance, has projected that the percentage of children aged 0–14 years will decrease to 27 per cent in 2037 from 44 per cent in 2007, whereas the share of the working-age population will rise from 53 per cent to 68 per cent during the same period (CSA 2013). This is a good outcome because it implies a decrease in dependency ratio, which indeed is expected to fall from 0.89 (2007) to 0.52 (2037).[6]

Data from the 2015 revision of the 'World Population Prospects' (United Nations 2015) reaffirms the decline in dependency ratio in Ethiopia as depicted in Figure 5. The figure shows that the dependency ratio has been declining continuously since the turn of the century, and although the dependency ratio for Ethiopia started to decline a bit later than the Sub-Saharan Africa (SSA) average it did so at a faster rate. Hence, the dependency ratio for the country is currently below the SSA average. The country has also gone a long way in improving its stock of human capital through appropriate policies and investments in the spheres of education, health, and family planning. The changes in Ethiopia's demographic structure and supporting policies are thus in the right direction. Nevertheless, these changes should deepen further and need to be complemented by policies promoting savings, investment, and job creation for the country to enjoy the demographic dividend in full (see also Gribble and Bremner 2012).

[6] All these figures refer to the 'medium variant' of projections of the Central Statistical Agency (see CSA 2013).

Figure 5: Ratio of working age to dependent population



Note: SSA, Sub-Saharan Africa.

Source: Authors' calculations using data from the 'World Population Prospects' (United Nations 2015).

4.2 Reforms in the education sector

One of the preconditions for exploiting potential demographic dividend is the commitment and ability of governments to provide basic health and education services. In this regard, the government of Ethiopia has been more efficient than other governments of similarly poor countries. Through a series of five-year education development programmes, called Education Sector Development Programs (ESDPs), the government of Ethiopia has built a large number of primary and secondary schools throughout the country with the prime objective of achieving universal primary education. This objective has been largely successful as most of the regional states of Ethiopia have already achieved universal primary education.

The government of Ethiopia has also aggressively introduced the Technical and Vocational Education and Training (TVET) programme with the aim of increasing the supply of semi-skilled and relatively well-suited workers to the growing manufacturing and construction sectors. These types of complementary investments have the potential to pay off in the long run by increasing labour productivity in these specific sectors as well as in the entire economy.

The government's effort in expanding TVET institutes is commendable and has led to substantial increases in the number of graduates from TVET institutes. Since the inception of the TVET programme, for instance, a large number of TVET institutes have been built. As a result, according to data from the Ministry of Education (1999–2015), the number of students enrolled in TVET institutes has increased from 5264 in academic year 1999–2000 to 271,389 in

2014–15. This, in turn, has led to a large increase in the number and range of available skills in the Ethiopian labour market.[7]

However, there appears to be a mismatch between the type of skills students acquire at TVET institutes and the skill sets most manufacturing firms are looking for. Besides, research findings indicate that the qualities of TVET graduates do not meet the quality standards of manufacturing firms, and the TVET programme does not seem to be driven by demand (Shaorshadze and Krishnan 2013). Thus, careful assessment of the sector to understand the current skill gaps and its trajectory is crucial for tailoring the TVET programme to the needs of manufacturing firms.

In this regard, the federal TVET agency has taken steps towards improving the quality and relevance of the TVET programme. In line with this, the TVET agency has adopted and expanded co-operative training programmes by bringing an increasing number of public and private enterprises into the training process. In the co-operative training process, theory is taught in TVET institutes and practical skills are acquired through the apprenticeship scheme in enterprises. As trainees have to be supervised and have to operate expensive equipment, offering training is costly to enterprises. Also, increasing the number of enterprises that participate in co-operative training programmes is a serious obstacle. The challenge, thus, is convincing enterprises that participating in the apprenticeship scheme is profitable.

At the same time, there have been ongoing debates and attempts to define occupational standards, assess occupational standards, and, subsequently, certify TVET trainees. Certification of occupational qualification has thus been introduced into the TVET system. The certificates are awarded upon passing the occupational assessments. Unlike previous practice, access to occupational qualifications does not depend on attending a formal TVET programme. This means graduates from any formal and non-formal TVET programme now have access to occupational assessment and certification, including those who have learned informally and those who have acquired skills through traditional apprenticeship.

Similarly, higher education has also gone through restructuring since the mid-1990s. The rapid expansion of both private and public colleges has been one of the major changes in higher education. As a result, the number of public colleges in Ethiopia has increased from 11 in academic year 1999–2000 to 34 in 2013–14, according to data from the Ministry of Education (1999–2015). Hence, college enrolment has increased from a little more than 10,000 in 1990 to more than 360,000 in 2015. This is expected to grow further with the planned inauguration of more than 10 new public universities as well as potential private colleges.

The expansions of college education and high population growth rate have put tremendous pressure on the Ethiopian labour market. Approximately 600,000 individuals enter the labour force every year (World Bank 2007). The economy, however, does not seem to create as many jobs to match this influx. The imbalance between the increase in the supply of and demand for workers in Ethiopia has resulted in a high unemployment rate and long unemployment duration, particularly among the youth.

Unemployment is a new phenomenon in Ethiopia's skilled labour market. Anecdotal evidence suggests that a large increase in the number of college graduates following the expansion of tertiary education in recent years partly explains the high unemployment rate and long unemployment duration among new college graduates. In the academic year 2009–10, for instance, 66,999 students graduated from college (Ministry of Education 1999–2015: *Annual*

[7] See Appendix Table A2 for the total number of students enrolled in TVET institutes in Ethiopia in 2015.

Abstract 2004E.C (2011–2012G.C)) and entered the skilled labour market whereas a total of 46,304 vacancies were reported during the same year, of which only 13 per cent (about 6020) were opened for skilled workers (Ministry of Labour and Social Affairs 2009–10). As a result, mean unemployment duration among new college graduates seems to be rising; in fact, one estimate puts it as high as 45 months (Serneels 2007).

Restricted/costly information flow between employers and job seekers can lead to longer spells of job search and unemployment for new college graduates. Understanding how the labour market functions, particularly the job search process, is crucial to addressing this issue. In Ethiopia, the majority of employers advertise job openings in newspapers and/or on small boards installed on the busiest street corners and squares of cities in which the employers are located. It is less likely for these types of advertisements to reach out to a large number of new college graduates spread throughout the country. Also, there is no communication among employers to co-ordinate their job advertisements and post them at a specific period of the year, say around the months during which college students graduate. Rather, job openings are advertised randomly throughout the year, which may negatively affect the intensity of the job search and, hence, increases unemployment duration.

