PART 2

# Evolving Markets and Household Consumption

Chapter 7

# EVOLVING FOOD VALUE CHAINS

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## Introduction

When food value chains and agricultural markets transform, they tend to go through fairly typical stages (Reardon et al. 2019; Reardon and Timmer 2014; Reardon and Minten forthcoming). In the *traditional* system, farmers are mostly focused on producing for own consumption. The urban share of the population is low and supply chains are mainly short and local, serving own consumption, local villages, and nearby towns. In the *transitional* system, markets become more important. Value chains extend spatially because of growing demand from cities and an expansion in the catchment areas for merchants (Braudel 1982). Emergence of public standards of quality are observed, but spot market relations are still dominant. In the *modern* system, value chains are spatially extensive, but there is disintermediation and consolidation in various segments—such as in retail markets that are characterized by the dominance of supermarkets. Private quality and safety standards, contracts, and capital intensification are widespread in this stage. A synthesis of the features of the food economy and of the food economy's structure and conduct in these three different stages of food value chains (FVC) transformation is shown in Table 7.1.

This chapter looks at the evolving food value chains in Ethiopia. Driven by population growth, improved connectivity, higher incomes, urbanization, and consequent diet change, we see a food and agricultural system that is rapidly transforming. Guided by the framework of Timmer (2014), we assess recent evidence regarding dietary, agricultural, and supply chain transformation. For this assessment we rely on a literature review as well as on an analysis of secondary data. We speculate on expected future developments based on simple assumptions of income growth, urbanization, and population growth and by benchmarking Ethiopia with other countries with lower and higher GDP levels—economic growth has been shown to be an important associate of change in food value chains (Timmer 2014).

**TABLE 7.1** Characteristics of the various stages of food value chains (FVC) in Ethiopia

| Indicator | Traditional FVC | Transitional FVC | Modern FVC |
|---|---|---|---|
| **Features of food economy** | | | |
| Urban share in food market | Low | Medium | High |
| Share of grains and staples | High | Medium | Low |
| Seasonality | High | Medium | Low |
| Food service sector | Small | Modest | Large |
| Reach FVC | Local | National | Global |
| Dominant product cycle | Local niche | National commodity | Differentiated product |
| **Structure** | | | |
| Spatial length FVC | Short | Long | Long |
| Intermediation length FVC | Short | Long | Short |
| Value addition | Low | Medium | Large |
| Concentration | Moderate | Low (large number of Small and Medium Enterprises) | High (private large-scale food industry firms) |
| **Conduct** | | | |
| Quality differentiation | Low | Low | High |
| Quality and safety standards | Few | Public | Private |
| Technologies | Labor-intensive | Labor-intensive | Capital-intensive |
| Contracts | Spot markets only | Spot markets dominate; emergence contracts | Spot markets small; contracts dominate |

**Source:** Reardon and Minten (Forthcoming).

Following the definition of Reardon et al. (2019) and acknowledging it is hard to put a food economy in one system based on all indicators, we are seeing in Ethiopia the start of a change from the traditional to a transitional system.[1] First, we see dietary transformation with higher consumption levels and better food security; the relative share of cereals in food baskets declining and those of high-value products, such as animal-sourced foods and fruits and vegetables, rising; an emergence of processed and convenience foods in markets; and greater out-of-home consumption. Second, we note changes in supply chains with more reliance on markets by consumers; better integrated markets; smaller spatial and seasonal price margins; and an increase in prices of noncereals. While food imports and the number of food aid beneficiaries in Ethiopia are not coming down, we find that Ethiopia was a net importer of agricultural products in value terms only in one of the past ten years.

At the agricultural production level, we note processes of intensification and modernization. We see changes in the characteristics of smallholder (with less than 25 hectares of land) farms and farmers—declining average farm sizes, increasing average age of farmers (head of households), and younger farmers being more reliant on rental markets to access the land they require.

1 Grain, pulses, and horticultural trade has existed for a while in Ethiopia as has international trade, especially of coffee.

We further see an increasing role of bigger commercial farmers (larger than 25 hectares) with at least 1.3 million hectares leased out to them. Although only 1 million hectares was effectively cultivated in 2013 (Ali, Deininger, and Harris 2017)—representing about 5 percent of all cultivated land in Ethiopia—it has been estimated that the area cultivated by them doubled over an eight-year period (Ethiopia, CSA 2015). However, Ali, Deininger, and Harris (2017) indicate their growth is slowing as the number of new licenses given out peaked in 2007/2008, and an increasing number of these farms are abandoning agriculture altogether (Fikade 2018). Furthermore, these commercial farms are mostly focused on export crops, and few spillovers have been noted for small farmers (Ali, Deininger, and Harris 2019).

While structural transformation of Ethiopia's economy is still at an early stage as seen by the continuing high share of employment in agriculture, food value chains are expected to continue to transform rapidly given similar dynamics going forward. This will have enormous implications for the required growth, functions, and efficiency of private-led agricultural input supply, logistics, and trading sectors.

This chapter describes the data used in the analysis, looks at contextual changes in Ethiopia, assesses dietary transformation, and examines agricultural and supply-chain transformations. We then discuss the current state of structural transformation of Ethiopia's economy and speculate on likely upcoming changes in Ethiopia's food value chains, focusing on agriculture, dietary, and supply chains. We finish with conclusions.

## Data

Diverse datasets are used in this analysis. First, for the consumption analysis we use nationally representative Household Income, Consumption, and Expenditure Surveys (HICES) conducted by the Central Statistical Agency (CSA) of Ethiopia.[2] These surveys were administered in 1995/1996, 1999/2000, 2004/2005, and 2010/2011. The HICES are repeated cross-sectional surveys that serve as the official source for poverty statistics in Ethiopia (Ethiopia, MoFED 2012). The sampling was done by stratifying the country into rural and urban areas. After that, enumeration areas were selected using a probability proportional to size approach where more populated units had a higher

2 The World Bank changed the name of these surveys to "Household Consumption Expenditures Surveys," which would be the official name of the 2011 and 2016 surveys. For simplicity, however, we refer to "HICES" whenever referring to these surveys.

probability of being selected into the final sample. Sampling weights provided by the CSA, which are based on selection probabilities, are used to compute representative estimates for rural and urban areas of the country.

Second, we use data collected by the CSA in its annual Agricultural Sample Survey (AgSS) of agricultural households. The data covers the main agricultural season (*meher*) for the period 2004/2005–2015/2016 and pertain to smallholder farmers—those farming less than 25 hectares—that dominate agricultural land use in Ethiopia. During the period covered in this study, the sampling frame of the AgSS included the entire rural parts of the country except for the nonsedentary population of three zones in Afar and six zones in Somali regions (Ethiopia, CSA 2018). We use these data to conduct descriptive analyses of trends in smallholder landholdings in Ethiopia.

Third, the Ethiopian Grain Trading Enterprise (EGTE), a grain procurement arm of the government, gathers prices of cereals in a number of major wholesale markets in the country. Prices are collected during the early morning, late morning, and afternoon on major market days, with simple averages of these prices over the course of a month being reported as monthly prices. The prices are collected by noting prices from observed transactions. Wholesale prices at 12 selected markets are made available publicly. These price data are used in the analysis. We rely on the national Consumer Price Index (CPI) as constructed by the CSA to deflate prices.

Fourth, import data were obtained from the Ethiopian Revenues and Customs Authority or downloaded from the United Nations's Comtrade website. We also rely for some data on the National Bank of Ethiopia (NBE 2018), the Ethiopian Road Authority, the World Bank, FAOSTAT (the Food and Agriculture Organization Statistics in the United Nations Corporate Statistical Database), the Ethiopian Meat and Dairy Institute, and the Ministry of Trade.

## Contextual Changes

A number of changes in Ethiopia's economy are resulting in significant dynamism in its agricultural and food markets. We discuss three major factors: infrastructure development, population growth and urbanization, and income growth.

First, Ethiopia has invested heavily in road network development over the past two decades. It is estimated that the length of asphalted roads expanded fourfold over the past 15 years from 3,900 kilometers in 2000–2001 to 15,900 kilometers in 2016–2017 (NBE 2018). However, investments in rural roads

were important as well. Data from the Ethiopian Roads Authority indicates that the length of gravel roads in Ethiopia increased from 22,900 kilometers in 2007 to 62,100 kilometers in 2015, while the length of asphalted roads increased from 4,800 kilometers to 15,400 kilometers over the same period. As a result of these and earlier massive investments in roads, travel times to major cities throughout Ethiopia have been greatly reduced (see Chapter 12). Second, the population of Ethiopia is rapidly growing. Since 2000, a population equivalent to that of Canada has been added to the country. The rural population grew by approximately 27 million people between 2000 and 2017. Over the same period, the urban population increased by approximately 11.5 million. While the rural areas are rapidly growing, cities are growing even more rapidly. In 2017, 20 percent of the Ethiopian population was living in cities (World Bank 2017b; see Chapter 12).

Third, Ethiopia has been one of the fastest growing economies in the world over the past decade—an impressive feat for a low-income African country that exports relatively few natural resources. Average annual GDP growth over the decade 2007/2008 to 2016/2017 was estimated at 10 percent (NBE 2018). Agriculture was a main contributor to that growth. While national official data show that real agricultural output growth was lower than overall GDP growth, it still grew on average by 6.3 percent per year over the same decade. This growth in agriculture, and especially in cereal production, has been a major contributor to the important reductions in poverty observed in the past decade (World Bank 2014).

## Dietary Transformation

We study consumption patterns and their changes over time using four rounds of the HICES dataset, covering the period from 1996 through 2011. To ensure comparability over time, expenditures are deflated using the national Consumer Price Index (CPI) and values are expressed in constant 1996 birr.[3] Quantities consumed per adult equivalent were calculated as well. We use as our preferred measure calories per adult equivalent, following the conversion factors suggested by CSA (Ethiopia, CSA 2012b). As the focus of our analysis in this chapter is on dynamics, the advantage of using adult equivalents is that changes over time reflect effective changes in consumption patterns instead of changes in household demographics. The results of this exercise, presented in

3 The exchange rate was 6.3 birr per US dollar in 1996, as per the National Bank of Ethiopia (www.nbebank.com/pdf/monthlymacroeconomic/January%202007.pdf).

