

Agricultural price evolution in drought versus non-drought affected areas in Ethiopia

An updated assessment using national producer data (January 2014 to January 2017)

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This ESSP Working Paper builds on the analysis of ESSP Working Paper 88 (April 2016) and ESSP Working Paper 97 (November 2016) by extending the period over which prices are examined through to January 2017.

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ABSTRACT

We analyze the evolution of crop and livestock producer prices and wages of unskilled laborers in Ethiopia between January 2014 and January 2017 to evaluate the effect of El Niño triggered droughts – which started in 2015 – that massively impacted parts of the country. The analyses reveal no evidence of widespread adverse price effects of the drought in cereal and labor markets. Real prices of major cereals were lower in January 2017 compared to three years earlier, especially for maize, sorghum, and wheat – the crops that are the major source of calories in areas that were most hit by drought. The decline in the cost of cereals in the food basket in January 2017 compared to three years earlier was estimated at 13.3 percent at the national level. Moreover, this decline in cereal costs was highest in areas most affected by the drought, possibly indicating the effect of major cereal imports and food aid directed to these areas. Considering crop and livestock prices jointly, the analysis reveals that livestock-cereal terms of trade improved. This is mainly due to the fact that although livestock prices declined during this period, as is usually seen in droughts, this decline was less than the decline in prices of cereals in such areas. The fluctuating behavior of cereal prices since January 2015 strikingly contrasts with the El Niño triggered major drought during 1997/98 in Ethiopia. During that period, cereal production declined by 25 percent compared to the year before, with significant increases in the real price of cereals, ranging between 15 and 45 percent. In contrast, in 2016 real cereal prices declined, which appears consistent with the relatively larger cereal imports and lower impacts of the drought on national cereal production in 2015/16.

I. INTRODUCTION

In 2015 and 2016, Ethiopia was enormously affected by El Niño triggered droughts. The *Belg* rains of 2015 failed in large parts of the country and there was further inadequate rainfall in the main *Meher* season mostly in the northern and eastern parts of the country, but also beyond (FEWS NET 2016).¹ This rainfall failure led to a fall in crop output and to a loss of livestock in parts of the country.² Consequently, a significant share of the rural population living in these drought-affected areas suffered hardship. Accordingly, an estimated 10.2 million people required emergency food assistance in 2016, on top of the 7.9 million already covered by the Productive Safety Net Programme (HDR 2016). The effects of the drought were clearly severe, with the situation evaluated as ‘critical’ by the WFP in the middle of 2016.

To help monitor the drought’s effect and its aftermath on Ethiopia’s food and agricultural economy, we seek to understand the evolution of some key prices between January 2014 and January 2017. Using producer price data collected by the Central Statistical Agency (CSA) at national level, we assess how much impact the drought has had on the evolution of prices in different areas of the country affected by the drought.³ In particular, we look at the evolution of three broad categories of prices: crops, livestock, and wages.⁴ Furthermore, we compare the price evolution of the current drought with an earlier period of major

¹ While the *Belg* season, which is based on the shorter rains that start in March, is important in some parts of the country, the *Meher* is the main cropping season and depends on the major rains during May through to September.

² CSA reports that decline in grains output in drought affected areas ranged from 10 percent in Tigray region to moderately higher declines of 25 and 30 percent in Somali and Gambella. The decline was considerably higher in Dire Dawa and Afar at about 45 and 66 percent, respectively (CSA, 2016).

³ While the disastrous effects of the drought are closely monitored and are clear in the areas affected (FEWS NET 2016; AKLDP 2016a, 2016b, 2016c), it, however, is not well understood how prices have been affected at the national level. The Agricultural Knowledge, Learning, Documentation and Policy Project (AKLDP) has followed price trends on major wholesale markets (see <http://www.agri-learning-ethiopia.org/el-nino-impacts-in-ethiopia-farmers-perspectives/>). However, there is a lack of national producer level analysis, differentiated by the degree of the drought’s effect. To fill this gap IFPRI-ESSP has been monitoring the nationally representative producer prices and publishing the results. This working paper, which is a third update, extends earlier assessments of the evolution of prices (ESSP Working Paper 88, April 2016; and ESSP Working Paper 97, November 2016), by covering the July 2016-January 2017 period.

⁴ Changes in agricultural and food prices are important given their crucial role in how they affect livelihoods and food consumption. The evolution of livestock prices is seen as an important indicator of hardship. Large drops in livestock prices are often considered a predictor of upcoming famines and food insecurity (de Waal 1988; Fafchamps and Gavian 1997). Moreover, changes in wages are an indicator of effects of droughts on welfare, especially for the poorest in the population who usually depend on such income (Bachewe et al. 2016). Wage income especially might become more important as droughts unfold as farmers, who may find it difficult to make a livelihood from their own agricultural production, increasingly switch to labor markets.

drought in the country. Monitoring the evolution of the prices is important, given that prices are among the key factors that influence livelihoods and the welfare of rural populations in areas affected by drought, since, as a result of lower production, many drought-affected rural households are more likely to be net food buyers, i.e., they spend more on food than they earn from agricultural production. Even in regular years, many of these people are net food buyers, but during drought this situation significantly worsens.

2. DATA AND METHODOLOGY

We rely on two sources of data. First, the Ethiopian government and its partners have classified the woredas (districts) in the country into hotspot categories based on the impact of the drought, whereby woredas severely affected are categorized as hotspot 1 and those with decreasing severity of drought as hotspots 2 and 3. The hotspot woreda classification is derived using six multi-sector indicators – food availability; water, sanitation, and hygiene; access to markets; health and nutrition; education; and other factors (increased migration, significant disruption to normal livelihoods, etc.) – at zonal, regional, and federal levels that were agreed upon through expert consultations (EWRD 2014). Operationally, this classification triggers a prioritized response, most notably in supplementary feeding (HRD 2016). According to this categorization, 27, 18, and 9 percent of the 743 woredas in the country were categorized as hotspot 1, 2, and 3, respectively, in March 2016. More details on the location of the woredas in the different categories are given in Table 2.1 and Figure 2.1. The map shows that the northern and the northeastern parts of the country have especially been hit hard by the drought. The number of hotspot 1 woredas increased from 186 in December 2015 to 211 in March 2016, indicative of a deteriorating humanitarian situation during that period.

Second, we rely on price data from the Central Statistical Agency (CSA) of Ethiopia. CSA collects monthly data on producer prices of different goods from a large number of woredas. We use the producer price data from over 400 woredas (CSA 2017a).⁵ CSA also collects data on wages of casual laborers (CSA 2017b). Data on wages are collected along with retail prices for a large number of items from about 120 woredas in all regions of the country. In Figure 2.2 we map the woredas in which CSA collects producer and retail price data. It is important to note that some of the worst-hit areas are not well covered by the CSA price collection system. Some caution in interpretation of the impact of the drought on prices is therefore warranted.

Table 2.1—Proportion of drought affected woredas by region, March 2016

Region	Number of woredas	Percent of woredas categorized as			
		Hotspot 1	Hotspot 2	Hotspot 3	Uncategorized
All regions	743	26.5	17.8	9.3	46.4
Tigray	47	40.4	6.4	17.0	36.2
Afar	31	93.5	-	-	6.5
Amhara	139	31.7	19.4	4.3	44.6
Oromia	279	21.9	11.8	7.2	59.1
Somali	55	43.6	45.5	-	10.9
Benishangul-Gumuz	20	-	-	40.0	60.0
SNNP	147	11.6	27.2	15.0	46.3
Gambella	13	15.4	30.8	30.8	23.1
Harari	1	-	-	100.0	-
Addis Ababa	10	-	-	-	100.0
Dire Dawa	1	100.0	-	-	-

Source: Authors' computation using CSA producer price data

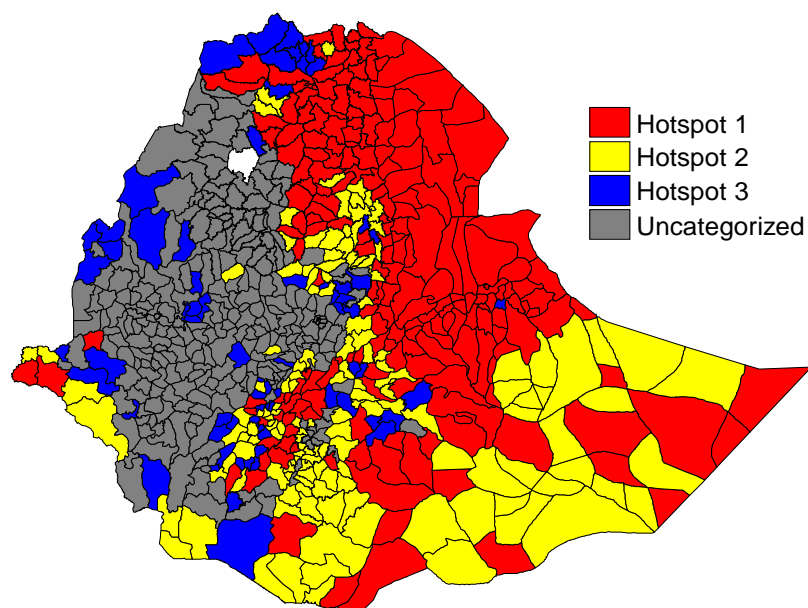
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

We use these price data together with the hotspot categories of the woredas to investigate the evolution of prices during the drought and in the subsequent period given that such major droughts are shown to have long-term impact on crop and livestock production capacity and hence on prices (Fafchamps and Gavian

⁵ In each month, CSA enumerators in the woredas collect price data by interviewing three retailers and consumers in a market selected for this purpose (CSA 2016c). We use a simple average of the three monthly price quotations in each market, which were observed to be rather similar. Since sampling weights are not attached to the markets surveyed the prices we use can only be taken to reflect prices prevailing in those markets and may not necessarily represent the entire woreda.