On the other hand, senior college students do not generally start looking for jobs before they graduate. Starting the job search early (i.e. while they are still in college) may help reduce unemployment duration among new college graduates. That most universities do not have career placement offices to assist graduating seniors in their job search means it is rather difficult for students to initiate such searches. Moreover, in most cases, employers require job applicants to have their degree certificates in hand when they apply for jobs.

Considering the Ethiopian skilled labour market is not well organized, it is worth exploring the role information plays in unemployment duration among new college graduates. Better flow of information may improve functioning of the labour market by increasing both the intensity of the job search and the quality of the job match. In this regard, job fairs may be one mechanism to nurture and exploit.

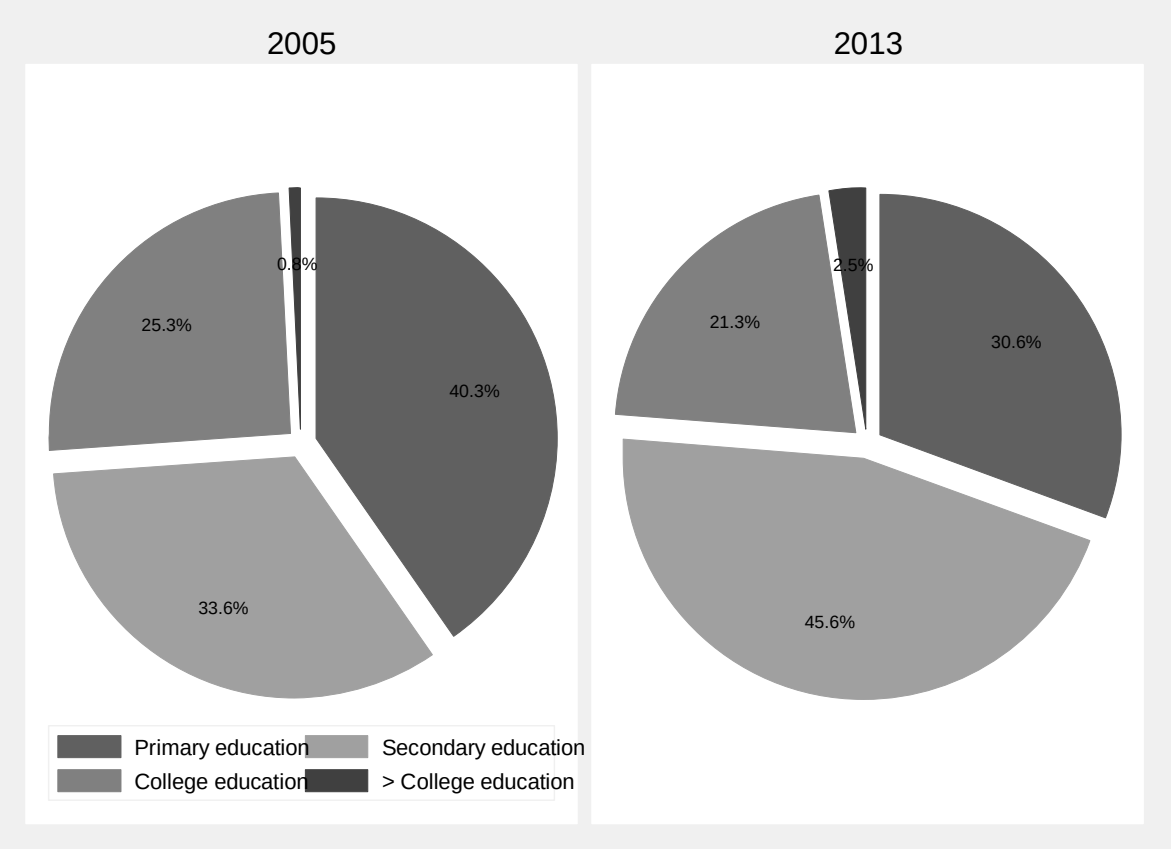
4.3 Educational expansion and returns to education

As discussed earlier, the Ethiopian education sector has undergone a series of changes since the mid-1990s. As a result, enrolment and graduation from primary, secondary, and tertiary schools have increased significantly. Overall, Ethiopia has achieved universal primary school enrolment and the average years of schooling in the country have increased. However, the same cannot be said for improvement in quality. In fact, some commentators argue that the quality of education has been compromised during the period of rapid school expansion (e.g. see Kahsay 2012).

Although there is no rigorous research on the effect of this school expansion programme on the returns to education in Ethiopia, it is plausible that the increase in years of schooling for an average worker has led to higher earnings. It is also likely that changes in the quality of education dampen the effect of education expansion on the returns to education.

Human capital has been emphasized as a critical determinant to economic progress. Better educational attainment implies more skilled and productive workers, who in turn increase an economy's output of goods and services. Given the importance of educational achievement, we first assess whether (non-agricultural) wage workers in Ethiopia have become more educated over time. Using data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014), we present the education profile of workers in Ethiopia in 2005 and 2013 in Figure 6.

Figure 6: Workers' education level



Source: Authors' computation based on data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014).

As expected, a large proportion of workers in Ethiopia (40 per cent) have completed only primary education in 2005, followed by workers with secondary (34 per cent) and tertiary (25 per cent) education. Only a very small proportion of workers (less than 1 per cent) have completed above college education. In contrast, in 2013 about 46 per cent of workers have completed secondary education, 12 percentage points increase from that in 2005. Similarly, the proportion of workers with above college education is noted to have increased from 0.8 per cent in 2005 to 2.5 per cent in 2013, but the proportion of workers with primary and college education is observed to have decreased.