**TABLE 7.2** Food consumption and real per adult equivalent expenditure in Ethiopia, 1996–2011

| | 1996 | | 2000 | | 2005 | | 2011 | |
|---|---|---|---|---|---|---|---|---|
| Category | Birr | Share (%) | Birr | Share (%) | Birr | Share (%) | Birr | Share (%) |
| **Real expenditures (birr per adult equivalent per year)** | | | | | | | | |
| Food | | | | | | | | |
| Teff | 85 | 11.6 | 96 | 12.6 | 72 | 8.9 | 69 | 7.5 |
| Wheat | 53 | 7.2 | 66 | 8.7 | 71 | 8.9 | 68 | 7.4 |
| Barley | 34 | 4.7 | 29 | 3.8 | 35 | 4.4 | 22 | 2.4 |
| Maize | 74 | 10.1 | 82 | 10.8 | 69 | 8.6 | 71 | 7.7 |
| Sorghum | 52 | 7.1 | 46 | 6.1 | 65 | 8.1 | 46 | 5.0 |
| Other cereals | 22 | 3.0 | 24 | 3.2 | 13 | 1.7 | 13 | 1.4 |
| Processed cereals | 15 | 2.1 | 15 | 2.0 | 26 | 3.2 | 42 | 4.6 |
| All cereals | 337 | 45.7 | 357 | 47.1 | 351 | 43.8 | 333 | 36.0 |
| Pulses | 56 | 7.6 | 75 | 9.9 | 62 | 7.7 | 88 | 9.5 |
| Oilseeds | 2 | 0.3 | 2 | 0.3 | 2 | 0.2 | 1 | 0.2 |
| Animal products | 56 | 7.5 | 60 | 7.9 | 70 | 8.7 | 100 | 10.8 |
| Oil and fat | 34 | 4.6 | 27 | 3.6 | 31 | 3.9 | 61 | 6.6 |
| Vegetables and fruits | 28 | 3.7 | 34 | 4.5 | 37 | 4.6 | 59 | 6.4 |
| Pepper | 36 | 4.9 | 30 | 4.0 | 21 | 2.6 | 61 | 6.6 |
| Enset/kocho | 38 | 5.1 | 57 | 7.5 | 36 | 4.4 | 39 | 4.2 |
| Coffee/tea/chat | 72 | 9.8 | 52 | 6.9 | 62 | 7.7 | 84 | 9.1 |
| Root crops | 19 | 2.6 | 26 | 3.4 | 25 | 3.1 | 16 | 1.8 |
| Sugar and salt | 18 | 2.5 | 15 | 2.0 | 15 | 1.9 | 25 | 2.7 |
| Other foods | 42 | 5.7 | 23 | 3.0 | 90 | 11.3 | 57 | 6.2 |
| *Total food* | *739* | *100.0* | *759* | *100.0* | *802* | *100.0* | *925* | *100.0* |
| **Food/nonfood** | | | | | | | | |
| Food | 739 | 59.6 | 759 | 63.6 | 802 | 54.1 | 925 | 47.9 |
| Nonfood | 502 | 40.4 | 434 | 36.4 | 681 | 45.9 | 1,005 | 52.1 |
| *Total* | *1,240* | *100.0* | *1,193* | *100.0* | *1,483* | *100.0* | *1,930* | *100.0* |

Table 7.2, illustrate a number of interesting findings (see Worku et al. [2017] for more details).

The share of nonfood items in the total consumption basket increased substantially over time, especially since 2000. In 2000 the share of nonfood consumption expenditures accounted for 36 percent of the total. Over the following decade, this type of expenditure grew to 52 percent by 2011. Such rapid increases of nonfood expenditures, outstripping increases in food

| Consumption (kilogram per adult equivalent per year) | 1996 | | 2000 | | 2005 | | 2011 | |
|---|---|---|---|---|---|---|---|---|
| | Kilo-grams | Share (%) | Kilo-grams | Share (%) | Kilo-grams | Share (%) | Kilo-grams | Share (%) |
| Teff | 31 | 10.6 | 38 | 10.0 | 32 | 8.0 | 33 | 7.3 |
| Wheat | 25 | 8.7 | 32 | 8.4 | 37 | 9.1 | 31 | 6.9 |
| Barley | 17 | 5.9 | 12 | 3.3 | 16 | 3.9 | 12 | 2.7 |
| Maize | 41 | 14.0 | 47 | 12.5 | 47 | 11.6 | 63 | 14.2 |
| Sorghum | 20 | 7.1 | 28 | 7.5 | 40 | 9.9 | 35 | 7.8 |
| Other cereals | 10 | 3.4 | 17 | 4.5 | 7 | 1.6 | 9 | 2.0 |
| Processed cereals | 5 | 1.9 | 6 | 1.6 | 8 | 2.0 | 9 | 2.0 |
| All cereals | 149 | 51.7 | 180 | 47.8 | 187 | 46.2 | 192 | 43.0 |
| Pulses | 23 | 8.1 | 21 | 5.6 | 21 | 5.1 | 22 | 5.0 |
| Oilseeds | 1 | 0.3 | 1 | 0.1 | 0 | 0.1 | 0 | 0.1 |
| Animal products | 17 | 6.0 | 16 | 4.2 | 18 | 4.6 | 21 | 4.6 |
| Oil and fat | 2 | 0.8 | 2 | 0.5 | 3 | 0.7 | 5 | 1.2 |
| Vegetables and fruits | 31 | 10.9 | 37 | 9.7 | 42 | 10.5 | 45 | 10.0 |
| Pepper | 3 | 1.2 | 2 | 0.6 | 2 | 0.6 | 5 | 1.2 |
| Enset/kocho | 13 | 4.6 | 71 | 18.8 | 52 | 12.8 | 58 | 13.0 |
| Coffee/tea/chat | 10 | 3.6 | 10 | 2.6 | 10 | 2.5 | 15 | 3.4 |
| Root crops | 15 | 5.3 | 28 | 7.4 | 34 | 8.3 | 30 | 6.7 |
| Sugar and salt | 8 | 2.7 | 6 | 1.7 | 7 | 1.7 | 10 | 2.1 |
| Other foods | 14 | 4.8 | 4 | 1.0 | 28 | 7.0 | 43 | 9.7 |
| *Total food* | *288* | *100.0* | *376* | *100.0* | *404* | *100.0* | *447* | *100.0* |

**Source:** Ethiopia, CSA 1996, 2000, 2005, and 2011; also cited in Worku et al. (2017).
**Note:** Exchange rate in 1996 was approximately 6.4 birr per US$.

expenditures, are typical of transforming economies and indicate significant improvements in welfare in the country (World Bank 2014; Ethiopia, MoFED 2012).

An important increase in the total quantity of food consumed per capita equivalent is seen at the bottom of Table 7.2. HICES data show that consumption increased from 288 kilograms per capita equivalent per year in 1996 to 447 kilograms in 2011, an increase of 55 percent. The quantities of cereals consumed have shown much less growth, especially in the past 10 years. Consumption of cereals grew from 180 kilograms per capita equivalent in 2000 to 192 kilograms per capita equivalent in 2011, an increase of 7 percent. Moreover, expenditures on food have grown in real terms in the last two surveys conducted compared to 2000. Per capita equivalent food expenditures in 2011 were 22 percent higher than in 2000.

Some notable shifts are seen within the food basket. Overall, the share of cereals in total food expenditures is declining. While the share made up 47 percent of expenditures in 2000, this declined to 36 percent 10 years later. Most growth in the noncereal food categories was recorded in the "other food" category that grew from 3.0 percent in 2000 to 6.2 percent in 2011. There also is seen a growing importance of animal-sourced foods in the food basket over time. Although the share is still relatively low (see Humphries et al. [2014] for a comparison with Peru), it has grown from about 7.5 percent in 1996 to 10.8 percent in 2010. These patterns are a reflection of Bennett's law that describes a relative decline in starchy staples and an increase in animal proteins with income (Bennett 1941). While rural—and to a lesser extent urban—Ethiopia is generally characterized by a lack of diverse diets, which are associated with poor nutritional outcomes (Headey 2014), this seems to be changing over time, albeit slowly.

Cereal expenditures make up 36 percent of the total national consumption basket, but they make up 43 percent of the quantity consumed in 2011. This indicates that the relative cost of cereals is declining. In contrast, animal products constitute 10.8 percent of expenditures and 4.6 percent of the quantities consumed. These animal products are the most expensive items in the consumption basket. On the opposite side of the price spectrum, root crops are a relatively cheap food category in the consumption basket.

Table 7.3 illustrates differences in consumption patterns between rural and urban areas using the 2011 HICES dataset. Average per capita equivalent expenditures are significantly higher in urban areas than in rural ones, and the share of nonfood expenditures is also significantly higher in urban areas (61.8 percent) than in rural areas (48.1 percent). Compared to rural areas, urban food expenditures are relatively higher: rural food consumption expenditures are only two-thirds of the urban food expenditures at 863 birr versus 1,219 birr, respectively. Although food expenditures are significantly higher in urban areas, the actual quantities consumed are lower—462 kilograms in rural areas versus 376 kilograms in urban areas. This is due to the higher prices paid in urban areas for food, but also possibly because of lower calorie requirements in these urban settings (Deaton and Drèze 2009).

Interestingly, there are almost no differences in the share of cereals in total food expenditures between urban and rural areas, and the quantities consumed of cereals are also at similar levels. However, consumption of animal products is substantially higher in urban areas. Within the cereal category, however, consumption patterns differ significantly. Rural households consume significantly more sorghum (40 kilograms versus 14 kilograms in urban

**TABLE 7.3** Per adult equivalent expenditures and food consumption in Ethiopia in 2011, urban versus rural

| | Real expenditures by food group (birr/adult equivalent/year) | | | | Consumption by food group (kg/adult equivalent/year) | | | |
|---|---|---|---|---|---|---|---|---|
| | Rural | | Urban | | Rural | | Urban | |
| Category | Birr | Share (%) | Birr | Share (%) | Kilo-grams | Share (%) | Kilo-grams | Share (%) |
| **Food** | | | | | | | | |
| Teff | 51 | 6.0 | 153 | 12.6 | 25 | 5.4 | 69 | 18.4 |
| Wheat | 59 | 6.8 | 113 | 9.3 | 29 | 6.2 | 41 | 10.9 |
| Barley | 25 | 2.9 | 10 | 0.8 | 14 | 3.0 | 4 | 1.1 |
| Maize | 80 | 9.3 | 30 | 2.4 | 72 | 15.7 | 22 | 5.8 |
| Sorghum | 52 | 6.0 | 18 | 1.5 | 40 | 8.6 | 14 | 3.6 |
| Other cereals | 14 | 1.6 | 11 | 0.9 | 10 | 2.2 | 4 | 1.0 |
| Processed cereals | 28 | 3.3 | 109 | 8.9 | 5 | 1.1 | 26 | 7.0 |
| All cereals | 309 | 35.8 | 445 | 36.5 | 195 | 42.2 | 180 | 47.9 |
| Pulses | 84 | 9.8 | 105 | 8.6 | 23 | 4.9 | 21 | 5.6 |
| Oilseeds | 2 | 0.2 | 1 | 0.1 | 0 | 0.1 | 0 | 0.1 |
| Animal products | 84 | 9.8 | 175 | 14.3 | 20 | 4.4 | 23 | 6.1 |
| Oil and fat | 51 | 5.9 | 110 | 9.0 | 4 | 0.8 | 11 | 2.9 |
| Vegetables and fruits | 51 | 5.9 | 99 | 8.1 | 42 | 9.2 | 56 | 14.8 |
| Pepper | 59 | 6.8 | 73 | 6.0 | 5 | 1.1 | 6 | 1.6 |
| Enset/kocho | 45 | 5.3 | 7 | 0.6 | 69 | 14.9 | 8 | 2.0 |
| Coffee/tea/chat | 85 | 9.9 | 78 | 6.4 | 16 | 3.6 | 10 | 2.5 |
| Root crops | 16 | 1.9 | 17 | 1.4 | 32 | 7.0 | 19 | 5.1 |
| Sugar and salt | 21 | 2.4 | 44 | 3.6 | 9 | 1.9 | 13 | 3.5 |
| Other foods | 55 | 6.4 | 67 | 5.5 | 46 | 10.0 | 30 | 7.9 |
| *Total food* | *863* | *100.0* | *1,219* | *100.0* | *462* | *100.0* | *376* | *100.0* |
| **Food/nonfood** | | | | | | | | |
| Food | 863 | 51.9 | 1,219 | 38.2 | n.a. | n.a. | n.a. | n.a. |
| Nonfood | 799 | 48.1 | 1,975 | 61.8 | n.a. | n.a. | n.a. | n.a. |
| *Total* | *1,662* | *100.0* | *3,194* | *100.0* | n.a. | n.a. | n.a. | n.a. |

