Chapter 12

URBANIZATION AND STRUCTURAL TRANSFORMATION

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Introduction

Ethiopia is urbanizing rapidly but from a low base. While the absolute numbers of the rural population in Ethiopia are projected to rise for the next several decades, the urban population growth rate (4.2 percent between 1994 and 2015) exceeds the overall population growth rate (2.5 percent). As a result, the share of the population residing in urban areas (using the official Central Statistical Agency of Ethiopia definition of urban areas) rose from 13.7 percent to 19.4 percent between 1994 and 2015.[1] This share is expected to increase to 27.8 percent by 2025 (assuming a 5.4 percent urban population growth rate, per World Bank [2015]) but is still far below the average for Africa south of the Sahara (SSA) (45.3 percent in 2020), for which urban populations are growing by 4.4 percent per year (UNDESA 2015).

Urbanization has major implications for overall growth. Long-term economic development is generally associated with a movement of workers from low-productivity agricultural labor (in rural areas) to high-productivity manufacturing labor (in more urbanized areas).[2] This structural transformation

1 Official estimates from the government of Ethiopia of urban population are based on administrative boundaries that exclude peri-urban areas but include small cities. In this chapter we present data on two other measures of urbanization as well—one based on agglomerations (that is, large, high-population density areas) and another focusing on cities with populations greater than 50,000.

2 Whereas within-sector productivity growth and structural change go hand-in-hand, there are two primary views as to where the process of growth originates (Rodrik, McMillan, and Sepúlveda 2013). One argues that agricultural productivity is a precondition for growth (Gollin 2018; Johnston and Mellor 1961; Timmer 1988, 2002; Mellor 1995, 2017); the other argues that growth is industrialization-led, and agricultural productivity improves when nonfarm jobs absorb rural population growth, maintaining the same level of agricultural output with a smaller agricultural labor force (Lewis 1954).

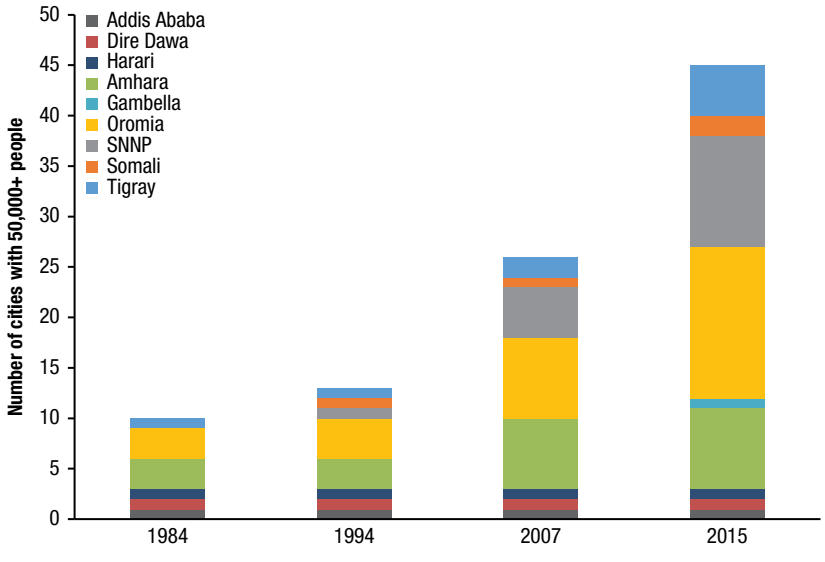
not only boosts incomes of individuals earning a higher wage, but it also provides capital to invest in inputs and mechanization for greater agricultural productivity growth in rural areas. Similarly, assuming a greater share of individuals move toward off-farm labor, this frees up agricultural land for more productive farmers (that choose to stay in agriculture), resulting in greater productivity effects among agricultural laborers (Mellor 1995). Moreover, urbanization, if supported by appropriate infrastructure, has the potential to boost total factor productivity and economic output through positive agglomeration effects. For these reasons urbanization has been an important aspect of Ethiopia's development strategy for the past two decades, including the agricultural development–led industrialization (ADLI) strategy of the early 2000s and the more recent Growth and Transformation Plans I and II (Ethiopia, MoFED 2007, 2010; National Planning Commission 2016).

This chapter examines the urbanization process in Ethiopia and places it in the context of structural transformation and recent public investments to promote industrialization. The chapter is organized as follows: After a brief overview of the data and methodology used in the chapter, we describe the historical growth of total and urban populations in Ethiopia and project future urban population growth. The chapter builds on this analysis, presenting data on both population growth and the structural transformation of Ethiopia's economy, in comparison with other countries in Africa south of the Sahara, as well as with the experience of India and China. Next we focus on key aspects of Ethiopia's development strategy related to structural transformation and urbanization. In doing so, we estimate the direct and multiplier effects of industrial parks and agro-industrial centers, which represent the major public investments designed to implement Ethiopia's current development strategy. The chapter concludes with a summary and highlights areas for future research and analysis.

Urbanization in Ethiopia

Over the past three decades, the size and number of cities dramatically increased across Ethiopia. In 1994 the country had a population of more than 53.6 million people but housed only 13 cities with populations greater than 50,000. By 2007 the total population increased by 20 million, and the number of cities doubled to 26. By 2015 the total population increased another 16 million from 2007, and the number of cities almost doubled again with 45 cities of at least 50,000. Urbanization rates differ across regions, with Oromia and Southern Nations, Nationalities, and Peoples (SNNP) regions

FIGURE 12.1 Number of cities in Ethiopia of at least 50,000 people



Source: Authors, based on data from Central Statistical Agency of Ethiopia (Ethiopia, CSA 1991, 1996, 2010, 2013b). See Schmidt et al. (2018), Annex Table A2.1.

Note: SNNP = Southern Nations, Nationalities, and Peoples.

experiencing the largest growth in city numbers from 8 to 15 and 5 to 11 cities, respectively, between 2007 and 2015 (Figure 12.1).[3]

Correlated with this increase in the number of cities over time is an overall increase in urbanization throughout Ethiopia. We evaluate urban population and urban growth rates using two methodologies. First, we review the official rural and urban population figures based on official census data collected in 1984, 1994, and 2007 (Ethiopia, CSA 1991, 1996, 2010, 2013b). In addition, we simulate urbanization trends into the future using CSA's published population projection figures and the urban growth rate of 5.4 percent per year estimated in the World Bank's Ethiopian urbanization review (World Bank 2015).[4] Second, we evaluate urbanization over time using the agglomeration index methodology developed by Uchida and Nelson (2008). Compared to administrative definitions of urban and rural locations (defined by census

3 Addis Ababa, Dire Dawa, and Harari are regions defined by an urban administrative unit and thus remain constant over time.

4 The average urban growth rate estimated by the World Bank's Ethiopian urbanization review (World Bank 2015) incorporates natural population growth, rural-urban migration, migration to mega project sites, and urban area expansion.

designations and used for official CSA documents) that change over time due to redistricting and redefinition, the agglomeration index defines "urban" based on travel time to cities of a defined population size and surrounding areas with a defined population density.[5] For this analysis urban areas are locations that have a population density of at least 150 people per square kilometer and are located within one-hour travel time to a city of at least 50,000. This analysis builds on earlier work by Schmidt and Kedir (2009) that modeled travel times to major cities (see Appendix 12A for further detail on the estimation of travel time and the agglomeration index).[6] We compare previous estimates reported by Schmidt and Kedir (2009) to updated 2015 agglomeration values. A comparison of results generated from these two methodologies reveals important differences in overall urban growth rates and, in particular, urban growth trends in and around the capital city of Addis Ababa.

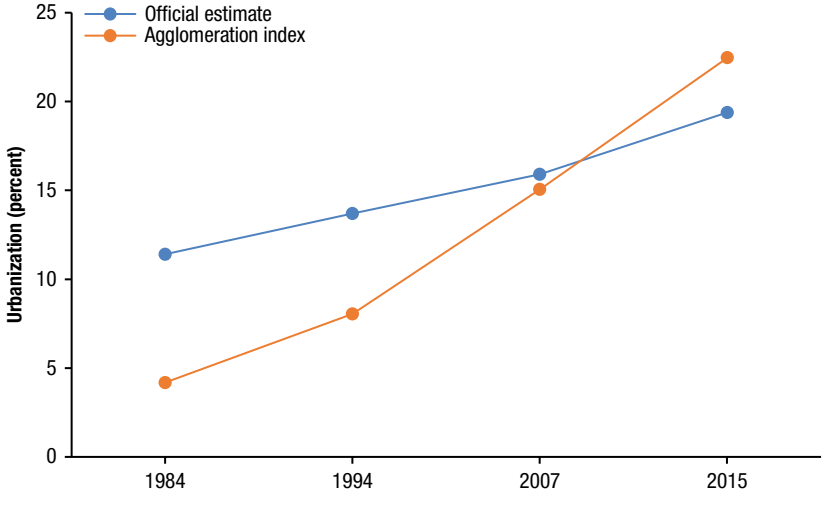
Comparing Ethiopia's urban share of population as measured by the agglomeration index with official urbanization rates based on administrative boundaries suggests that urban growth is occurring faster than officially projected. Until 2007, official CSA estimates of the share of Ethiopia's population living in urban areas was greater than the agglomeration index estimation. In 1984 and 1994 few urban centers and limited road networks resulted in lengthy travel times to urban areas, hence a lower urbanization rate (as per the agglomeration index estimation). However, by 2015 the compounded effect of city and population growth, along with ongoing investments in road infrastructure and improved accessibility led to a higher urbanization rate as measured by the agglomeration index than the CSA official estimate (Figure 12.2). As urban centers proliferate, and transportation infrastructure facilitates the movement of goods and people, it is expected that agglomerations extending past official urban boundaries will continue to expand.

Focusing specifically on the official population figures published from the census, we evaluate urbanization over time by city size, separating cities into three categories: (1) cities with between 50,000 and 100,000 people; (2) cities with between 100,000 and 500,000 people; and (3) the city of Addis Ababa. To understand growth rates by city size, we identify cities that were projected to have at least 50,000 people by 2015 based on the 5.4 percent growth rate published by the World Bank's Ethiopian urbanization review (World Bank

5 A detailed explanation of administrative definitions and urbanization calculations in Ethiopia can be found in Schmidt and Kedir (2009).

6 The methodology to summarize travel time and calculate agglomeration is slightly modified compared to Schmidt and Kedir (2009). See Appendix 12A for an in-depth description of the methodology and modifications.

FIGURE 12.2 Comparison of the agglomeration index for Ethiopia and official estimates of the share of the total population residing in urban areas, 1984–2015



Source: Ethiopia, CSA (2013b) and agglomeration index estimations.

2015) using the most recently published census data from 2007. We then create a database of those specific cities dating back to 1984 (the first census year of the analysis) to evaluate urban growth over time, holding the number of cities constant throughout the period from 1984 to 2015. Similarly, we use the same consistent set of cities to project urban growth to 2035.

Census data, reported by administrative unit, suggest that the population of Addis Ababa, Ethiopia's capital and largest city, grew at 2.02 percent per year from 1994 to 2007 and at 2.25 percent per year between 2007 and 2015. The population of cities between 100,000 and 500,000 persons grew at twice the rate of Addis Ababa (Table 12.1; see also Appendix Tables 12B.1 and 12B.2). Similarly, the growth rates of cities between 50,000 to 100,000 people grew at more than twice the rate of Addis Ababa between 1994 and 2015. Projecting urbanization rates into the future using the official census data suggests that the population growth rate of medium-sized and large cities will continue to outpace the growth rate of Addis Ababa. These projections suggest that the total urban population living in cities greater than 50,000 people will increase by more than 10 million by 2025 compared to 2007 levels and increase by an additional 11 million by 2035 (Table 12.1 and Figure 12.3).