There is extensive empirical work on returns to education in both developed and developing countries. In Ethiopia, however, there are limited studies on the topic, particularly those that attempt to mitigate biases from potential endogeneity of ability in the returns to education equation.[8] Perhaps an exception to this is the study by Girma and Kedir (2005) that has attempted to deal with the potential endogeneity of ability by using instrumental variable quantile regression. The authors found positive and significant effect of education on earnings and that the returns to education are higher for people at the lower end of the income distribution. For

[8] Earning equations are the workhorse of estimating the returns to education. The specific challenge noted in fitting these equations is effectively controlling for endogeneity of ability to earnings. For instance, more able individuals may be inherently different and earn more regardless of their education level. For this reason, it is important to control for differences in ability in the returns to education equation.

instance, the impact of schooling at the 25th quantile is more than 10 percentage points higher than the returns to education at the 90th quantile.

Given the data we have (i.e. pooled cross-section data from the 2005 and 2013 National Labour Force Survey; see CSA 2006, 2014), it is difficult to control for endogeneity of ability in the returns to education equation. However, as a complementary analysis to prior studies conducted on the returns to education in Ethiopia and in the interest of presenting more current results, we estimated the returns to education equation using ordinary least squares regression and uncovered positive correlation between earnings and education level (see Table 2 for regression results).

In Table 2, the coefficient estimates of education level dummies are positive and statistically significant, implying reasonably high returns to education. For instance, workers who completed primary education earn 14.1 per cent higher wages relative to workers with below primary level education (the omitted group). The table also shows that the returns to education increases with years of schooling, where workers with above college education earn the highest.

Table 2: Ordinary least squares regression of the returns to education in Ethiopia (dependent variable, log(*wage*))

	Coefficient	SE
Age	0.070***	0.004
Age squared	–0.001***	0.000
Female dummy	–0.426***	0.014
Primary school graduate dummy	0.141***	0.030
Some secondary school dummy	0.281***	0.025
Secondary school graduate dummy	0.566***	0.025
Some college education dummy	0.842***	0.025
College graduate dummy	1.204***	0.031
Above college education dummy	1.454***	0.038
Father's years of schooling	–0.029***	0.003
Mother's years of schooling	0.013***	0.002
Married dummy	0.274***	0.023
Divorced/widowed/separated dummy	–0.151**	0.070
Constant	4.606***	0.164
Observations	19,104	
R^2	0.528	

Note: *P<0.10, **P<0.05, ***P<0.01. Robust standard error (SE) is clustered by enumeration area, a primary sampling unit. The regression also controls for district and year fixed effects.

Source: Authors' calculations using data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014).

5 The effect of economic growth on the labour market

As indicated in Section 3, there are important changes in the Ethiopian economy, including huge investment in infrastructure, interventions in the agriculture sector, and rapid economic growth. These changes are expected to alter the structure of the labour market, which in itself is one of the indicators of the intensity of structural transformation in an economy. Changes in labour force participation, unemployment rate, sectoral share of employment, productivity, and wage rates are some of the indicators of changes in the structure of the labour market. In this part of the analysis, we consider trends and patterns of labour force participation, employment-to-population ratio, sectoral distribution of workers, unemployment rate, and labour engagement in the informal sector to make a preliminary judgement on the impact of change in the economic momentum on the structure of the labour force over the last 15 years. The analysis uses data from the 1999, 2005, and 2013 National Labour Force Survey (CSA 2000, 2006, 2014) and the

Groningen Growth and Development Centre (GGDC) 10-Sector Database of the University of Groningen (Timmer et al. 2014).

The general observation is that nationwide activity rate of the labour force has increased between the years 1999 and 2013, and the change is predominantly attributed to the increase in female labour force participation in rural areas. This pattern has been corroborated by the rise in the employment-to-population ratio over the same period. The rise in this ratio is also dominated by the increase in female labour force participation in rural as well as urban areas of the country.

A decline is recorded in the share of labour force in the agriculture sector by 7.5 percentage points between 2005 and 2013. This rate is paralleled by an increase in the share of labour force in the service and construction sectors. The sub-sectors in the service sector in which net labour flow has increased vary significantly by geography and gender. Consistent with productivity measures, there is no net shift of labour force to the manufacturing sector during the period between 2005 and 2013.

Other important developments during the period under consideration include a decline in unemployment rate in both rural and urban areas and a decline in the share of labour force operating in the informal sector in urban centres.

5.1 Changes in labour force participation

There is an overall rise in labour force participation rate between 1999 and 2013 (see Table 3). The change in participation rate is solely accounted by the rise in participation of female workers. Between 1999 and 2013, labour force participation rate increases by about 6 percentage points for female workers. This change is the result of the upsurge in activity rate among rural women. The rise was robust enough to more than offset the decline in participation rate of female workers in urban centres (see Table 3).[9]

Table 3: Rates of labour force participation in Ethiopia

	Rates of participation (%)		
	1999	2005	2013
Country level			
Male + Female	80.5	84.5	83.6
Male	89.7	90.7	89.6
Female	71.9	78.8	77.8
Rural areas			
Male + Female	81.5	87.2	86.2
Male	91.2	93.7	91.7
Female	72.3	81.2	80.8
Urban centres			
Male + Female	75.0	71.4	74.1
Male	81.5	75.8	81.6
Female	69.8	67.7	67.5

Source: Data from the 1999, 2005, and 2013 National Labour Force Survey (CSA 2000, 2006, 2014).

5.2 Changes in the employment-to-population ratio

The employment-to-population ratio is found to increase by about 7 percentage points between 1999 and 2013 (see Table 4). Consistent with the trend in labour force participation rate, the

[9] Labour force participation rate by age group shows a slight decrease in activity rate among the young in urban areas and a slight increase in activity rate in rural areas for the same age group. In general, the usual (inverted-U shaped) pattern of relationship between age and activity rate is maintained during the period of analysis.

significant increase in the employment-to-population ratio is accounted by the rise in the employment of female workers. Unlike in the case of labour force participation rate, however, the rise in employment-to-population ratio was also an urban phenomenon although the change in rural areas is by far greater.

Table 4: Trends in employment-to-population ratio by gender in Ethiopia

	Employment-to-population ratio (%)		
	1999	2005	2013
Country level			
Male + Female	69.1	76.6	76.2
Male	80.2	84.7	82.7
Female	58.5	69.0	69.8
Rural areas			
Male + Female	73.0	82.0	81.6
Male	84.0	89.8	86.9
Female	62.1	74.4	76.3
Urban centres			
Male + Female	48.2	50.2	55.5
Male	57.4	57.7	65.6
Female	40.5	43.7	46.6

Source: Data from the 1999, 2005, and 2013 National Labour Force Survey (CSA 2000, 2006, 2014).

