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Agricultural prices during drought in Ethiopia

An updated assessment using national producer data (January 2014 to June 2016)

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This ESSP Working Paper builds on the analysis of ESSP Working Paper 88 (April 2016) by extending the period over which prices are examined through to June 2016 and expanding several components of the analysis.

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ABSTRACT

Expanding and extending an earlier assessment (ESSP Working Paper 88, April 2016), we analyze the evolution of crop and livestock producer prices and wages of unskilled laborers in Ethiopia between January 2014 and June 2016 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 the middle of 2016 compared to two years earlier, especially for maize, sorghum, and wheat – the crops that are the major source of calories in areas that were most hit by the drought. The decline in the cost of cereals in the food basket in June 2016 compared to two years earlier was estimated at 12.6 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 because, 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 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.

1. 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 reduced agricultural output and to a loss of livestock in parts of the country. 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 June 2016. 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.[2] In this paper, we look particularly at the evolution of three broad categories of prices: crops, livestock, and wages.[3] Furthermore, we compare the price evolution of the current drought with an earlier period of major 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

[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] 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 is however, 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.

[3] 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 therefore 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 that find it difficult to make a livelihood from their own agricultural production, increasingly switch to labor markets.

spend more on food than they earn from the sales of agricultural products. 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, 27.9, 19.2, and 9.7 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 220 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 2016a).[4] CSA also collects data on wages of casual laborers (CSA 2016b). 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 drought on prices is therefore warranted.

We use these price data together with the appropriate hotspot categories of the woredas mentioned above to investigate the evolution of prices in the drought season. For price deflation, we rely on the general Consumer Price Index (CPI) calculated by CSA in order to express all prices in December 2011 Birr (CSA 2016c). 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.[5]

[4] 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.

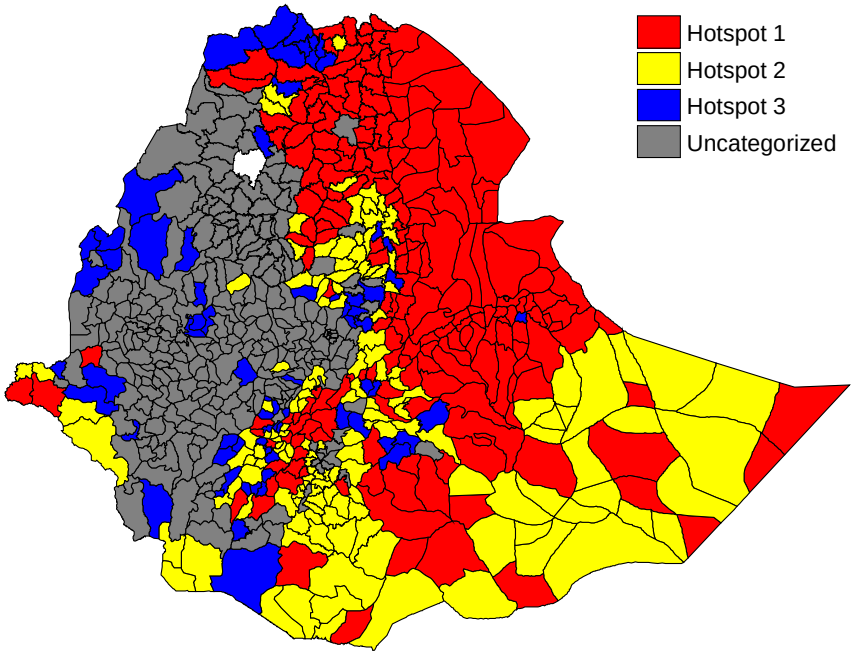
[5] We expect a number of drought-related impacts on the prices in these categories. First, lower rainfall is expected to negatively affect local crop production, and we therefore expect crop prices to be higher in 2015 than in 2014, assuming no additional cereal imports. If markets are not well integrated, we would also expect prices in drought-affected areas 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.

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	27.5	18.4	9.7	44.4
Tigray	47	40.4	6.4	19.1	34.0
Afar	31	96.8	-	-	3.2
Amhara	139	31.7	19.4	5.0	43.9
Oromia	279	22.9	12.5	7.5	57.0
Somali	55	49.1	50.9	-	0.0
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	-	-	-

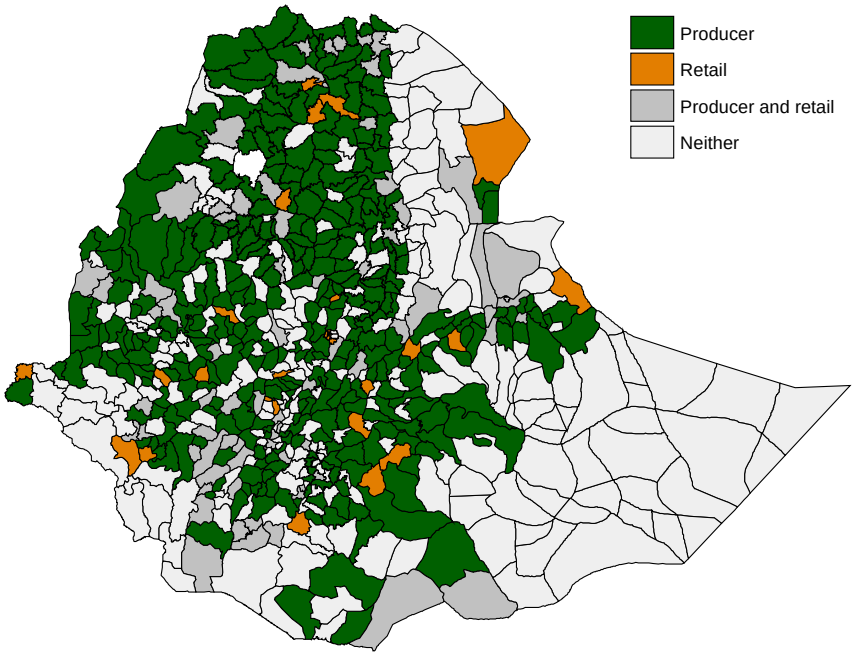
Source: Authors' computation using CSA producer price data
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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

3. AGRICULTURAL PRICES

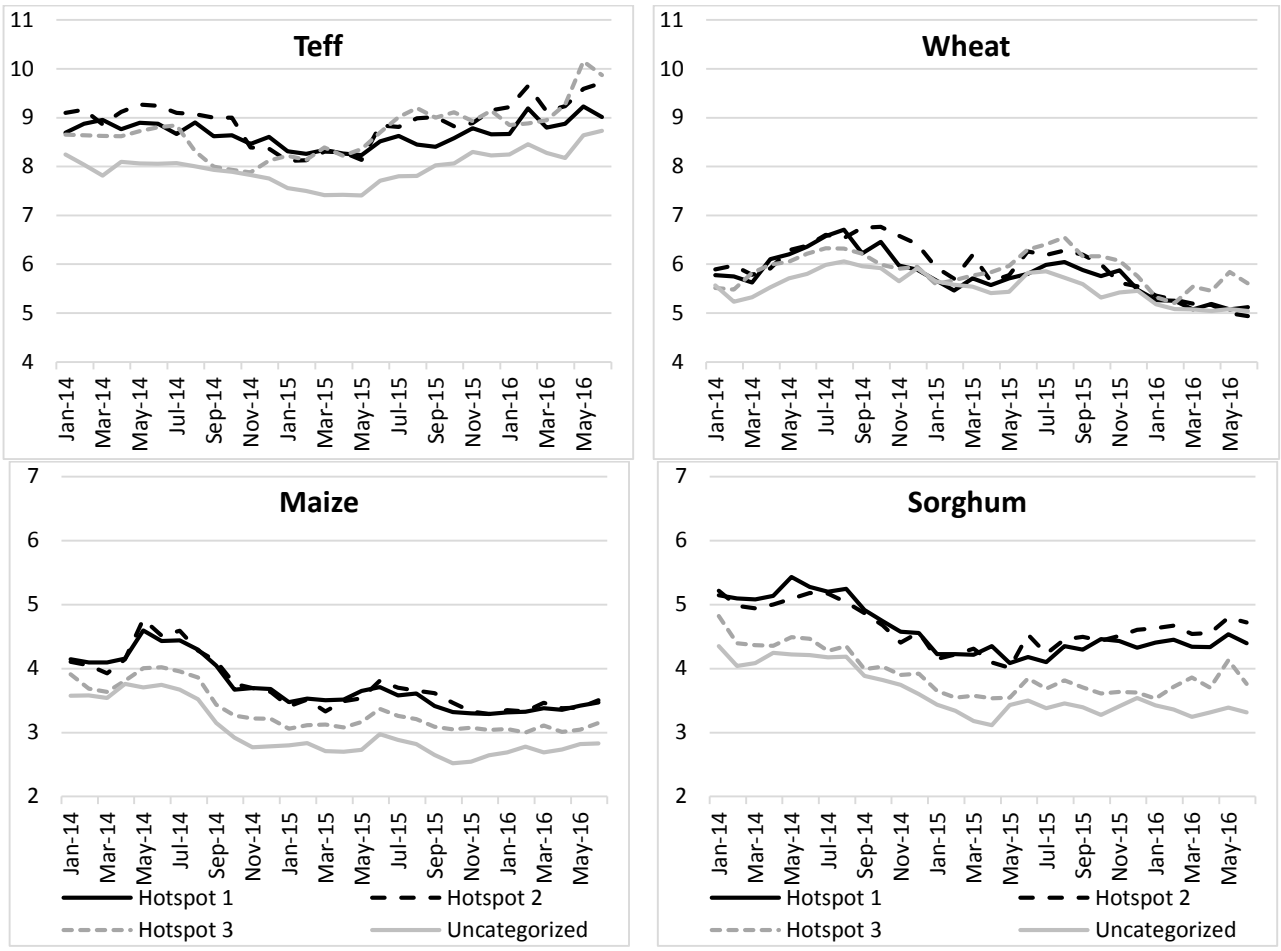
In this section we discuss the evolution of crop and livestock producer prices during the January 2014 to June 2016 period. We also compare trends in cereal prices during this same period with the prices of the 1997 and 1998 period, during which the country also experienced a major drought. Finally, 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 June 2014 with the corresponding month in 2016. Three main points can be deduced from the patterns in Figures 3.1, 3.2, and Table 3.1. First, cereal prices, in general, declined over this period. Compared with June 2014, the unweighted average prices of cereals in June 2016 were 11.6 percent lower in both hotspot 1 and 2 areas and 10 percent lower for all woredas combined (Table 3.1).[6] A decline was seen in the other areas as well, with 5.0 and 8.9 percent declines in prices for hotspot 3 and uncategorized woredas, respectively. Second, prices of the four cereals are higher for hotspot 1 and 2 woredas throughout most of the period studied (Figure 3.1), indicating that the majority of woredas in these hotspot areas are usually food deficit areas. 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. Third, 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.