**Source:** Worku et al. (2017).

**Note:** n.a. = not applicable.

households) and maize (72 kilograms versus 22 kilograms). In contrast, the share of teff in the urban food consumption basket is significantly higher than in rural areas—more than three times as high. Urban residents consume relatively more expensive cereals, such as teff, than do rural ones (Worku et al. 2017). Overall, we see a substantially different diet in urban households than in rural ones. This implies that national food value chains will likely change in important ways in the future with an increase in the share of Ethiopia's population residing in urban areas and the changing food preferences accompanying that demographic shift.

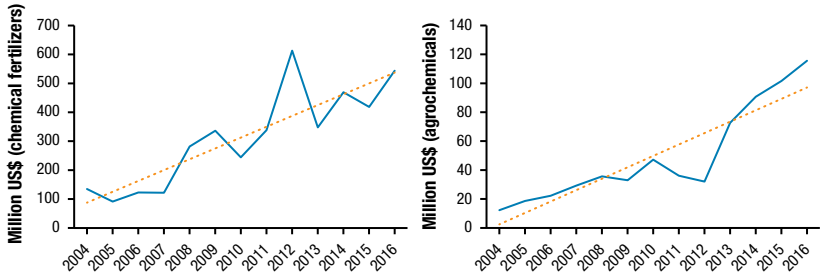
## Agricultural Transformation

CSA official statistics show that grain production doubled from 13.4 million metric tons in 2005/2006 to 27.0 million metric tons in 2014/2015. Bachewe et al. (2018) triangulate these numbers and assess some of the drivers for that change. They find that there has indeed been substantial growth in agricultural production in Ethiopia, driven by increasing land expansion but even more so by increasing yields. These increasing yields have been achieved through improved total factor productivity but also by increasing use of modern inputs. They argue that this modernization and intensification process in agriculture was driven by expanded availability of agricultural extension agents, improved market access, better price incentives, and improvements in education levels of farmers.

This process of intensification and modernization of agricultural production has continued in more recent years. Figure 7.1 illustrates to what extent imports of chemical fertilizers and agrochemicals have changed over the past decade. The figure shows that imports of such modern inputs more than quadrupled since 2004. While some of these agrochemicals are used in large commercial farms (especially the commercial large-scale flower farms that have quickly taken off in the past decade), there is also increasing uptake by smallholder farmers. For example, Tamru et al. (2017) show herbicides-applied cereals area, mostly by smallholders, doubled during 2004–2014 to more than a quarter of the cereal area in the country. One of the changes that typically happens during this agricultural transformation process is the increasing use of machines in agriculture. This is discussed in more detail in Chapter 3.

We also note some important changes in agricultural production, although it remains largely a smallholder economy. For example, Taffesse (2019) shows, pooling data from the annual agricultural sample surveys, that during the period 2003–2016 the average farm size was slightly less than a hectare. Half

**FIGURE 7.1** Imports of chemical fertilizers and agrochemicals in Ethiopia (million US$)




**Source:** UN Comtrade (https://comtrade.un.org/data/).
**Note:** The dotted line is a linear trend over the period examined.

of these smallholders operated less than 0.65 hectare of cropland, while the bottom tenth of the distribution manage less than 0.13 hectare. Only the top 10 percent of holders operated more than 2 hectares and 0.75 percent had more than 5 hectares. As shown in Chapter 6, these smallholders have over time become even smaller, and there is also increasing evidence that landlessness is on the rise (Vaughan 2018). Yet in recent years Ethiopia has pursued a policy aiming to increase the role of large commercial farms (those cultivating more than 25 hectares).[4] There are different estimates on the land area allocated to commercial farms. Based on large farm census data collected by the CSA in 2013, Ali, Deininger, and Harris (2017) estimated that 1.3 million hectares were allocated to 6,612 commercial farmers in 2013/2014. This compares to 1.4 million hectares estimated by Rulli, Saviori, and Odorico (2013) and 2 million hectares by Bekele (2016). However, it has been observed that a substantial part of the land allocated to commercial farms is not under cultivation (Ali, Deininger, and Harris 2017). It was also estimated that about 1 million hectares were cultivated by large commercial farms in 2013. It appears that the area cultivated by commercial farms increased significantly, coming from 0.46 million hectares in 2007/2008 (Ethiopia, CSA 2015). However, Ali, Deininger, and Harris (2017) indicate their growth has been slowing more recently as the number of new licenses that are given out had peaked in 2007/2008, and there is evidence that an increasing number of these investors are abandoning agriculture altogether (Fikade 2018).

4 An important change for potential land acquisitions by domestic and foreign investors was done in 2009 through the approval of "Proclamation 29/2001" giving federal authorities more leeway in large land allocations (those over 5,000 hectares).

Table 7.4 summarizes the most recently available CSA data (2017/2018) on the relative contribution of commercial farms. We compare in that year the production of smallholder farms—in the *belg* and *meher* seasons and in the irrigated dry season—with overall area allocation and production on commercial farms. The table shows that commercial farms made up 5.5 percent of overall area cultivated in that year. Commercial farms focus more on export crops than smallholder farms. For example, area under cereals made up 30 percent of the area cultivated by commercial farms but 68 percent of that cultivated by smallholders (Table 7.4). The most important crops cultivated by commercial farms are sesame, cotton, and coffee. These crops are spatially clustered for these commercial farms with sesame mostly grown in the northwest, maize mostly in the west, and wheat in the south and southeast of the country (cotton and sorghum are more scattered in different areas).

Ali, Deininger, and Harris (2017) further found that commercial farms have higher yields (about double) than smallholders. Table 7.4 also suggests higher yields as the share of production of commercial farms is higher than the share in area for all crop categories except oilseeds. Ali, Deininger, and Harris (2019) further assessed the spillovers from large to small farms, but they found that there was little job creation and that the benefits in terms of technology and input markets were modest. The upshot is that the role of commercial farms in national agricultural production—in particular for local markets—is still rather small. Moreover, despite the fiscal advantages that were given to these farms, their performance has been lower than anticipated (Fikade 2018).

We also find that smallholder farmers on average are becoming older. Figure 7.2 (left) indicates that the share of farmers under age 35 years has declined from 36 percent in 2004 to 30 percent in 2015, driven by the expanding life experience of more mature farmers as well as lower entry into farming by younger farmers. The CSA data also show that young farmers have smaller and declining farm sizes. We depict average land sizes cultivated by young and by mature farmers in Figure 7.2 (right). The decline in agricultural area has occurred in both age groups, but it is relatively more important for young farmers given their smaller farm sizes to start with. The absolute differences in farm sizes between the different age groups remained rather similar across years.

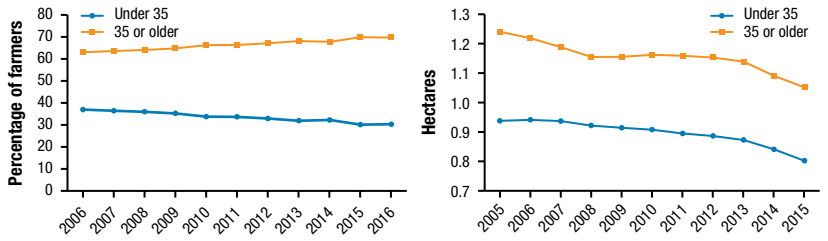
As most rural residents depend on agriculture as their main source of livelihood (Schmidt and Bekele 2016; Bachewe et al. 2017), access to land is crucial for agricultural activities. This is especially an issue for the younger population given that they have less access to agricultural land. In response

**TABLE 7.4** Area allocation and production by smallholders and commercial farms in Ethiopia, 2017/2018

| | Total | | Smallholders | | | | Commercial farms | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Crop | Area (1,000 hectares) | Production (million tons) | Area (1,000 hectares) | Production (million tons) | Area (%) | Production (%) | Area (1,000 hectares) | Production (million tons) | Area (%) | Production (%) |
| Cereals | 11,976 | 29.62 | 11,680 | 28.65 | 97.5 | 96.7 | 296 | 0.97 | 2.5 | 3.3 |
| Pulses | 2,127 | 3.49 | 2,068 | 3.38 | 97.2 | 96.8 | 59 | 0.11 | 2.8 | 3.2 |
| Oilseeds | 1,165 | 1.10 | 879 | 0.86 | 75.5 | 78.2 | 286 | 0.24 | 24.5 | 22 |
| Vegetables | 439 | 3.64 | 431 | 3.54 | 98.2 | 97.3 | 8 | 0.1 | 1.8 | 2.9 |
| Root crops | 850 | 13.58 | 849 | 13.55 | 99.9 | 99.8 | 1 | 0.03 | 0.1 | 0.2 |
| Permanent crops | 1,504 | 9.75 | 1,157 | 2.86 | 76.9 | 29.3 | 347 | 6.89 | 23.1 | 70.7 |
| **Total** | **18,061** | **61.18** | **17,064** | | **94.5** | | **997** | | **5.5** | |

**Source:** Ethiopia, CSA 2018.

**FIGURE 7.2** Share of farmers in age categories and farm size (three-year moving average), 2004/2005–2016/2017




**Source:** Authors' calculations based on AgSS 2004/2005–2016/2017 (Ethiopia, CSA 2005–2016).

to more binding land constraints, rental markets are seemingly becoming more widespread, with the youth increasingly relying on these rental markets to access land. In Figure 7.3 we show the share of rented-in land out of the total land that is operated by youth and mature farmers, respectively. The share of rented-in land operated by youth farmers was nearly twice that operated by mature farmers in an average year during the 2004/2005–2015/2016 period, with the share of rented-in land especially increasing from 2009 forward. Vandercasteelen et al. (2018) illustrate that these formal rental markets are especially taking off in areas with better market access. For an assessment of the share of farm households that hire in or rent out labor and the evolution of wage rates, see Chapter 11.[5]