However, these data can be misleading given the urban area expansion that has occurred in and around Addis Ababa. Addis Ababa official population

TABLE 12.1 Urban center census populations, population projections, and growth rates in Ethiopia, 1984–2035

	Census			Population projection[a]		
City size	May 1984	October 1994	May 2007	July 2015	2025	2035
Population size (thousands)						
50,000–100,000[a]	337	650	1,139	1,782	3,284	5,593
100,000–500,000[a]	847	1,340	2,276	3,488	9,225	20,242
Addis Ababa	1,413	2,113	2,740	3,273	4,561	5,810
Subtotal	2,597	4,102	6,154	8,543	17,070	31,646
Total urban (CSA)	4,869	7,385	11,863	17,459	31,072	52,574
Total population	42,617	53,764	73,751	90,076	111,644	132,701
Annual population growth rate since previous measurement (%)						
50,000–100,000[a]		6.77	4.41	5.76	6.31[c]	5.47[c]
100,000–500,000[a]		4.69	4.16	5.48	10.21[c]	8.18[c]
Addis Ababa		4.11	2.02	2.25	3.37[c]	2.45[c]
Subtotal		5.33	3.13	4.37	6.94[c]	6.20[c]
Total urban (CSA)		4.25	3.71	4.95	5.40[b]	5.40[b]
Total population		2.35	2.46	2.53	2.17[d]	1.74[d]

Source: CSA population and housing census data for 1984, 1994, 2007, and 2015 (Ethiopia, CSA 1991, 1996, 2010, 2013b); EGIS International (2016); and authors' calculations.

Note: a. City size categories are defined in terms of 2015 population using Ethiopia, CSA urban population projections regardless of population size in years prior to or following 2015. This permits examination of changes in population for a consistent set of geographic localities over time.

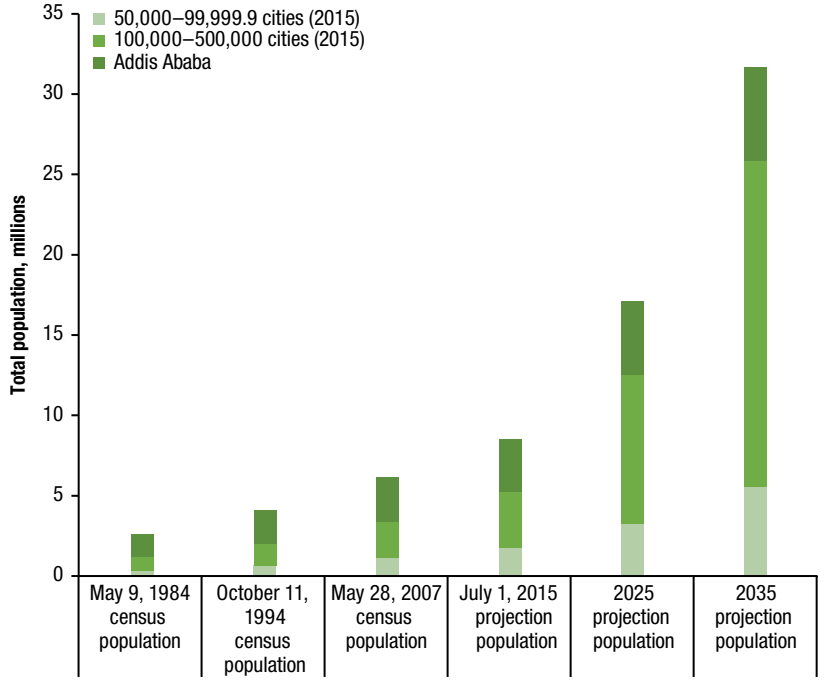
b. 5.4 percent is the overall urban growth rate used for projections from 2012 forward by World Bank (2015). This projection rate is also used by the Ethiopian Development Research Institute (EDRI).

c. Growth rates derived from the EGIS national urban system study report projections (EGIS International 2016).

d. These total population growth rate projections are the log estimate annual growth rate of the respective period years of the full 2008–2037 series of World Bank projected populations, medium variant.

statistics are confined to the Addis Ababa census administrative boundary designation and do not consider the urban expansion occurring along major transportation corridors leading from and adjacent to the Addis Ababa administrative boundaries. A paper by Zeleke et al. (2018) shows that the expansion of Addis Ababa in terms of land use is exponential. In absolute terms the expansion in Addis Ababa is larger than the combined land use of Adama, Mekele, Hawassa, and Bahir Dar with 2015 populations of 324,000 (Adama), 324,000 (Mekele), 300,000 (Hawassa), and 282,000 (Bahir Dar) (Ethiopia, CSA 2013b; City Population 2018). From 1986 to 2010 the average rate of growth in area for Addis Ababa was calculated at 9.1 square kilometers per year, while the combined average rate of growth in area for Adama, Mekele, Hawassa, and Bahir Dar was 3.2 square kilometers per year (Zeleke et al. 2018).

FIGURE 12.3 Breakdown of urban population in Ethiopia by city size categories for urban centers with population of more than 50,000, 1984–2035



Source: CSA population and housing census data for 1984, 1994, 2007, and 2015 (Ethiopia, CSA 1991, 1996, 2010, 2013b); EGIS International (2016); and authors' calculations.

Note: City size categories are defined in terms of 2015 population (using Ethiopia, CSA urban population projections) regardless of population sizes in years prior to or following 2015.

Comparing urbanization over the past four decades using the agglomeration index methodology highlights the immense investments in road infrastructure as well as the increasing growth of secondary cities across Ethiopia. While in 1984 only 4.2 percent of the total population was considered urban according to the agglomeration index, 22.5 percent of the population was urban in 2015 (Table 12.2). Of the population increase in Ethiopia of 36 million between 1994 and 2015, the urban share of annually added population increased from 34 percent between 1994 and 2007 to 56 percent between 2007 and 2015 (Figure 12.4).

Urbanized networks are forming between important secondary cities throughout the country. For example, between 1994 and 2015 the emergence of upgraded or newly constructed roads along the main corridors connecting

TABLE 12.2 Percentage of people residing in urban areas in Ethiopia, by region (1984–2015)

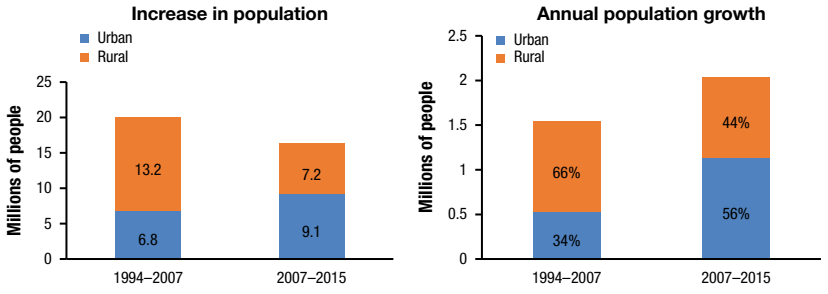
	Urban share of total population (%)			
Regions	1984[a]	1994	2007	2015
Addis Ababa	57.5	91.1	91.9	99.9
Afar	0.0	0.0	0.0	0.6
Amhara	3.2	4.9	7.9	14.0
Benishangul-Gumuz	0.0	0.0	0.0	0.0
Dire Dawa	16.9	55.8	59.5	67.9
Gambella	0.0	0.0	0.0	11.9
Harari	44.7	75.8	81.0	94.3
Oromia	2.0	5.2	10.3	15.9
SNNP	—	2.6	23.7	39.5
Somali	0.3	2.4	2.7	2.4
Tigray	2.7	4.3	8.1	19.1
Ethiopia	**4.2**	**8.0**	**15.1**	**22.5**

Source: CSA population and housing census of 1984, 1994, 2007, and 2015 (Ethiopia, CSA 1991, 1996, 2010, and 2013b); and EGIS International (2016).

Note: See Appendix 12A for details on urban population calculations using the agglomeration index. SNNP = Southern Nations, Nationalities, and Peoples.

a. Population figures for 1984 were approximated due to changes in administrative boundaries after 1984. To maintain consistency across all years, we geographically allocated population to the current administrative boundaries.

FIGURE 12.4 Population added in Ethiopia since 1994 and annual population growth (millions)



Source: CSA population and housing census data for 1984, 1994, 2007, and 2015 (Ethiopia, CSA 1991, 1996, 2010, 2013b); EGIS International (2016); and authors' calculations.

Addis Ababa to Dukem, Bishoftu, Mojo, Adama, and Assela to the southeast of Oromia region all significantly improved the travel time between cities and accelerated the rate of urbanization. Particularly striking is the growth in urban corridors in and around Addis Ababa over time (Figure 12.5). In 1984 urban population (as classified by the agglomeration index) was limited to the western part of the city with limited agglomeration around the five major transportation corridors, while in 2015 the greater urban area and corridors of Addis Ababa fully comprise the Addis Ababa administrative unit and reach to other neighboring smaller cities in Oromia and Amhara regions (Figure 12.5). According to the agglomeration index analysis, approximately 20 percent of Addis Ababa's urban population lives outside of the Addis Ababa administrative region boundary along major transportation corridors and in urban feeder towns (Figures 12.5 and 12.6).

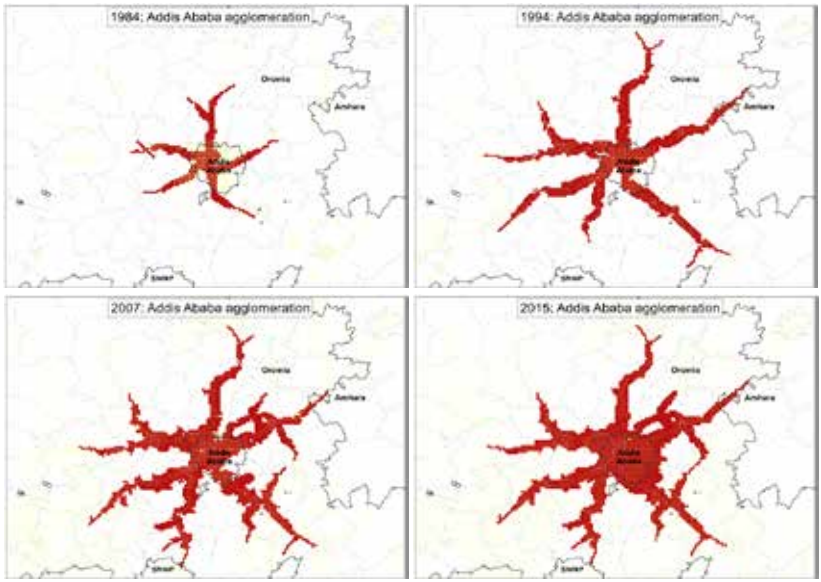
Investments and improvements in major transportation arteries as well as the development of regional secondary cities within Ethiopia have improved the accessibility of remote rural areas to urban centers. Between 2007 and 2015 an additional 15 percent of the population were within three hours' travel time of a city of at least 50,000 people—the share of the population with this level of access to urban centers rising from 44.5 percent in 2007 to 58.6 percent in 2015 (Table 12.3; Appendix Tables 12A.2, 12A.3, and 12A.4 and Figure 12A.3). Even the most remote populations that were more than 10 hours away from a city decreased from 11 percent of the population in 2007 to 5.4 percent in 2015. One-fifth of the population of Ethiopia (nearing 20 million people now) are estimated to be farther than five hours from an urban center of 50,000 or greater, suggesting that further investments are needed to link these individuals to important public infrastructure and services (see discussions in Chapters 3, 5, and 11).

While urban centers continue to grow, total population and labor force growth in Ethiopia are slowing. Annual population growth is expected to decelerate from 2.5 percent per year (between 2011 and 2015) to 1.7 percent per year between 2025 and 2035 (Table 12.4).[7] Likewise, annual labor force growth, which was 4.9 percent between 2011 and 2015, is expected to drop to 2.1 percent in the 2025–2035 period.[8] Given the recent surge in population and subsequent deceleration, Ethiopia is currently experiencing a "youth

7 Population growth averaged 2.5 percent from 2010 to 2020 and is expected to decline to 1.8 percent between 2020 and 2030, and further to 1.4 percent by 2040.