1997). We deflate prices using the general Consumer Price Index (CPI) calculated by CSA in order to express all prices in December 2011 Birr (CSA 2017c). Prices will be presented by hotspot category to enable a better understanding of the extent to which the woredas impacted most by the drought are affected by differential price movements, compared to others.⁶

Figure 2.1—Drought hotspot woredas across Ethiopia, March 2016

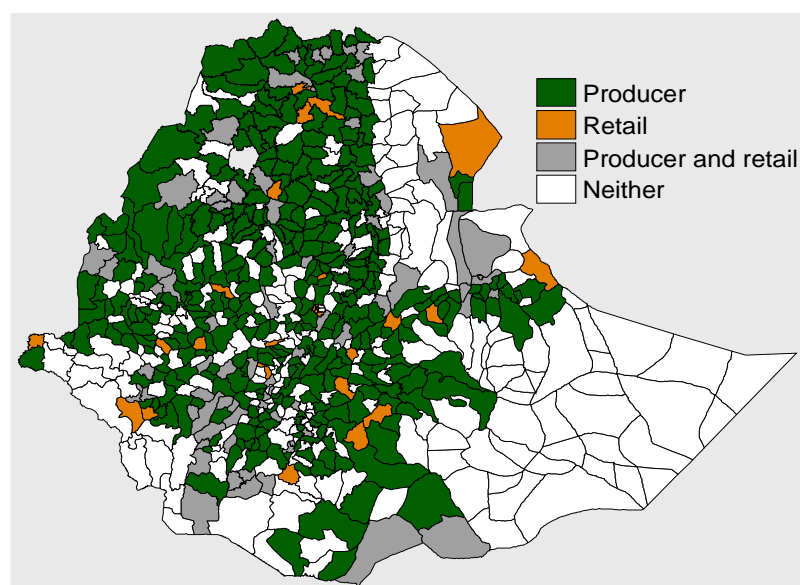


Source: Authors' computation

Notes: 1) Woredas in Hotspot 1 are the most severely affected by the drought.

2) This figure assumes that 25 rural woredas, which are not assigned a hotspot category but are surrounded by woredas that are either hotspot 1 or 2, take the hotspot category of the woredas that surround them. This includes 10 and 15 woredas categorized as hotspot 1 and 2, respectively.

Figure 2.2—Woredas, by type of price data collected



Source: Authors' computation

⁶ We expect a number of drought-related impacts on the prices in these categories. First, lower rainfall is expected to negatively affect local crop production, so crop prices are expected to be higher in 2015 than in 2014, assuming no additional cereal imports. Moreover, if markets are not well integrated, prices in drought-affected areas are expected to increase faster than in non-drought affected ones. Second, a lower demand for labor during periods of low rainfall as well as a larger supply of labor – as drought-affected households look for alternative livelihood options – are expected to lead to lower real wages. Third, during extended periods of low rainfall in which pasture areas decline and crop residue that can be used to feed cattle is scarce, the condition of cattle deteriorates. Furthermore, farmers keep cattle in part as a form of insurance against crop failure and for sales when cash is needed (de Waal 1988 Fafchamps and Gavian 1997). Given the decline in crop income resulting from the drought, farmers' sales of livestock are therefore expected to increase and cattle prices to decline in 2015 compared to 2014.

3. AGRICULTURAL PRICES

In this section we discuss the evolution of crop and livestock producer prices during the January 2014 to January 2017 period. We also compare trends in cereal prices during this period with prices in 1997 and 1998, during which period the country also experienced a major drought. Finally, we use the terms of trade between livestock and cereals to examine patterns of change in their relative prices.

3.1. Cereal prices

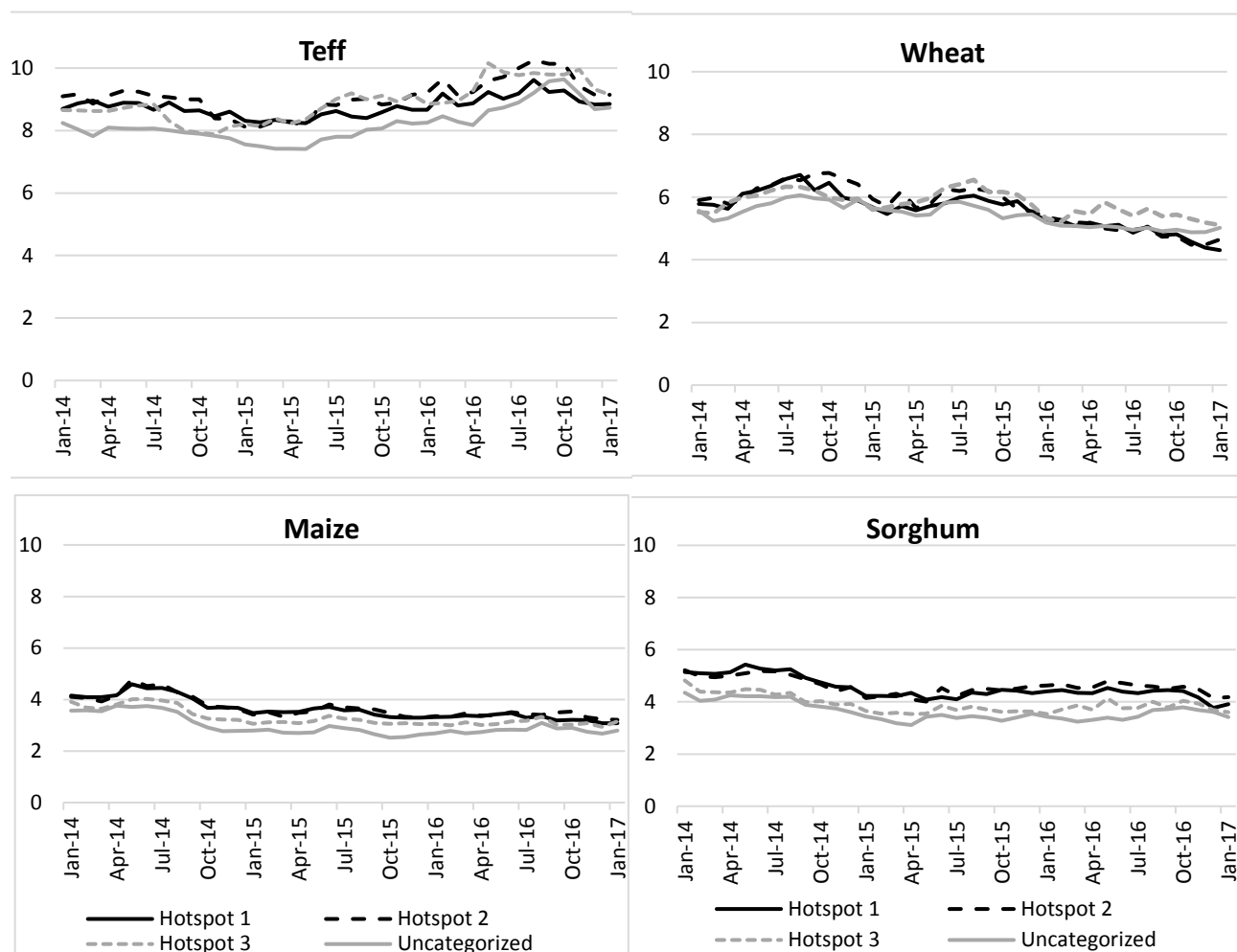
Figure 3.1 presents the price trend for four main cereals: teff, maize, wheat, and sorghum, while Figure 3.2 presents trends in the average combined price for these four cereals, plus barley. Table 3.1 presents comparisons in prices of January 2014 with the corresponding month in 2017. Three main points can be deduced from the patterns in Figures 3.1 and 3.2 and Table 3.1.

1. Cereal prices, in general, declined over this period. Compared with January 2014, the unweighted average price of cereals in January 2017 in hotspot 1 and 2 areas, were lower by about 16 and 15 percent, respectively, and 12 percent lower for all woredas combined (Table 3.1).⁷ A decline was seen in the other areas as well, with 9.2 and 9.6 percent declines in prices for hotspot 3 and uncategorized woredas, respectively.
2. Prices of the four cereals are higher for hotspot 1 and 2 woredas during most of the period studied (Figure 3.1), but more so in the beginning, indicating that the majority of woredas in these hotspot areas are usually food deficit. Higher food prices in these areas therefore often reflect the additional marketing costs required to transport products from lower-priced food surplus areas. Wheat is an exception, where its prices are relatively lower in drought-affected areas, likely reflecting the impact of the increasing food aid directed to these areas.
3. The prices of these cereals in all four woreda categories show a similar trend over the period. This is consistent with earlier findings that indicate improvements and relatively good market integration for cereal products in the last decade in Ethiopia (Minten et al. 2014), and this trend seems to continue during this era of drought.

When we look at specific crops, we note that maize showed a consistent decline in price in all the hotspot categories in 2015 and 2016 compared to 2014. This is important as maize is the biggest contributor of calories in the food consumption basket of the country, and, in particular, it is the main source of calories for poorer sections of the population (Worku et al. 2016). Compared to January 2014, maize prices had declined by nearly 87 cents per kg (22.6 percent) in January 2017. Prices of teff, mostly consumed by richer households, saw a decline at the beginning of 2015, but prices have been increasing in all areas between mid-2015 and the beginning of the last quarter of 2016, surpassing price levels seen at the beginning of 2014 in all woreda categories. In January 2017 the price of teff was 3.8 percent higher compared to the same month in 2014. Sorghum prices declined up until April 2015 but have been increasing since. However, sorghum prices in January 2017 were 22 percent lower than those in January 2014 (24 and 20 percent lower in hotspot 1 and 2 areas, respectively). Finally, wheat prices increased in the middle of 2014, but have mostly been declining since the end of that same year. Wheat prices in January 2017 were 16 percent lower than those in January 2014. More importantly, wheat prices were 25.5 and 21 percent lower in hotspot 1 and 2 areas, respectively. In non-hotspot areas wheat prices in January 2017 were 10 percent lower than those in January 2014. The decline in wheat prices in hotspot 1 and 2 areas may have been accelerated due to the provision of humanitarian food aid in those areas, which often involves wheat.

⁷ That is, cereal prices declined at monthly average rate of 0.45 percent in hotspot 1 woredas and at 0.34 percent in all woredas during the period.

Figure 3.1—Trends in real (December 2011) producer prices of teff, maize, wheat and sorghum, by woreda hotspot category, Birr/kg



Source: Authors' computation using CSA producer price data (CSA 2016a).