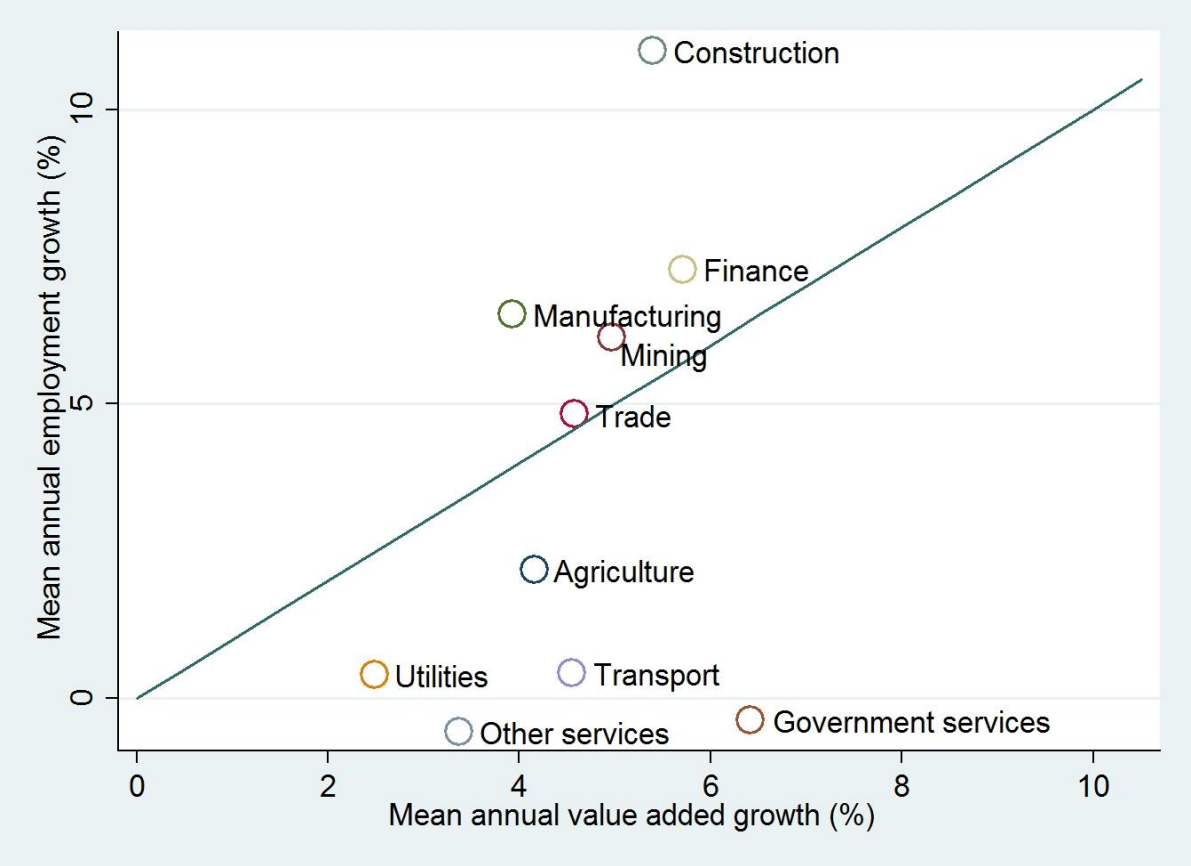
5.3 Between- and within-sector employment shift

In this part of the analysis, we consider sectoral contributions of labour to the Ethiopian economy using time-series data from the GGDC 10-Sector Database (Timmer et al. 2014). Figure 7 shows the interaction between GDP and employment growth by sector. Each of the bubbles in the figure represents a sector. The vertical axis measures average annual employment growth whereas the horizontal axis shows the annual growth in gross value added, both in percentages. Thus, the co-ordinates for the centre of each of the bubbles are the relevant sector's employment and gross value-added growth rates for the period. The 45° line divides the figure into two sections: bubbles below the line represent sectors in which employment growth was lower than gross value added growth whereas bubbles above the line represent sectors in which employment growth exceeded output growth.

Figure 7 shows that all sectors in Ethiopia do well in the period between 1990 and 2011, where each sector experiences positive output growth. Regarding employment growth during the same period, however, 'government services' and 'other services' (i.e. community, social, and personal services) perform particularly badly, with negative employment growth, suggesting employment in these two sectors shrank during the period of analysis. Note that these are the only two sectors that experience contractions in employment in the period of analysis, with employment growth in government services and other services contracting by 0.4 and 0.6 per cent, respectively. One potential factor contributing to the contraction of employment in government services sector could be the privatization of a number of government-owned enterprises, particularly in the 1990s.

The construction sector is noted to experience a disproportionately high level of employment expansion in the period between 1990 and 2011, where the employment growth (11 per cent) is almost twice as high as output growth (5.6 per cent) in the sector. This is not surprising considering the construction boom in Ethiopia since the early 2000s, which is driven by, among other factors, large public investment in infrastructure development including the construction of large dams such as the Grand Ethiopian Renaissance Dam.

Figure 7: Mean value added and employment growth by sector (1990–2011)



Source: Authors' computation based on data from the GGDC 10-Sector Database (Timmer et al. 2014).

Financial services, mining, and manufacturing sectors are also found to experience higher employment growth than growth in output. Specifically, employment growth for the finance, mining, and manufacturing sectors was 7.3, 6.1, and 6.5 per cent, respectively, for the period of analysis. In contrast, the corresponding output growth rate for these sectors was 5.9, 5.1, and 4.1 per cent, respectively. Trade, on the other hand, experienced labour-neutral growth, where both employment and output grew by about 5 per cent. The agriculture sector experienced growth in output and employment, the latter at a slower pace. Finally, the utilities and transport sub-sectors recorded employment growth rates of 0.41 and 0.44 per cent, respectively.

When we look at the patterns of within-sector employment shift between 2005 and 2013 using a different dataset, a similar pattern emerges. As discussed, changes in sectoral shares in employment of factors of production, in particular labour, are important outcomes of critical changes in the economy and also key indicators of intensity of structural transformation within an economy.