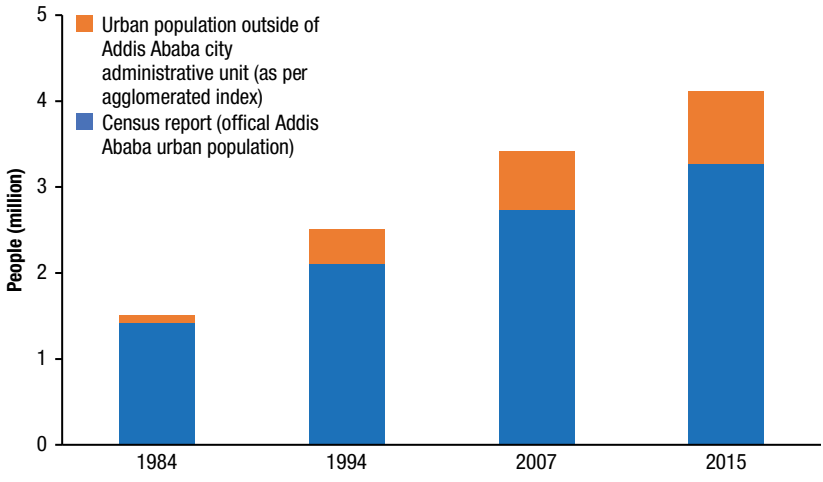
8 Annual labor force growth was an average 3.7 percent from 2010 to 2020, down from 5.8 percent during the 1990–2000 period.

FIGURE 12.5 Estimates of the urban extents for 1984, 1994, 2007, and 2015: Addis Ababa



Source: Authors' calculations.

FIGURE 12.6 Urban population within the Addis Ababa regional administrative unit and additional urban population based on agglomeration index calculations, 1984–2015



Source: Authors' calculations.

TABLE 12.3 Travel time to nearest city in Ethiopia of at least 50,000 people in 2015, share of total population, by region (%)

Region	Less than 1 hour	1–3 hours	3–5 hours	5–10 hours	More than 10 hours
Tigray	24.7	34.9	20.0	18.1	2.4
Afar	1.2	18.3	26.3	41.7	12.6
Amhara	16.2	39.3	24.9	17.6	2.1
Oromia	18.3	39.7	24.5	15.4	2.2
Somali	4.6	11.0	12.8	29.7	42.0
Benishangul-Gumuz	0.1	1.3	18.3	49.0	31.4
SNNP	40.4	36.2	11.2	9.6	2.5
Gambella	15.7	18.0	16.3	27.6	22.4
Harari	94.3	5.7	0.0	0.0	0.0
Addis Ababa	99.9	0.1	0.0	0.0	0.0
Dire Dawa	69.0	16.8	8.8	5.5	0.0
Ethiopia	**24.5**	**34.1**	**19.8**	**16.2**	**5.4**

Source: Authors' calculations using the agglomeration index.
Note: SNNP = Southern Nations, Nationalities, and Peoples.

bulge" in the labor force as people born between 1998 and 2002—those ages 15 to 19 years old in 2015—enter the labor market. Until this cohort retires, Ethiopia has an opportunity to benefit from a "demographic dividend" as the ratio of workers to dependents rises (Figure 12.7). Although a greater share of laborers (compared to dependents) will characterize the Ethiopian demographic for coming decades, this "dividend" will only pay off if workers find work. Filmer and Fox (2014) outline the constraints for rural youth to enter into paid labors, listing a variety of factors, including insufficient capital or credit or both, information asymmetries of markets and input supplies, and lack of education and skills. A concerted effort will need to be placed on improving job opportunities in terms of demand for labor and supply of skilled labor to reap the potential benefits of Ethiopia's "youth bulge."

Ethiopia's labor force, defined as the sum of females and males between the ages of 15 and 64 years, is increasing faster than the overall population. It will continue to do so over the next two decades, rising from a 51.8 percent participation rate in 2007 to an expected 72.1 percent in 2035 (Table 12.5). Although the population of females of any age is slightly lower than the population of males, female participation in the labor force is slightly greater than that of males. Moreover, population growth of females is taking place at a

TABLE 12.4 Urban and rural populations in Ethiopia, 1994–2035

	Population					Labor Force				
	Addis Ababa	Other urban[a]	Total urban[b]	Rural	Total	Addis Ababa	Other urban[a]	Total urban[b]	Rural	Total
Population and labor force size (thousands)										
1994	2,113	1,990	4,102	49,375	53,764					
2007	2,740	3,415	6,154	67,597	73,751	1,420	1,770	3,190	35,039	38,229
2011[c]	2,994	4,242	7,237	74,269	81,506	1,724	2,442	4,166	42,753	46,919
2015	3,273	5,270	8,543	81,533	90,076	2,064	3,323	5,387	51,416	56,804
2025	4,561	12,148	16,709	94,935	111,644	3,169	8,441	11,611	65,969	77,580
2035	5,810	24,677	30,487	102,214	132,701	4,187	17,781	21,967	73,649	95,616
Annual growth rate (%)										
2011–2015	2.25	5.57	4.24	2.36	2.53	4.61	8.01	6.64	4.72	4.90
2015–2025	3.37[d]	8.71	6.94[d]	1.53	2.17	4.38	9.77	7.98	2.52	3.17
2025–2035	2.45[d]	7.34	6.20[d]	0.74	1.74	2.82	7.74	6.59	1.11	2.11

Source: CSA population and housing census data for 1994, 2007, and 2015 (Ethiopia, CSA 1996, 2010, 2013b); EGIS International (2016); and authors' calculations.

Note: Urban population in each year is calculated as the sum of inhabitants living in cities that had a population of at least 50,000 in 2015.

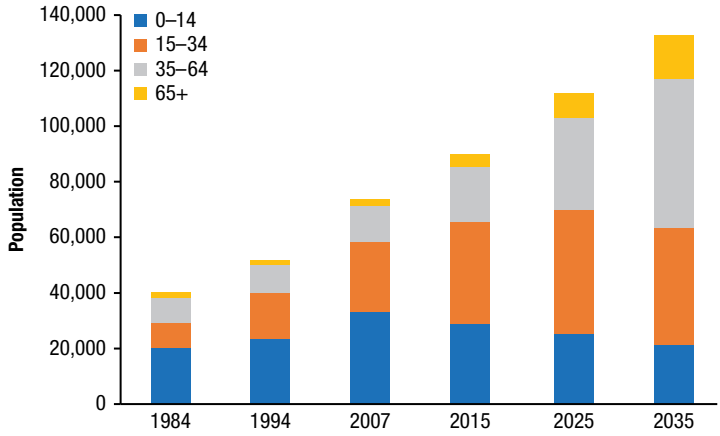
a. City size categories are defined in terms of 2015 population using Ethiopia, CSA urban population projections regardless of population size in years prior to or following 2015. This permits examination of changes in population for a consistent set of geographic localities over time.

b. Urban is defined as settlements with a population of 50,000 and greater. All other areas are rural for the purposes of this table.

c. 2011 figures are imputed using a steady growth rate between 2007 and 2015.

d. Growth rates derived from the EGIS national urban system study report projections (EGIS International 2016).

FIGURE 12.7 Ethiopia's census population and population projections by age bracket, 1984–2035



Source: Authors' calculations using historical CSA data and projections (Ethiopia, CSA 2013b) and EGIS growth rates (EGIS International 2016).

TABLE 12.5 Female and male labor force participation and annual growth in Ethiopia, 2007–2035

	Population			Labor force			
	Female	Male	Total	Female	Male	Total	Participation rate (%)
Population and labor force size (thousands)							
2007	36,534	37,217	73,751	19,312	18,917	38,229	51.8
2015	44,825	45,250	90,075	28,486	28,318	56,804	63.1
2025	55,705	55,939	111,644	38,856	38,724	77,580	69.5
2035	66,311	66,389	132,700	47,833	47,783	95,616	72.1
Annual growth rate (%)							
2007–2015	2.6	2.5	2.5	5.0	5.2	5.1	n.a.
2015–2025	2.2	2.1	2.2	3.2	3.2	3.2	n.a.
2025–2035	1.8	1.7	1.7	2.1	2.1	2.1	n.a.

Source: Authors' estimates based on CSA data and projections (Ethiopia, CSA 2013b).
Note: n.a. = not applicable.

slightly higher rate of 0.1 percentage points above the annual male population growth, while the male annual labor force growth is about equal to or slightly higher than growth of the female labor force.

Migration and Structural Transformation

Migration in Ethiopia

According to the last three censuses in Ethiopia—those of 1984, 1994, and 2007—the share of migrants moving to another district is increasing. From 1984 to 1994 migrant population grew from 4.5 million people, or 11 percent of the population in 1984, to 6.9 million, or 13 percent of the population in 1994. Total migrants increased to 12.2 million (17 percent) in 2008 (Ethiopia, CSA 1991, 1996, 2010). Almost half of the migrants in 2008 migrated from a rural area to another rural area, while 27 percent of migrants moved from a rural to an urban area (Dorosh et al. 2011). The remaining migrated within urban areas (20 percent) or from an urban to a rural area (7 percent). More recent data collected by the National Labor Force Survey (NLFS) in 2013 (Ethiopia, CSA 2013a) suggests that rural-rural and rural-urban migration shares were almost equivalent at 35 and 33 percent, respectively, of total migrants (Table 12.6).

Given that the most recent census data are from 2007, we use the National Labor Force Survey of Ethiopia to evaluate migration rates within the country.[9] Although measures of the contribution of rural-urban migration toward total urban growth are reported in various datasets, including the 2007 census and the National Labor Force Survey, the sampling design used to generate these calculations are constrained to administrative boundaries. Therefore the rural-urban migration rate of 32.5 percent as reported by the NLFS in Table 12.6 masks a substantial share of rural-to-peri-urban and rural-to-urban migration. Thus rural-urban migration as reported by the NLFS can be considered as a lower bound because it is defined using administrative boundaries and does not capture the agglomerated urban areas as presented in this chapter.

The NLFS data provide a national picture of migration and suggest that migration destinations vary by regions. Greater rural-rural migration occurs in Amhara, Oromia, and SNNP regions; less than a third of migrants moved from rural to urban areas in these regions (Table 12.6).[10] Youth between the ages of 15 and 35 make up a large share of the migrant population. Overall, 53 percent of rural-urban migrants and 44 percent of rural-rural migrants were between the ages of 15 and 35 years (Figure 12.8).

According to the NLFS data, 32 percent of migrants at least 15 years old move in search of work or due to job transfers. While 45 percent of males move for work, a majority of female migration is attributed to marriage, followed by migration in search of work at 32 and 22 percent, respectively. When disaggregating migrants by origin and destination, of all migrants that move from rural to urban areas, fewer than half—58 percent of men and 34 percent of women—are motivated to migrate in search of work.

More detailed studies of migrants in Ethiopia suggest that migrants are predominantly pushed from their homes rather than attracted by an urban pull of higher returns on human capital investments. For example, the Ethiopian Urban Migration Study (Moller 2012) reports that more than 42 percent of migrants stated that they would not have migrated if they had been able to make a living in their original home. In comparison to nonmigrants, migrants who moved to Addis Ababa came from families with much

9 The NLFS is a nationally representative dataset that provides information on labor trends in the country and is collected every five years.