## Supply Chain Transformation

### Local Markets

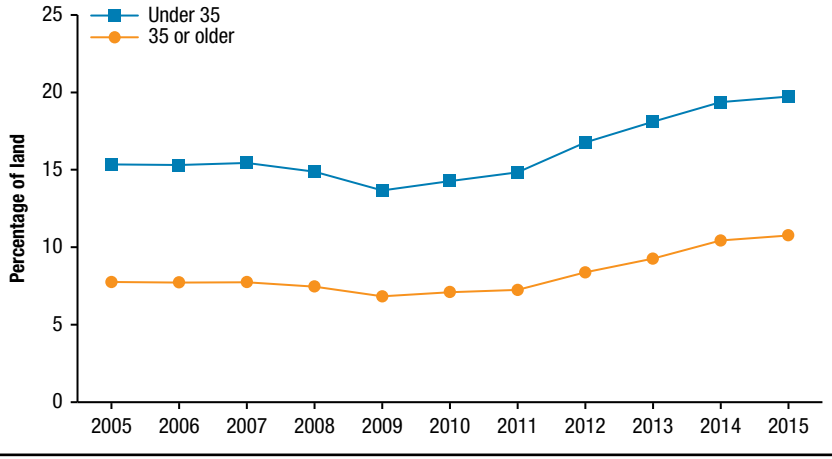
#### EXPANSION

The quantities traded and the total value of agricultural commercial surpluses are rapidly increasing. To illustrate these changes, we use production data of all reported crops from the AgSS of CSA and value those at real yearly prices by crop.[6] We only rely on smallholder data as no sales data on commercial

5 It would also have been interesting to analyze trends in land rental rates and fertilizer prices to assess if the farming system is moving toward more land-saving, labor-saving, and/or capital-using forms of technology as seen in other African countries (Jayne et al. 2019). However, we are not aware of easily available datasets in Ethiopia that would capture these dynamics.

6 Including all grain crops, vegetables, fruit crops, root crops, chat, coffee, hops, and sugarcane.

**FIGURE 7.3** Share of total land operated by farmer that is rented-in, by age category, 2004/2005–2016/2017

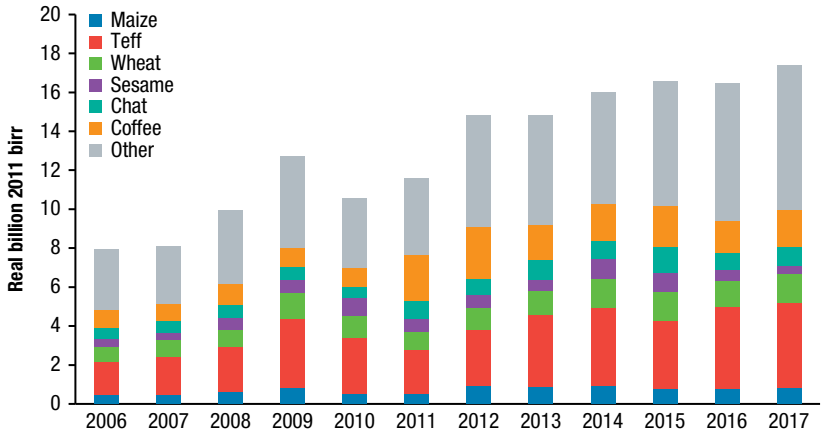



**Source:** Authors' calculations based on AgSS 2004/2005–2016/2017 (Ethiopia, CSA 2005–2016).

farms (those with more than 25 hectares) are available. We also only rely on *meher* data. Note that these omissions will only influence overall trends marginally, given the low importance of large farms and *belg* production compared to *meher* smallholder production. We see in Figure 7.4 that the overall real value of agricultural sales in Ethiopia has more than doubled over the past decade, from 8 billion birr in 2006 to 17.4 billion birr in 2017. We also note relatively small changes in the crop composition of these sales. Teff is by far the most important crop, making up about 23 percent of the value of agricultural sales in the country. The other important crops are coffee (13 percent), wheat (9 percent), chat (7 percent), and sesame (6 percent). Maize—despite being on top in quantities produced in the country—is relatively less important as a component of agricultural sales (at 6 percent), consistent with consumption patterns in rural areas noted above.

The increased agricultural commercialization patterns also show up in the purchase behavior of households. Respondents during the National Consumption Survey of 2011 were asked how they paid for specific food purchases. As expected, there are large differences between rural and urban areas. Consumption of households' own agricultural products accounts for 42 percent of total food expenditures in rural areas (Worku et al. 2017), but that share is much higher in calorie terms (two-thirds), indicating that

**FIGURE 7.4** Real value of agricultural sales (*meher*) in Ethiopia, 2006–2017




**Source:** Authors' calculations based on CSA smallholder data.

relatively more expensive foods are acquired through purchase (WFP and CSA 2014). These numbers reflect the high level overall of auto-subsistence of the rural Ethiopian economy (Worku et al. 2017).

However, the value and share of auto-consumption is considerably lower than is often assumed. Even rural households depend in important ways on commercial food markets. This is a consistent finding with other countries in eastern and southern Africa. For example, Dolislager, Tschirley, and Reardon (2015) show rural households bought 44 percent (in value terms) of the food they consume. As might be expected, in urban areas only 3 percent of food expenditures comes from own production. Towns and cities therefore are important commercial food markets. Despite the low urbanization share in the total population of Ethiopia, urban markets made up about one-third of the total commercial food market in 2011.

## Change in the Structure of Supply Chains

We note important growth and transformation in the trading and transport, processing, and food service sectors, and in retailing and distribution (discussed below consecutively). It is estimated that 4 percent of the population was employed in agricultural trade or transport in 2011 per Ethiopia's social accounting matrix (SAM) and is one of the most important areas of employment in the service sector. This sector has shown rapid change. Minten, Tamru, and Stifel (2014) reported that the number of trucks in urban

wholesale markets rose by about 75 percent over a decade. They also illustrate a shift to larger trucks being used for the transportation of agricultural products. Trader focus groups indicated considerable growth over time in the number of traders in these markets as well (Minten, Tamru, and Stifel 2014). With the number of traders perceived to be growing by almost 150 percent over the past decade, and the number of brokers growing by more than 250 percent, competition in these markets appears to have become keener and turnover per trader and broker lower. Bachewe et al. (2016) also show that agricultural trade is one of the main nonfarm activities in rural areas in Ethiopia, especially so for the relatively rich.

The increased consumption of processed food is a pattern that is seen globally with increases in income. Benfica and Thurlow (2017) estimate that processed food accounted for 17 percent of the food budget in 2011 in Ethiopia. We rely on the most updated data from two manufacturing enterprises surveys conducted by CSA to assess the food processing sector. In 2010/2011, CSA surveyed large and medium-scale manufacturing firms, defined as those that employ 10 or more people and use electricity-driven machinery. Based on this survey, 686 firms were identified as being involved in the manufacturing of food products and beverages, employing more than 67,000 people (Table 7.5). Of these employees, two-thirds are men and one-third are women. By subsector the most important subsectors in terms of employment in the food processing sector are firms involved in grain milling, baking, and the production of sugar and sugar confectionery.

In 2013/2014, CSA surveyed small-scale manufacturing firms, defined as those that employ fewer than 10 people. Such firms are significantly more important in terms of employment than the larger firms: they employ 1.7 million people nationally, of which 52 percent is involved in food processing (Table 7.5). A full 21 percent of these firms manufacture beverage or food products, with the production of bakery products being particularly important, employing more than 220,000 people. Grain milling accounts for 31 percent of people employed in small-scale manufacturing industries with more than 540,000 people engaged. In contrast to larger firms, more females are employed in these smaller firms, making up almost half of permanent employees. Overall, it is estimated that almost one million people are engaged in food processing in Ethiopia (bottom Table 7.5), or around 2 percent of the economically active population of the country defined as those ages 15–64 years. While food processing is important within the manufacturing sector, employment in food processing is overall small given the small share of the population employed in manufacturing in Ethiopia. Unfortunately, good

**TABLE 7.5** Food processing sector in Ethiopia, by scale

| Industry | Number of establish-ments | Number of persons engaged | Of which permanent | |
|---|---|---|---|---|
| | | | Male | Female |
| **Large and medium-scale manufacturing (2010/2011)** | | | | |
| Total | 2,170 | 175,698 | 95,211 | 52,037 |
| Manufacturing of food products and beverages | 686 | 67,471 | 38,134 | 18,612 |
| Share (%) | 32 | 38 | 40 | 36 |
| Production, processing and preserving of meat, fruits, and vegetables | 10 | 2,716 | 1,890 | 579 |
| Manufacture of… | | | | |
| vegetable and animal oils and fats | 34 | 1,198 | 743 | 198 |
| dairy products | 24 | 1,867 | 1,165 | 509 |
| grain mill products | 197 | 10,077 | 5,590 | 2,419 |
| prepared animal feeds | 11 | 601 | 375 | 136 |
| bakery products | 247 | 14,917 | 6,619 | 7,696 |
| sugar and sugar confectionery | 31 | 15,273 | 8,897 | 1,303 |
| macaroni and spaghetti | 20 | 1,855 | 1,230 | 569 |
| other food products | 29 | 2,522 | 973 | 624 |
| distilling, rectifying, and blending of spirits | 18 | 1,886 | 1,079 | 739 |
| wines | 2 | 524 | 353 | 171 |
| malt liquors and malt | 10 | 6,049 | 4,398 | 1,021 |
| soft drinks and production of mineral water | 53 | 7,986 | 4,822 | 2,648 |
| **Small scale manufacturing industry (2013/2014)** | | | | |
| Total | 116,604 | 1,744,544 | 532,859 | 445,209 |
| Manufacturing of food products, except milling services | 25,430 | 373,259 | 116,458 | 110,102 |
| Share (%) | 22 | 21 | 22 | 25 |
| Production, processing and preserving of meat, fruits, and vegetables | 269 | 3,271 | 1,162 | 1,238 |
| Manufacture of… | | | | |
| vegetable and animal oils and fats | 720 | 7,487 | 3,082 | 2,640 |
| bakery products | 14,218 | 221,301 | 69,754 | 65,760 |
| cocoa, chocolate, and sugar confectionery | 29 | 320 | 134 | 115 |
| other food products | 10,195 | 140,881 | 42,326 | 40,349 |
| Grain mill services | 35,430 | 540,539 | 152,896 | 129,843 |
| Share (%) | 30 | 31 | 29 | 29 |
| Total food processing sector | 61,546 | 981,269 | 307,488 | 258,557 |

**Source:** Authors' calculations based on Ethiopia, CSA (2012a, 2015).

and consistent time-series data are lacking for the processing sector as a whole. However, important changes are happening in the sector, as illustrated by two examples. First, in the case of dairy processing plants, there were eight companies active in the country in 2007. By 2017 this had more than tripled to 25 (Figure 7.5, left side).[7] While there now is significant overcapacity in dairy processing, this example illustrates significant change in the subsector.