[6] That is, cereal prices declined at monthly average rate of 0.48 percent in hotspot 1 woredas and at 0.41 percent in all woredas during the period.

Figure 3.1—Trends in real producer prices of teff, maize, wheat, and sorghum, 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.

Table 3.1—Real price changes between June 2014 and June 2016 for major agricultural products and livestock, by woreda drought hotspot category, percent

		Woreda drought hotspot category			
Item	Overall	Hotspot 1	Hotspot 2	Hotspot 3	Uncategorized
Crops					
Cereals (weighted)	-11.5	-11.8	-11.1	-9.4	-12.0
Cereals (unweighted)	-9.9	-11.6	-11.6	-5.0	-8.9
Teff	6.1	1.5	5.1	12.1	8.4
Wheat	-16.4	-19.5	-22.6	-9.8	-13.1
Maize	-23.2	-21.7	-22.3	-21.6	-24.5
Sorghum	-17.2	-16.7	-8.9	-15.9	-21.3
Pulses	36.8	35.6	37.5	27.1	40.1
Oilseeds	16.6	13.4	10.4	7.8	23.9
Enset/kocho	-1.1	-7.7	-2.5	19.4	-0.8
Root crops	18.9	26.2	11.9	9.2	19.4
Livestock					
Cows	-3.8	-6.1	-9.4	-7.0	1.6
Oxen	-3.9	-13.1	0.4	-2.6	0.2
Sheep	-0.7	3.6	5.2	5.2	-7.2
Goats	0.7	1.8	-7.1	-0.6	4.5

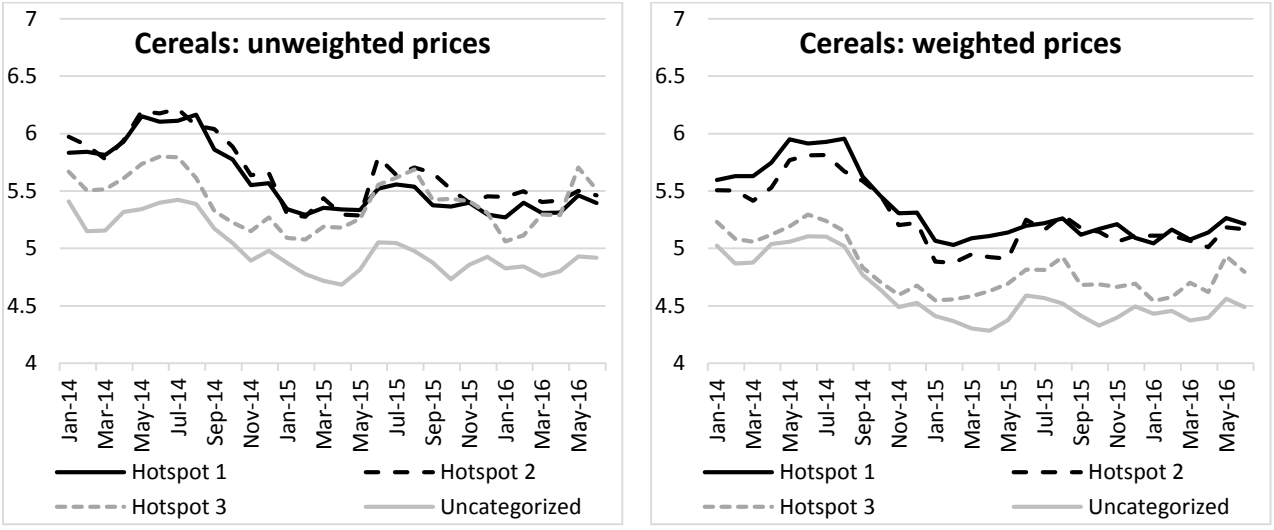
Source: Authors' computation using CSA producer price data (CSA 2016a).
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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 June 2014, maize prices had declined by nearly 1 birr per kg (23 percent) in June 2016. Prices of teff, mostly consumed by richer households, saw a decline at the beginning of 2015, but prices have been increasing in most areas since mid-2015, surpassing price levels seen at the beginning of 2014 in all woreda categories. In June 2016 the price of teff was 6 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 June 2016 were 17 percent lower than those in June 2014 (16.7 and 9.0 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 June 2016 were about 1 birr (16.4 percent) lower than those in June 2014. More importantly, wheat prices were 19.5 and 22.6 percent lower in hotspot 1 and 2 areas, respectively. In non-hotspot areas wheat prices in June 2016 were 13 percent lower than those in June 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.

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 by taking the share of each cereal in total per capita consumption of the five cereals.[7] 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 (It is to be noted however that a significant number of households lost assets and agricultural production, and prices might not be a good indicator of welfare for those affected households). We note overall that both unweighted and weighted average cereal prices were lower in 2016 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.

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



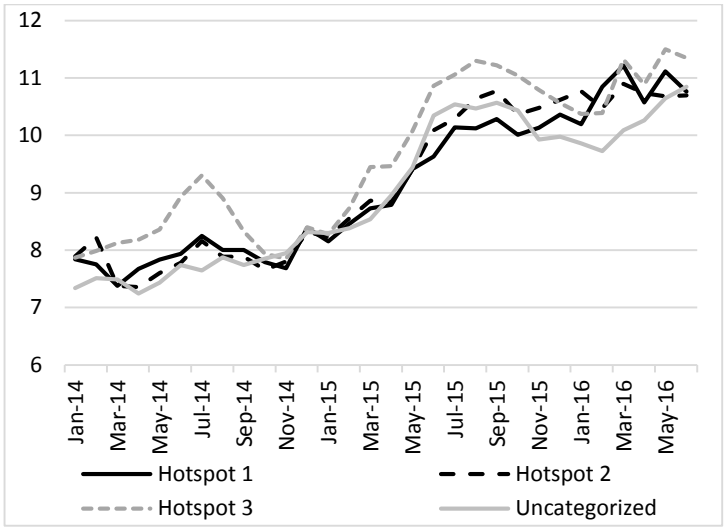
Source: Authors' computation using CSA producer price data (CSA 2016a). Combined prices for teff, maize, wheat, sorghum, and barley.
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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

3.2. Other crops

When we look at the pulses category [8], a different picture emerges. The prices of pulses have increased substantially over the period considered. Relative to June 2014, prices of pulses in June 2016 were at least 2.4 birr per kg higher in all three hotspot areas as well as in the non-hotspot areas. That is, June 2016 prices in all woredas were at least 35 percent higher relative to June 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 played a part, noting the higher international prices in 2015 and 2016 than recorded in 2014.