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

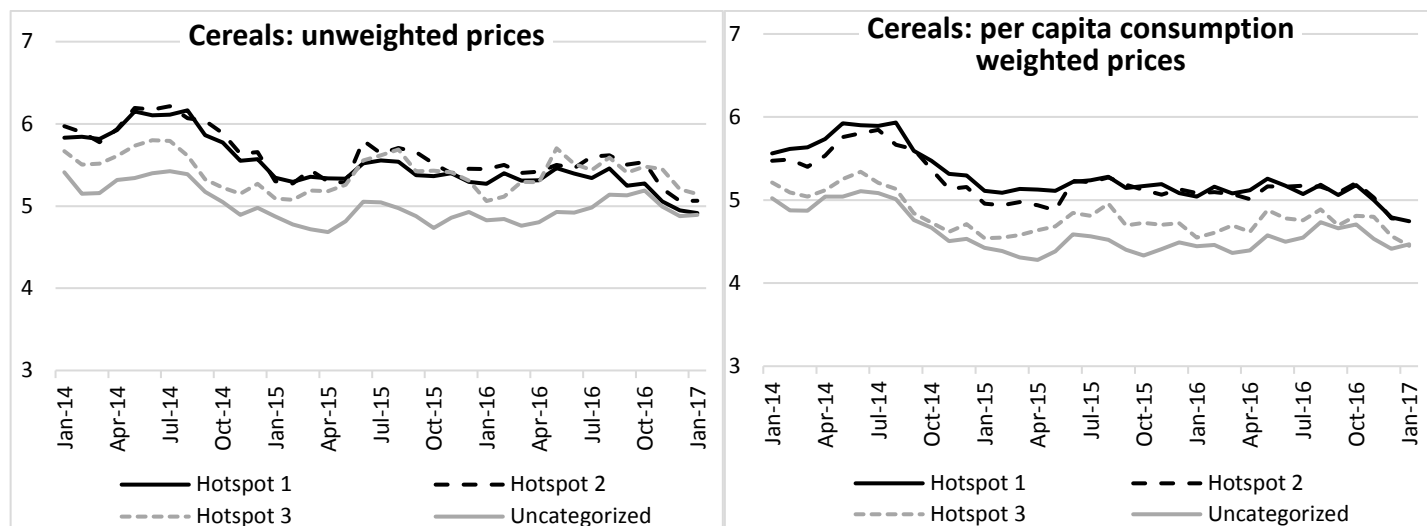
Table 3.1—Real price changes between January 2014 and January 2017 for major agricultural products and livestock, by woreda drought hotspot category, percent

Item	Woreda drought hotspot category				
	Overall	Hotspot 1	Hotspot 2	Hotspot 3	Uncategorized
Crops					
Cereals (weighted)	-12.8	-14.7	-12.9	-14.6	-11.0
Cereals (unweighted)	-12.2	-15.8	-15.2	-9.2	-9.6
Teff	3.8	1.8	0.5	5.6	5.9
Wheat	-22.6	-25.7	-21.7	-19.5	-21.9
Maize	-15.9	-25.5	-21.1	-7.4	-9.9
Sorghum	-22.2	-24.0	-19.9	-25.1	-21.6
Pulses	27.7	23.0	22.9	33.3	31.1
Oilseeds	5.7	3.1	-8.3	0.5	15.4
Enset/kocho	4.5	-7.3	14.4	29.2	3.2
Root crops	18.8	11.9	22.3	55.3	16.8
Livestock					
Cows	-2.4	-12.0	3.7	-11.9	3.6
Oxen	-5.7	-13.0	-6.5	-0.2	-2.0
Sheep	0.1	-9.4	-1.1	11.1	4.4
Goats	4.3	-2.4	2.1	15.5	6.9

Source: Authors' computation using CSA producer price data (CSA 2016a).

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

Figure 3.2—Trends in unweighted real average price of cereal (left) and per capita consumption weighted real average price of cereal (right) by woreda hotspot category, Birr/kg in December 2011 prices



Source: Authors' computation using CSA producer price data (CSA 2016a).

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

Figure 3.2 shows the simple (unweighted) average and per capita consumption weighted average real price trends of the five cereals. We calculate the weighted average cereal price by first computing the weights that are to be attached to each of the five cereals for each region. The weights are computed from the average consumption basket that Worku et al. (2016) obtained from the 2011 Household Income and Expenditures Survey (HICES) data, which we describe in further detail in Section 4.1. The weight associated with each cereal is computed for each region by taking the share of each cereal in total per capita consumption of the five cereals.⁸ These weights assign a higher/lower value to crop types that constitute a larger/smaller share in the cereal consumption basket of each region. In so doing, the weights provide further insight into how the welfare of residents in each of the hotspot areas were affected due to changes in cereal prices.

We note overall that both unweighted and weighted average cereal prices were lower in 2016 and in the beginning of 2017 than in 2014 for all hotspot areas. Moreover, prices on average were rather stable over the last 12 months considered, except for the typical seasonal increases which start at the beginning of the main rainy season, around May, until August, when farmers' crop stock from the previous harvest is low. We also note that the uncategorized woredas – those not affected by the drought – had much lower prices throughout the period, i.e., before and after the onset of the drought.

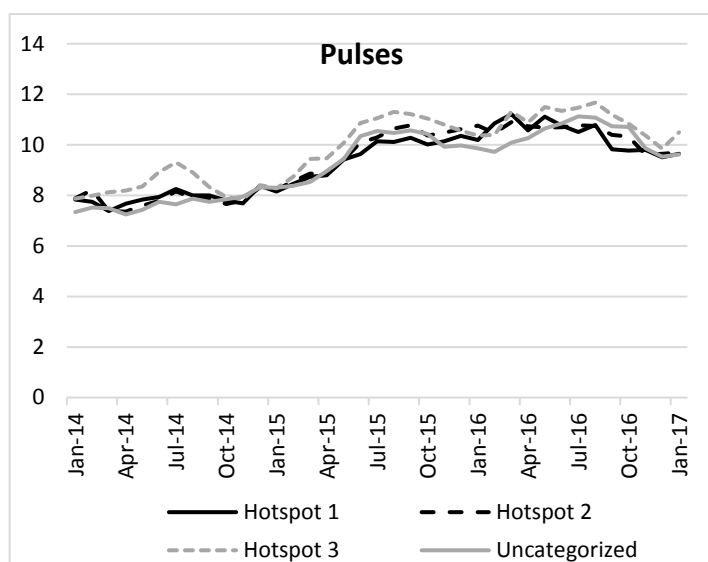
3.2. Other crops

When we look at the pulses category,⁹ a different picture emerges. The prices of pulses have increased substantially over the period considered. Relative to January 2014, prices of pulses in January 2017 were at least 1.8 Birr per kg higher in all three hotspot areas as well as in the non-hotspot areas. That is, January 2017 prices in all woredas were at least 23 percent higher relative to January 2014 (Figure 3.3 and Table 3.1). The higher price of pulses could be explained by local factors, such as a reduced supply, since the national production of pulses had already diminished in 2014/15 according to the estimates by CSA. In addition, international factors may have played a part, given that the international prices of pulses were higher in 2015 and 2016 than in 2014.

⁸ That is, for each of the 11 regions, the weight attached to the price of each crop is computed as: $Weight_j = (\text{Per capita consumption of cereal}_j / \sum_{j=T,W,M,S,B} \text{Per capita consumption of cereal}_j)$ where T, W, M, S, and B stand for teff, wheat, maize, sorghum, and barley, respectively.

⁹ Pulses include chickpeas, haricot beans, horse beans, lentils, field peas, vetch, and soya beans.

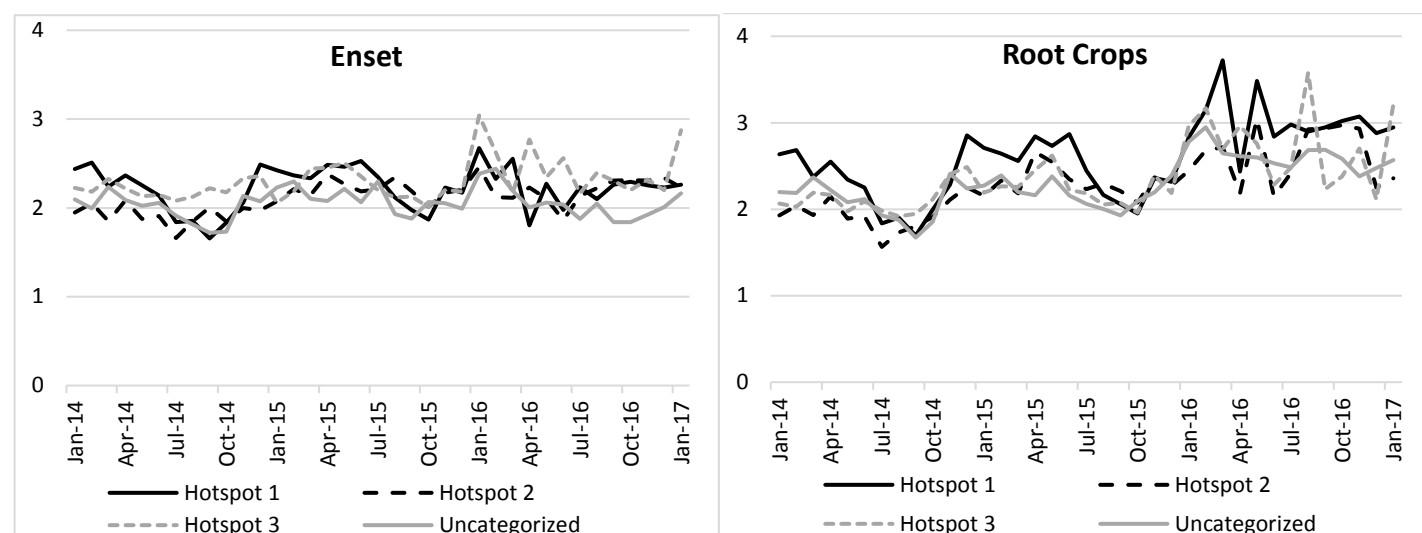
Figure 3.3—Trends in real pulses prices by woreda hotspot category, Birr/kg in December 2011 prices



Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

In Figure 3.4 we further provide trends in real producer prices of enset (unprocessed 'kocho'), which is consumed in large parts of SNNP and some parts of Oromia, and of root crops.¹⁰ Enset prices in January 2017 were 4.5 percent higher than those in January 2014 for an average woreda. Enset price in January 2017 showed a larger increase of about 29 percent than January 2014 in hotspot 3 areas while enset prices were 7 percent lower in hotspot 1 woredas. Root crop prices appear to have generally increased. They further show typical high seasonality with significantly lower prices observed in the third quarter of each year. Root crop prices in January 2017 were 19 percent higher than prices in January 2014, averaged over all areas. However, the increase was less pronounced in hotspot 1 woredas compared to the other ones. On the other hand, hotspot 3 and 2 woredas prices showed an increase of 55 and 22 percent, respectively. These root crops, however, are relatively less important in the food consumption basket (see Figure 4.1 below).