Data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014) reveal that the share of labour in the agriculture sector declined by 7.5 percentage points between 2005 and 2013. This is paralleled by the increase in the share of labour in the service sector by 5.8 percentage points and in other industries (typically, the construction sub-sector) by 1.1 percentage points. In contrast, the manufacturing sector's share of the labour force declined marginally (0.4 per cent).

A major feature of the development effort in Ethiopia has been the focus on laying foundations for industrialization in the form of infrastructure such as roads, railways, power, telecommunications, and human capital formation. This focus had two implications for the

manufacturing sector. First, initially limited infrastructure meant the country was less ready for manufacturing development. Power shortage is a case in point. Second, the service sector has enjoyed better linkages with high rates of return to the relatively large public investments in social and economic infrastructure, thus attracting investors away from the relatively risky manufacturing sector. In the face of quick and high rates of returns in the service sector, the manufacturing sector is believed to have encountered a number of deterrents. Banks tend to extend loans to short-term businesses in the service sector rather than to the manufacturing sector. The backward linkage of the manufacturing sector within itself and the agriculture sector is weak, thus compelling investors to rely on imported raw materials and face the corresponding constraints.

A closer look at the patterns of changes in the sectoral share at disaggregated (i.e. sub-sector) level (in Table 5), on the other hand, reveals that the 7.5 per cent decline in the share of labour in the agriculture and allied activities is paralleled by a 5.2 percentage point increase in the share of labour in the sub-sectors of services such as social, cultural, personal household activities, and activities by private households with employed persons. The balance is distributed to other sub-sectors, the maximum being 1 percentage point increase in education and health sectors.

Table 5: Change in the composition of labour force by sub-sectors between 2005 and 2013

Major industrial divisions	Country total			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Agriculture, hunting, forestry, and fishing	–7.5	–4.8	–10.8	0.5	0.2	0.7	–5.3	–1.6	–9.6
Mining and quarrying	0.1	0.2	0.1	0.3	0.5	0.0	0.2	0.1	0.1
Manufacturing	–0.4	0.6	–1.5	0.1	0.1	0.3	–1.0	0.1	–2.2
Electricity, gas, and water supply	0.4	0.2	0.8	0.6	0.5	0.7	0.4	0.1	0.7
Construction	0.5	0.7	0.2	2.1	2.6	1.2	0.1	0.1	0.0
Wholesale and retail trade, repair of vehicles, personal and household goods	0.2	–0.1	0.6	–1.8	–3.9	1.0	–0.3	–0.4	–0.2
Hotels and restaurants	–1.4	0.0	–2.8	–5.7	–0.5	–11.3	–1.0	0.0	–2.1
Transport, storage, and communication	0.5	0.7	0.2	1.9	2.6	0.8	0.1	0.1	–2.7
Financial intermediation	0.2	0.3	0.2	0.9	1.1	0.6	0.0	0.0	0.0
Real estate, renting, and business activities	0.5	0.6	0.4	2.5	2.9	2.1	0.1	0.0	0.1
Public administration and defence, compulsory social security	–0.5	–0.5	–0.5	–3.5	–4.8	–2.1	–0.2	–0.2	–0.4
Education, health, and social work	1.0	1.0	1.1	3.1	2.0	4.3	0.4	0.5	0.3
Other social, cultural, personal, and household activities	7.0	1.3	13.6	4.5	–2.4	12.7	7.1	1.4	13.5
Private households with employed persons	6.5	1.8	12.0	1.1	1.2	1.6	7.1	1.8	13.4
Extraterritorial organization and bodies	–0.1	–0.2	–0.2	–0.4	–0.5	–0.2	–0.2	–0.2	–0.1

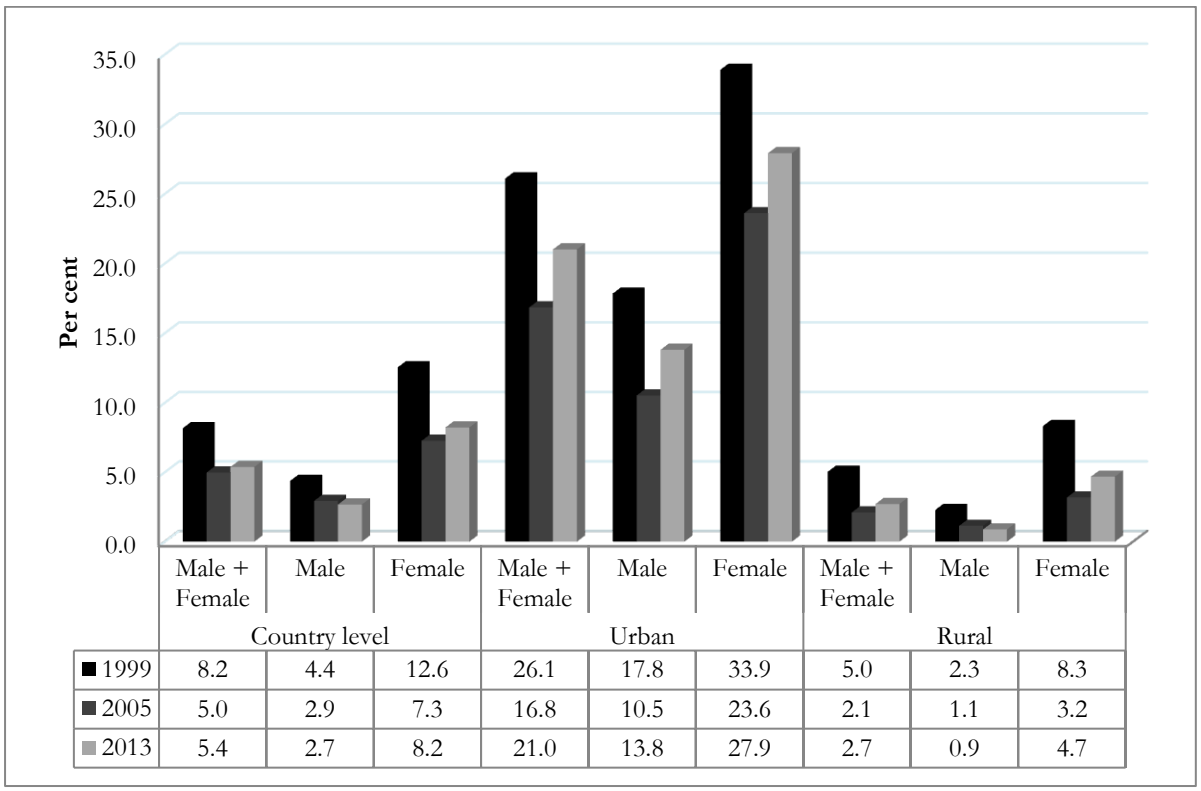
Source: Data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014).