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



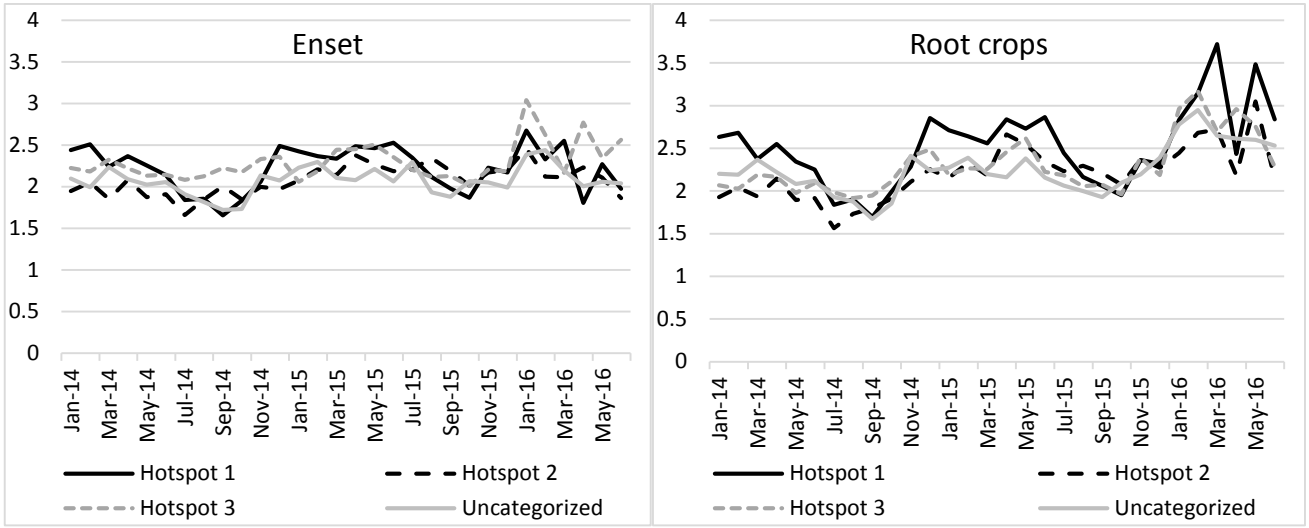
Source: Authors' computation using CSA producer price data (CSA 2016a).
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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.[9] Enset prices in June 2016 were slightly lower than those in June 2014 for an average woreda. 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 June 2016 were 19 percent higher than prices in June 2014, averaged over all areas. However, the increase was less pronounced in hotspot 2 and 3 woredas compared to the other ones. On the other hand, hotspot 1 woredas prices showed an increase of 26 percent. These root crops are, however, relatively less important in the food consumption basket (see below).

[8] Pulses include chickpeas, haricot beans, horse beans, lentils, field peas, vetch, and soya beans.

[9] Root crops includes potatoes, sweet potatoes, and godere (*Colocasia esculenta*, taro).

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

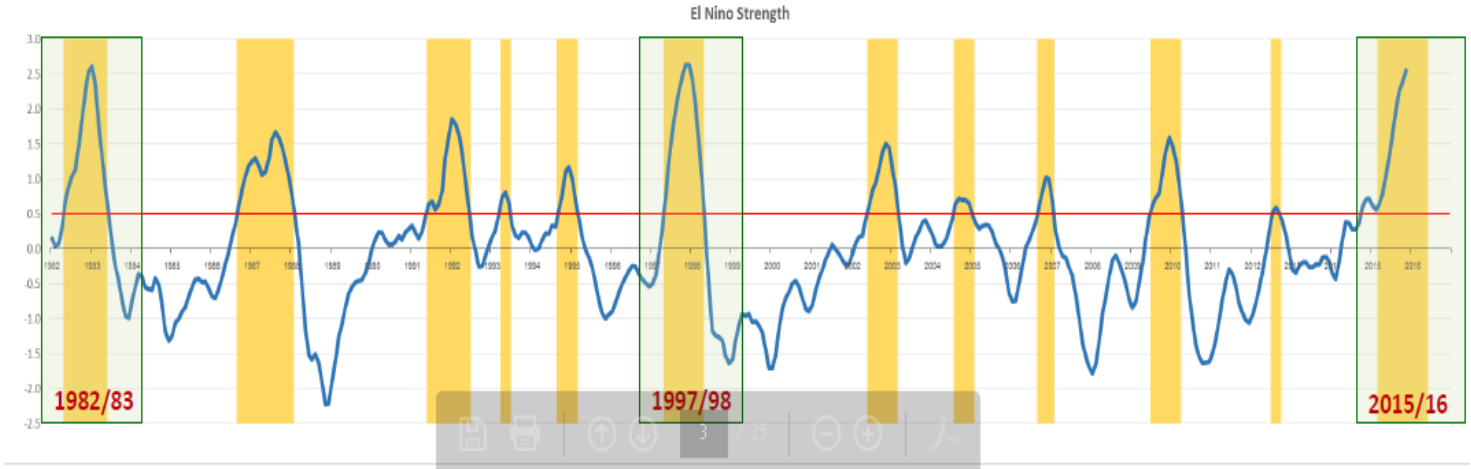


Source: Authors' computation using CSA producer price data (CSA 2016a).
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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 with previous droughts in the country, 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.[10] It has been stated that the current drought shows many similarities with the 1997-1998 drought (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



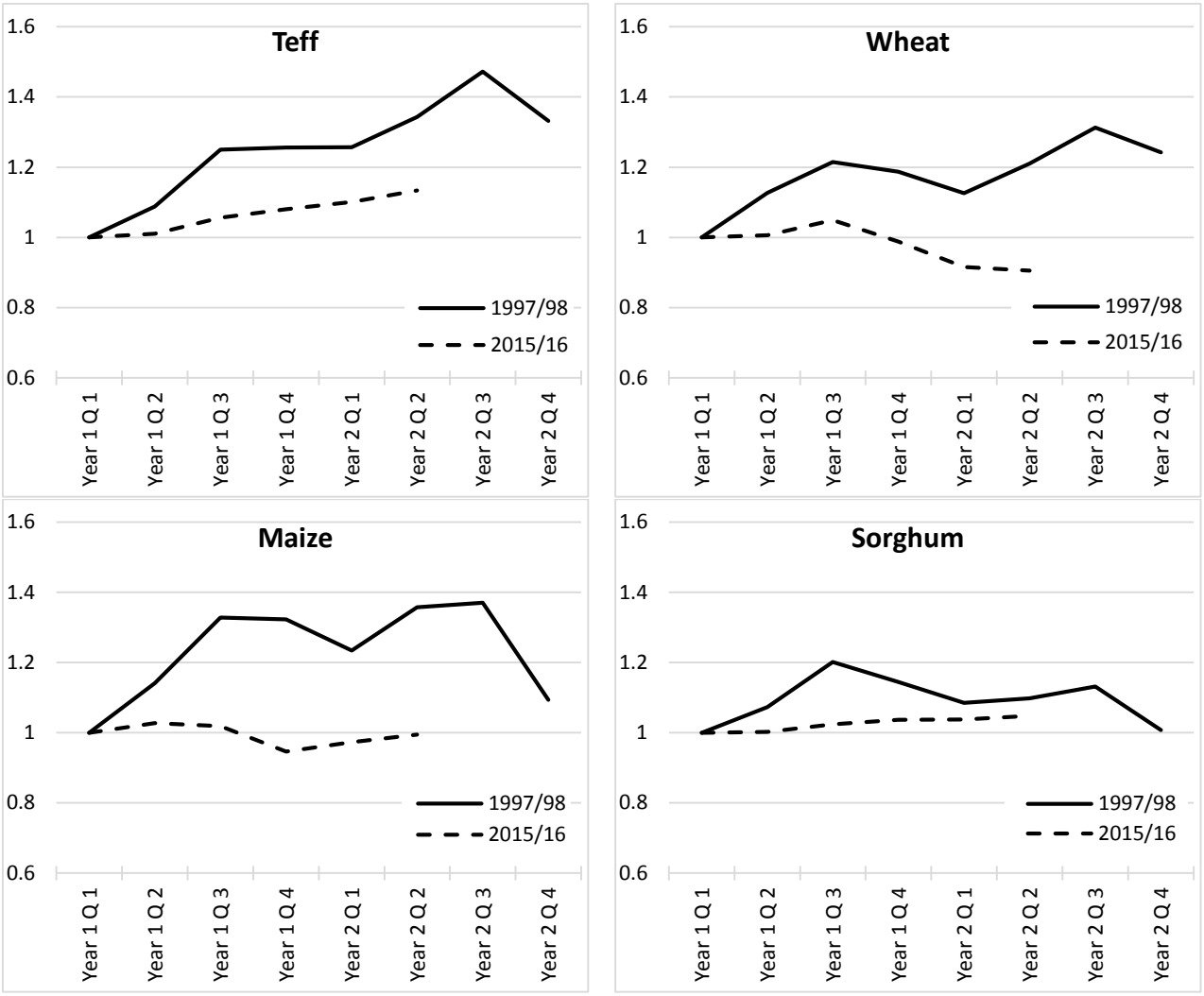
Inter-tropical Pacific Sea Surface Temperature anomalies from 1982 to present. The current event and the two most intense events in record are highlighted. Red line is the El Niño threshold

Source: VAM-WFP (2015)

Based on CSA estimates, total cereal production in 1997/98 was 25 percent lower compared to the previous year, 1996/97 (CSA 1998). We compare the price evolution of that period 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 as the base, respectively.