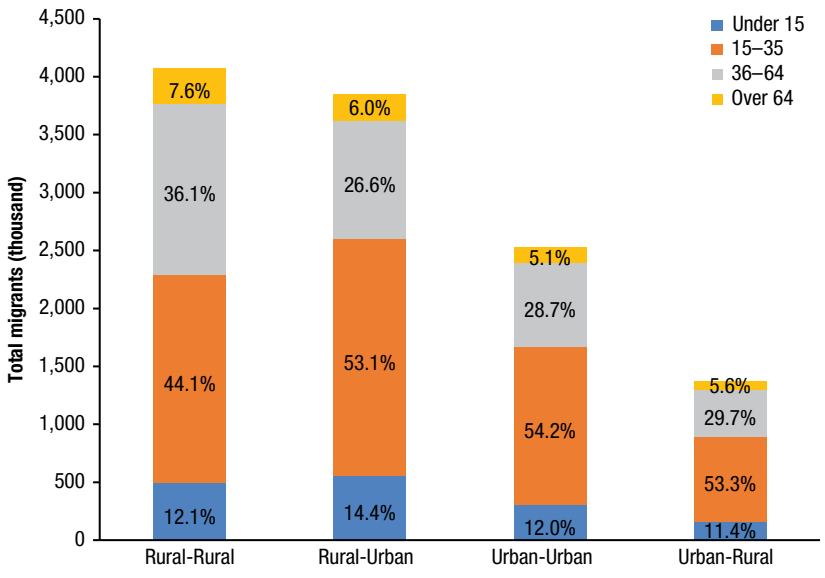
10 Data from the Ethiopia Socioeconomic Survey (ESS) for 2012–2013 suggest that the rural-urban migration rate in Ethiopia was approximately 2 percent of rural households per year.

TABLE 12.6 Forms of migration by region in Ethiopia, percentage of region migrants (%)

Current region	Rural-rural	Rural-urban	Urban-urban	Urban-rural	Total (thousands)
Amhara	40.0	32.9	18.0	9.2	2,628.0
Oromia	39.8	27.4	17.4	15.4	4,368.4
SNNP	39.2	27.5	18.1	15.3	2,067.4
Tigray	31.1	35.5	24.4	9.1	768.4
Benishangul-Gumuz	55.4	22.5	15.1	6.9	227.0
Gambella	40.6	25.6	22.9	11.0	86.9
Afar	25.5	37.3	25.6	11.6	190.2
Somali	20.5	23.8	35.7	20.0	101.9
Addis Ababa	0.0	58.7	41.3	0.0	1,217.1
Dire Dawa	3.9	37.7	52.8	5.6	112.8
Harari	6.5	38.5	52.5	2.4	50.2
Ethiopia	**34.5**	**32.5**	**21.3**	**11.6**	**11,818.3**

Source: Authors' calculations using NLFS 2013 (Ethiopia, CSA 2013a).
Note: SNNP = Southern Nations, Nationalities, and Peoples.

FIGURE 12.8 Forms of migration by age group and by migration type in Ethiopia, total and percentage of migrants



Source: Authors' calculations using NLFS 2013 (Ethiopia, CSA 2013a).

lower educational levels than nonmigrants. Female migrants had three times the illiteracy rate of nonmigrant females.

Other analyses also suggest that migrants in Ethiopia are pushed from rural areas as a means to diversify rural incomes. Asfaw, Degaga, and Gete (2010) report that young men are the most common migrants in Amhara region, with respondents citing a lack of sufficient means of subsistence, shortage of land, and shortage of employment opportunities in the rural areas as their primary reasons for migrating. Dorosh et al. (2011) reported that households with more agricultural land were less likely to send out migrants, while poorer households and households afflicted by a communitywide drought were more likely to have migrant household members. Similarly, Kosec et al. (2017) found that larger land inheritances led male youths in Ethiopia to migrate less to urban centers and increased the likelihood of them being employed in the agricultural sector. These findings are echoed by Gray and Mueller (2012), who reported men's labor migration in Ethiopia increases with drought.

In theory, migration can potentially improve the sending household's well-being via remittances. However, studies of Ethiopian migrants suggest remittances are uncommon among both rural and urban migrants. Results from the Ethiopia Urban Migration Survey suggest that only 13 percent of respondents send remittances home (Martins 2014). A majority of migrants report that it is too costly to remit. Analysis by De Brauw, Mueller, and Woldehanna (2013), using a panel survey of 1,800 households, reported that only 33 percent of rural-urban migrants in Ethiopia send remittances. Given the relatively low remittance rate of internal migrants in Ethiopia and the reported push factors for migration (such as climate shock, land scarcity, and the like), it may be important for households to diversify income sources via migration (seasonal or permanent) to take pressure off of the sending households during times of agricultural production shortfalls.

Migrating can be costly, risky, and difficult for any individual regardless of ex ante human or capital endowments. To the extent that these workers have skills, find employment, and increase market demand, they can contribute to agglomeration economies that raise overall productivity (Lucas 1988; Moretti 2004; Ciccone and Peri 2006). Nonetheless, given that rural-rural migration is more prevalent than rural-urban migration in Ethiopia and that rural-urban migration is characterized predominantly by push factors, an increased focus on the rural and small-town, nonfarm economy may be a more viable avenue to absorb excess rural labor, diversify rural income sources, and reduce

seasonal consumption shortfalls as a medium-term rural development strategy. Christiaensen et al. (2018) find that in Tanzania, migration to towns contributed more to poverty reduction compared to migration to cities.

Benefits of Secondary City Development and the Rural Nonfarm Economy

Much of the future growth in Ethiopia's urban population will likely be in secondary cities that will have the potential to serve as regional markets for agricultural products and to provide seasonal and full-time employment for nearby rural areas. However, current labor statistics in Ethiopia suggest a low rural nonfarm participation rate. Recent work by Schmidt and Bekele (2016) evaluated labor activities in Ethiopia to understand labor diversification in rural areas. They used the Ethiopia Socioeconomic Survey (ESS) to compose work portfolios for each individual based on hours reported working in each sector. The analysis suggested that approximately 76 percent of the total working-age population (15–64 years old) reported working on their own farm, for a wage, or in a nonfarm enterprise (Table 12.7). Of those, more than three-quarters of the working population reported working solely on their own farm. About 13 percent of the population reported working in a mix of own-farm and off-farm activities, while 12 percent reported working exclusively off-farm in wage labor or in nonfarm enterprises.

To understand work portfolios by location, we disaggregate the labor data in the ESS (2012/2013) into workers who live in rural areas, small towns (defined as those living in centers with fewer than 10,000 people), or urban centers of greater than 10,000 people. Given the growth in secondary cities and urban agglomerations along major transportation corridors, it is surprising that only 11 percent of the rural working-age population reports working in a nonfarm activity in addition to working on their own farm. Even in small towns, only 12 percent of the population works in a mixture of off- and on-farm labor, whereas one-third of the population of small towns reports working solely in off-farm work.

Although the government of Ethiopia has made significant investments in education during the past decade, a large share of nonagricultural work is comprised of low-skill jobs. For example, according to the National Labor Force Survey (Ethiopia, CSA 2013a), 30 percent of nonagricultural work is comprised of sales workers, of which street and local market vendors comprise 44 percent (Schmidt and Bekele 2016). The second largest employment type is construction and mining activities that account for only 10 percent of total

TABLE 12.7 Distribution of labor type in Ethiopia by spatial domain, 2013

	People ages 15–64 years, thousands (% share)			
Labor type	Rural	Small town[c]	Urban[c]	Total
Own farm only	27,304.3	55.4	216.4	27,576.1
	(67.8)	(13.8)	(3.1)	(57.8)
Own farm and off-farm	4,404.5	47.8	166.1	4,618.3
	(10.9)	(11.9)	(2.4)	(9.7)
Off-farm[a]	922.7	130.6	3,189.7	4,243.0
	(2.3)	(32.6)	(45.5)	(8.9)
Not working	6,620.3	121.9	2,077.5	8,819.8
	(16.4)	(30.4)	(29.6)	(18.5)
Student[b]	1,010.5	45.3	1,357.6	2,413.4
	(2.5)	(11.3)	(19.4)	(5.1)
Working population	32,631.4	233.8	3,572.2	36,437.5
	(81.0)	(58.3)	(51.0)	(76.4)
Total population (ages 15–64 years)	**40,262.2**	**401.1**	**7,007.4**	**47,670.7**

Source: Adapted from Schmidt and Bekele (2016).

Note: a. Off-farm work comprises individuals that work in off-farm enterprise or wage work or both.

b. Students are defined as those that do not report time working in own farm, wage, or off-farm enterprise activities and report activity as student.

c. Small towns were defined as those under 10,000 inhabitants, while urban areas were defined as having a population of 10,000 inhabitants or more at the time of the survey year (2013/2014).

nonagricultural employment in Ethiopia. The specific service activities that individuals are engaged in across Ethiopian small towns and cities reflect a low level of development with limited labor demand.

Contextualizing Ethiopia's Story: Patterns of Population Growth in Asia and Africa

Migration and employment in Africa appear consistent with recent patterns observed elsewhere. We take China and India as interesting comparisons to structural transformation processes in Ethiopia. In both countries initial investment policy focused on industrialization at the expense of rural areas. These strategies were paired with restrictions on labor mobility, particularly in China. Eventually, both countries enacted agricultural policy reform—China in the late 1970s and India in the early 1990s—and relaxed rural-urban migration restrictions. Although China has experienced a more classic economic transformation (via rapid industrial and agricultural growth leading

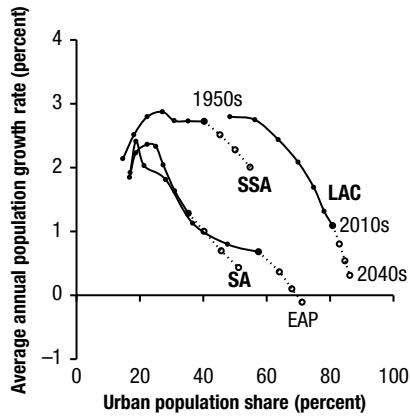
to significant rural-urban migration), India's transformation has been constrained by insufficient labor demand from the industrial sector and is more characterized by rural-rural migration (Fan, Chan-Kang, and Mukherjee 2005; Binswanger-Mkhize 2012; Cai 2013; Cai and Wang 2010).

China began experiencing negative rural population growth starting in the 1990s, resulting in greater urbanization. It is projected that in India, even by 2020, rural population growth is still expected to be positive. In 1990 the urban share of the population in India was 27.7 percent, while that in China was 36 percent; the agriculture share of GDP was 30.1 percent for India and 26.6 percent for China.[11] In Africa south of the Sahara, while urbanization is still taking place at a rapid pace, rural population growth is projected to be positive in 2020 at 1.7 percent. While India's labor mobility has been driven by manufacturing, Africa south of the Sahara has largely urbanized without industrialization (Gollin et al. 2016). Ethiopia has lower urbanization compared with other countries in SSA, with a rural population growth of 1.6 percent, close to the average level for Africa south of the Sahara.

Over the past several decades China experienced a massive exodus of people from rural areas driven by the overall slowing of population growth due to restrictive population control policies early on, a resultant drop in the youth population, and significant urban economic growth. In contrast, trends in Africa south of the Sahara, including Ethiopia, are more similar to India's experience. The rural population is continuing to increase, and any absolute population declines are projected to take place decades from now (Figure 12.9). Whereas India's labor force is expanding at close to the total population's growth rate of about 1.2 percent, Ethiopia's labor force population exceeds its total population growth rate at 3.5 percent and 2.5 percent, respectively. The proportion of population 15 to 34 years old to the entire population is currently at its greatest in Ethiopia (having grown from a share of 22 percent in 1984 to 41 percent in 2015 and projected to be 40 percent in 2025 and 32 percent in 2035, derived from the same data presented in Figure 12.7), and many of these young adults are just entering the labor force now. In comparison, China's young working population is decreasing in size (Thurlow et al. 2018). In Ethiopia the number of young adults ages 15–35 is still peaking and is only expected to decrease after 2025.

11 A brief summary of the growth pathways that China and India experienced during their economic structural transformations is included in Schmidt et al. (2018).