Figure 3.4—Trends in real producer prices of enset and root crops by woreda hotspot category, Birr/kg in December 2011 prices



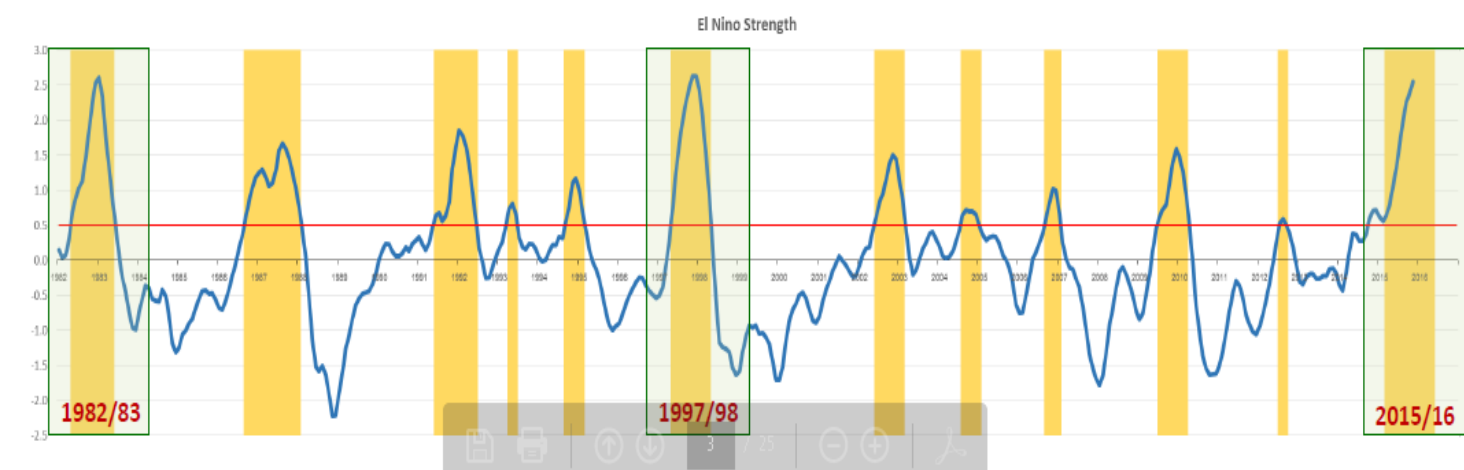
Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

¹⁰ Root crops includes potatoes, sweet potatoes, and godere (*Colocasia esculenta*, taro).

3.3. Comparing recent cereal price evolution with that of a previous major drought in Ethiopia (1997-1998)

To put the price movements during the current drought in perspective we compare average price evolutions over the period 2015 to 2016 with price movements during the drought that hit Ethiopia in the *Meher* season of 1997/1998.¹¹ It has been stated that the current drought shows many similarities with the drought during 1997/1998 (VAM-WFP 2015). For example, Figure 3.5 maps anomalies in sea surface temperatures over the last 30 years, showing similar deviations in 2015/16 to those in 1997/98.

Figure 3.5—Sea surface temperature anomalies



Inter-tropical Pacific Sea Surface Temperature anomalies from 1982 to present. The current event and the two most intense events in record are highlighted. Red line is the El Niño threshold

Source: VAM-WFP (2015)

However, the 1997/98 and 2015/16 droughts have seemingly one important difference: CSA estimates indicate that total cereal production in 1997/98 was 25 percent lower compared to 1996/97. In contrast, cereal output, which was only 2 percent lower in 2015/16 relative to 2014/15, appears to be less impacted by the recent drought, although it should be noted that the recent drought had a more damaging impact on severely affected areas (CSA 1998; 2016). We compare the price evolution during the 1997/98 drought with the current situation in the country. We assess prices using indices constructed from quarterly average real prices of the four main cereals and the wages of unskilled laborers. In Figures 3.6 and 3.7, the indices in each quarter of 1997-1998 and 2015-2016 are computed, taking prices in the first quarter of 1997 and 2015, both of which are labelled as “Year 1 Q 1”, as the base, respectively.

The comparison of prices for these two periods indicates that cereal prices were generally more stable during the recent drought, in contrast to the 1997 and 1998 period, during which prices of all four main cereals increased relatively rapidly at national level. Real prices of sorghum, wheat, maize and teff were 13, 31, 38, and 47 percent, respectively, higher in the third quarter of 1998, compared to the first quarter of 1997, before showing a large drop in the fourth quarter of 1998, likely because of incoming food aid.¹²

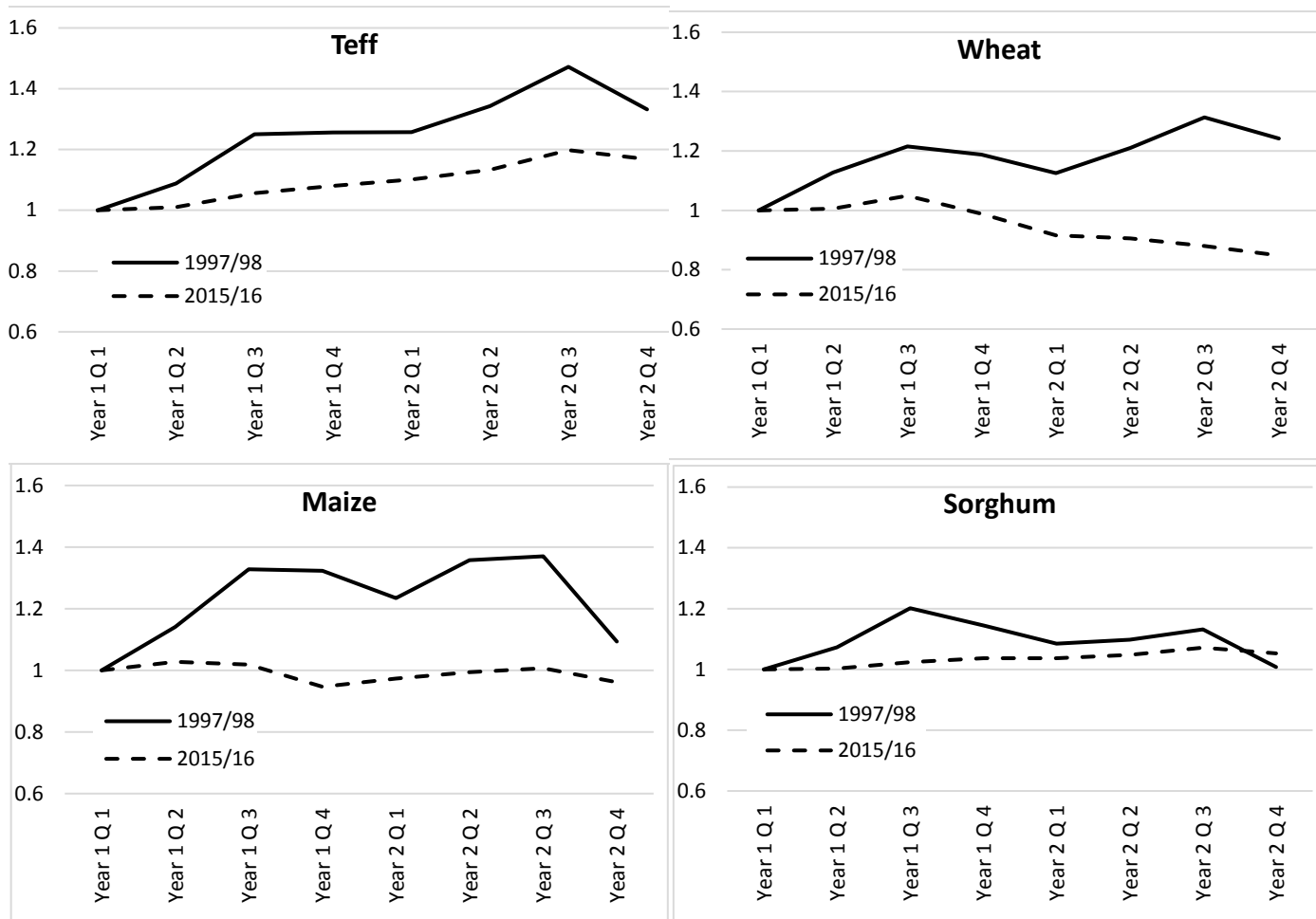
Compared with average prices in the first quarter of 2015, prices of maize and wheat were only slightly higher in the second and third quarters of 2015 before they declined in the fourth quarter of 2015. Wheat prices in the fourth quarter of 2016 were much lower than prices in the first quarter of 2015 while maize prices are only slightly lower. Teff prices have been increasing steadily beginning from the second quarter of 2015 with marginal decline in the fourth quarter of 2016. Although less pronounced, the same pattern is observed

¹¹ In the second update of this paper (Bachewe et al 2016b) we further discusses how prices during 2015 and 2016 compare with prices observed in periods of normal rainfall.

¹² Although food aid pledges by donors covered almost all of the estimated food shortfall requirements in 1997/1998, deliveries fell well short of target levels. This was in part due to the closure of the Massawa and Assab ports in Eritrea following border conflicts between Eritrea and Ethiopia, and the congestion of the port in Djibouti.