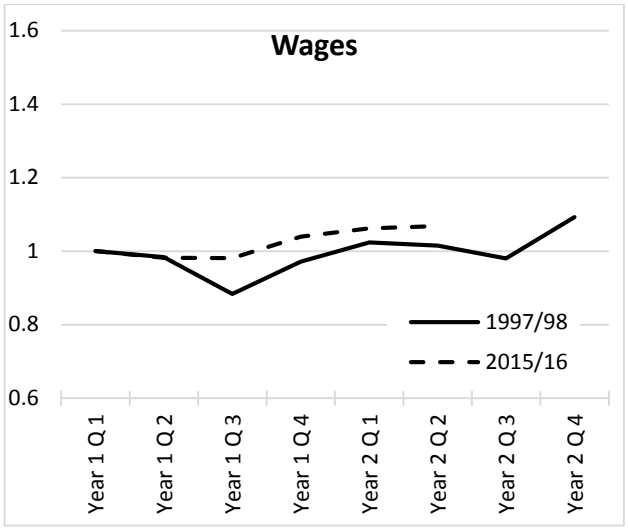
[10] Appendix 1 further discusses how prices during 2015 and 2016 that were affected by the drought compare with prices observed in periods of normal rainfall.

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



Source: Authors' computation using CSA producer price data (CSA 2016a and CSA 1998).

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



Source: Authors' computation using CSA producer price data (CSA 2016a and CSA 1998).

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 fast 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.[11]

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 second quarter of 2016 were lower than prices in the first quarter of 2015 while maize prices are nearly the same. Teff prices have been increasing steadily beginning from the second quarter of 2015. Although less pronounced, the same pattern is observed 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.

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. 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).

EXPLAINING DIFFERENCES IN CEREAL PRICE TRENDS DURING THE 1997/98 AND 2015/16 DROUGHTS

Two factors that may have contributed to the different trends in cereal prices observed during each of the drought periods compared, are (i) changes in total production and (ii) imports of cereals. We summarize the data on total cereal production by smallholder farmers in Table A.2.1 under Appendix 2. We also summarize in Table A.2.2 wheat imports, which constitutes almost all of the cereal Ethiopia imports, using data obtained from UN-Comtrade. While patterns in cereal production during the 1996/97 to 1997/98 and 2014/15 to 2015/16 periods show the adverse impacts of the droughts on cereal output and the increases in cereal imports show some of the efforts made to ameliorate the situation in those periods, neither of these patterns show the effects on cereal prices directly. In the following, we use these figures together with other statistics and results from other research, to conduct a simple, but reasonable, computation to provide some insight on observed changes in cereal prices.

Total cereals production declined from 8.62 million metric tons (MMT) in 1996/97 to 6.50 MMT in 1997/98, a decline of 24.7 percent (Table A.2.1). Cereals production increased from 21.58 MMT in 2013/14 to 23.61 MMT in 2014/15 (9.4 percent) and to 23.13 MMT in 2015/16 (-2.0 percent). Total cereal supplies (locally produced plus imports), were therefore 8.63 and 6.72 MMT during 1996/97 and 1997/98, respectively, and 22.51, 24.92, and 25.14 MMT during 2013/14, 2014/15, and 2015/16, respectively. Assuming an approximate population growth of 3.0 percent between 1996/97 and 1997/98, there was a decline in per capita supply in cereals between 1996/97 and 1997/98 of 25.1 percent (an actual decline of 22.1 percent plus the additional cereals needed to feed 3.0 percent more people). Similarly, with CSA (2013) projected population growth rates of 2.41 and 2.36 percent during 2013-2014 and 2014-2015, the annual change in cereal output per capita is 8.3 and -1.5 percent during the period 2013/14-2014/15 and 2014/15-2015/16, respectively.

To measure the impact on cereal prices of the changes above, we use the average elasticity of demand for the four most important cereals that Berhane et al. (2012) computed for rural areas, -0.817, while also assuming that the quantity of cereals supplied equals the quantity demanded. Accordingly, prices are expected to increase by 30.7 percent between 1996/97 and 1997/98. In our descriptive analyses, we find a growth rate in cereal prices with the same order of magnitude (26 to 36 percent between January 1997 and most of 1998). Moreover, these simple calculations imply a decline in cereal prices of 10.1 percent during the 2013/14 to 2014/15 period and an increase in prices of 1.8 percent during the 2014/15 to 2015/16 period. Moreover, these simple computations imply that cereal prices in 2015/16 are expected to be 8.4 percent lower than those in 2013/14, which is close to the 10 percent decline in cereal prices seen between June 2016 and 2014 (Table 3.1). However, if we further include the effect of increases in per capita income (on which we do

[11] 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.

not have a complete data, particularly for 2015/16) price declines will be slower, while any price increases will be faster.

USING ALTERNATIVE CEREAL PRICES IN THE ANALYSIS OF PRICE TRENDS

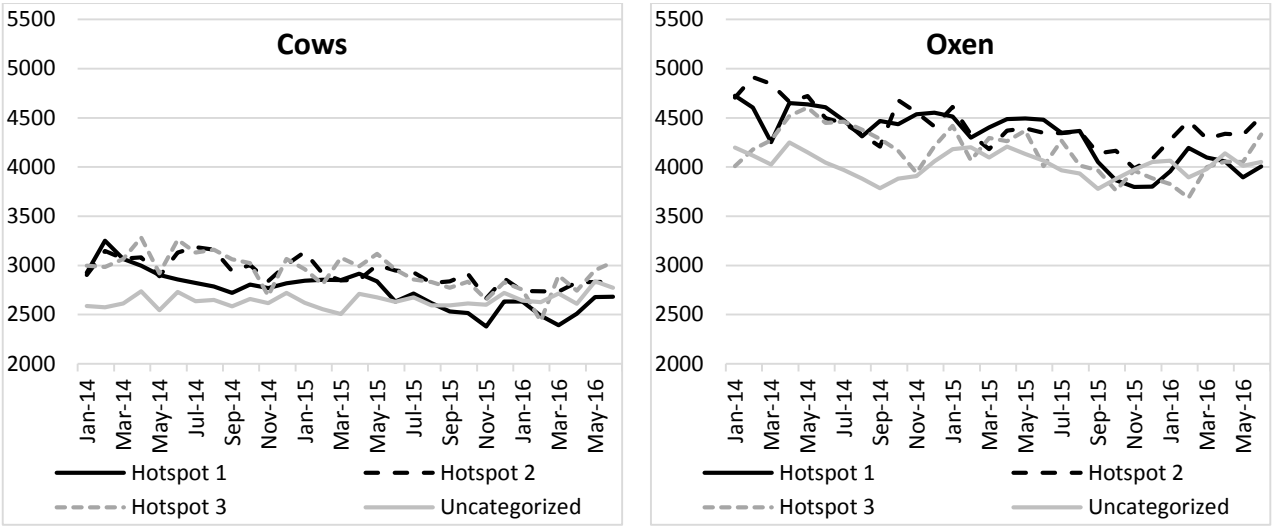
We compare CSA producer and retail price data, which we primarily used in our analyses, with wholesale price data from the Ethiopia Grain Trade Enterprise (EGTE). CSA and EGTE price data differ in their collection methods. CSA collects price data, particularly producer prices, from markets in nearly all administrative zones of the country, while EGTE data has a considerably smaller spatial coverage.

Two observations can be made about regional average prices of cereals (Table A.3.1 under Appendix 3). First, CSA retail prices, which, for the most part, are collected from retail markets in small towns and urban centers, are generally the highest, followed next by EGTE prices, which generally represent wholesale prices in urban centers. CSA producer prices, which are collected from rural markets, are generally the lowest among these price series. Second, differences between CSA retail and EGTE wholesale prices were generally small, indicating the tight margin between the urban wholesale and retail prices, while differences between CSA retail and producer prices were the largest.

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 cattle prices have been characteristically declining. In hotspot 1 woredas, cow prices were on average 175 birr lower in June 2016 compared to prices in June 2014. This reflects a decline of over 6 percent. In hotspot 2 areas, cow prices declined by 294 birr or by 9.4 percent. In contrast, cow prices increased in areas not affected by the drought. Patterns in oxen prices were similar across hotspot woredas, however, the decline in oxen prices were larger in hotspot 1 woredas. The average price for oxen in June 2016 was over 600 birr lower relative to June 2014 in hotspot 1 areas, a decrease of about 13 percent. Oxen prices in hotspot 2 and non-hotspot woredas were about the same in June 2016 as in June 2014, while prices declined by 117 birr (2.6 percent) in hotspot 3 areas during this time period (Table 3.1). We observe a considerable decline in oxen prices in the second half of 2015. Oxen prices improved since December 2015, particularly in hotspot 2 and 3 areas. Similar to that seen in the prices of cows, no important upward nor downward trend was noted with regard to the prices of oxen in the uncategorized woredas.