The patterns of change in the distribution of the labour force by rural and urban centres of economic activities are different among sectors. In the case of urban centres, the share of labour in the wholesale and retail trade, hotels and restaurants, public administration and defence, and other household services has declined. This decline is largely dominated by the decline in female labour. On the other hand, the share of labour in other sub-sectors (i.e. construction, transport, storage, and communication, real estate and business activities, and health and education sectors) has increased. Female labour has dominated the increase in the share of labour in the health, education, and social works sub-sector whereas male labour has dominated the increase in the labour force in the other sub-sectors.

5.4 Changes in unemployment rate

In general, there is a decline in the national rate of unemployment among people aged 15 years and above from 8.2 per cent in 1999 to 5.4 per cent in 2013. Unemployment in Ethiopia has been an urban phenomenon. Over the same period, urban unemployment is noted to drop from 26.1 to 21.0 per cent (see Figure 8).

Figure 8: Changes in unemployment rate between 1999 and 2013



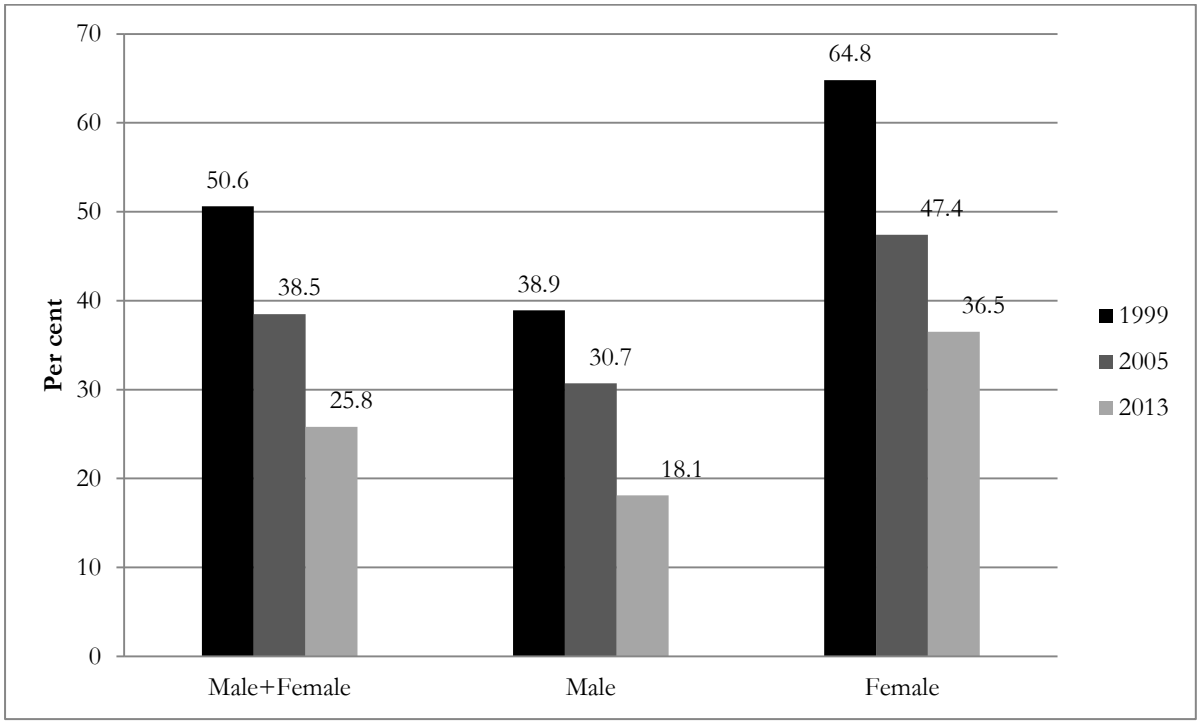
	Country level			Urban			Rural		
	Male + Female	Male	Female	Male + Female	Male	Female	Male + Female	Male	Female
1999	8.2	4.4	12.6	26.1	17.8	33.9	5.0	2.3	8.3
2005	5.0	2.9	7.3	16.8	10.5	23.6	2.1	1.1	3.2
2013	5.4	2.7	8.2	21.0	13.8	27.9	2.7	0.9	4.7

Source: Data from the 1999, 2005, and 2013 National Labour Force Survey (CSA 2000, 2006, 2014).

5.5 A transition of labour from the informal to the formal sector

One of the important developments in the structure of the Ethiopian labour force is the significant decline in the share of labour force operating in the informal sector. Between 1999 and 2013, the share of labour force in the informal sector is seen to decline from 50.6 to 22.8 per cent. The usually high rate of female labour force in the informal sector is found to decline from 64.8 per cent in 1999 to 36.5 per cent in 2013, and the share of male labour force is found to have more than halved, dropping from 38.9 to 18.1 per cent (see Figure 9).

Figure 9: Trends in the proportion of labour force in the informal sector between 1999 and 2013



Source: Data from the 1999, 2005, and 2013 National Labour Force Survey (CSA 2000, 2006, 2014).

5.6 Differential effects of economic growth on skilled and unskilled workers

In recent years, Ethiopia has seen patterns of economic transformation that have directly affected its labour market, particularly the salaried urban sector. Real wages have shown large increases across the distribution, where the increase in wage is relatively higher for skilled workers.

The Blinder–Oaxaca wage decomposition between skilled and unskilled workers is presented in Table 6. The results reveal that unskilled and skilled workers, on average, earn about 1021 and 1782 Ethiopian birr (ETB) per month, respectively. This is a wage differential of 761 ETB per month in favour of skilled workers. The finding suggests that the changes in demographic and labour market characteristics explain a large portion (55 per cent, i.e. 422/761 ETB) of the observed increase in wage among skilled workers. The results also indicate that the increase in wage is driven by faster wage growth for high-skilled jobs.