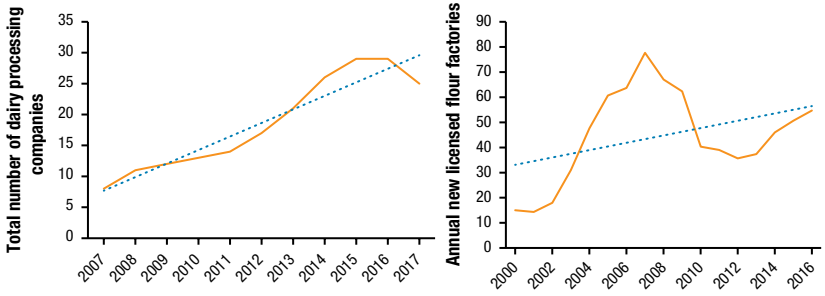
Second, data were obtained from the Ministry of Trade on the number of licenses given out to flour factories in Ethiopia. Beginning in the 2000s, about 15 licenses were given out annually, which tripled to more than 50 in 2016 (Figure 7.5, right side). Further illustrating large changes in the milling sector, Comtrade data indicate that the three-year moving average of the value of imports of machinery for mills (HS code 8437) quadrupled from US$7 million in 2006 to US$28 million in 2015. Minten, Tamru, and Stifel (2014) further provide evidence of the much greater presence of mills in urban areas, their evolving roles in moving toward one-stop retail shops, increasing competition, and lower milling margins over time.

In Ethiopia the share of food eaten away from home is increasing—a development that is seen globally as incomes rise.[8] In 2011 the share of food eaten away from home in the urban food budget was estimated to be 16 percent—that is, twice as high as expenditures on vegetables and fruits. Moreover, a strong gradient over income is seen. The poorest quintile spends 6 percent of its food budget on food eaten away from home, compared to 25 percent for the richest quintile. Associated with this, we see the increasing emergence of a rapidly growing food service sector. For example, in the case of commercial enjera markets, Minten et al. (2016a) show how these markets are quickly transforming with a large number of people, especially in urban areas, now buying enjera instead of preparing it themselves. They estimate that more than 100,000 people in urban centers in Ethiopia make their living in enjera-making enterprises or through the retailing of the enjera produced. This sector therefore provides a high level of employment in Ethiopia, comparable to the much publicized flower export sector (see, for example, Oqubay 2015; Schaefer and Abebe 2015).

7 Data from the Ethiopian Meat and Dairy Industry Development Institute.

8 For example, Smith, Dupriez, and Troubat (2014) note that food eaten away from home increased from 10 percent to 49 percent of total food expenditures in the United States between 1900 and 2010 and that similar fast changes are seen in this area in a number of quickly transforming economies such as China, India, and Mauritius.

**FIGURE 7.5** Change in number of agro-processing firms in Ethiopia




**Source:** Data from Ethiopian Meat and Dairy Industry Development Institute (left) and Ministry of Trade (right).
**Note:** The dotted lines are linear trends in number of agro-processing firms over this period.

Modern retail and different food distribution and retail systems are emerging. Assefa et al. (2016) analyze the urban food retail market in Ethiopia and find increasing differentiation in food retail markets in recent years. Despite the prohibition of foreign direct investment in food retail, a domestic modern private retail sector is quickly appearing. However, its share of the total urban food retail market is still very small and, in contrast to rollouts of modern retailing systems in other countries (for example, Reardon et al. 2003), it has not yet entered the cereal sector in a big way. The cereal sector remains overwhelmingly in the hands of local flour mills, cereal shops, and cooperative retail outlets. Another example of changes in distribution systems—in input markets—is the model of Ethio-chicken, where a private firm has engaged 2,500 agents in the country to distribute their chickens.

## Innovations in Supply Chains

Three major innovations in agricultural markets in the past decade can be highlighted. First, a modern commodity exchange, the Ethiopian Commodity Exchange (ECX), was started in 2008. From December 2008 on, it became mandatory to sell coffee—followed by other export crops, such as sesame and other oilseeds—through the ECX. The ECX trades standard contracts, based on a warehouse receipt system, with standard parameters for grades, transaction size, payment, and delivery. Before the establishment of the ECX, there was no third-party quality control except when exported. All trade was centralized and sold through an auction system in Addis Ababa. While the ECX has had important impacts on the structure of value chains, it appears not to

have led to important improvements in value chain performance (Hernandez et al. 2017). The ECX is only involved in the trade of export crops.

Second, mobile phones are used ubiquitously by agricultural traders. Minten, Tamru, and Stifel (2014) show that cell phone usage rates increased to 100 percent for traders and brokers of all the cereal crops in the various markets within an average of only four to five years after the introduction of cell phone coverage. This has contributed to behavioral changes such as the bypassing of the Addis Ababa wholesale markets as the clearinghouse for agricultural trade and the increasing use of mobile phones by traders to coordinate logistics and trade. However, surprisingly, no major effect of these improvements in communication on trade margins were found (Riera and Minten 2017). Also, farmers and pastoralists have increasingly adopted these mobile phones. They have, for example, been useful for pastoralists to find buyers as well as pastures to migrate to (Debsu et al. 2016). Despite these better communication possibilities, Tadesse and Bahiigwa (2015) did not find an effect of mobile phone ownership on the prices obtained by crop farmers.

Third, contract farming has been promoted by a number of institutions and firms in recent years. As argued by Reardon et al. (2019), contract farming might take off in transitional marketing systems but is more widespread in modern markets. Contracting schemes have the potential to solve a number of constraints that might exist in these markets, such as access to improved inputs, credit, extension, and lack of market access, which could lead to important spillover effects (Negash and Swinnen 2013). Holtland (2017) reviewed a number of implemented contracting schemes in recent years in Ethiopia. He showed that none of them was long-lived and that the only large-scale contracting scheme with smallholders that existed for a number of years, with the Heineken brewery, was subsidized by the company. Holtland identified a number of issues with these contract farming schemes, including firms not following up on their promises or farmers failing to deliver because of production problems or side-selling. Such issues have also been found to be major constraints to contract farming in other developing countries (Otsuka, Nakano, and Takahashi 2016).

## Market Performance

We look at some measures of agricultural market performance over time. First, the degree to which cereal prices move together across markets throughout Ethiopia—that is, how well they are integrated—provides a measure of how well these markets function. Several authors have shown that markets have

**TABLE 7.6** Degree of market integration of Addis Ababa with other cereal wholesale markets between 1999 and 2016

| Indicator | Year | White teff | Mixed teff | Maize | White wheat | White sorghum |
|---|---|---|---|---|---|---|
| Total market pairs | 1999 | 11 | 11 | 8 | 10 | 5 |
| | 2004 | 11 | 11 | 8 | 10 | 5 |
| | 2010 | 11 | 11 | 8 | 10 | 4 |
| | 2016 | 11 | 11 | 8 | 10 | 4 |
| Percent integrated markets | 1999 | 36 | 27 | 25 | 70 | 60 |
| | 2004 | 38 | 27 | 25 | 80 | 60 |
| | 2010 | 36 | 45 | 50 | 80 | 75 |
| | 2016 | 50 | 45 | 50 | 80 | 50 |
| Half-life of adjustment to price changes (months) | 1999 | 1.2 | 4.0 | 2.0 | 4.3 | 0.7 |
| | 2004 | 1.0 | 3.7 | 1.6 | 4.0 | 0.6 |
| | 2010 | 1.0 | 3.7 | 0.8 | 3.6 | 0.5 |
| | 2016 | 0.8 | 3.2 | 0.8 | 2.2 | 3.0 |
| Transaction costs measured as percentage of average cereal prices in that period (%) | 1999 | 16 | 8 | 13 | 10 | 11 |
| | 2004 | 10 | 7 | 13 | 10 | 10 |
| | 2010 | 7 | 6 | 12 | 9 | 5 |
| | 2016 | 6 | 6 | 10 | 8 | 10 |

**Source:** Authors' calculation based on data from EGTE.

become better integrated over time and are more resilient to drought (Minten et al. 2016b; Dercon 1995; Hill and Fuje 2017). We update that analysis and assess the integration of cereal wholesale markets from 1999 to 2016 by studying market integration between various market pairs for each of the major cereals using the methodology developed by Van Campenhout (2007). In particular, we pair Addis Ababa with the most important regional wholesale markets for each of the cereals, thus our analysis reflects the country's major cereal flows (Table 7.6).

Three important results can be highlighted from this market integration analysis. First, there has been an overall improvement in market integration over the past two decades. While wholesale markets for white teff, mixed teff, maize, and white wheat were well integrated at the end of 2016, this was less the case in 1999. About 50 percent of the regional white teff, mixed teff, and maize markets were integrated with respect to the Addis Ababa market in 2016, compared to 36 percent, 27 percent, and 25 percent, respectively, in 1999. In contrast, there seems to be no improvement in sorghum market

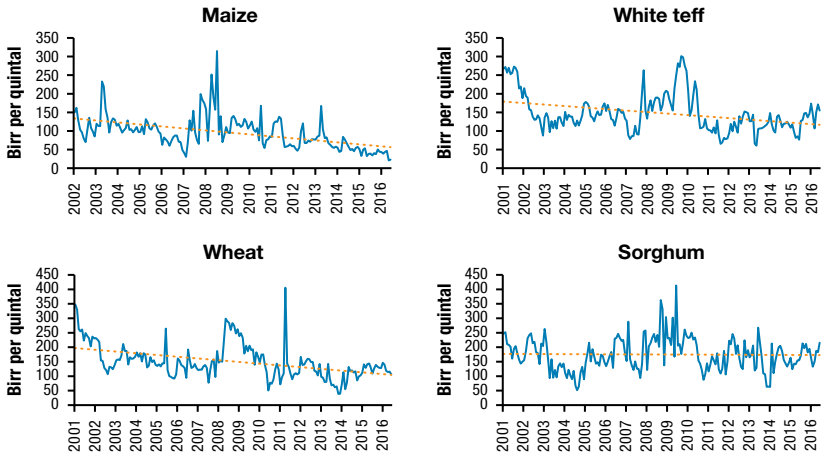
integration over time, but integration was already high to start with. Second, the speed of price adjustments has improved. This is illustrated in the average half-life of adjustment to price changes declining from an average of three months in 1999 to a month and a half in 2016. Compared to the case in 1999, it now takes about half the time for prices between wholesale markets to return back to half of the long-run equilibrium after a given price shock. Third, estimated transaction costs between the wholesale markets considered have come down substantially over time (bottom row, Table 7.6). Transaction costs fell by about 50 percent for all of the cereals examined, except for white sorghum.[9]

Second, the analysis shows that marketing margins between agricultural markets are seemingly decreasing over time. Relying on EGTE price data from a number of wholesale markets in the country, Figure 7.6 shows that the standard deviation between wholesale market prices for cereals have all come down over time, expect for sorghum. Using the trend line for maize, wheat, and teff, standard deviations fell by 100 birr per quintal over the 15-year period, indicating that price differences between maize and wheat wholesale markets fell to one-third and half the differences at the beginning of the period. This decrease is likely a reflection of investments in road and communication infrastructure and the more competitive markets that have developed over time (Minten, Tamru, and Stifel 2014). However, there is still substantial volatility around this trend. This deviation was especially high in 2008 and 2009 during periods of global food price crises when there also were spikes in food prices in the country.