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

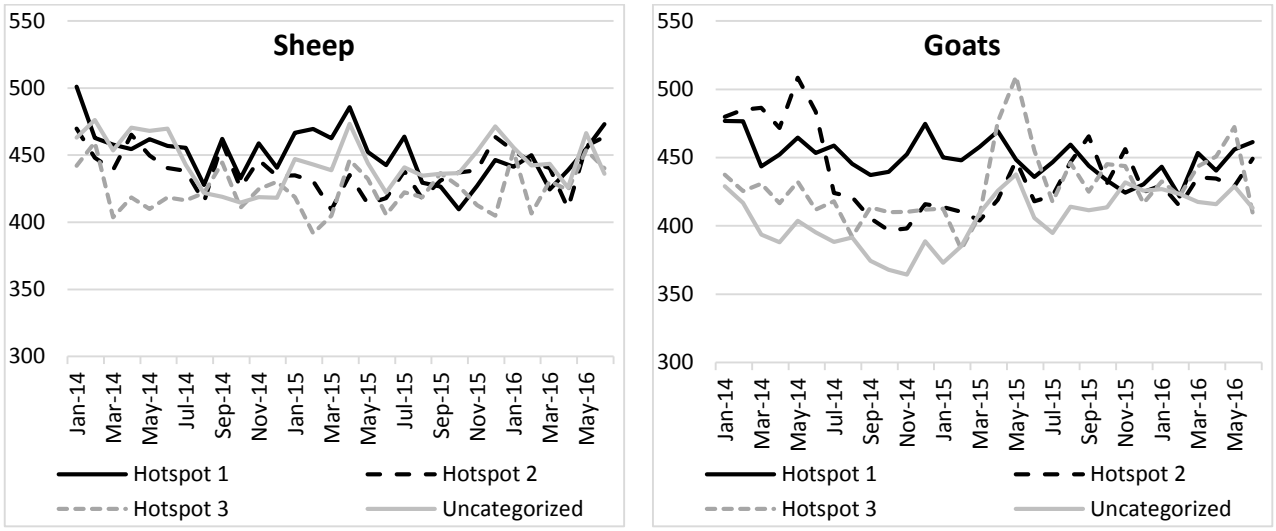


Source: Authors' computation using CSA producer price data (CSA 2016a).
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

Figure 3.9 illustrates the price trends for sheep and goats. In the case of sheep, we note prices in June 2016 were higher than in June 2014 in all hotspot areas by 3.6 to 5.2 percent, while the faster decline in non-hotspot areas appears to dominate the national average prices, which shows a decline overall (see Table

3.1). Goat prices in June 2016 were higher than prices in June 2014 in hotspot 1 and non-hotspot areas, while they declined in the remaining two areas. Differences in sheep and goat prices between June 2014 and June 2016 appear to show the similar signs of recovery as seen in cattle prices in all hotspot areas.

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

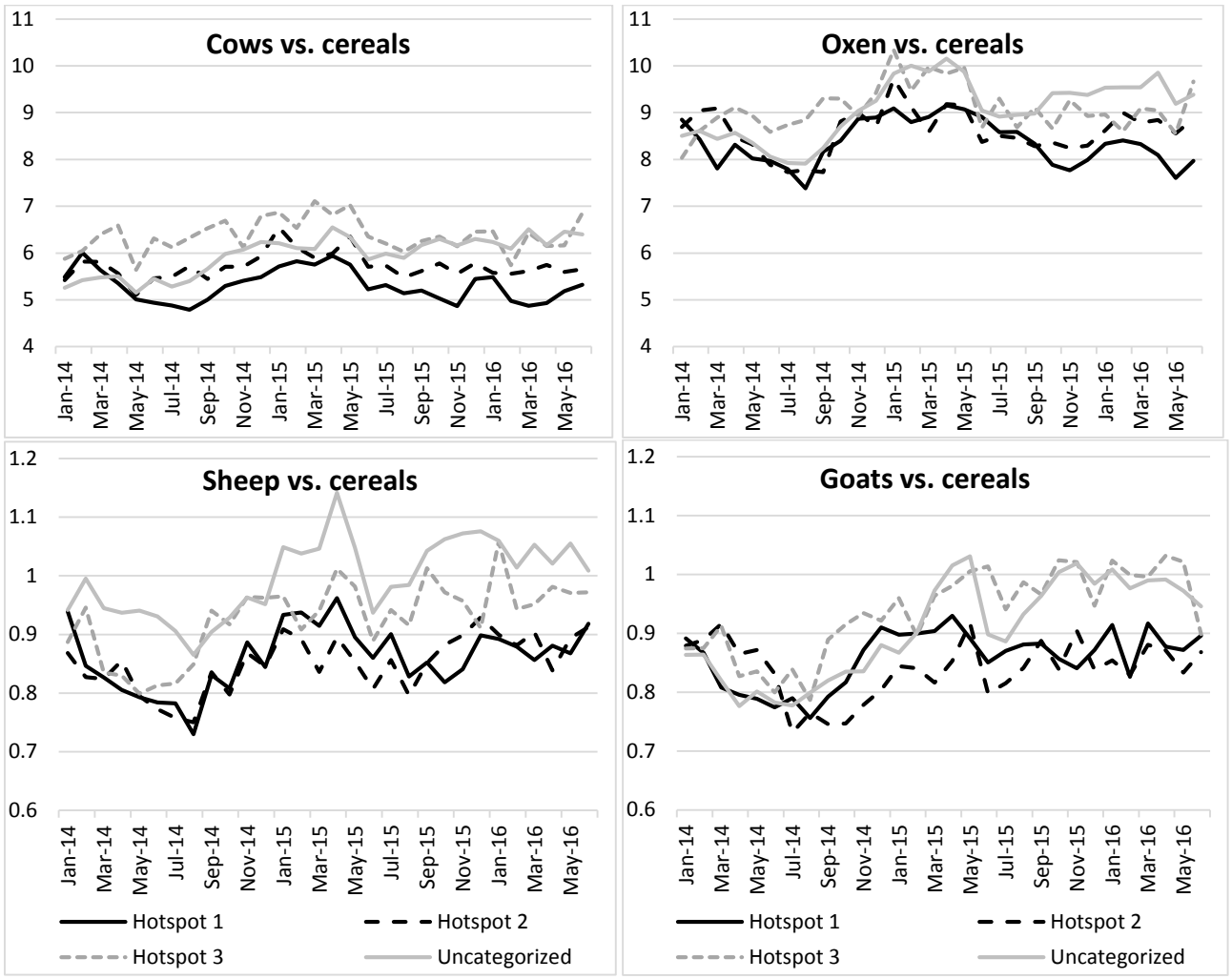


Source: Authors' computation using CSA producer price data (CSA 2016a).
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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 of each of the four livestock species versus cereals. The ToT 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 ToT 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 10.8 percent, while those for oxen versus cereals increased by 11.2 nationally when comparing June 2016 with June 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 June 2014 to 6.4 in June 2016; that is, in uncategorized woredas, one cow was worth of 5.5 quintals of cereals in June 2014 and 6.4 quintals in June 2016. Expressed another way, the quantity of cereals needed to barter with a cow increased by 17.4 percent. Similarly, the ToT of oxen, sheep, and goats versus cereals increased by 16.4, 8.4, and 20.8 percent, respectively, in uncategorized areas. This is considerably higher relative to changes in the respective ToT observed in hotspot 1 woredas.

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.

The maps in Figure 3.11 shows the distribution of the terms of trade of cereals versus the average of cows and oxen (cattle) and for cereals versus the average of sheep and goats (shoats) for the months of June 2014 and June 2016, respectively.[12] Consistent with Table 3.2, the maps shows that the terms of trade of sheep and goats and cattle versus cereals in June 2016 were generally higher in the western half of the country, which comprises mostly uncategorized and hotspot 3 areas (Figure 2.1), 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 from a light-red in the June 2014 map to a darker red color in the June 2016 map. In contrast, little improvement or declining ToTs are visualized across the maps in hotspot 1 and hotspot 2 woredas. The maps illustrate a shift from dark-red in June 2014 to lighter-red in June 2016 in woredas in the eastern half of the country, such as the Eastern and Central parts of Tigray, Eastern Amhara, Central and Southern SNNP, and parts of Afar and Somali regions.