Table 6: Blinder–Oaxaca mean wage decomposition between skilled and unskilled workers

Overall change	Change due to changes in	
	Wage structure	Characteristics
761 ETB	422 ETB	339 ETB

Note: ETB, Ethiopian birr. The control variables included in the Blinder–Oaxaca decomposition regression are: age, age squared, binary indicators for years of schooling (i.e. dummies for completion of some primary education (the omitted group), primary school graduates, some secondary education, secondary school graduates, some college education, college graduates, above college education), father's and mother's years of schooling, and binary indicator for marital status (i.e. dummies for single (the omitted group), married couples, and divorced, widowed, or separated individuals). Skilled workers include managers and professionals; clerks, service, and sales workers; and operators and assemblers. Unskilled workers include elementary workers.

Source: Authors' computation based on data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014).

Although it is difficult to be conclusive, the result presented in Table 6 seems to suggest that Ethiopia is in some sort of skill-biased labour demand trajectory. This is also implied by the discussion earlier where data from the 2005 and 2013 National Labour Force Survey (CSA 2006, 2014) show that the employment share of agriculture has decreased by 7.5 percentage points whereas that of the service sector has increased by 5.8 percentage points. This is particularly true since the average number of years of schooling among workers in the industrial sector is higher than that of workers in the agriculture sector.

5.7 The role of public sector in employment

Given the extensive history of Ethiopia, public administration has long been at the centre of different regimes in the country. However, the inception of modern public administration and the emergence of civil servants and public enterprises are believed to have become prominent since the beginning of the twentieth century.

The public sector has gone through a number of reforms since the current government came to power in 1991. In particular, the government has put in place a number of political and economic measures that have influenced the role and the relative importance of the public sector in the economy. Following the country's change in economic ideology from a mixed/command economy to a market-based economy and the subsequent adoption of the World Bank's Structural Adjustment Programme in the 1990s, a number of government-owned enterprises have been privatized. Another major reform during the 1990s was the issuance of a retrenchment policy, resulting in the retrenchment of civil servants and employees of public enterprises who were said to be redundant. Among other things, these changes have decreased the relative role the public sector plays in the economy as well as in job creation.

These changes and the subsequent policy choices made by the government are based on the assumption that the private sector is the engine of growth. As a result, the relative size of the public sector (in total GDP and employment) has been decreasing continuously since the 1990s.

Although lack of data prevents us from presenting the effect of the policy changes (which favoured the private sector) on the role of the public sector in employment in the 1990s, Table 7 shows the change in employment share in the public sector in the 2000s.

Table 7: Employment share in the public sector in urban Ethiopia by gender and year (%)

	2003	2006	2009
Male	24	22	14
Female	16	14	13
Male + Female	20	19	13

Source: Authors' calculation based on data from the Urban Employment Unemployment Survey (CSA 2000–09).

As can be seen in Table 7, the relative share of the public sector in total employment has been continuously decreasing in the 2000s. In 2003, for instance, about 20 per cent of workers in urban areas in Ethiopia are employed by the public sector. This figure falls to 13 per cent in 2009, a 35 per cent decrease from its 2003 level. Table 7 also shows that the decrease in employment share of the public sector is gender neutral, except the decrease is a bit higher among male workers.

5.8 The role of social protection in growth and employment

Most of the social protection programmes in Ethiopia target people in rural areas, with the Productive Safety Net Programme (PSNP) being the largest social protection programme in the country and the second largest in SSA, next only to South Africa (Gilligan et al. 2009). PSNP is a

government programme that attempts to offer temporary public works employment as well as food/cash transfer to eligible households.

Attempts have been made to assess the effect of PSNP on a number of growth-related outcome variables. For instance, it has been documented that PSNP increases the likelihood of households using improved agricultural technologies and of them being food secured (Gilligan et al. 2009), of the number of trees that households plant (Andersson et al. 2011), and of improved child nutrition (Debela et al. 2014).

Evidence for the effect of PSNP on employment, however, is limited, except the findings by Gilligan et al. (2009) that there are no short-term disincentive effects of PSNP on labour supply. The scarcity of evidence for the effect of PSNP on employment is surprising considering the programme is also designed to provide employment (i.e. public works) to vulnerable households during agricultural slack season.

Although Ethiopia's PSNP is one of the largest social protection programmes ever, a parallel government-sponsored social protection programme is not yet available to vulnerable urban households in Ethiopia despite the tremendous pressure the Ethiopian urban labour market has started to face in recent years.

As mentioned earlier, Ethiopia is the second most populous country in Africa and has one of the highest fertility rates in the continent. The fast growing population puts tremendous pressure on the Ethiopian labour market. Approximately 600,000 individuals enter the labour force every year (World Bank 2007). The economy, however, does not seem to create as many jobs to match the influx of workers into the labour market. The imbalance between the increase in the supply of and demand for workers results in high unemployment rate and long unemployment duration, particularly among the youth. These issues suggest a need to introduce government-sponsored urban safety net programmes. The government's effort to do so is at a well-advanced design stage. More broadly, studies on the design of urban social protection programmes in other typical developing countries will have strong potential to inform policy makers in Ethiopia.

6 Conclusions

The decades since the mid-1990s have witnessed significant public investments in Ethiopia. The nation has invested significantly in social and economic infrastructure such as roads, schools, health facilities, and, more recently, railways and energy. These investments are a vital ingredient to enhancing its long-term capabilities. Considerable effort has also been exerted to transform the agriculture sector, reduce vulnerability of rural livelihood to adverse shocks, and transform rural areas, more broadly. More specifically, agricultural extension programmes have been broadened and enhanced, schools have become considerably more widely available and accessible in rural areas, preventive rural health services/facilities have been expanded, and rural road networks have been enlarged. Recent interventions in urban development in the form of urban infrastructure and major housing schemes have not only contributed towards the modernization of urban spaces but also created jobs for many urban youth.

Such investments spearheaded by the Ethiopian government have generated fast economic growth—on average 11 per cent real GDP growth per between 2005 and 2014. This growth has translated into rising incomes, with per capita GDP doubling between 2000 and 2014 (World Development Indicators database, World Bank 2015b). Indeed, growth has led to reduction in poverty from a 45.5 per cent head count rate to 29.6 per cent between 1995 and 2012. Combined

with successes in the health sector, income growth has also contributed to the rise of life expectancy to 63 years in 2013, up from 43–46 years in the early 1990s.