Third, seasonality is a major characteristic of agricultural markets. We assess with the EGTE wholesale market price data to what extent seasonal behavior is present in market prices and how this seasonal behavior is changing. To do this, we run a simple regression on the logarithm of the wholesale prices with market, year, and monthly dummies on the right-hand side. We then interpret the coefficients for the monthly dummies (Table 7.7). There is significant price seasonality, with prices low immediately after the main harvest and highest at the end of the rainy period before the new harvest starts coming in. Over the period considered, price seasonality was the highest for maize with a price amplitude of 16 percent, while it was lowest for teff with a price amplitude of 7 percent. This difference between crops might reflect

9 In the latter case sorghum is not widely consumed in major markets such as in Addis Ababa. As such, the thin sorghum markets with limited flows among them appear to be reflected in these estimation results.

**FIGURE 7.6** Standard deviation of cereal market prices between wholesale markets in Ethiopia, 2001–2016 (birr per quintal)




**Source:** Authors' calculations based on EGTE price data.
**Note:** Dotted lines are linear trends in prices over the period considered.

aptitude for storage as maize is less suited for long storage periods compared to teff.

Interestingly, we see a significant decline in price seasonality over time, comparing seasonal amplitudes for 2002–2008 and 2009–2016 periods. Seasonal price amplitudes were reduced over these two periods by between 8 percentage points for teff and 10 percentage points for wheat. For example, while the price difference for wheat between the highest and the lowest-priced month in the first period was 17 percent, this had declined to 7 percent in the second period. Several explanations could account for this reduced-price seasonality. First, as shown above, agricultural production during the main *meher* season has increased rapidly. Thus there might be more food available for storage and sale later in the year. Second, markets are better integrated and different supply regions can be used to smooth the lack of seasonal supplies in some areas. Third, farm households are relatively richer now than before and are less cash constrained in the immediate period after the harvest. Consequently, they are not quite so obliged as previously to sell all of their harvest immediately. Fourth, storage conditions have improved due to infrastructural improvements, and due to easier access to agrochemicals used to reduce storage losses. However, quantifying the impacts of each of these factors is left for future research.

**TABLE 7.7** Price seasonality in cereals in Ethiopia, 2002–2016

| | Amplitude | | | | 2002–2008 | | 2009–2016 | |
|---|---|---|---|---|---|---|---|---|
| | All | Period 1 | Period 2 | Reduction | | | | |
| | 2002–2016 | 2002–2008 | 2009–2016 | p1–p2 | Lowest price | Highest price | Lowest price | Highest price |
| **All wholesale markets** | | | | | | | | |
| Teff | 7.34 | 13.05 | 5.48 | 7.57 | February | August | December | September |
| Wheat | 8.45 | 16.81 | 6.53 | 10.28 | January | August | December | September |
| Barley | 10.84 | 16.96 | 8.04 | 8.92 | March | October | December | August |
| Sorghum | 12.89 | 19.41 | 11.06 | 8.35 | February | November | April | January |
| Maize | 15.99 | 25.18 | 16.58 | 8.60 | January | August | December | August |
| **Addis Ababa** | | | | | | | | |
| Teff | 9.22 | 17.17 | 6.33 | 10.84 | March | August | December | September |
| Wheat | 8.83 | 17.43 | 6.84 | 10.59 | January | August | December | June |
| Barley | 12.78 | 23.04 | 5.49 | 17.55 | February | August | February | June |
| Sorghum | 12.22 | 19.52 | 11.24 | 8.28 | February | November | April | September |
| Maize | 19.33 | 29.39 | 19.25 | 10.14 | January | August | December | August |

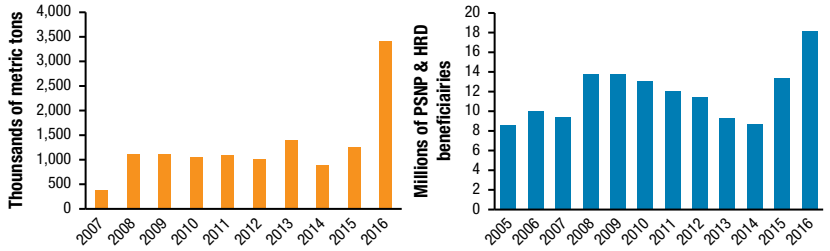
**Source:** Authors' calculations based on EGTE data.
**Note:** Seasonality calculated as dummies in regression of the form log (real price) = f (city, year, month).

Finally, different food groups have shown different price developments over time. Using a large-scale price dataset collected monthly in 116 urban and rural markets across the country, Bachewe et al. (2017) show that real prices of all nutritionally rich food groups increased between 19 percent and 62 percent over the past ten years. This contrasts with staple crops (grains, roots, and tubers), which did not show any real price increase, and with oils, fats, and sugar, the prices of which decreased substantially. Given the large influence of prices on consumer choices in countries like Ethiopia, these findings suggest that more investments and attention to the production of nutritious foods—combined with behavioral change messaging—is needed to improve their affordability for consumers.

## Changes in International Trade

An important policy consideration is also Ethiopia's dependence on international food markets. Ethiopia is a consistent importer of wheat, mostly by the government or international agencies such as the World Food Programme (WFP) to be used for distribution in humanitarian activities or in its large social safety net, the Productive Safety Net Program (PSNP). Figure 7.7 (left) illustrates the quantities of wheat imported into the country over the past

**FIGURE 7.7** Wheat imports, 2007–2016, and number of aid beneficiaries, 2005–2016



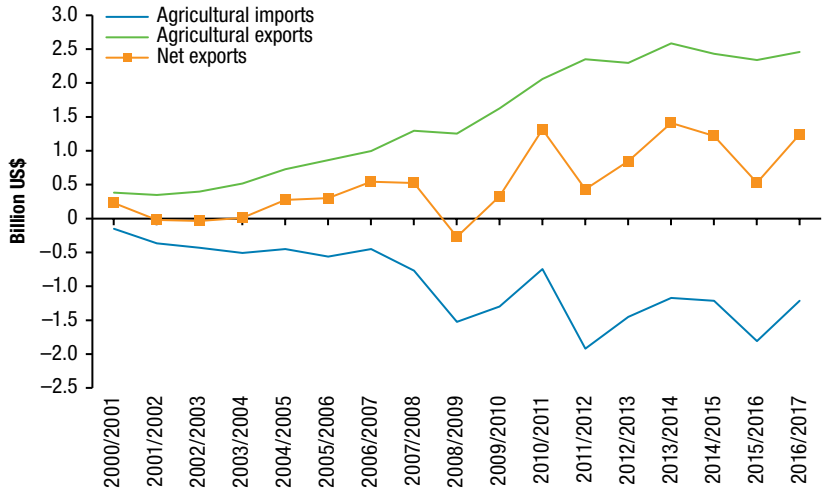

**Source:** UN Comtrade, AKLDP (2017), and World Bank (2017a).
**Note:** Aid beneficiaries from Productive Safety Net Program and Humanitarian Requirements Document.

decade. Wheat imports were typically about 1 million tons per year until 2016, during which imports more than tripled because of a large El Niño–induced drought in the country. Figure 7.7 (right) shows how the overall number of beneficiaries in safety net and aid programs has changed over the years. Imported quantities of wheat and the number of aid beneficiaries are, on average, not declining over time.

Ethiopia is also an exporter of a number of agricultural products, particularly coffee but also oilseeds, chat, flowers, and meat. Figure 7.8 shows to what extent agricultural exports have changed over the past 15 years. We see an important increase, partly driven by increasing commodity prices in international markets over the past decade for crops such as coffee and sesame, but also by rapidly increasing exported quantities. The value of agricultural exports overall rose six-fold, from US$0.4 billion in 2000/2001 to $US2.5 billion in 2016/2017. When we compare the value of these exports with agricultural imports, including those products that are major inputs in the agricultural production process such as chemical fertilizer, we find that both agricultural imports and exports have increased significantly since 2000.[10] However, Ethiopia in the past decade was a net agricultural exporter in all years except one. The annual value of net agricultural exports hovered around US$1 billion over the past five years. This increasing reliance on international trade is noteworthy, especially given complicated trade regimes in Ethiopia (World Bank 2015).

10 Relying on the National Bank of Ethiopia classification system, food and live animals, tobacco, fertilizer, and grains are included in agricultural imports. Only data on official imports and exports are included in this analysis. Given lack of data on informal trade, such as that of exports of livestock or imports of rice and pasta, these could not be included.

**FIGURE 7.8** Ethiopia's agricultural imports (–) and exports (+), 2000/2001–2016/2017




**Source:** Authors' calculations based on data from the National Bank of Ethiopia.

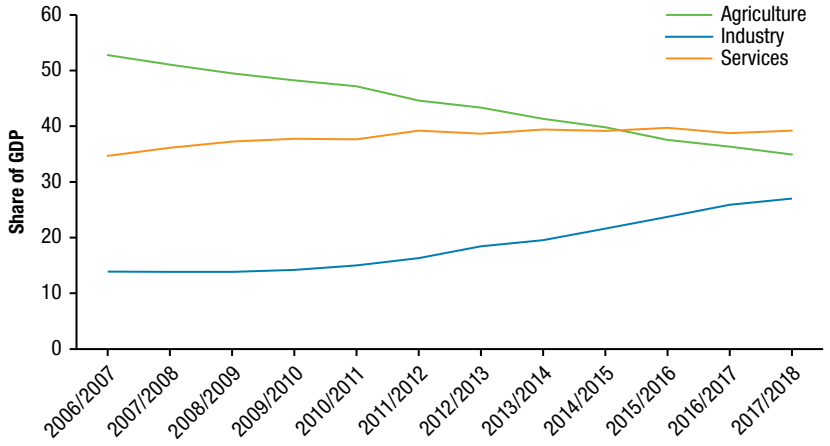
## Structural Transformation and Future Food Value Chains

### Structural Transformation

Structural transformation of economies is an essential process for poverty reduction and welfare improvements (Timmer 2014). In this process the share of agriculture in the overall economy declines while the services and, most important, the manufacturing sectors grow. As these sectors grow, lower labor productivity that is usually seen in the agricultural sector catches up with productivity levels in the other economic sectors. Ethiopia is still a relatively poor developing country where agriculture is important for the economy and for overall employment. However, the situation of Ethiopia's economy is rapidly changing. Figure 7.9 illustrates sectoral GDP changes over the past decade. While agriculture made up more than 50 percent of Ethiopia's GDP in 2006/2007, this share came down to 35 percent in 2015/2016. Based on share of GDP, agriculture is no longer the largest sector of the economy. Since 2014/2015, it has been overtaken by the services sector.