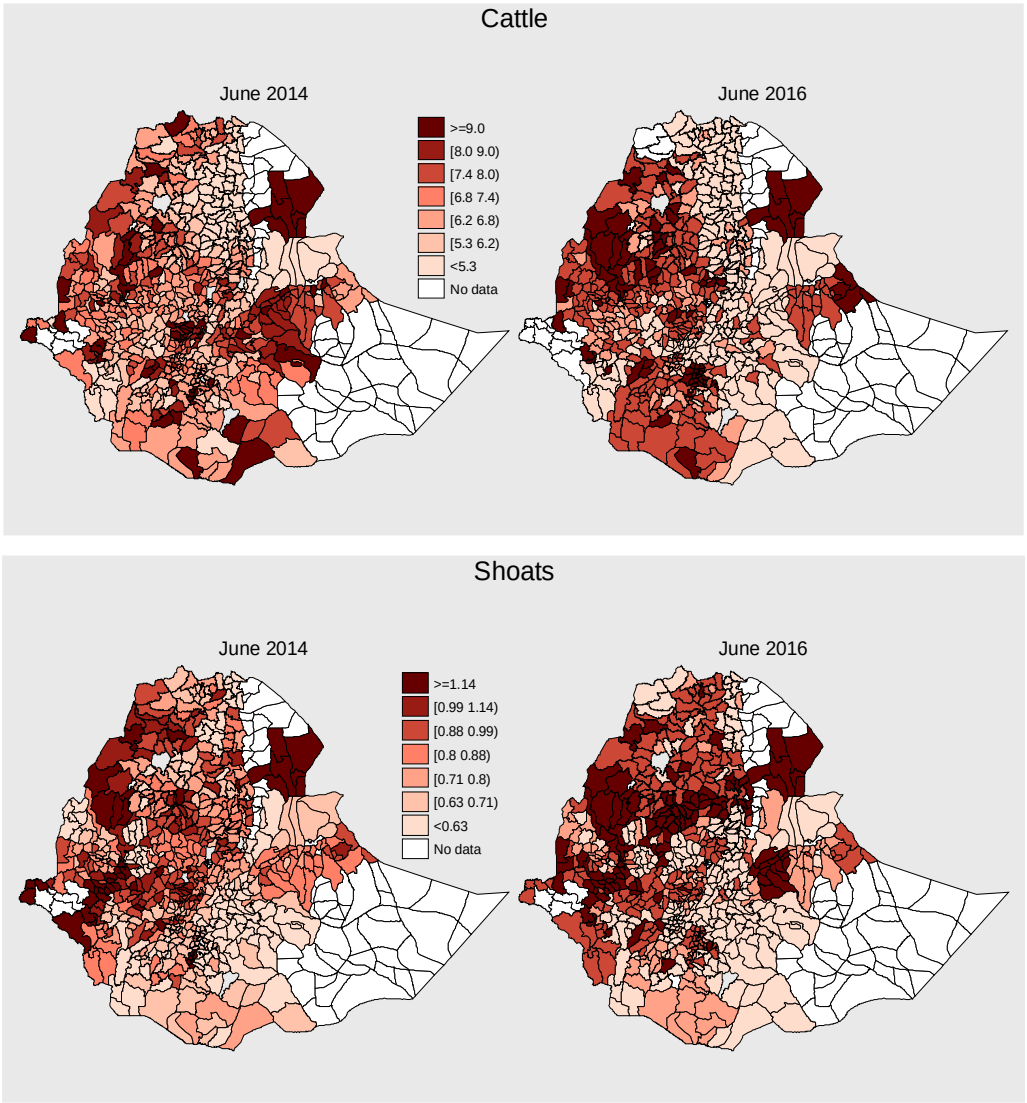
[12] In these maps we use zonal average prices for woredas with no price data or we assume that markets surveyed are representative of zones.

Table 3.2—Change in terms of trade between livestock and cereals comparing June 2016 with June 2014, by woreda hotspot area, percent change

Items compared	Overall	Hotspot 1 woredas	Hotspot 2 woredas	Hotspot 3 woredas	Uncategorized woredas
Cattle vs cereals	11.0	3.0	8.8	10.9	16.8
Cows vs cereals	10.8	7.8	3.5	8.6	17.4
Oxen vs cereals	11.2	0.0	12.4	12.6	16.4
Sheep and goats vs cereals	14.3	16.4	11.0	16.0	14.1
Sheep vs cereals	13.4	17.1	18.1	19.5	8.4
Goats vs cereals	15.3	15.7	4.4	12.4	20.8
Sheep and goats vs teff	-4.3	2.2	-4.1	-6.0	-7.9
Sheep and goats vs wheat	22.2	28.8	29.9	13.5	17.3
Sheep and goats vs maize	32.9	32.2	26.2	32.5	35.4
Sheep and goats vs sorghum	26.7	25.0	11.3	29.4	31.6

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

Figure 3.11—Distribution of terms of trade of cattle versus cereals and of sheep and goats (shoats) versus cereals in June 2014 and in June 2016, by woreda



Source: Authors' computation

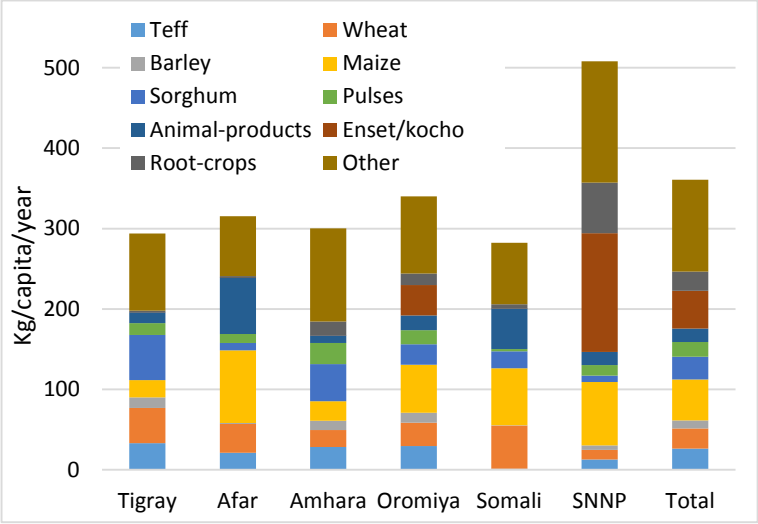
4. CONSUMPTION AND WAGES

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 the 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 the pastoralists Afar and Somali areas, 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.

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.[13] 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[14], to investigate the extent to which the cost of cereal, kocho/enset, and root crop per capita consumption was impacted by price changes between June 2014 and June 2016. Table 4.1 shows changes in per capita consumption costs comparing June 2014 and June 2016 by woreda hotspot category.[15] The results illustrate that the costs of the regular consumption basket of cereals has decreased by 12.6 percent over the June 2014 to June 2016 period. This reduction was higher in the hotspot 1 category, at 14.0 percent, than in the non-affected (uncategorized) (8.1 percent), hotspot 2 (7.0

[13] 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.

[14] 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.

[15] 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.

percent), and hotspot 3 (7.6 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 11.6 percent with cereal and root crops combined, and by 10.2 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 June 2016 general, food, and non-food Consumer Price Indices (CPI) were 10.7, 10.3, and 11.2 percent higher, respectively, relative to a year earlier.

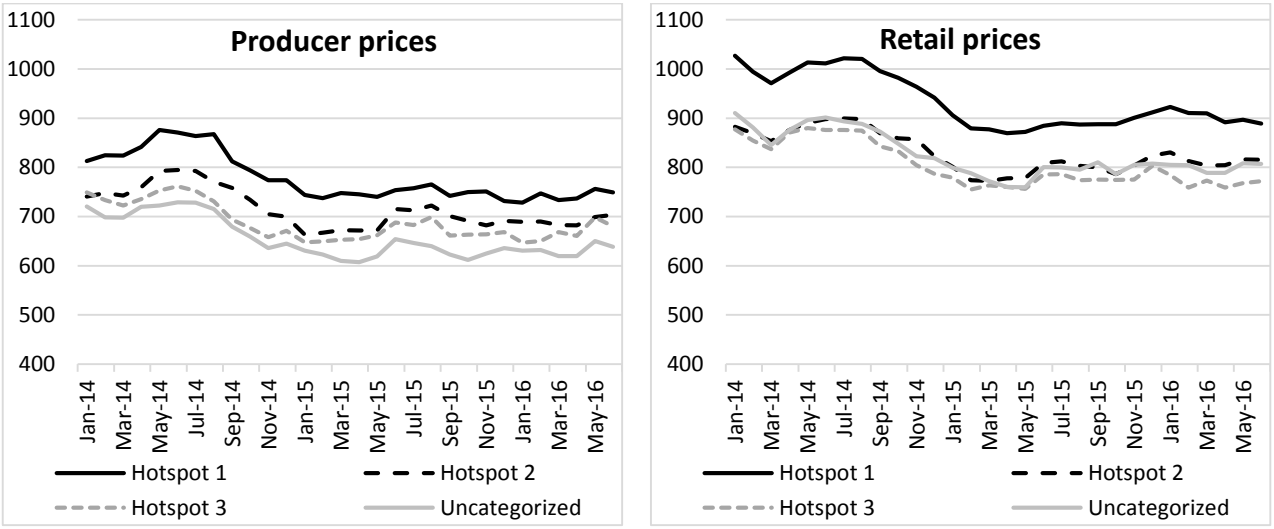
Table 4.1—Changes in real costs of per capita consumption spending computed using producer and retail prices, comparing June 2016 with June 2014, by woreda hotspot category, percent change

	Overall	Hotspot 1 woredas	Hotspot 2 woredas	Hotspot 3 woredas	Uncategorized woredas
Valuation using producer prices					
Cereals	-12.6	-14.0	-7.0	-7.6	-8.1
Cereals and root crops	-11.6	-11.5	-6.0	-7.7	-8.5
Cereals, root crops and kocho	-10.2	-10.6	-11.5	-10.6	-12.4
Valuation using retail prices					
Cereals	-10.9	-13.3	-10.5	-9.0	-11.4
Cereals and root crops	-8.6	-12.7	-9.5	-6.5	-9.7
Cereals, root crops and kocho	-8.4	-12.1	-9.2	-11.9	-10.4

Source: Authors' computations
Note: Woredas in Hotspot 1 are the most severely affected by the drought.