Following investments and other policy interventions, economic activities have shown signs of a shift from the agriculture sector to the services and construction sectors. The contribution of the traditionally dominant crop sub-sector to the growth of GDP has been overtaken by the construction sector, followed by the wholesale and retail trade sector. The change in the share of labour force has also been in line with changes in productivity. Changes in the labour force participation rate and employment-to-population ratio, in particular among the female labour force, the reduction in unemployment rate, and the movement of labour outside the agriculture sector (up to 7.5 percentage points) are indicative of change in the structure of the economy. Still, the country has to continue to deepen its focus on long-term capabilities towards industrialization.

Although investments in the manufacturing sector show encouraging trends with fairly high growth in value added in the sector (17 per cent per year between 2010 and 2014), contribution to overall output and employment growth has been overwhelmed by the sheer rate of expansion of value added in the construction sector. This trend can be deemed positive because of the nature of investment in the construction sector: most of the investments are targeted towards relaxing infrastructure and energy constraints for the much-anticipated expansion of the manufacturing sector.

The primary focus of the country should be the deployment of its accumulated capabilities towards delivering sustainable growth and development. In particular, this calls for changing gears towards the more productive sectors such as new niches in the agriculture sector and targeted manufacturing industries.

Cognizant of this need, the second phase of the GTP (2015–16 to 2019–20), also known as GTP II, identifies rapid industrialization and structural transformations as its core objectives. GTP II also duly emphasizes the indispensable role of the private sector in this process and the necessity of capacitating it further. In this regard, the correct stress on domestic resource mobilization needs to include widening the set of saving and investment instruments available to citizens of the country.

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Appendix A

Table A1: GDP growth decomposition

Country	Years	GDP growth	Percentage contribution to GDP growth from growth/change in:				
			Employment	Labour composition	Non-ICT capital services	ICT capital services	Total factor productivity
Ethiopia	1990–94	–1.23	0.96	0.03		1.01	–3.23
	1995–99	4.37	1.49	0.02		2.42	0.43
	2000–04	4.00	1.39	0.01		1.88	0.72
	2005–09	9.80	2.01	0.00		3.10	4.69
	2010–14	9.51	2.07	0.06		3.42	3.96
	1990–2014	5.29	1.58	0.02		2.36	1.31
Ghana	1990–94	4.04	0.27	0.01		–0.45	4.20
	1995–99	4.29	1.03	0.01		0.27	2.98
	2000–04	4.71	1.04	0.00		0.29	3.38
	2005–09	5.87	1.77	0.00		2.77	1.34
	2010–14	7.88	2.21	0.08		1.61	3.98
	1990–2014	5.36	1.26	0.02		0.90	3.18
Kenya	1990–94	1.56	2.60	0.05	0.21	0.53	–1.83
	1995–99	2.81	3.16	0.07	0.30	0.41	–1.14
	2000–04	2.66	2.12	0.05	0.36	0.34	–0.22
	2005–09	4.13	1.84	0.04	0.75	1.27	0.23
	2010–14	5.69	1.88	0.14	1.15	1.35	1.17
	1990–2014	3.37	2.32	0.07	0.55	0.78	–0.36
Mozambique	1990–94	3.05	1.52	0.01		1.42	0.10
	1995–99	11.01	1.62	0.00		3.98	5.40
	2000–04	7.18	0.95	0.00		4.77	1.46
	2005–09	7.36	0.72	0.00		3.78	2.86
	2010–14	7.04	0.91	0.04		6.30	–0.21
	1990–2014	7.13	1.15	0.01		4.05	1.92
Nigeria	1990–94	2.00	0.90	0.07	0.11	–0.08	0.99
	1995–99	2.45	1.19	0.07	0.28	0.72	0.19
	2000–04	9.71	0.89	0.07	0.76	0.77	7.23
	2005–09	6.24	1.12	0.06	3.18	3.09	–1.21
	2010–14	5.61	0.88	0.10	5.02	2.39	–2.78
	1990–2014	5.20	1.00	0.07	1.87	1.38	0.89
South Africa	1990–94	0.06	1.51	0.30	0.42	0.20	–2.37
	1995–99	2.55	0.91	0.43	0.73	0.88	–0.40
	2000–04	3.55	0.29	0.41	0.71	1.09	1.04
	2005–09	3.60	0.71	0.41	1.67	2.11	–1.30
	2010–14	2.49	0.83	0.20	1.61	1.81	–1.96
	1990–2014	2.45	0.85	0.35	1.03	1.22	–1.00
Tanzania	1990–94	3.92	1.40	0.01		2.94	–0.42
	1995–99	3.96	1.17	0.01		0.97	1.81
	2000–04	6.35	1.40	0.01		0.09	4.85
	2005–09	6.15	1.75	0.01		2.25	2.15
	2010–14	6.90	1.32	0.04		3.62	1.91
	1990–2014	5.46	1.41	0.01		1.98	2.06

Note: GDP, gross domestic product; ICT, information and communication technologies.

Source: Authors' computation using country details data from the Total Economy Database™ (TCB 2015b).

Table A2: Number of students in public and private TVET institutes in Ethiopia in 2015 by sector

	Public institutes			Private institutes			Public + Private institutes		
	Levels 1+2	Levels 3+4	Level 5	Levels 1+2	Levels 3+4	Level 5	Levels 1+2	Levels 3+4	Level 5
Agriculture	8083	4554	96	1972	1356	147	10,055	5910	243
Industry	43,088	11,051	2183	4618	1484	889	47,706	12,535	3072
Mining	96	0	0	0	0	0	96	0	0
Utilities	80,716	54,578	1829	18,208	7160	5391	98,924	61,738	7220
Trade	60	218	0	74	445	0	134	663	0
Health	1070	4214	236	1430	2947	1812	2500	7161	2048
Tourism	6244	952	159	886	480	60	7130	1432	219
Social Affairs	2015	40	0	478	70	0	2493	110	0
Total	141,372	75,607	4503	27,666	13,942	8299	169,038	89,549	12,802

Note: TVET, Technical and Vocational Education and Training.

Source: Authors' calculation based on administrative data from the Ministry of Education (1999–2015).