While the importance of agriculture in GDP has come down rapidly, the share of workers employed in agriculture has barely changed. Based on data

**FIGURE 7.9** Share of different sectors in Ethiopia's economy, 2006/2007–2017/2018 (%)



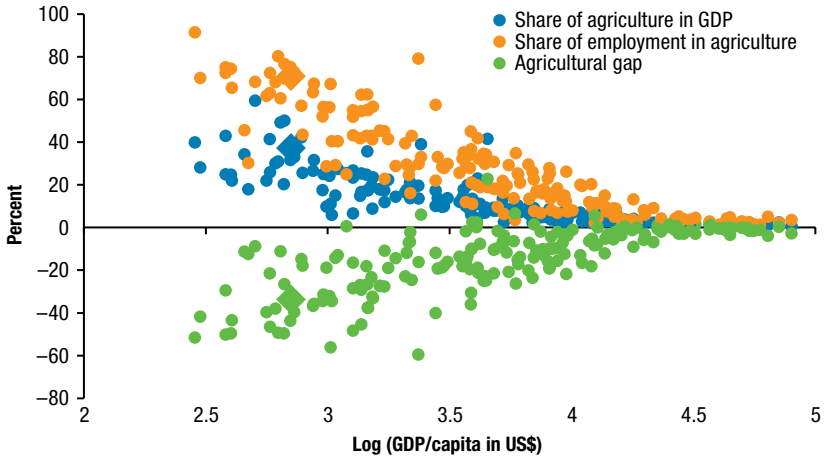

**Source:** NBE (2018).
**Note:** Base year = 2015/2016.

from the national labor survey, Schmidt and Bekele (2016) find that the share of the population employed in agriculture declined by only 4 percent between 2005 and 2013—from 80.2 percent in 2005 to 76.7 percent in 2013. The large share of employment in agriculture and the declining share of its economic weight is a typical pattern in developing countries and is reflective of low productivity levels in agriculture. Timmer (2014) uses a measure of the difference between the share of agriculture in GDP and employment as an "agricultural gap" to illustrate this phenomenon. We plot this measure for all countries for which World Bank data were available for the year 2016 (Figure 7.10). It shows to what extent the situation of Ethiopia is fairly typical for countries at its level of development. Timmer (2014) further argues that to achieve the desired closing of the gap, growth of all sectors—including agriculture—is required. Next we assess some of the trends that will likely shape the agricultural sector and food value chains in Ethiopia during this ongoing process of structural transformation.

## Future Food Value Chains

To assess these future developments, we follow the guiding framework of the three transformations discussed above: dietary, agriculture, and supply chain transformation. To frame the discussion, we compare Ethiopia to other countries characterized by higher and lower levels of GDP per capita. We also

**FIGURE 7.10** Relationship between GDP per capita, share of agriculture in GDP, share of employment in agriculture, and the "agricultural gap" at national level and globally, 2016




**Source:** Authors' calculations based on World Bank data.

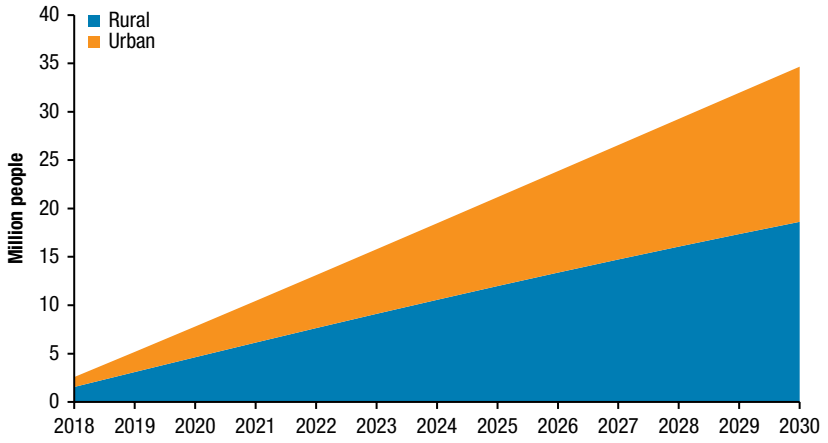
simulate through simple empirical models the expected changes in food value chains based on income growth and urbanization projections.

### CONTEXTUAL CHANGES

First, while the growth of the population is expected to slow down in Ethiopia, we will still see important growth in the total population through 2030. Figure 7.11 shows the expected growth for both the rural and the urban populations. Projections put the rural population at 106 million in 2030—26 million more than in 2016 (World Bank 2015). The share of the urban population is expected to further increase with especially the population in secondary cities growing in importance. The World Bank (2017b) estimates that the urban population will reach 40 million in 2030 and that one-third of Ethiopia's population would then be urban.

Second, Ethiopia is planning to continue on its high economic growth path. Several policy documents state that Ethiopia aims to reach middle-income status by 2025 (for example, World Bank 2015). While the outcome needs to be seen—especially given recent political unrest in the country as well as the increasing constraints on foreign capital (Dorosh et al. 2017)—we assess the impact of economic growth on Ethiopia's food value chains by looking at two scenarios: one with no income growth and a second one with annual income growth of 2 percent to 2030.

**FIGURE 7.11** Projected population growth in Ethiopia, urban and rural, in millions of persons added, 2017–2030



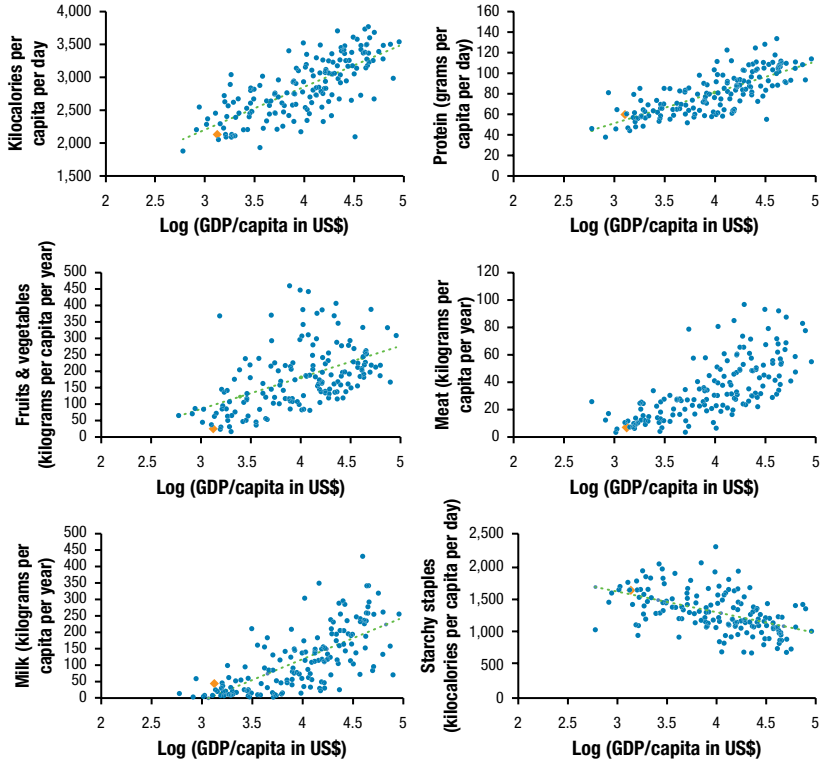

**Source:** Authors' calculations based on World Bank.

### DIETARY TRANSFORMATION

Two important dynamics will shape future diets in Ethiopia: higher consumption levels and different types of foods. First, it can be expected that calories and proteins consumed will increase with increasing incomes in the country. Relying on data from multiple countries (FAOSTAT for the year 2013), Figure 7.12 illustrates to what extent calorie and protein consumption are associated with different GDP levels. A doubling of GDP per capita is associated with an increase in calorie consumption of 700 calories per capita, or an increase of 23 percent. However, protein consumption shows relatively larger differences between poorer and richer countries. A doubling of income leads to 30 grams more consumption per capita, or an increase of 60 percent for lower-income countries.

Second, we see changes in types of foods demanded with income growth, specifically further diversification in diets and an increase in the consumption of higher-value products, in particular fruits and vegetables, animal-sourced foods, and fish, and a decline in the consumption of starchy staples (Bennett 1941). Figure 7.12 illustrates, again using cross-sectional data from FAOSTAT for 2013, to what extent the consumption of these different food groups is associated with different GDP levels. It also shows the current situation of Ethiopia in the international context.

**FIGURE 7.12** Global association of dietary patterns and per capita GDP (US$)



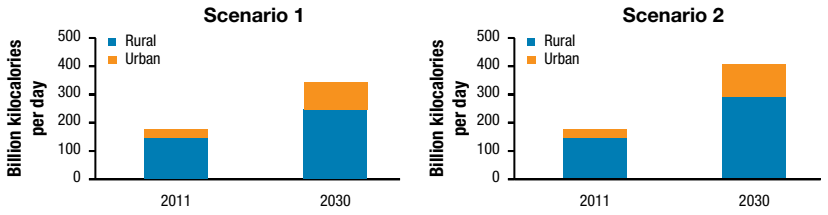

**Source:** Authors' calculations based on FAO Food Balance Sheets (www.fao.org/economic/ess/fbs/en/) and World Development Indicators (https://datacatalog.worldbank.org/dataset/world-development-indicators).

**Note:** Ethiopia data points are plotted with red diamonds. Gross domestic product (GDP) per capita is expressed in Purchasing Power Parity.

## Agricultural Transformation

The rapid increase in population, income, and urbanization will further propel agricultural transformation and intensification (Vandercasteelen et al. 2018). To illustrate the expected changes necessary to feed the increasing population and the growing better-off part of the population, if planned income growth will happen, we simulate below some implications of this expected change. In the "no income growth" scenario, we illustrate what expected daily calorie requirements would be with no income growth and stable per capita calorie consumption. In this case, total national calorie consumption would go up by 92 percent by 2030 (Figure 7.13). In a second scenario, we assume

**FIGURE 7.13** National food consumption expansion scenarios between 2011 and 2030 in Ethiopia: No income growth (scenario 1); 2 percent annual income growth (scenario 2)



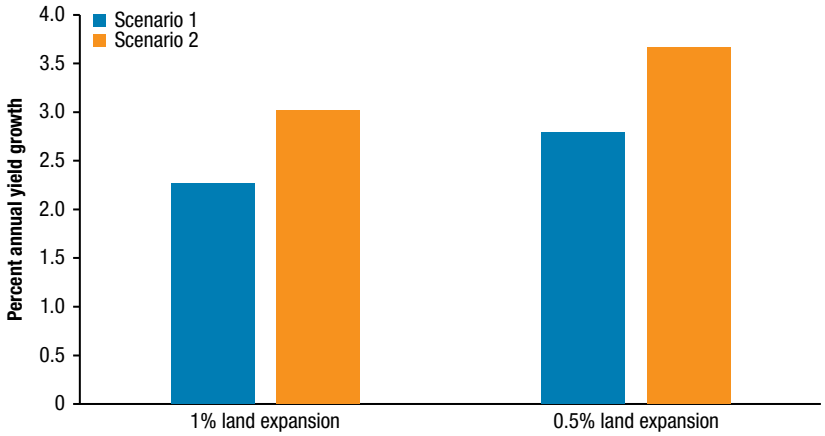

**Source:** Authors' calculations.

a 2 percent growth in income, a change in average calorie consumption from the current third quintile to the current fifth quintile levels as per the data of Ethiopia, MoFED (2012). Calorie consumption for the country as a whole would increase by 127 percent by 2030 in this scenario, 35 percent higher change than in the case of no income growth. Note that we did not account for likely price increases in the second scenario that might possibly dampen food consumption increases.