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, notably the cost of the cereal consumption basket is considerably higher in the most drought-affected woredas. This situation however, pre-existed before the onset of the drought, as most of these affected areas are net importers of cereals.

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

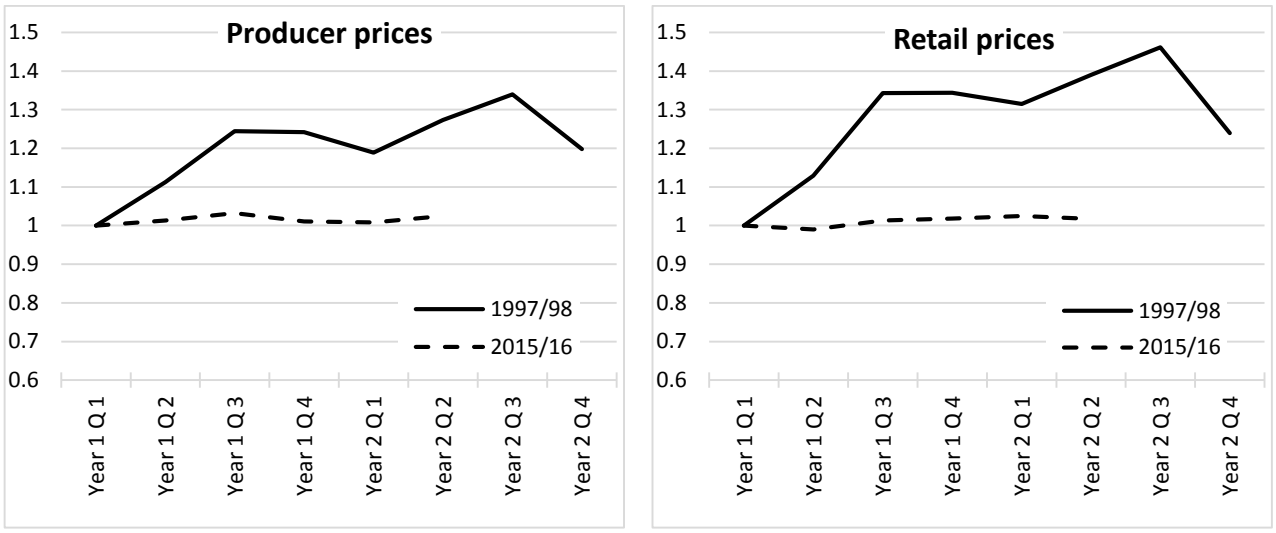


Source: Authors' computations

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 18.4 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 3 percent in all quarters of 2015 and through June 2016, compared to costs at the beginning of 2015.[16]

Figure 4.3—Comparison of real costs of cereal consumption baskets indices, valued using producer and retail prices during 1997/98 and 2015/16 drought periods

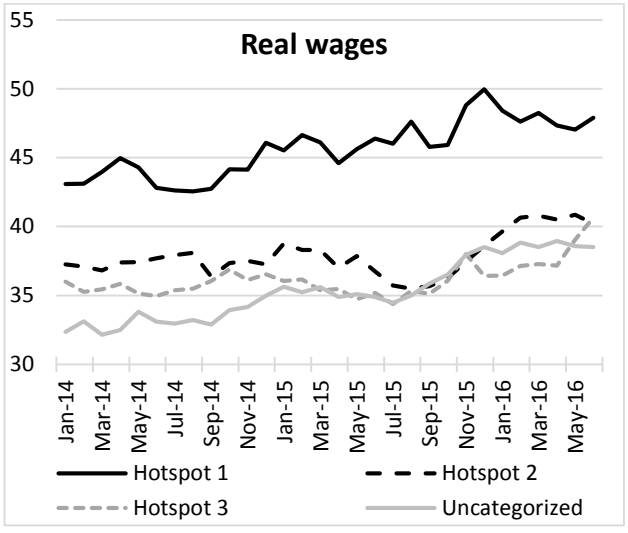


Source: Authors' computations

4.2. Wages

Finally, we look at the evolution of wages of casual laborers over the same period. Surprisingly, based on these CSA data, 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 the final months of 2015 in hotspot 1 and hotspot 3 categories. The decline in wage rate has continued in the beginning of 2016 in hotspot 1, unlike the other categories which showed rise in wages. 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. 2015). 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.

[16] 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.

5. CONCLUSIONS

Our research findings reflect some of the effects of the 2015-16 drought on Ethiopia's agricultural and food economy, emerging through our analysis of producer price data over the June 2014 to June 2016 period,.

First, 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 affected areas. We estimate that the costs of the cereal consumption basket at the national level declined by 12.6 percent in June 2016 compared to June 2014. We further note that there are small differences between the drought-affected (decline of 14.0 percent) and non-drought affected (decline of 8.1 percent) areas in price evolutions of cereals over this period. The larger decreases in drought-affected areas might be due to the targeted food aid in 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 37 percent in the middle of 2016 compared to the middle of 2014. The prices of root crops overall also showed an important increase of 19 percent over the same period. Prices of enset, however, declined. When considering a typical consumption basket of consumers in the country overall, as well as in the drought-affected areas, the price of the food consumption basket for an average household has decreased compared to 1 or 2 years earlier. This is the case in the drought-affected as well as in the non-drought affected areas. It is estimated that the costs of the consumption basket of cereals, root crops, and enset declined at the national level by 10.2 percent.

Third, livestock prices are a good predictor of upcoming food insecurity. Prices of cows and oxen were down in June 2016 compared to two 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 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. While prices of cows and oxen were down compared to two years earlier, this was not the case for sheep and goats. 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 in the period November 2015 to June 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 drought-stricken period in the country (1997/98), during which cereal production was estimated to have been 25 percent lower compared to the previous agricultural season, 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.

Overall, the analysis of the CSA prices suggest that there is no indication of major large-scale effects of the drought on wage and cereal markets. 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. Such households have lost their livelihoods due to the drop in or loss of agricultural output, as well as a large depletion of their agricultural or other assets.

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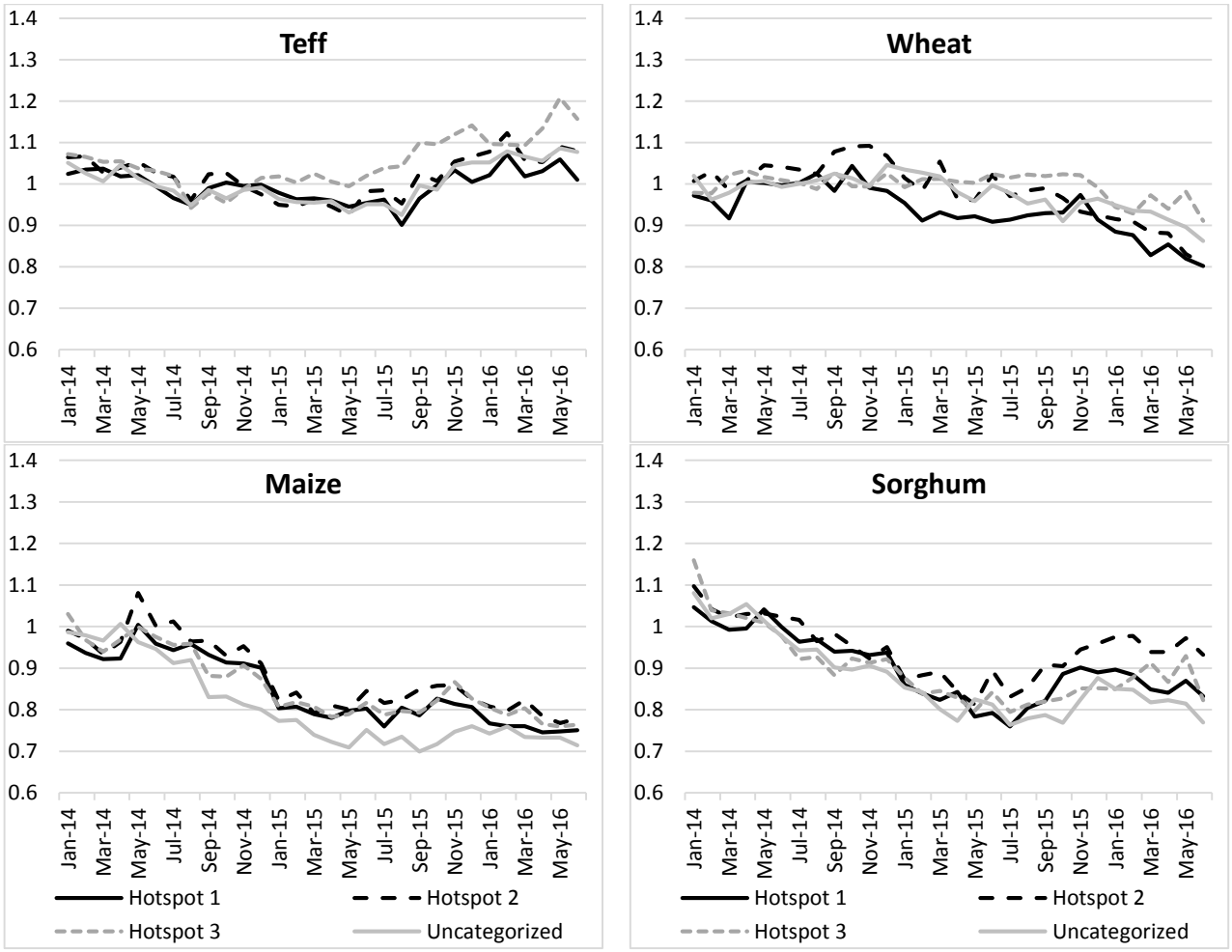
APPENDICES