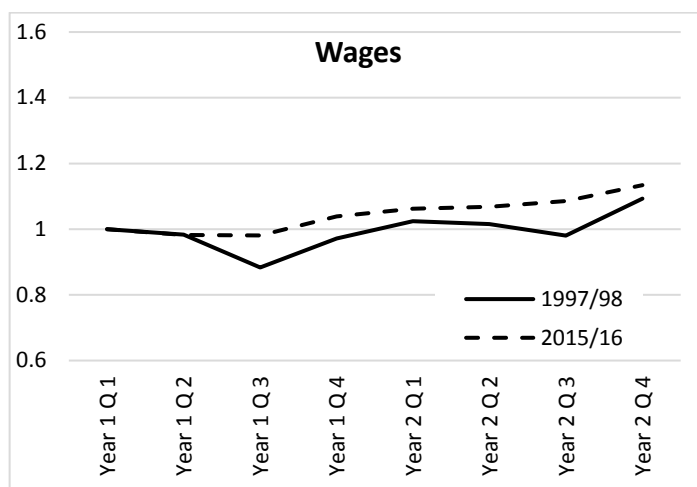
for sorghum. However, cereal price indices during the 1997 and 1998 period showed a rather higher rise. Quarterly average price indices were higher than 1.0 during 1997-1998 for all crops and in all quarters.¹³

Figure 3.6—Trends in price indices of cereal crops during 1997/98 and 2015/16



Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

Figure 3.7—Trends in wage indices during 1997/98 and 2015/16



Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

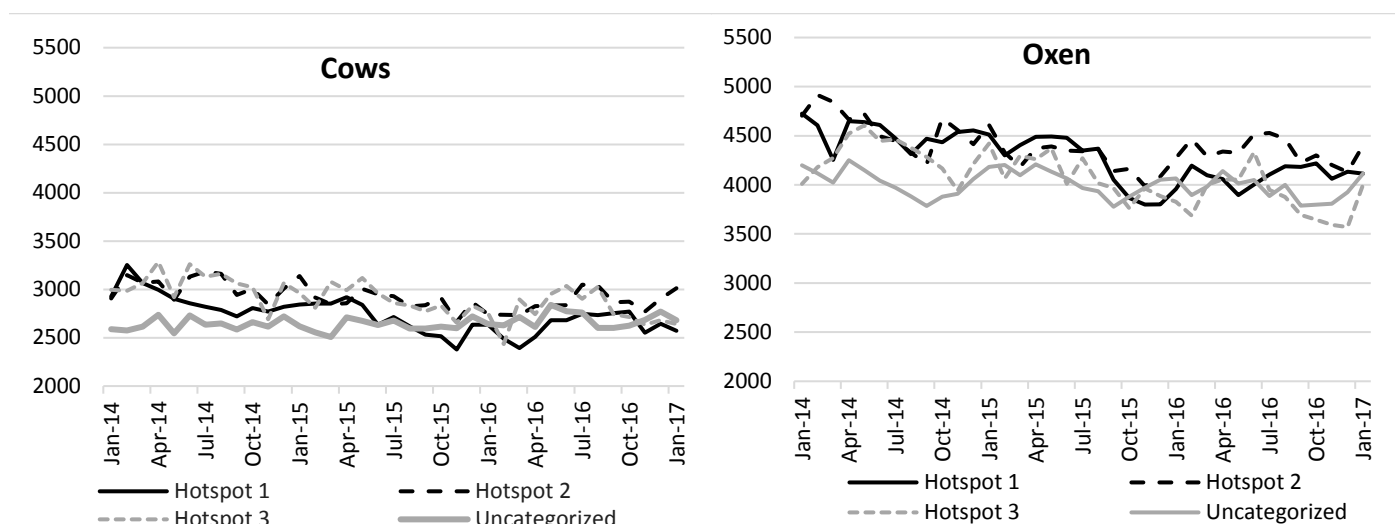
¹³ The previous version of this paper (Bachew et. al. 2016b) briefly explains the movements in cereal prices observed during the 1997/98 and 2015/16 drought periods.

Relative to the first quarter of 1997, wages were lower in all quarters of the same year and in the third quarter of 1998. Relative to the first quarter of 2015, wages were lower also in the second and third quarters of 2015, while they were slightly higher in the remaining period, ending 13 percent higher in the fourth quarter of 2016 relative to the first quarter of 2015. However, increases in wages were slow in the latter period, which could be attributed to the seasonality of agricultural labor and wages (Bachewe et al. 2016).

3.4. Livestock prices

With regard to livestock, four categories – cows, oxen, sheep, and goats – are examined, again differentiated by hotspot area. Figure 3.8 shows the evolution of cattle producer prices. This figure illustrates, especially in hotspot 1 and hotspot 2 areas, that prices of both cows and oxen have been characteristically declining until the first quarter of 2016 and prices generally increased in the remaining three quarters of 2016. However, cow and oxen prices at the end of the study period were still lower relative to the beginning of 2014. Patterns in oxen prices were similar across hotspot woredas: prices declined in all areas during most of 2014 and 2015 and prices appear to have improved in 2016, when they grew in at least two of the four quarters of 2016 in all areas. Despite their increase in 2016 prices in January 2017 were still lower than January 2014 prices. In hotspot 1 areas the price of oxen in January 2017 was over 600 Birr lower relative to January 2014, a decrease of about 13 percent. Oxen prices declined by 305 Birr (6.5 percent) in hotspot 2 areas and by 2 percent in non-hotspot woredas during this time period while in hotspot 3 areas prices in January 2017 were about the same as in January 2014 (Table 3.1).

Figure 3.8—Trends in real producer cattle prices by woreda hotspot category, Birr/head in December 2011 prices

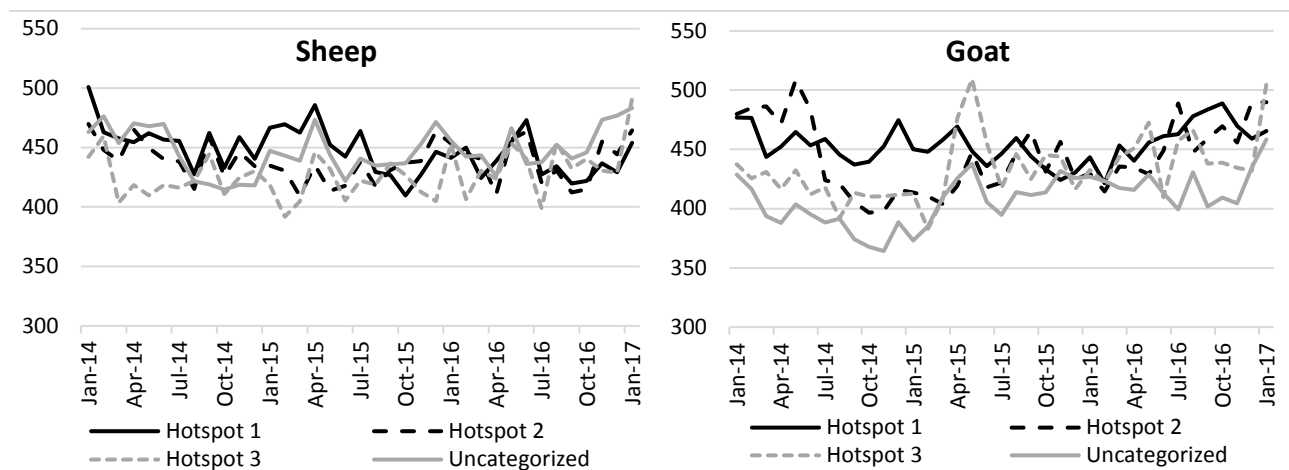


Source: Authors' computation using CSA producer price data (CSA 2016a).

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

Figure 3.9 illustrates trends in prices of sheep and goats. In the case of sheep, we note prices in January 2017 were 9.4 and 1 percent lower than in January 2014 in hotspot 1 and 2 areas while they were 11 and 4.4 percent higher in hotspot 3 and uncategorized areas, respectively. In particular, sheep prices declined in hotspot 1 areas and grew in hotspot 3 areas throughout of the period. The opposite movement of sheep prices in different hotspot areas appear to have offset each other such that the overall average sheep prices in January 2017 were about the same as January 2014 prices. Goat prices in January 2017 were higher than prices in January 2014 in all areas except in hotspot 1. Aside differences in rates and months/quarters when they began, livestock prices appear to have improved/increased in 2016 and particularly in the last two quarters of 2016 and January 2017.

Figure 3.9—Trends in real producer sheep and goat prices by woreda hotspot category, Birr/head in December 2011 prices