FIGURE 12.9 Population growth and share of population that is urban by global region, 1950–2050



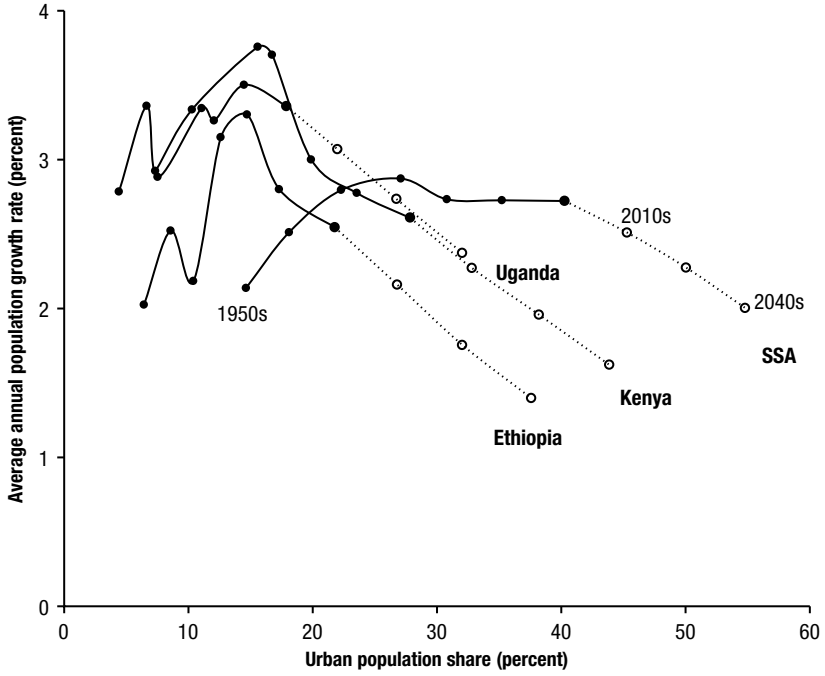
Source: Thurlow, Davis, and Dorosh (2018).

Note: Figure includes historical data (solid lines) and projections (dotted lines). Future populations are based on the median variant fertility and life expectancy projections. EAP = East Asia and the Pacific; LAC = Latin America and the Caribbean; SA = South Asia; SSA = Africa south of the Sahara.

Figure 12.9 shows total population growth and urban population shares from 1950 to 2050 for the regions of Latin America and the Caribbean (LAC), Africa south of the Sahara (SSA), South Asia (SA), and East Asia and the Pacific (EAP). Every region has passed its peak population growth rate, and population growth continues to slow in each region going forward to 2050 (Thurlow, Davis, and Dorosh 2018). SSA in the 2040s will have a population growth rate similar to South Asia in the 1990s and to East Asia and the Pacific in the 1970s, indicating a comparable trend, although about six decades later and at a larger scale. Figure 12.9 also shows that South Asia in 2010 is only as urbanized as East Asia and the Pacific was in 1990, and that the gap between these two regions is expected to stay roughly the same over the next several decades.

Compared to the majority of other countries in SSA, where population growth peaked at an average rate of 2.9 percent in 1980, Ethiopia's peak population growth took place around 1990 and at a higher growth rate of 3.3 percent (Figure 12.10). Uganda and Kenya, two of Ethiopia's East African neighbors, similarly peaked at population growth rates higher than the average SSA rate. However, both of these countries reached their peaks closer

FIGURE 12.10 Population growth and share of population that is urban in Africa south of the Sahara, 1950–2050



Source: Authors' calculations using population estimates for developing countries from UNDESA (2015, 2017).
Note: SSA = Africa south of the Sahara. Figure includes historical data (dark lines) and projections (dotted lines). Future populations are based on the median variant fertility and life expectancy projections.

to when the rest of SSA did—Kenya's peak took place closer to 1970, and Uganda's took place around 1980.

Today, Ethiopia is only as urbanized as SSA was in the 1980s—Ethiopia's urban share in 2020 will be 26.8 percent according to these data, while the SSA urban share reached 27.1 percent by 1980, up from a 22.3 share in 1970. However, Ethiopia's urbanization growth rate is similar to Kenya and Uganda—Ethiopia's urban population share lags consistently between 0.9 to 6.3 percentage points behind Kenya and leads consistently between 1.5 and 5.5 percentage points ahead of Uganda in urban population share in every decade from 1950 to 2040. By 2040 projections suggest that Ethiopia will be about 40 percent urban compared with SSA's average of 55 percent urban, Kenya at 45 percent, and Uganda at only 35 percent.

Industrial and Agro-industrial Parks

Government Policy Related to Industrial Development: The Investment Administration of Ethiopia and the Growth and Transformation Plan II

In an effort to incentivize investments in the face of low levels of private sector development and industrialization, Ethiopia established its first investment office in 1992, with the objective "to promote and facilitate domestic and foreign investment" (Oqubay 2015). A high priority was placed on the manufacturing sector and the development of the industrial parks as well as on addressing the inefficiencies of the nascent policy environment.[12]

Taking into account the performance and lessons learned from the first Growth and Transformation Plan (GTP I), the GTP II reaffirmed its commitments and recognized its shortcomings in the area of promoting industrial development and encouraging foreign and local investment. Many of the GTP I targets related to the development of the industrial sector were not met, both in the promotion of small and medium-sized enterprises as well as in the development of industrial parks. The importance of continued investments in the industrial sector was recognized in the context of the high performance of the sector compared with other sectors during the GTP I implementation period.

The expansion of the country's industrial parks comes with three primary expectations. The parks are expected to (1) create a conducive environment for increasing investments in the manufacturing sector, (2) promote higher export processing, and (3) enhance linkages between domestic and foreign firms to facilitate transfer of technology, skills, and other externalities. Furthermore, to achieve these expectations for competitive industrial development, the GTP II outlines several provisions the government commits to offer the parks to allow for adequate delivery:

12 In 1996 the name for the office, chaired by the prime minister, changed to the Ethiopian Investment Authority (EIA), which later became the Federal Investment Agency (FIA) in 2006 (then chaired by the minister of trade and industry). In 2010 the cabinet was restructured, and the FIA was made accountable to the Ministry of the Interior. From 2008 to 2012, 84 percent of the board's 446 decisions related to duty-free privileges or duty exemptions, while only 17 decisions focused on amendments to various directives. The manufacturing sector and the development of the industrial parks have become a priority of investment law, benefiting from increased and generous incentives, while other sectors' incentives have been reduced. Oqubay (2015, 91) cites that "because of lack of effective control, there were many instances where investors abused their duty-free privileges, selling duty-free vehicles and goods for hotel and touring operations at market prices and transferring and reselling land given under concessional terms."

- All required infrastructure;
- Streamlined public procedures;
- Fiscal and trade policy incentives to attract export-oriented foreign direct investment as well as domestic industrial investment;
- Sector and subsector policies to ensure sustainable and competitive industrial development;
- Follow-up and support to ensure the effectiveness of existing policies; and
- To the extent possible, creation of the required capacity needed in the park development and management by using international best practices to inform them.

As part of its support to the industrial parks, and the manufacturing industry as a whole, the GTP II envisions that the industrial parks are to be developed based on feasibility studies and investment demand in coming years. Implicitly, these new investments build on the major prior investments in road infrastructure and electricity described earlier in this chapter. The plan aims to strengthen the institutional arrangement and ownership of the parks as well as the capacity in these institutions to develop, administer, and regulate the parks, to enable them to perform their role more effectively. The ongoing land administration reforms would also be accelerated during GTP II, prioritizing land supplied to industrial parks with the goal of encouraging investments in industrialization and export development. Finally, there is mention throughout the GTP II strategy that any emphasis on developing, expanding, and supporting the parks is certainly not to be perceived as a detriment for medium-sized, small, or micro enterprises, but rather that these changes should also strengthen and increase the market share of these businesses.

The Current Status of Ethiopia's Industrial Parks

Five industrial parks are currently operational in the country (Figure 12.11), including the following:

- Addis Industry Village Park, which has existed since the 1980s, although it was renovated in 2015;
- Bole Lemi I, which was completed during or shortly after the conclusion of the GTP I;

- Hawassa, inaugurated in July 2016;
- Kombolcha, inaugurated in July 2017;
- Mekelle, inaugurated in July 2017.

The lead subsector in all of these parks is apparel and textiles. Secondary subsectors include food processing. Addis Industry Village has a land area of 8.7 hectares, and the other four parks currently have a combined area of 427 hectares. Approximately 30,000 people are currently employed by Hawassa park, and 11,000 are employed by Bole Lemi I park. The four together are expected to attain an area of 2,147 hectares, with 189,000 people employed over the next 10 years.[13] The current developed area of these four parks is about 20 percent of future targets, while employment currently sits at about 22 percent of targeted future employment.

Seven industrial parks are currently under construction but not yet operational. These include Jimma, Bole Lemi II, Kilinto, Dire Dawa, Adama, Bahir Dar, and Arerti. They are anticipated to have a pilot phase total combined area of 1,018 hectares, with an eventual combined area of 9,979 hectares. A wide spectrum of sectors will be operating in these industrial parks, including pharmaceuticals, agro-processing, electric and electronics products, wood and furniture, textiles, apparel, vehicle assembly, food processing, chemicals, paper and allied products, and heavy industries, machinery, and parts.

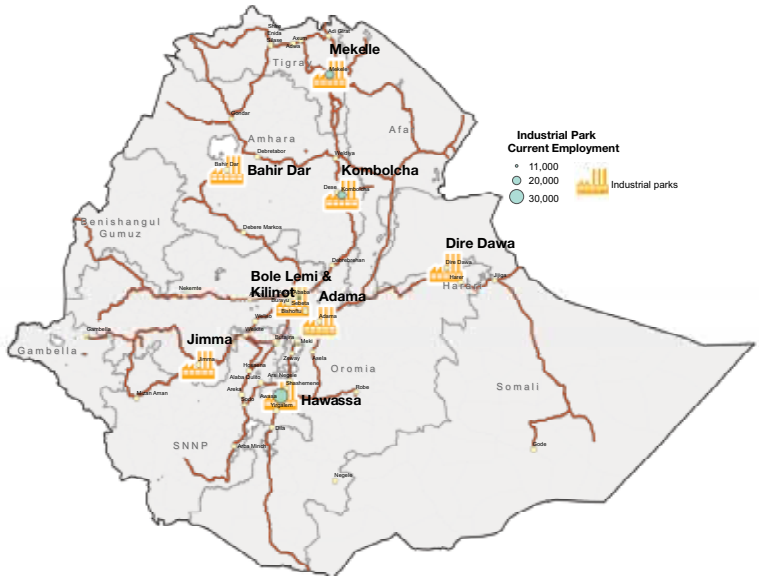
Jimma, Dire Dawa, Adama, and Bahir Dar industrial parks are included in the GTP II, as are the industrial parks in Hawassa, Kombolcha, and Mekelle that are already in operation. The construction of Kilinto and Bole Lemi II has been commissioned by the Ethiopian Industrial Parks Development Corporation (IPDC) with the support of a loan by the World Bank. Adama Industrial Park is being constructed as a joint venture between the governments of Ethiopia and the Hunan Province of China, with the help of a $250 million Chinese loan.[14] Every park is being constructed by a Chinese firm. The seven parks currently being constructed are expected to be operational by June 2018.