Providing this extra food can be met through different channels—that is, increased productivity in existing agricultural areas, bringing into production additional land, or food imports. For simplicity and illustrative purposes, we show in Figure 7.14 the required annual yield increases for the increased productivity and the land expansion options, respectively, assuming that food imports would not play an important role for local food provision.[11] In the case of no income growth and annual land expansion of 0.5 percent, annual yield growth would need to be 2.8 percent. In the same land expansion scenario but with income growth, yield would need to grow by 3.7 percent annually. If land expansion would be larger at 1.0 percent annually, required annual yield growth would be smaller, at 2.3 percent and 3.0 percent in the scenarios of no income growth (scenario 1) and 2 percent income growth (scenario 2), respectively. These simulations illustrate the further need for innovation and improved technology adoption so as to increase agricultural yields. They also show the need for further land investments and the opening up of areas previously not used for agriculture to make the provision of sufficient food supplies for the country easier to achieve.

11 Note that in 2011, food aid/imports (wheat) accounted for about 11 kilograms per capita per year—that is, 3 percent of the total quantity consumed.

**FIGURE 7.14** Required productivity increases to assure food self-sufficiency scenarios: No income growth (scenario 1); 2 percent annual income growth (scenario 2)



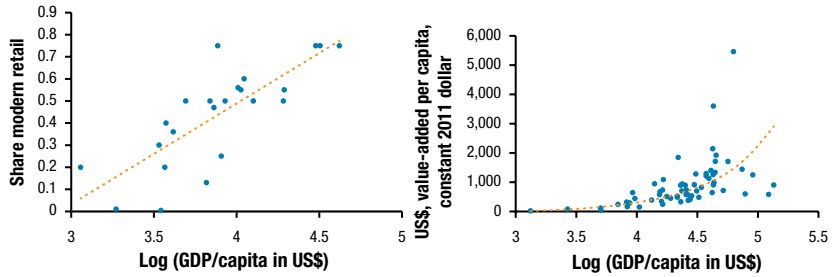

**Source:** Authors' calculations.

### SUPPLY CHAIN TRANSFORMATION

A number of changes can be expected in supply chains. First, there will be increasing demand for processed products and convenient and ready-to-eat products. Figure 7.15 illustrates to what extent higher incomes—as measured by GDP per capita levels of countries—are related to a larger food processing sector, given increasing demand for such types of processed foods with a better-off population. We see in the right chart of Figure 7.15 an especially rapid increase after a logarithm of 4 (equivalent to US$10,000 per capita). However, even below that level, growth rates are considerable.

Second, different types of food distribution systems will emerge and grow. Modern retail is currently in its infancy in Ethiopia—partly because of the prohibition of foreign direct investment in retailing—but changes can happen very fast. For example, it is estimated in China that already half of the distribution of rice in urban markets is in the hands of modern retail (Reardon et al. 2014). Figure 7.15 (left) shows to what extent GDP levels are associated with the share of modern retail in food markets. This development has important implications on value chain performance given the limited number of supermarket chains that are often active in a country and the consequent power that they subsequently might have on agricultural and food value chains—for example, through imposition of standards and prices (Timmer 2014).

**FIGURE 7.15** Global relationships of size of modern retail and value-added by food processing industry with GDP per capita (US$)



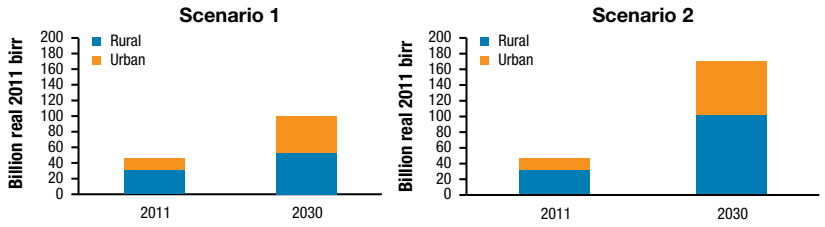

**Source:** Figure at left adjusted from World Bank (2008); figure at right from World Development Indicator database (https://data.worldbank.org/).

**Note:** Value-added of food, beverages, and tobacco in manufacturing sector.

Overall, commercial food markets are expected to expand rapidly. We look at two scenarios based on the consumption patterns observed in the national household survey of 2011. In a first conservative scenario, we build upon the differential food expenditures in urban and rural areas, assume urbanization and population growth rates as predicted by the World Bank, and assume no change in purchasing behavior—58 percent and 97 percent of the food obtained from the market in rural and urban areas, respectively. In this scenario we see overall a doubling of the commercial food market by 2030, with an increase in the value of rural expenditures by 67 percent and a tripling of the size of the urban food market (Figure 7.16, left).

In the second scenario, we assume that there is a growth of food expenditures by 2 percent annually and an increase in use of commercial markets in rural areas from 58 percent to 75 percent, driven by better infrastructure and by increasing incomes. Under this scenario we see almost a quadrupling (a growth of 264 percent) of the commercial food market size, with a 360 percent and 220 percent increase in urban and rural areas, respectively (Figure 7.16, right). Such large changes have also been found in other developing countries (Haggblade 2011). These numbers indicate that we should expect significant dynamism in food markets in Ethiopia, even with conservative assumptions. The scenarios also point to significant growth in related sectors associated with agricultural production and marketing, including input supply, logistics, trading, and distribution.

**FIGURE 7.16** Commercial market expansion scenarios between 2011 and 2030 in Ethiopia: No income growth (scenario 1); 2 percent annual income growth (scenario 2)




**Source:** Authors' calculations.

## Conclusion

In this chapter we assess the changes that have happened in Ethiopia's food value chains in the past decade. We do so by documenting changes happening downstream at the consumption level, midstream with agricultural markets, and upstream with agricultural producers. We note major changes in dietary patterns, in agricultural production practices, and in agricultural supply chains driven by major contextual changes including high population growth, rapid urbanization, infrastructure investments, and income growth. To assess developments in the future, we simulate—relying on different assumptions of income growth, urbanization, and population growth—the impact of different income growth scenarios. We also put Ethiopia in an international context of countries with different GDP levels, as economic growth is an important associate of transformation in agricultural and food value chains (Timmer 2014).

At the consumption level we see important dietary change. Overall food consumption in Ethiopia, measured in calories, has been increasing over several decades. The relative share of cereals in food expenditures is declining and those of high-value products, including animal-sourced foods and fruits and vegetables, is rising. We note the increasing emergence of processed and convenience foods and out-of-home food consumption and a significantly different dietary pattern for urban households. Given fast growth in population, urbanization, and incomes, these diets are expected to evolve rapidly in the future. It is expected that there will be further increasing consumption of high-value products, such as meat, dairy products, and fruits and vegetables. Although this will be good for nutritional outcomes, a concern is the issue of the double-burden of nutrition. While food security will likely become less of an issue, at

least at the national level, avoiding the obesity trends that have been noted in other transforming countries will likely become an important new challenge in the decades ahead (Ghebru et al. 2018).

To assure that this increased local demand for these high-value products can be met by local supply and not by imports, attention will need to be paid to their production with increased availability of seeds, agrochemicals, extension advice, and cold storages. Increasing the supply of animal-sourced foods will require increased livestock-related investments. These include broader adoption of improved animal husbandry and feeding practices, increased production of genetically superior breeds of livestock, the provision and use of appropriate veterinary health practices, and the facilitation of an enabling environment that will allow for efficient livestock markets. Changes in these high-value sectors has been slow in the past decade, as illustrated by the increasing real prices of high-value products—an indication that increasing demand is outstripping supply.

At the production level we have noted significant growth in agricultural production over the past decade. We have seen a process of intensification and modernization, but from a low base, as illustrated by the rapid change in the adoption of chemical fertilizers and agrochemicals. There has been increasing emphasis on large commercial farms as a way to stimulate agricultural production, but only a share of the land allocated to such large-scale farmers is effectively cultivated—amounting to 5 percent of all cultivated land in Ethiopia. Yields have not been much higher on these farms than under smallholder farming conditions. We also see important changes with smallholder agriculture: smallholder farmers are estimated to cultivate 95 percent of all agricultural land. We find over the past decade that

- Average farm sizes of smallholders are declining;
- Farmers are becoming older—the share of Ethiopian farmers under 35 years of age declined from 36 percent to 30 percent over the past decade;
- Young farmers have smaller and declining farm sizes, declining from 0.9 hectare to 0.8 hectare on average over the past decade; and
- Agricultural land rental markets are becoming more important, with 12 percent of cropland now being rented-in. Young farmers especially rely on the rental market to access land.

Given increasing land constraints across Ethiopia, agricultural innovations to increase productivity will be increasingly demanded and adopted. Access to

land to supply these increasingly demanded products will be crucial, and better functioning land markets, in particular, will be needed to assure more efficient land allocations to achieve higher productivity levels.

There has been a substantial growth in agricultural commercial surpluses. In consequence, there have been a number of structural changes in supply chains as seen by evidence from the trading and transport, food service, and processing sectors, and from urban retail and distribution. We see more reliance on markets by consumers, better integrated markets, and smaller spatial and seasonal margins. However, an increase of prices of noncereals—especially of those products important to improve diet diversity and therefore nutritional outcomes—also is seen in the data, suggesting the demand for these foods is outstripping supply. While food imports are high, and the number of food aid beneficiaries has not come down in the past decade, nonetheless, Ethiopia exports significant amounts of agricultural goods. In a normal year the country is a net exporter of food in value terms. In the future, supply chains will need to cater to larger and different demands. We should expect to see rapid growth in the agro-processing sector and in the modern distribution sector. Under reasonable assumptions we expect that the value of the commercial food sector will almost quadruple over a 20-year period. This will have enormous implications on growth in agricultural input supply, logistics, trading, and distribution sectors, as well as on agricultural production across Ethiopia.

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