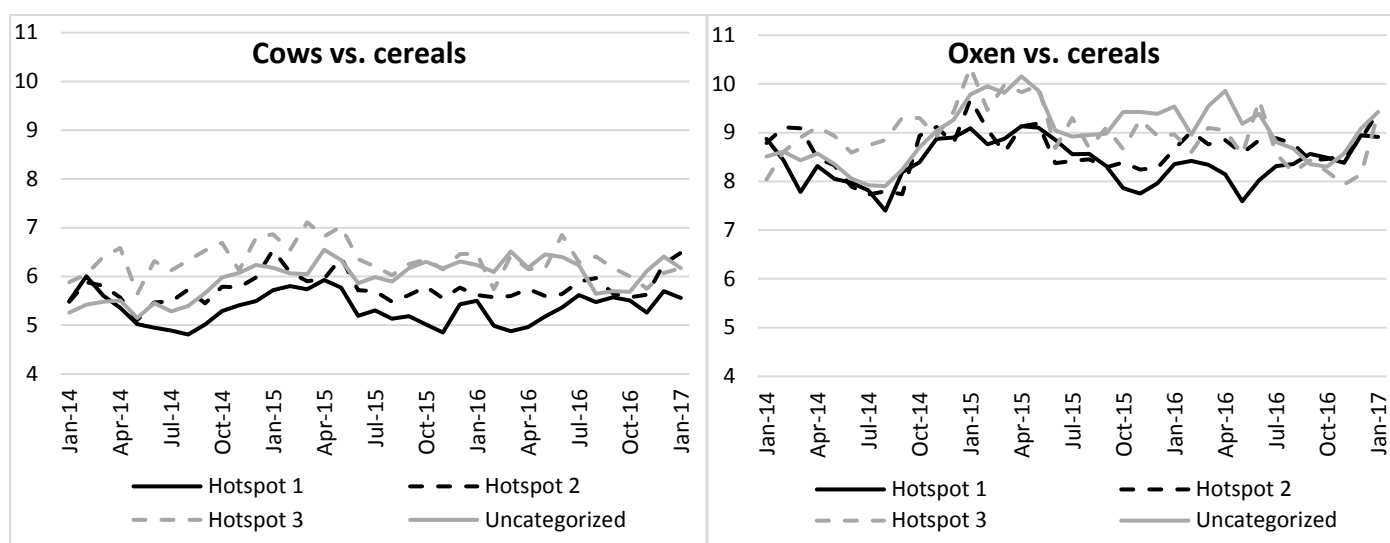


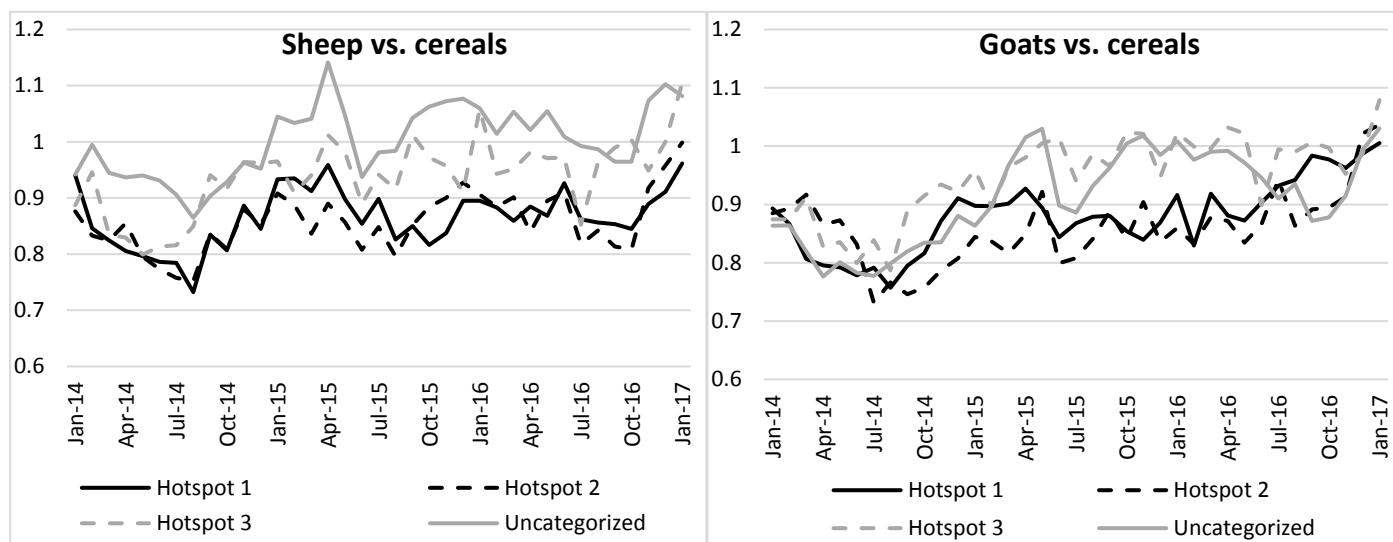
Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

3.5. Terms of trade between livestock and cereals

We compute the terms of trade (ToT) between each livestock type and cereals as a ratio of real livestock prices and the per capita consumption weighted average price of 100 kg of cereals (see Section 3.1 for a description of the computation of weighted average cereal price). Figure 3.10 shows trends in ToT for each of the four livestock species versus cereals. The ToTs show similar patterns during 2014 in areas both severely affected and less affected by drought. However, they start diverging starting from the middle of 2015, during which time the ToTs in drought affected areas either remain the same or decline, while they improve in less affected areas. Accordingly, the ToT of cows versus cereals increased by 12.1 percent, while those for oxen versus cereals increased by 8.3 nationally when comparing January 2017 with January 2014 (Table 3.2). The increase in cow and oxen versus cereals ToT is lowest in hotspot 1 areas and mostly increases as the severity of the drought declines. In areas not affected by drought, the ToT between cows and cereals increased from 5.5 in January 2014 to 6.4 in January 2017; that is, in uncategorized woredas one cow was worth of 5.5 quintals of cereals in January 2014 and 6.4 quintals in January 2017. Expressed another way, the quantity of cereals needed to barter with a cow increased by 17.4 percent. Similarly, the ToTs of oxen, sheep, and goats versus cereals increased by 11, 18.6, and 22 percent, respectively, in uncategorized areas.

Figure 3.10—Trends in terms of trade of livestock types with cereal crops, by woreda hotspot category





Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

Table 3.2—Change in terms of trade between livestock and cereals comparing January 2017 with January 2014, by woreda hotspot area, percent change

Items compared	Overall	Hotspot 1 woredas	Hotspot 2 woredas	Hotspot 3 woredas	Uncategorized woredas
Cattle vs cereals	9.8	0.9	12.8	11.9	13.3
Cows vs cereals	12.1	1.3	19.6	5.0	17.4
Oxen vs cereals	8.3	0.7	8.5	17.0	10.8
Sheep and goats vs cereals	17.8	7.5	16.5	36.6	20.1
Sheep vs cereals	15.2	2.4	15.0	34.7	18.6
Goats vs cereals	20.4	12.8	18.0	38.5	21.8
Sheep and goats vs teff	-1.6	-9.3	0.1	9.4	0.3
Sheep and goats vs wheat	-18.0	24.4	27.6	24.2	15.9
Sheep and goats vs maize	95.5	22.4	25.8	42.7	38.1
Sheep and goats vs sorghum	36.7	19.8	23.1	72.3	43.6

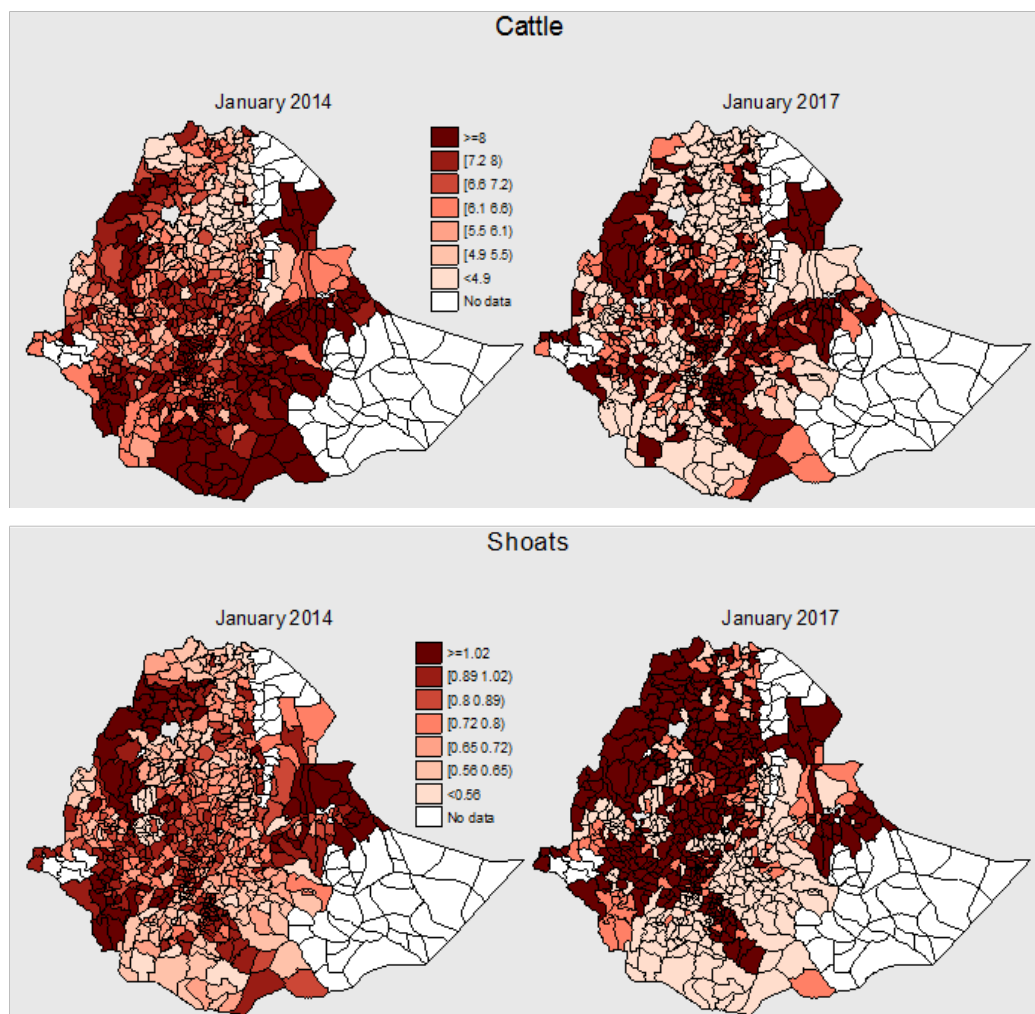
Source: Authors' computation using CSA producer price data (CSA 2016a).
 Note: Woredas in Hotspot 1 are the most severely affected by the drought.