Up to seven more parks are in planning for development over the next five years with construction on some now under way. These include industrial parks in Debre Birhan, Aysha, Awsh Arba, Andido, Bishoftu, and Asayta,

13 More details concerning the current status of Ethiopia's industrial parks is included in Schmidt et al. (2018).

14 All references to dollars in the chapter refer to US dollars.

FIGURE 12.11 Geographic locations of selected industrial parks in Ethiopia, 2017



Source: Compiled by authors.

and the Airlines Logistics park. The sectors to be active in these new parks are yet to be entirely determined, but the combined area is expected to be approximately 1,500 hectares. Some estimates have projected that two million jobs will ultimately come from the 17 to 19 industrial parks that are in current plans. These jobs would constitute between 3 percent and 5 percent of Ethiopia's total labor force. Expected employment per urban labor force is highest for Hawassa industrial park in SNNP region at 42.9 percent of Sidama zone's urban labor force and 3.8 percent of the zone's total labor force (rural and urban combined). Bole Lemi I, Bole Lemi II, and Kilinto—the three industrial parks in Addis Ababa—are expected to employ 90,000 workers, which amounts to a combined 28.5 percent of East Shewa zone's urban labor force and 8.2 percent of its total labor force. The total labor force is estimated at 63 percent of total population. Excluding Addis Industrial Village, 11 of these parks are expected to employ a combined minimum total of 352,000 persons. Total investment on the 11 parks is estimated at US$1.8 billion, with the value of public investment being US$1.1 billion. This yields about one job per US$5,000 of total investment, or about one job per

US$3,000 in public investment. Annual wages across the 11 parks is estimated at US$280 million.[15]

There are 17 agro-industrial parks planned for construction across the country, focused on livestock, sesame, cereals, coffee, sugar plantations, pulses, fruits, and vegetables. Activities revolve around agrifood processing as well as the production of agri-inputs (for example, bioenergy, greenhouse cultivation, agrichemicals, renewable energy), agri-infrastructure (for example, energy management, mechanization and transport, storage facilities), capacity building and others, such as agritourism, rural financing, and crop insurance. Only one park is currently operational in its pilot phase, Yirgalem in eastern SNNP. Along with Yirgalem, three others—Baeker in western Tigray, Burie in southwest Amhara, and Bulbula in central-eastern Oromia—are part of the first four-year investment development horizon timeline. Beginning with a combined 997 hectares in the pilot phase, these four parks are expected to cover 4,000 hectares and employ more than 2.3 million individuals in 120 firms. By 2025, 13 additional agro-industrial parks are expected to be constructed over a combined area of 100,000 hectares.

Industrial parks also have been developed by foreign companies, primarily Chinese. These include Huajian Industrial Park on the outskirts of Addis Ababa, specializing in shoes; Modjo Industrial Park, specializing in "George Shoes"; and the Eastern Industrial Zone, located 37 kilometers south of Addis Ababa, which hosts miscellaneous manufacturing industries and was operational in 2015. It currently spans 40 hectares but will expand to an expected 207 hectares. Also, a fertilizer plant has been constructed at the Dire Dawa industrial park that was cofinanced by the Moroccan and Ethiopian governments, with 60 percent of financing from private investment.

In summary, Ethiopia is developing and supporting industrial zones to foster higher-value manufacturing and service activities, according to the GTP II. These industrial zones will benefit from the large investments in transportation (primarily road) infrastructure and maintenance that Ethiopia has invested in during the past several decades (shown above by the agglomeration index analysis). However, a focus on increasing human capacity and labor mobility will be necessary to ensure that rural farmers are able to take advantage of the new labor opportunities outside of the agriculture sector that the industrial parks offer. The following section models a variety of scenarios to

15 For a list of the 12 parks that are either operational or are currently under construction and the 2015 CSA projected population of both the city and zone(s) in which they are located, as well as the total expected employment each park is anticipated to generate, expected public and total investments and wage estimates, see Schmidt et al. (2018).

understand how Ethiopia's focus on industrialization may impact GDP and employment in the future.

Estimates of Multiplier Effects on GDP and Employment

Table 12.8 presents data on investment and production for Ethiopia's industrial, agro-industrial parks, and sugar factories, along with calculations of the multiplier effects of these investments. For these estimates we use value-added coefficients consistent with Ethiopia's national accounts—0.3 for Bole Lemi I and Hawassa, and 0.25 for the remaining industrial parks. For the agro-industrial parks we assumed a coefficient of value-added of 0.4 for Baeker and Bulbula, where a combination of agricultural products is processed (livestock, sesame, coffee, cereals, sorghum, sugar, fruits and vegetables, and pulses) and a coefficient of value-added of 0.22 for Burie and Yirgalem. A 0.925 coefficient of value-added is used for the sugar factories.

Two estimates of the multiplier effects are presented. The first estimate, *total value-added I*, is based on a multiplier of 1.75, an average of national economywide multiplier estimates using endogenous prices from computable general equilibrium models (Haggblade, Hazell, and Reardon 2007). The second estimate, *total value-added II*, uses a multiplier of 2.10, based on national semi-input-output fixed-price models. These larger multipliers may be appropriate for local economy effects where there is substantial underemployment.[16]

For the industrial parks the value-added per investment ranged from 1.75 to 2.10 in the case of the endogenous price multipliers, excluding Bole Lemi I, whose production appears to be an outlier. Using the larger fixed-price model multiplier, the value-added per investment ranged from 2.10 to 2.52, again excluding Bole Lemi I. The value-added per investment for the agro-industrial parks ranged from 0.21 to 0.77 using the lower endogenous price multiplier, and from 0.25 to 0.93 using the larger fixed-price multiplier. For the sugar factories the value-added per investment ranged from 0.56 to 4.72 in the case of the endogenous price multipliers and from 0.68 to 5.66 using the larger fixed-price model multiplier.

Given that the total investment in the industrial parks is $1.74 billion, estimated production and value-added are $6.57 and $1.69 billion, respectively. Including estimated multiplier effects, total value-added is $3.0 billion to $3.6 billion (equal to 4 percent to 5 percent of GDP in 2016, $72.4 billion).

16 We use two alternative multipliers taken from a literature review of economies with widely varying infrastructure and level of economic development. In this way we capture the likely range of multiplier effects as Ethiopia's economy develops.

TABLE 12.8 Estimates of multiplier effects of investments in industrial parks and sugar factories in Ethiopia (US$ millions)

	Investment	Production	Value-added[a]	Total value-added I[b]	Total value-added I / Investment	Total value-added II[c]	Total value-added II / Investment
Industrial parks							
Bole Lemi I	102	20	6	11	0.10	13	0.12
Hawassa	250	1,000	300	525	2.10	630	2.52
Kombolcha	125	500[d]	125	219	1.75	263	2.10
Mekelle	125	500[d]	125	219	1.75	263	2.10
Jimma	64	256[d]	64	112	1.75	134	2.10
Bole Lemi II	149	596[d]	149	261	1.75	313	2.10
Kilinto	234	937[d]	234	410	1.75	492	2.10
Dire Dawa	190	760[d]	190	333	1.75	399	2.10
Adama	500	2,000[d]	500	875	1.75	1,050	2.10
Total	**1,739**	**6,569**	**1,693**	**2,963**	**1.70**	**3,556**	**2.04**
Agro-industrial parks							
Baeker (western Tigray)	634[e]	700	280	490	0.77	588	0.93
Burie (southwestern Amhara)	620[e]	558	123	216	0.35	259	0.42
Bulbula (eastern Oromia)	635[e]	591	236	414	0.65	496	0.78
Yirgalem (eastern SNNP[f])	480[e]	260	57	101	0.21	121	0.25
Total	**2,370**	**2,109**	**697**	**1,220**	**0.51**	**1,464**	**0.62**

For agro-industrial parks the total investment is $2.3 billion with total production of $2.1 billion and value-added of $0.70 billion. Including multiplier effects, the total value-added ranges from $1.2 billion to $1.5 billion, approximately 2 percent of GDP in 2016.

Public and private investment in industrial and agro-industrial parks may provide a catalyst for future growth by facilitating the transfer of technology and contributing a significant share of export earnings. However, this analysis shows that even if the plans for these industrial parks are successful, they are likely to provide only a small share of total output and employment.

Investments in the sugar factories are anticipated to total $5.2 billion, with estimated production of $3.6 billion and value-added of $3.3 billion, which is 9.4 times 2014/2015 sugar production and value-added. If these targets were achieved, the sugar investments would have a larger effect on GDP than the

	Investment	Production	Value-added[a]	Total value-added I[b]	Total value-added I / Investment	Total value-added II[c]	Total value-added II / Investment
Sugar factories							
Wonji Shoa Modern Factory	528	206	191	334	0.63	400	0.76
Finchaa sugar crushing mill	132	206	191	334	2.53	400	3.03
Metehara (expanded)		85	78	137		165	
Tendaho (second phase not started)	769	472	437	765	0.99	918	1.19
Arjo Dediessa	152	444[g]	411	719	4.72	863	5.66
Kesem	297	202[g]	187	327	1.10	393	1.32
Wolkayit	200	376[g]	348	609	3.05	731	3.65
Kuraz Sugar Development Project	1,475	1,041[g]	963	1,685	1.14	2,022	1.37
Tana Belles Sugar Project	1,620	564[g]	522	914	0.56	1,096	0.68
Total	**5,173**	**3,597**	**3,327**	**5,823**	**1.13**	**6,988**	**1.35**

Source: Authors' calculations.

Note: a. We assume a coefficient of value-added of 0.3 for Bole Lemi I and Hawassa, and a coefficient of value-added of 0.25 for the remaining industrial parks listed. For the agro-industrial parks, we assumed a coefficient of value-added of 0.40 for Baeker and Bulbula, and a coefficient of value-added of 0.22 for Burie and Yirgalem. For the sugar factories, we assume a coefficient of value-added of 0.925, which accounts for 0.075 fertilizer share of sugar cane value, the value found in the Pakistan study of Anderson, Cockburn, and Martin (2010) in 2004/2005 (assuming US$1 cane = US$1.6 processed sugar).

b. The total value-added I is based on the multiplier 1.75, which is the national endogenous price estimation method given by Haggblade, Hazell, and Reardon (2007) in Table 7.3 of their study.

c. The total value-added II is based on the multiplier 2.10, which is based on national semi-input-output fixed price models.

d. For all parks but Bole Lemi I, the production figure is scaled to the total investment made in the park, using the share of expected production to investment for Hawassa industrial park.

e. For the agro-industrial parks, we assume private investment is allocated according to shares of public investments.

f. SNNP = Southern Nations, Nationalities, and Peoples.

g. For all the sugar factories but Wonji Shoa, Finchaa, Metehara, and Tendaho, the expected production is calculated using an average of the expected production in dollars per kilogram of sugar output per year of Wonji Shoa, Finchaa, Metehara, and Tendaho, multiplied by the tons of sugar per year capacity of each respective factory.

industrial and agro-industrial parks combined. Including estimated multiplier effects, the total value-added of the planned sugar factories in Ethiopia comes to between $5.8 billion and $7.0 billion. However, an increase in sugar output of this magnitude would imply massive sugar exports that would not necessarily be profitable financially. As summarized by Arkebe Oqubay (2015, 284): "Industrial clustering and industrial parks have played an insignificant role till now but could play a much bigger future role in the overall industrial development strategy. Again, some of these issues point to dilemmas that the government will need to address. For instance, there is the tension between industrial

clustering and agglomeration and the political commitment to spreading resources and opportunities across federal regions."[17]

Conclusion

Ethiopia's urbanization is driven by various demographic, economic, and political factors. Higher net birth rates, rural-urban migration, and expanding urban centers contribute to overall urban population growth (Farrell 2017). This rapid urbanization has major implications for structural transformation.

Ethiopia is urbanizing rapidly. However, the country remains behind many countries in Africa south of the Sahara. Urbanization is expected to reach 40 percent by 2035. According to official CSA projections, the population of Addis Ababa will increase from 3.27 million in 2015 to 7.17 million in 2035; however, much of the expected 56 percent increase in urban population nationally over the next 20 years will likely be in secondary cities. Between 1984 and 2015 the number of secondary cities expanded rapidly. By 2015, 35 cities had populations over 50,000, and 9 cities had populations over 100,000. These secondary cities have the potential to play a key role in Ethiopia's future development, as they serve as major regional markets for local agricultural products, help spread the benefits of growth across more of Ethiopia, and contribute to rapid poverty reduction, in part by providing seasonal and full-time employment opportunities for new migrants and for residents in surrounding areas.

Government policy will play a key role in these developments in terms of infrastructure investments. In addition, macroeconomic and trade policy will have major implications for private-sector incentives. Public and private investment in industrial and agro-industrial parks may provide a catalyst for future growth by facilitating the transfer of technology and contributing a significant share of export earnings, even though they are likely to provide only a small share of total output and employment in the Ethiopian economy.

17 Oqubay is a former minister and special adviser to the prime minister of Ethiopia and a high-level official in policy implementation in the country.

Appendix 12A: Estimations of Travel Time and the Agglomeration Index

Travel Time Estimation

In order to calculate travel time to the nearest city of 50,000 people, the model built here combines transport infrastructure (road network) and landscape features (land use, rivers, lakes, and slope). The traverse modality from point of origin to the nearest city assumes that all movement along the road is by vehicle, whereas off-road people walk through different land cover types before reaching the nearest road. This analysis uses the 2007 road network as the base data (Table 12A.1), with updated road surface types for the 2015 year from Open Street Maps and Google Earth. Access to the nearest city is mainly determined by road infrastructure, and a specific speed limit was assigned to the three road types in our GIS data (asphalt/concrete, gravel, and earth), ranging from 90 kilometers per hour to 10 kilometers per hour. For off-road travel, however, an average walking speed of 5 kilometers per hour is used through various land cover types.

Prior to combining the GIS layers into a friction (or impedance) grid, each layer was assigned the designated speed limit and vector layers, including roads, rivers, and lakes, and were converted into 1-kilometer grid cell raster layers. Slope is also taken into account to model uphill and downhill movement. All input layers are combined into a friction grid using a Python (arcpy) script that runs a "Mosaic to New Raster" function in ArcGIS 10.5.

The travel time raster grid is generated by calculating the travel time from any point within Ethiopia to the nearest city of at least 50,000 people. The Python (arcpy) script used the COSTDISTANCE function, where the friction grid and cities of at least 50,000 people locations are inputs to calculate travel time in minutes from each grid cell to the nearest city. Given the broad assumptions and the quality of data used, the travel time model provides an estimated measure of varying market access across the country.

The travel time computation was summarized differently for the research here from how it was done in Schmidt and Kedir (2009). Schmidt and Kedir (2009) used woreda population and average woreda-level travel time to calculate population by travel time. In contrast, the analysis presented in this chapter classifies each grid cell's travel time values (without averaging cells at woreda level) and accordingly summarizes population values. Examples in Figure 12A.1 and Figure 12A.2 show this difference.

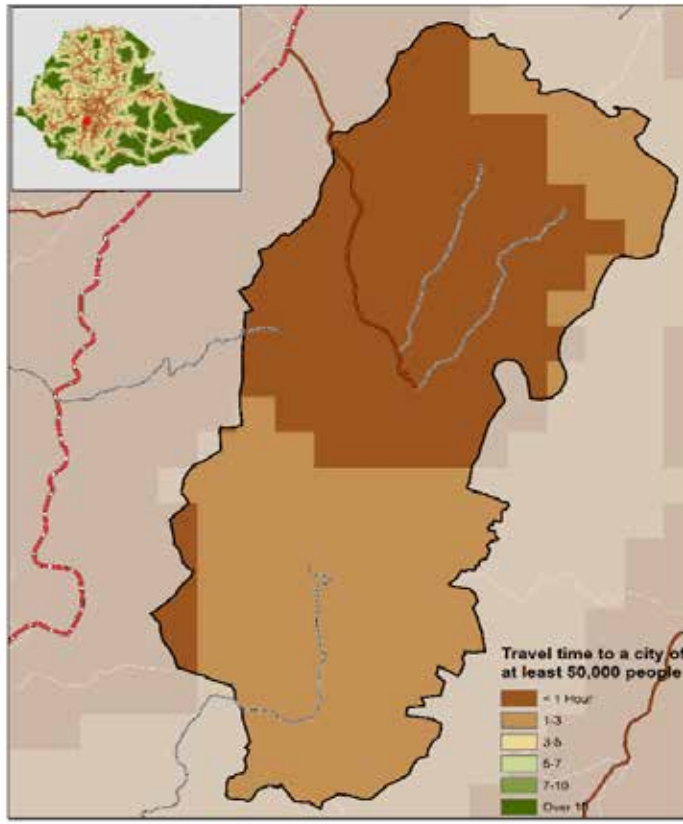
TABLE 12A.1 Estimating travel time to nearest city with population of at least 50,000 in Ethiopia (data sources summary)

Layers	Description
Road network in 2015	The 2007 road network surface updated using Open Street Map and verified on Google Earth.
Cities	Cities/towns of at least 50,000 as reported by CSA population projection report (Ethiopia CSA 2013b).
Landscape features	Slope factor: raster value generated for each cell based on slope rise or run according to van Wagtendonk and Benedict (1980) formula $v = v0e^{-ks}$ where: v = off-road foot-based velocity over sloping terrain $v0$ = the base speed of travel over flat terrain, 5 kilometers per hour in this case s = slope in gradient (meters per meter) k = a factor that defines the effect of slope on travel speed (k is 3.0 in this case) Rivers and lakes: a 1 kilometer per hour traverse speed assigned for both features Land cover: an average of 5 kilometers per hour is used for entire land cover area other than waterbodies.
Population density	GRUMP 2000: The Global Rural-Urban Mapping Project, Version 1 (GRUMPv1) gridded population estimated based on country's census unit and derived density at resolution of 30 arc-second (1 kilometer) grid for the year 2000. GRUMP 2015: Gridded Population of the World, Version 4 (GPWv4) density grid estimated for 2015 using national census and adjusted to UN population projection for 2015. LandScan 2000 and 2012: LandScan spatially models population density by allocating population with respect to land use/land cover, transportation infrastructure, landscape (elevation and slope), and so on.[a] For the research years 1984,1994, and 2007, GRUMP and LandScan 2000 was projected to each year using a 3 percent average annual growth rate. For 2015, LandScan 2012 projected to 2015 using woreda-level annual population growth rate calculated from 2007 census and 2015 projected population.

Source: Authors.

Note: a. The LandScan 2012™ High Resolution Global Population Data Set is copyrighted by UT-Battelle, LLC, operator of Oak Ridge National Laboratory under Contract No. DE-AC05-00OR22725 with the US Department of Energy. See Bright, Rose, and Urban (2012).

FIGURE 12A.1 Travel time to nearest city in Ethiopia calculation methods, Example 1



Previous method: Average travel time grid-cell values in the woreda used to set the entire woreda population into one travel time category. This either underestimates (see example 1) or overestimates (example 2) population within a travel time band.

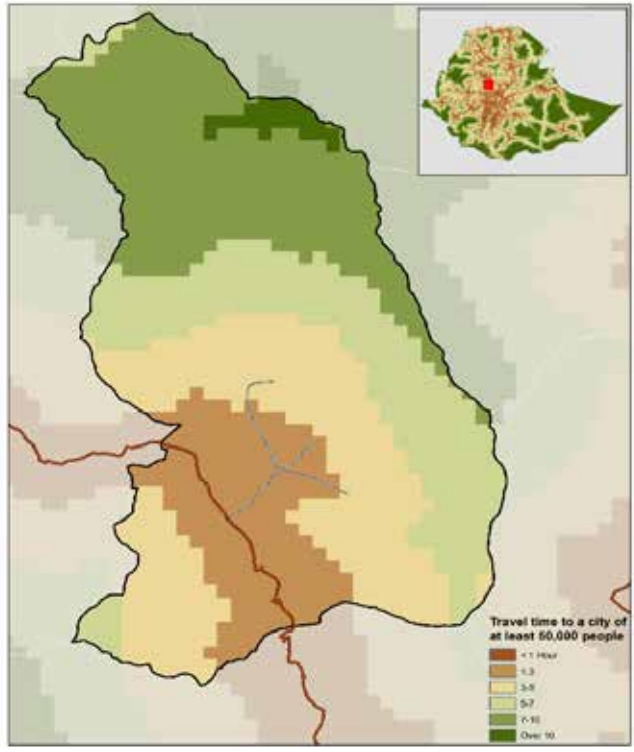
New method: Each travel time grid-cell value is used to summarize the corresponding population grid values.

Example 1: The woreda average travel time to the nearest city is 59 minutes, and therefore the whole woreda population falls under the 1 hour travel time category. The summary from grid population, however, shows 49 percent of the population is under 1 hour and the rest between 1 and 3 hours.

	Percentage of population calculated (%)	
Anigacha woreda	Woreda population	Grid population
Under 1 hour	100	49.5
1–3 hours	0	50.5

Source: Authors' calculations.

FIGURE 12A.2 Travel time to nearest city in Ethiopia calculation methods, Example 2



The average woreda travel time to the nearest city is 5.5 hours. Using the average woreda travel time for the entire woreda population results in 100 percent of the population being within the 5 to 7 hours travel time category.

However, if a gridded population surface is used, only 20 percent of the woreda population is within the 5 to 7 hours category, 53 percent are closer than 5 hours, and 27 percent face a travel time of more than 7 hours to the nearest city.

	Percentage of population calculated (%)	
Abuna Gindebere	Woreda population	Grid population
Under 1 hour	0	0
1–3 hours	0	25
3–5 hours	0	28
5–7 hours	100	20
7–10 hours	0	26
Over 10 hours	0	1

Source: Authors' calculations.

TABLE 12A.2 Travel time to nearest city of at least 50,000 in Ethiopia in 1984, share of population (%)

Region	Less than 1 hour	1–3 hours	3–5 hours	5–10 hours	More than 10 hours
Tigray	2.7	4.1	9.5	45.0	38.6
Afar	0.0	0.3	4.0	22.2	73.6
Amhara	3.7	8.8	13.9	37.1	36.5
Oromia	2.3	10.0	13.6	40.1	34.0
Somali	0.3	1.5	5.3	11.4	81.5
Benishangul-Gumuz	0.0	0.0	0.0	4.8	95.2
SNNP	0.0	0.4	4.2	50.4	45.0
Gambella	0.0	0.0	0.0	35.0	65.0
Harari	45.3	44.9	8.6	1.3	0.0
Addis Ababa	57.5	41.3	1.2	0.0	0.0
Dire Dawa	17.1	52.7	14.6	11.3	4.3
Ethiopia	**4.4**	**8.2**	**10.2**	**37.4**	**39.7**

Source: Authors' calculations.

Note: SNNP = Southern Nations, Nationalities, and Peoples.

TABLE 12A.3 Travel time to nearest city of at least 50,000 in Ethiopia in 1994, share of population (%)

Region	Less than 1 hour	1–3 hours	3–5 hours	5–10 hours	More than 10 hours
Tigray	5.3	10.9	17.6	37.6	28.6
Afar	0.0	1.8	4.3	31.0	63.0
Amhara	5.8	13.8	17.2	36.2	26.9
Oromia	6.2	16.0	15.7	33.9	28.2
Somali	2.9	4.7	5.1	13.7	73.6
Benishangul-Gumuz	0.0	0.0	1.6	16.0	82.4
SNNP	2.6	18.1	24.1	34.4	20.8
Gambella	0.0	0.0	0.0	16.4	83.6
Harari	84.0	14.1	2.0	0.0	0.0
Addis Ababa	91.1	8.9	0.0	0.0	0.0
Dire Dawa	57.1	11.7	12.5	15.7	3.1
Ethiopia	**8.7**	**14.0**	**16.1**	**31.9**	**29.3**

Source: Authors' calculations.

Note: SNNP = Southern Nations, Nationalities, and Peoples.