The maps in Figure 3.11 shows the distribution of the terms of trade of cereals versus the average of cows and oxen (cattle) prices and for cereals versus the average of sheep and goats (shoats) prices for the months of January 2014 and January 2017.¹⁴ Consistent with Table 3.2, the maps show that the terms of trade of sheep and goats and cattle versus cereals in January 2017 were generally higher in the western half and central parts of the country. As shown in Figure 2.1 these areas mostly comprise uncategorized and hotspot 3 areas, including Western and Central Amhara, Western and South-western Oromia, and Benishangul-Gumuz. The map's symbology highlights the increase in terms of trade, with a large number of woredas in those areas changing colors from a light-red in the January 2014 map to a darker red color in the January 2017 map. In contrast, little improvement or declining ToTs are visualized across the maps in hotspot 1 and hotspot 2 woredas. The improvement in the shoats versus cereals ToT is particularly clear given the higher number of woredas that change colors from light-red in the January 2014 map to darker red in January 2017 map. This is true also for cattle despite a larger area of the January 2014 map is dark-red. This apparent contradiction is due to some woredas with larger surface area in south-western and southern parts of the country, which were severely affected by the drought and hence became light-red. However, the number of

¹⁴ In these maps we use zonal average prices for woredas with no price data or we assume that markets surveyed are representative of zones.

small-sized woredas that become darker red (in western and central parts) more than compensated for this deterioration in the ToT.¹⁵

Figure 3.11—Distribution of terms of trade of cattle and sheep and goats (shoats) versus cereals during January 2014 and January 2017



Source: Authors' computation

4. CONSUMPTION AND WAGES

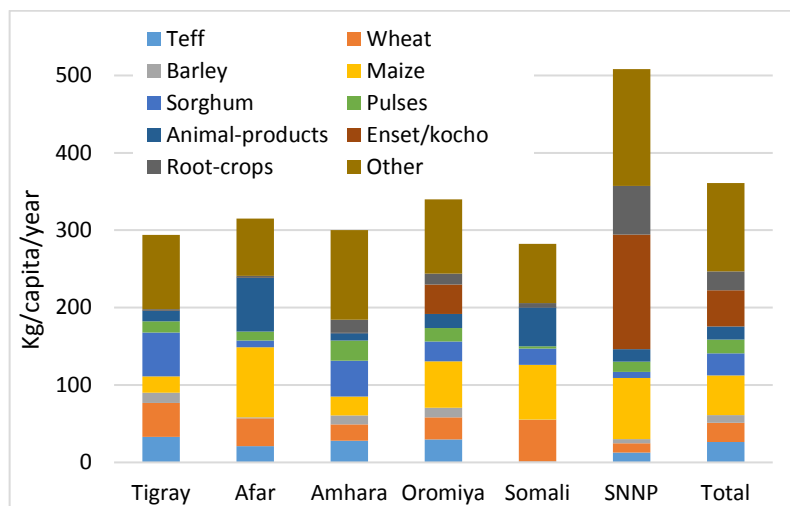
4.1. Consumption

To better understand to what extent price changes affect the consumption basket, we examine the quantity of different crops and products consumed. Figure 4.1 shows these data for the four major crop producing regions, as well as for Afar and Somali regions, the two pastoralist areas that were badly hit by the drought. We use the average consumption basket, obtained from the Household Income and Expenditures Survey (HICES) in 2011 (Worku et al. 2016). Figure 4.1 illustrates that cereals are, in quantity terms, very important in these regions. They comprise 60 percent in Tigray, decreasing to 53 percent and 56 percent in Afar and Somali regions, and still remain at 50 percent in the Amhara and Oromia regions. In contrast, they comprise only 24 percent of the quantity consumed in SNNP due to the high levels of consumption of enset and root crops there.

¹⁵ The data used to make the maps indicate that 156 woredas (out of the 613 with ToT data) remained in the same category (had the same cereal versus cattle ToT) in both January 2014 and January 2017. ToT deteriorated for 126 while it improved for 331 of the woredas. For instance, there were 157 woredas in January 2014 in the highest category (darkest-red), out of which 88 were also in the highest category in January 2017. This in turn implies that the ToT of 69 deteriorated in January 2017. The latter, together with the number of woredas in January 2017 in the highest category, 237, implies that the number with improved ToT (that changed color to darkest-red) is more than twice the number that exited the category.

The most important crop in terms of contribution to calorie intake is maize. It accounts for nearly 20 percent of the average calories consumed per capita. Sorghum accounts for 12 percent, while teff and wheat make up 11 percent and 10 percent of calories consumed, respectively.¹⁶ Figure 4.1 shows how different cereals have different levels of importance by region. Maize is the most important cereal in Somali and Afar, regions that were hard-hit by the drought; average annual per capita consumption of this crop is 71 and 90 kg, respectively. Maize consumption is also high in SNNP at 79 kg per capita. Wheat is also an important crop in the drought-affected areas. Annual per capita wheat consumption stands at 36 kg in Afar, 54 kg in Somali, and 44 kg in Tigray. However, none of these crops have shown price rises over the period considered.

Figure 4.1—Annual per capita consumption, kg/capita/year



Source: Authors' calculations from CSA, HICES 2011.

We use these consumption data to evaluate changes in the costs of consumption baskets, at least for the starchy crops, in the four different areas considered. We use the average consumption basket, together with CSA's producer and retail price series,¹⁷ to investigate the extent to which the cost of cereal, kocho/enset, and root crop per capita consumption was impacted by price changes between January 2014 and January 2017.

Table 4.1 shows changes in per capita consumption costs comparing January 2014 and January 2017 by woreda hotspot category.¹⁸ The results illustrate that the costs of the regular consumption basket of cereals declined by 13.3 percent over the January 2014 to January 2017 period. This reduction was higher in the hotspot 3 category, at 19 percent, than in the hotspot 1 (17.4 percent), hotspot 2 (14.4 percent), and the uncategorized (13.7 percent) areas. If we include other important crops in the consumption basket, we find that the reduction of per capita consumption costs was not as great as for cereals alone, driven by increases in prices of root crops. However, the average cost of the consumption basket still decreased by 12.2 percent with cereal and root crops combined, and by 10.5 percent when combining cereals, root crops, and kocho (Table 4.1). Valuation using retail prices shows a similar pattern to the valuation by producer prices. It is further to be noted that while the real price decreased, nominal costs increased given prevailing inflation rates in the country – the January 2017 general, food, and non-food Consumer Price Indices (CPI) were 6.0, 5.0, and 7.4 percent higher, respectively, relative to a year earlier.

¹⁶ Barley and other cereals are less important. While processed cereals account for almost 5 percent of expenditures, however they contribute relatively less towards calories, with 2 percent of calories provided by this category.

¹⁷ Given that a large proportion of the population relies on producing food for their own consumption, the valuation of consumption is not straightforward. We therefore opt to present valuations based on both producer prices and retail prices.

¹⁸ As we do not have data on consumption baskets at woreda level, we used the regional consumption baskets coming out of the HICES of 2011 and imputed those at the woreda level, in order to aggregate these data to a hotspot category.

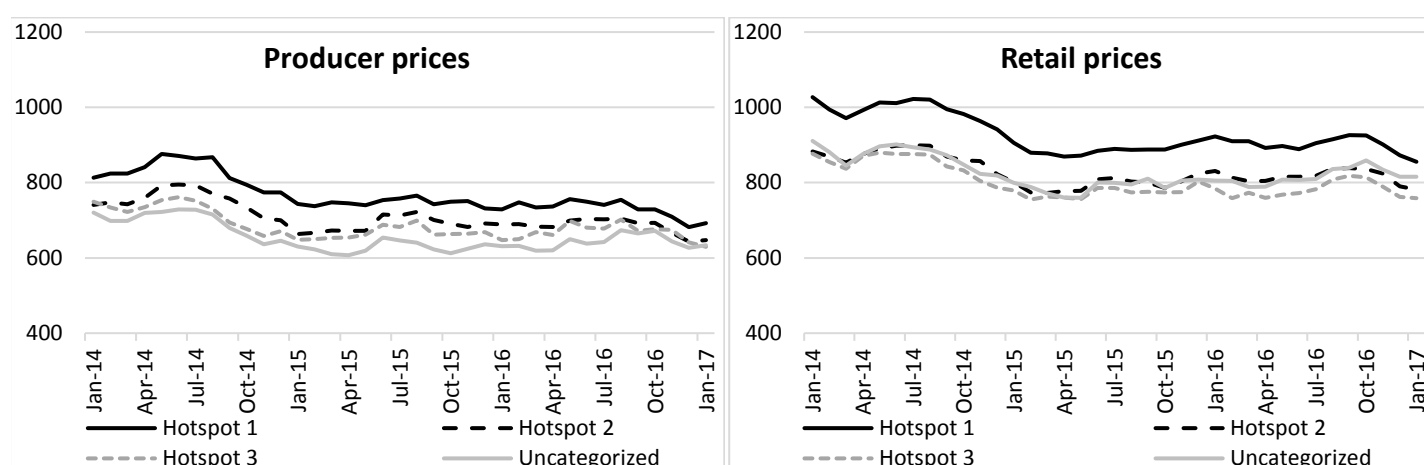
Table 4.1—Changes in real costs of per capita consumption spending computed using producer and retail prices, comparing January 2017 with January 2014, by woreda hotspot category, percent change

	Overall	Hotspot 1 woredas	Hotspot 2 woredas	Hotspot 3 woredas	Uncategorized woredas
Valuation using producer prices					
Cereals	-13.3	-17.4	-14.4	-19.0	-13.7
Cereals and root crops	-12.2	-16.4	-12.4	-15.3	-12.7
Cereals, root crops and kocho	-10.5	-14.9	-8.4	-12.3	-11.3
Valuation using retail prices					
Cereals	-12.7	-20.1	-12.9	-15.7	-11.7
Cereals and root crops	-11.1	-18.4	-11.0	-12.5	-9.7
Cereals, root crops and kocho	-14.7	-20.8	-18.3	-14.7	-15.4

Source: Authors' computations

Figure 4.2 shows the evolution of the value of the cereal consumption basket by month, using producer prices in the graph on the left and retail prices on the right. The graphs illustrate that the cost of the cereal consumption basket especially decreased towards the end of 2014, and has been rather stable since then in all hotspot categories. However, the cost of the cereal consumption basket is considerably higher in the most drought-affected woredas. However, this situation existed before the onset of the drought, as most of these affected areas are net importers of cereals.

Figure 4.2—Trends in real cost of per capita cereal consumption using producer prices (left) and retail prices (right) to value consumption by woreda hotspot category, Birr/kg in December 2011 prices



Source: Authors' computations

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

We also compare changes in the cost of the cereal consumption basket over the two drought periods discussed earlier (Figure 4.3). We rely on the same consumption basket in the 2011 HICES data, which we described above, and use producer and retail prices to value consumption quantities. The graph on the left in Figure 4.3 shows that the cost of the consumption basket valued at producer prices increased in the third quarter of 1998 by 34 percent compared to the beginning of 1997. However, it then declined by 14 percent in quarter 4 of 1998 summing only to an 19.4 percent rise in the cost of the cereal consumption basket compared to first quarter of 1997. In contrast, in the current drought, the cost of cereal consumption has remained almost the same with increases of less than 4 percent in all quarters of 2015 and through January 2017, compared to costs at the beginning of 2015.¹⁹

¹⁹ It is to be noted that the year before the 1997/98 drought, it was a relatively good agricultural year as grain production had increased in 1996/97 by 3.9 percent compared to 1995/96, according to CSA estimates. This might have led to slightly lower producer prices at the beginning of the period considered.