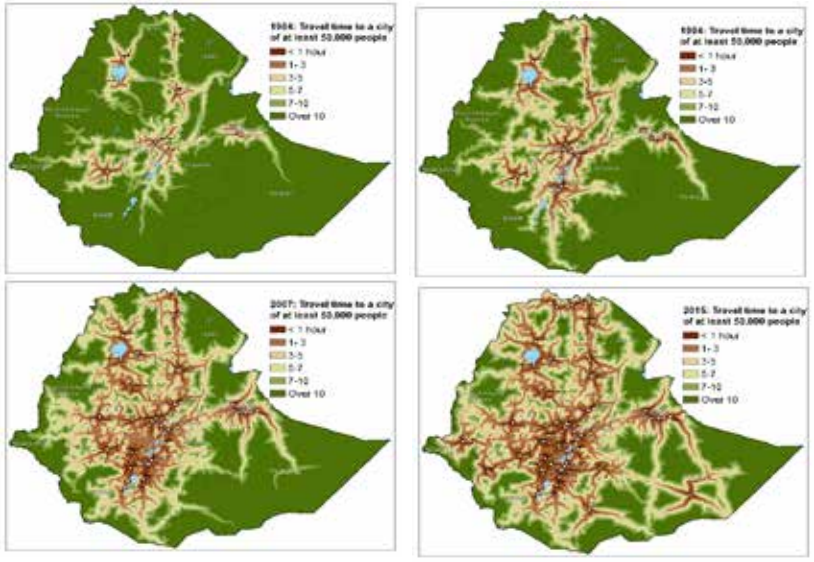
TABLE 12A.4 Travel time to nearest city of at least 50,000 in Ethiopia in 2007, share of population (%)

Region	Less than 1 hour	1–3 hours	3–5 hours	5–10 hours	More than 10 hours
Tigray	10.0	15.9	28.0	33.8	12.3
Afar	0.0	3.5	14.3	38.2	44.1
Amhara	9.3	31.4	26.8	27.0	5.6
Oromia	11.8	28.6	24.5	28.3	6.8
Somali	3.3	5.5	5.9	19.1	66.3
Benishangul-Gumuz	0.0	1.9	8.1	28.1	62.0
SNNP	24.1	42.9	14.5	14.3	4.2
Gambella	0.0	0.0	0.0	14.4	85.6
Harari	85.3	11.5	3.2	0.0	0.0
Addis Ababa	91.9	8.1	0.0	0.0	0.0
Dire Dawa	62.3	20.3	11.1	6.3	0.0
Ethiopia	**16.2**	**28.3**	**20.8**	**23.9**	**10.8**

Source: Authors' calculations.

Note: SNNP = Southern Nations, Nationalities, and Peoples.

FIGURE 12A.3 Maps of travel time to nearest city in Ethiopia of at least 50,000 in 1984, 1994, 2007, and 2015



Source: Agglomeration index estimations.

Agglomeration Index

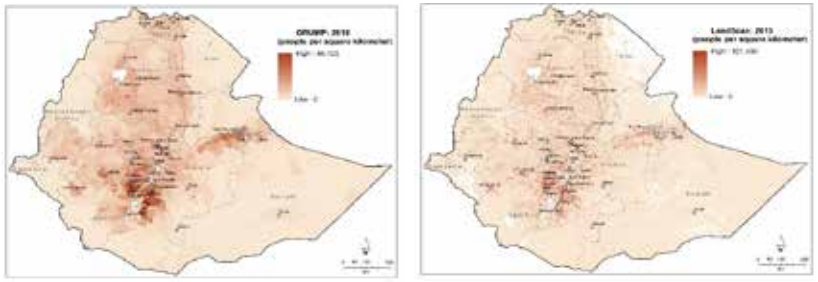
Agglomerated areas are places characterized by relatively large population concentrations with economic interactions (Lemelin, Rubiera-Morollón, and Gómez-Loscos 2016). For countries like Ethiopia where urbanization is relatively low, we classify agglomerated areas as those with a population density above 150 persons per square kilometer and within one-hour travel time from an urban center of at least 50,000 people (Schmidt and Kedir 2009). Accordingly, all areas that fall above the minimum population density (150 people per square kilometer) and under the maximum travel time to an urban center (one hour) are considered an agglomerated area, even if the area transcends the defined urban administrative boundary. The shape of city growth follows the pattern of infrastructure, which may also be hindered by natural physical barriers. The agglomeration index measurement requires travel time and demographic datasets of population density.

The agglomeration index generated for this analysis was built by Schmidt and Kedir (2009) for three consecutive census years (1984, 1994, 2007) using projected average gridded population density of 1-kilometer resolution from the Global Rural and Urban Mapping Project (GRUMP) as well as from LandScan (Figure 12A.4). Given that the underlying population distribution models for GRUMP and LandScan differ and each has pros and cons in how the population is spatially allocated, we average the two datasets for this analysis to better capture the true pattern of population distribution in Ethiopia (Figure 12A.5).[18]

For the three index (census) years 1984, 1994, and 2007, Schmidt and Kedir (2009) adjust the GRUMP and LandScan grids from 2000 with a 3 percent per year growth rate. For the 2015 projection year, unlike the previous analysis, we use LandScan 2012 gridded data and project the population to 2015 by a growth rate calculated from the 2007 census (Ethiopia, CSA 2007) and the 2015 projected population figure (Ethiopia, CSA 2013b). The woreda-level growth rate was then applied to each grid that was located within each woreda boundary (Figures 12A.4 and 12A.5). Areas that met the criteria set to define agglomerated area with a population density of at least 150 persons per square kilometer and less than 1 hour to the nearest city with 50,000 or more people were identified using the Python (arcpy) script using the CON function of ArcGIS 10.5.

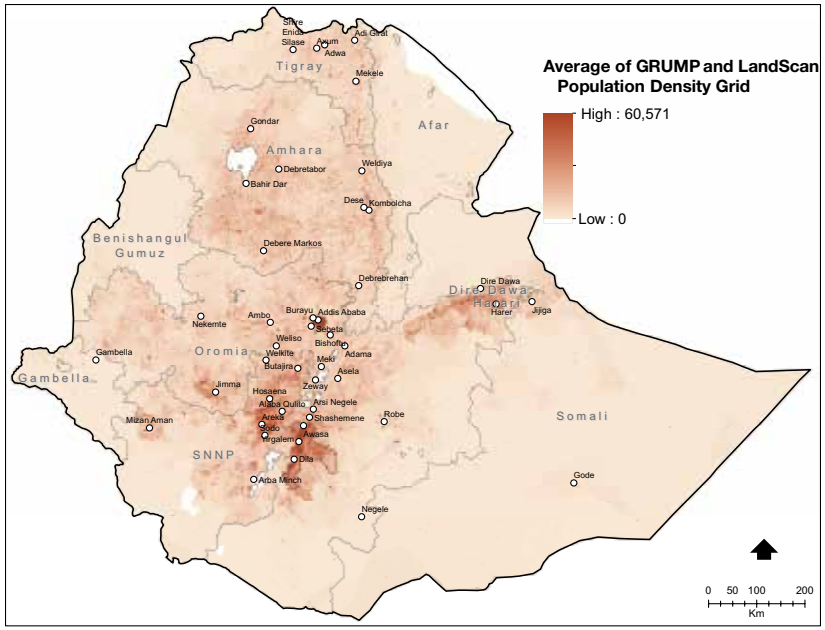
18 GRUMP data spatially allocates population based on the census population at the lowest available administrative unit, whereas LandScan data uses roads, land cover, slopes, and other terrain features to model population density across geographic space.

FIGURE 12A.4 GRUMP and LandScan population density grids for Ethiopia, 2015



Source: Authors' calculations.

FIGURE 12A.5 Average of GRUMP and LandScan population density grids for Ethiopia, 2015



Source: Authors' calculations.

Appendix 12B: Population Projections for Ethiopia

TABLE 12B.1 Population figures and projections for selected urban centers in Ethiopia, 1984–2035

	Census			Projection		
Urban center	May 1984	October 1994	May 2007	July 2015	2025	2035
Addis Ababa	1,412,600	2,112,700	2,739,600	3,273,000	4,561,149	5,810,263
Adama (Nazret)	76,300	127,800	220,200	324,000	856,789	1,880,020
Gondar	80,900	112,200	207,000	323,900	856,525	1,879,440
Mek'ele	61,600	96,900	215,900	323,700	855,996	1,878,280
Hawassa	36,200	69,200	157,100	300,100	793,588	1,741,340
Dire Dawa	98,100	164,900	233,200	277,000	732,502	1,607,301
Bahir Dar	54,800	96,100	155,400	243,300	643,385	1,411,756
Dessie	68,800	97,300	120,100	187,900	496,885	1,090,296
Jimma	61,000	88,900	121,000	177,900	470,441	1,032,270
Jijiga	23,200	56,800	125,900	159,300	421,255	924,343
Shashemene	31,500	52,100	100,500	147,800	390,844	857,614
Bishoftu (Debre Zeit)	51,100	73,400	99,900	147,100	388,993	853,552
Sodo	24,600	36,300	76,100	145,100	383,704	841,947
Arba Minch	23,000	40,000	74,900	142,900	377,886	829,182
Hosaena	15,200	31,700	70,000	133,800	353,822	776,379
Harari	62,200	76,400	99,400	129,000	341,129	748,527
Dila	23,900	33,700	59,200	112,900	298,554	655,106
Nekemte	28,800	47,300	75,200	110,600	292,578	641,992
Debre Birhan	25,800	38,700	65,200	102,100	269,994	592,438
Total population for centers with population 50,000 to 100,000 (thousands)[a]	337	650	1,139	1,782	3,284	5,593
Total population for centers with population 100,000 to 500,000 (thousands)[a]	847	1,340	2,276	3,488	9,225	20,242
Addis Ababa (thousands)	1,413	2,113	2,740	3,273	4,561	5,810
Total urban (thousands)	**4,869**	**7,385**	**11,863**	**17,459**	**31,072**	**52,574**

(continued)

TABLE 12B.1 Continued

Urban center	Census			Projection		
	May 1984	October 1994	May 2007	July 2015	2025	2035
Population growth from last census (%)						
For centers with population 50,000 to 100,000 (thousands)[a]	n.a.	6.77	4.41	5.76	6.31	5.47
For centers with population 100,000 to 500,000 (thousands)[a]	n.a.	4.69	4.16	5.48	10.21	8.18
Addis Ababa	n.a.	4.11	2.02	2.25	3.37	2.45
Total urban	n.a.	**4.25**	**3.71**	**4.95**	**5.40**	**5.40**

Source: CSA population and housing census of 1984, 1994, 2007, and 2015 (Ethiopia, CSA 1991, 1996, 2010, and 2013b); EGIS International (2016); World Bank (2015); and authors' calculations using growth rates from EGIS national urban system study report projections, and a growth rate of 5.4 percent for the total urban population projection from the World Bank (2015) for years 2012 and forward.

Note: n.a. = not applicable.

a. City size categories are defined in terms of 2015 population using CSA urban population projections regardless of population size in years prior to or following 2015.

TABLE 12B.2 Urban population projections for Ethiopia, 2025 and 2035

	City size categories, by 2015 population				
	20,000–50,000[a]	50,000–100,000	100,000–500,000	Addis Ababa	Greater than 50,000
Cities (number)	95	26	18	1	45
1994 total urban population	1,168	650	1,340	2,113	4,102
2007 total urban population	1,901	1,139	2,276	2,740	6,154
2015 total urban population	**2,982**	**1,782**	**3,488**	**3,273**	**8,543**
Annual change, 1994–2007 (%)	3.82	4.41	4.16	2.02	3.17
Annual change, 2007–2015 (%)	5.79	5.76	5.48	2.25	4.18
Projected 2025 total urban population	5,531	3,284	9,225	4,561	16,709
Projected 2035 total urban population	9,792	5,593	20,242	5,810	30,487
Annual change 2015–2025 (%)[b]	6.37	6.31	10.21	3.37	6.94
Annual change 2025–2035 (%)[b]	5.88	5.47	8.18	2.45	6.20

Source: CSA population and housing census of 1994, 2007, and 2015 (Ethiopia, CSA 1996, 2010, and 2013b); EGIS International (2016); and authors' calculations.

Note: a. City size categories are defined in terms of 2015 population (using CSA urban population projections) regardless of population sizes in years prior to or following 2015.

b. Growth rates derived from the EGIS national urban system study report projections (EGIS International 2016).

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