Figure 4.3—Comparison of indices of the real costs of the cereal consumption basket during the droughts of 1997/98 and 2015/16, using producer prices (left) and retail prices (right) to value consumption



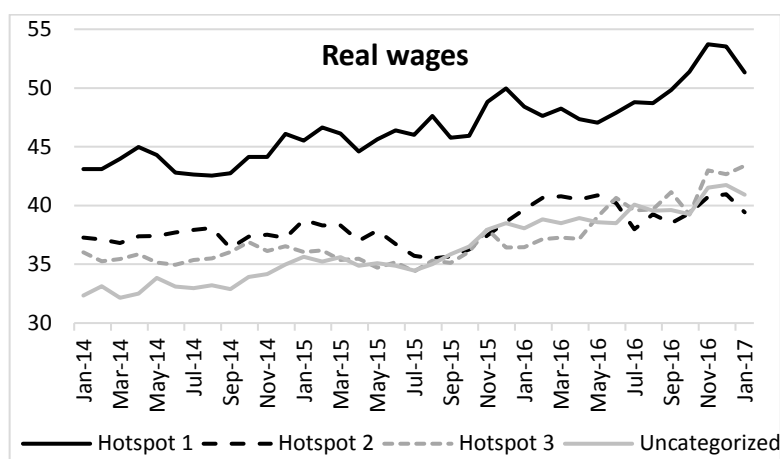
Source: Authors' computations.

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

4.2. Wages

Finally, we look at the evolution of wages of casual laborers over the same period. Surprisingly, based on these CSA data (2017b), wages for unskilled labor for hotspot 1 and 2 areas are found to be relatively higher than the other areas (Figure 4.4). Further, we see no deterioration in these wage rates in 2015, with the exception of decline in wages in the first half of 2016 in hotspot 1 areas. However, wages generally increased in the remaining period (at average monthly rate of 0.52, 0.2, 0.56, and 0.68 percent in hotspot 1, 2, 3, and uncategorized areas during January 2014-January 2017) such that January 2017 real wages were 19.0, 6.0, 20.5, and 26.5 percent higher than January 2014 wages in the respective areas. Rural wages in Ethiopia have been characterized by important real growth over the last decade and that growth seems to have continued up to the end of 2015 (Bachewe et al. 2016a). The overall results therefore suggest that, while there are reported incidences of rapid declines in wages in some affected areas (as documented by the AKLDP studies), this does not appear to be widespread over the period studied.

Figure 4.4—Trends in real wages by woreda hotspot category, December 2011 Birr



Source: Authors' computation using CSA retail price data (CSA 2016b).

Note: Woredas in Hotspot 1 are the most severely affected by the drought.

5. CONCLUSIONS

Our research studies some of the effects of the 2015-16 drought on Ethiopia's agricultural and food economy. Several findings emerge from our analysis, which mainly uses CSA's nationally representative producer price data (CSA 2017a) and covers the January 2014 to January 2017 period.

First, real cereal prices have been declining over the period studied. Wheat and maize prices are especially on the decline, which is important to note, given their share in the total calories consumed within the drought affected areas. We estimate that the costs of cereal consumption basket at the national level declined by 13.3 percent in January 2017 compared to January 2014. We further note that there are small differences between the drought-affected and non-affected areas in the evolution of cereal prices, particularly of wheat, over this period. The slightly larger decreases in cereal prices in drought-affected areas might be due to the food aid targeted to those areas.

Second, pulses and root crops, on the other hand, do show an increase in prices. Price increases of pulses were as high as 28 percent in January 2017 compared January 2014. The prices of root crops overall also showed an important increase of 19 percent over the same period. The price of enset was 4.5 percent higher in January 2017 compared to January 2014. The cost of a typical consumption basket decreased compared to 1 or 2 years earlier. This is the case for all woredas (districts) in the country, in the drought-affected as well as in the non-drought affected areas. It is estimated that the costs of per capita consumption basket of cereals, root crops, and enset declined at the national level by 10.5 percent.

Third, livestock prices are a good predictor of upcoming food insecurity. Prices of all four livestock species studied (cows, oxen, sheep, and goats) were lower in January 2017 compared to three years earlier in most drought affected areas. This contrasts with woredas that have not been affected by drought, as we do not observe a decline in most livestock prices in these areas. This price decline is likely caused by a lack of pasture regeneration and therefore degenerating body conditions of livestock, as well as lack of livelihood opportunities because of losses in agricultural output, driving increased sales of livestock. Considering crop and livestock prices jointly reveals an improvement in livestock-cereal terms of trade, mainly because the decline in livestock prices was slower than the decline in cereal prices.

Fourth, wages of unskilled laborers have not yet been characterized by large-scale downward trends at the national level. We note a slight downward trend, though, in hotspot 1 areas during the first half of 2016, confirming reports of some localized effects on wages, and labor markets more generally, in these drought-affected areas (AKLDP 2016a; 2016b; 2016c).

Fifth, when we compare the movement of prices over the last two years with those during another period stricken by El Niño triggered droughts (1997/98), during which cereal production was estimated to have declined by 25 percent, we note that prices appear to follow a different pattern in recent years. While the recent drought created enormous hardship, it might have been less severe in terms of food and agricultural prices than was experienced during the 1997/98 drought. This is likely because of the large wheat imports in the country in 2015 and 2016 and the lower impact of the drought on national cereal production in 2015/16 compared to 1997/98 (Bachew et al. 2016b).

Overall, the analysis of the CSA prices suggest that there is no indication of major large-scale effects of the drought on cereal prices and wages. While the cost of consumption baskets might not have increased over the period considered at the national level, as well as in the drought-affected areas, there is, however, a clear need to further assist those households that have directly been affected by the drought – and in the aftermath of the drought. The livelihoods of such households have been significantly adversely affected due to the drop in or loss of agricultural output and depletion of their agricultural or other assets.

REFERENCES

- AKLDP (Agricultural Knowledge, Learning, Documentation and Policy Project). 2016a. *Early Impacts of Drought in Amhara National Regional State*. Field Notes. Addis Ababa: AKLDP.
- AKLDP (Agricultural Knowledge, Learning, Documentation and Policy Project). 2016b. *Early Impacts of Drought in South Tigray Zone*. Field Notes. Addis Ababa: AKLDP.
- AKLDP (Agricultural Knowledge, Learning, Documentation and Policy Project). 2016c. *Early Impacts of Drought in Oromia National Regional State*. Field Notes. Addis Ababa: AKLDP.
- Bachewe, F., G. Berhane, B. Minten, and A.S. Taffesse. 2016a. *Non-farm Income and Labor Markets in Rural Ethiopia*. Ethiopia Strategy Support Program Working Paper 90. Addis Ababa: IFPRI.
- Bachewe, F., F. Yimer, and B. Minten, 2016b. *Agricultural Prices During Drought in Ethiopia: An Updated Assessment Using National Producer Data (January 2014 to June 2016)*. Ethiopia Strategy Support Program Working Paper 97. Addis Ababa: IFPRI
- CSA (Central Statistical Agency). 2015a. *Producer Price Survey*. Addis Ababa: Federal Democratic Republic of Ethiopia.
- CSA (Central Statistical Agency). 2017b. *Consumer Price Survey*. Addis Ababa: Federal Democratic Republic of Ethiopia.
- CSA (Central Statistical Agency). 2017c. *Country and Regional Level Consumer Price Indices*. Addis Ababa: Federal Democratic Republic of Ethiopia.
- CSA (Central Statistical Agency). (1998, 2005, 2006, ..., 2016). *Agricultural Sample Survey: Volume I: Report on Area and Production of Crops (Private Peasant Holdings, Meher Season)*. Addis Ababa: Federal Democratic Republic of Ethiopia.
- CSA (Central Statistical Agency). 1998. *Agricultural Sample Survey: Volume I – Report on Area and Production of Crops (Private Peasant Holdings, Meher Season)*. Addis Ababa: Federal Democratic Republic of Ethiopia.
- De Waal, A. 1988. "Famine Early Warning Systems and the Use of Socio-Economic Data." *Disasters* 12 (1): 81-91.
- EGTE (Ethiopia Grain Trade Enterprise). 2016. *Monthly wholesale grain prices*, accessed on September 28 2016, available at: <http://www.egte-ethiopia.com/en/2014-04-07-05-30-44/market-statistics.html>
- EWRD (Early Warning and Response Directorate). 2014. *Hotspot (Woredas of Concern) Classification Guideline*. Addis Ababa: Disaster Risk Management and Food Security Sector of the Federal Ministry of Agriculture.
- Fafchamps, M., and S. Gavian. 1997. "The Determinants of Livestock Prices in Niger." *Journal of African Economies* 6 (2): 255-295.
- FEWS NET (Famine Early Warning Systems Network). 2015. *Illustrating the Extent and Severity of the 2015 Drought*. Ethiopia Special Report. Addis Ababa: FEWS NET Ethiopia.
- FEWS NET (Famine Early Warning Systems Network). 2016. *Ethiopia: Food Security Outlook, February to September 2016. Large-scale Food Security Emergency to Continue through September*. Addis Ababa: FEWS NET Ethiopia.
- HRD (Humanitarian Requirement Document). 2015. *Ethiopia 2016: Joint Government and Humanitarian Partners' Document*. Addis Ababa: Federal Democratic Republic of Ethiopia. Accessed from: http://www.unicef.org/ethiopia/ECO_Ethiopia_HRD_2016.pdf
- Minten, B., D. Stifel, and S. Tamru. 2014. "Structural Transformation of Cereal Markets in Ethiopia." *Journal of Development Studies* 50 (5): 611-629.
- United Nations ComTrade. 2016. Accessed on September 28 2016, available at: <http://comtrade.un.org/>
- VAM-WFP (Vulnerability Analysis and Mapping – World Food Programme). *El Niño: Implications and Scenarios for 2015/16*, December 2016. Rome: VAM-WFP. Accessed from: <http://documents.wfp.org/stellent/groups/public/documents/ena/wfp280227.pdf>
- WFP (World Food Programme). 2016. *WFP Ethiopia: Drought Emergency Situation Report #2*. May 2016. Addis Ababa: WFP Ethiopia.
- Worku, I., M. Dereje, B. Minten, and K. Hirvonen. 2016. *Diet Transformation in Ethiopia*. Ethiopia Strategy Support Program Working Paper 87. Addis Ababa: IFPRI.

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