Appendix 1. Comparison of recent price trends with long-term average prices

We investigate how recent crop and livestock prices compare with long term price patterns, particularly prices in the second half of 2015 and first half of 2016 when the impact of the drought was strongest.[17] Such a comparison provides insights into how recent drought-affected prices compare with those in periods of normal rainfall. We construct a monthly price index for a given item by taking the ratio of the price of the item and its long-term average price in that month. The index is greater than one in months when prices are higher than the long-term average price. For a given hotspot area, the long-term monthly average price is constructed by averaging the prices of the item in that month using data that extends from July 2001 to June 2016. However, we exclude 2008, 2009, and 2011 because prices were considerably higher during those years, mainly due to the international price crisis.[18]

Figure A.1.1 provides graphs showing trends in price indices of the four most important cereals in Ethiopia. Similar graphs for other crops and livestock are provided in Figures A.1.2 and A.1.3, respectively. In Table A.1.1, we provide a summary of comparative prices for the items in the second half of 2015 and the first half of 2016 with the long term average prices.

Figure A.1.1—Trends in teff, maize, wheat, and sorghum price indices, 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.

[17] We thank Birhanu Lakew and Monica Zajac, whose questions gave rise to this appendix.

[18] Although not presented, our results from analyses that include these three years in the computations actually strengthens the conclusions made in this appendix.

Table A.1.1—Differences between monthly and long-term average prices for various crops and livestock in the second half of 2015 and in the first half of 2016, by woreda hotspot category, in percent

Item	Woreda category and period									
	Overall		Hotspot 1		Hotspot 2		Hotspot 3		Uncategorized	
	2015 2nd half	2016 1st half	2015 2nd half	2016 1st half	2015 2nd half	2016 1st half	2015 2nd half	2016 1st half	2015 2nd half	2016 1st half
Crops										
Cereals	-8.2	-8.2	-9.6	-10.7	-5.9	-6.5	-2.8	-3.9	-9.5	-8.4
Teff	0.3	6.9	-2.3	3.6	1.5	8.0	9.0	13.0	-0.8	6.9
Maize	-22.3	-24.3	-20.1	-24.5	-16.1	-20.6	-18.4	-21.9	-27.1	-26.4
Wheat	-4.4	-10.8	-19.4	-6.9	-22.5	-3.8	-9.7	1.6	-13.0	-4.6
Sorghum	-16.8	-13.8	-15.7	-13.8	-10.0	-4.4	-17.4	-12.4	-20.0	-17.9
Pulses	22.8	23.2	21.0	25.5	27.0	27.1	24.4	23.1	21.9	20.3
Oilseeds	18.5	12.2	14.3	11.5	17.2	12.7	17.7	12.9	21.7	12.4
Enset/kocho	-15.1	-13.9	-21.8	-23.9	-5.0	-8.8	-13.7	4.1	-16.6	-14.6
Root crops	-9.7	5.8	-13.6	3.8	0.6	5.6	-9.8	13.3	-12.0	5.5
Livestock										
Cows	8.9	8.7	3.4	4.3	13.6	10.4	7.4	4.7	10.7	11.7
Oxen	8.1	6.3	-0.5	-0.8	9.1	11.2	8.5	4.8	13.0	8.9
Sheep	9.4	7.0	6.0	6.8	15.5	13.0	4.7	6.0	10.0	4.7
Goats	18.2	14.3	13.4	11.5	21.7	12.9	17.0	10.7	20.0	17.7

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

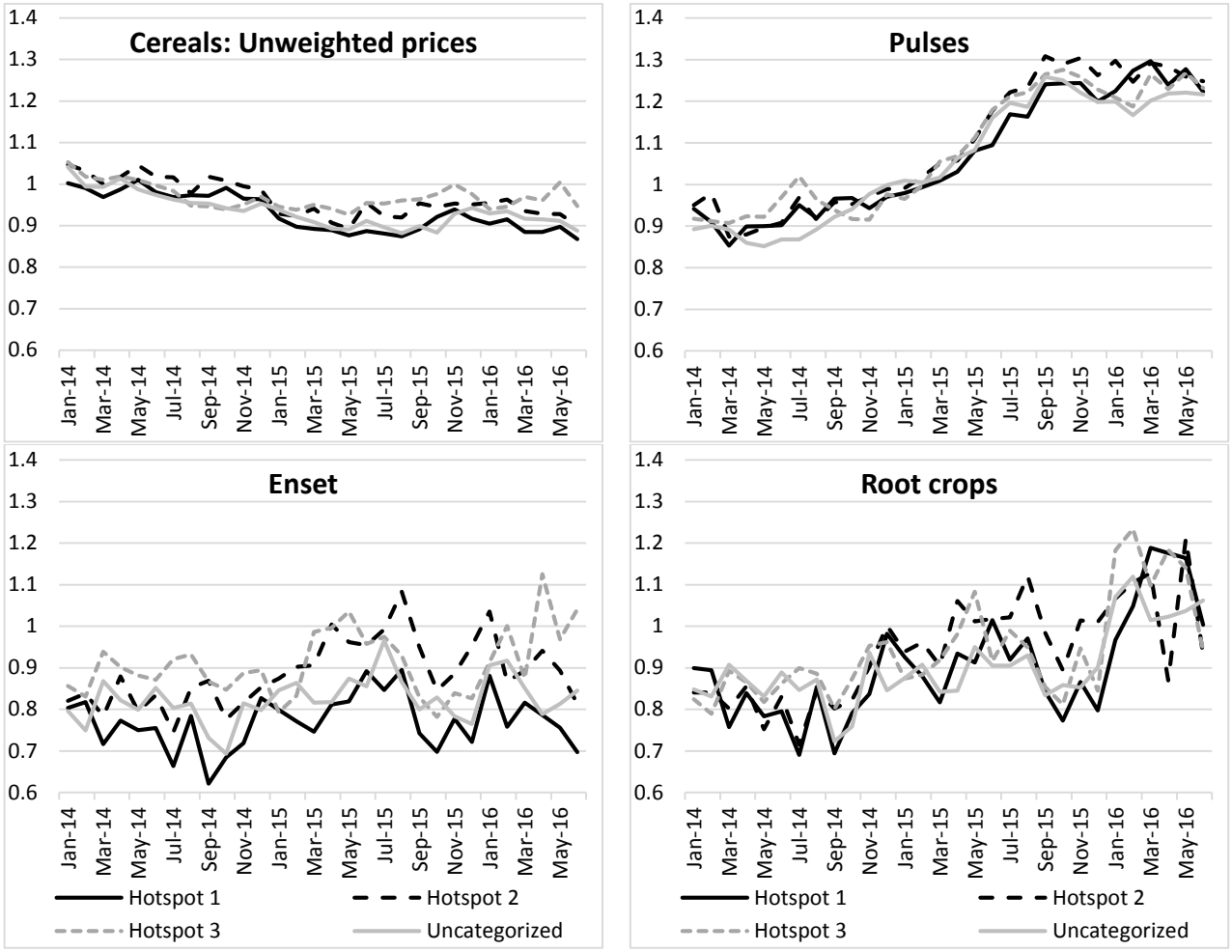
Figure A.1.1 indicates that teff prices were higher than their long-term average in the first half of 2014 and mostly increased since November 2015 in all hotspot areas. In particular, in hotspot 3 woredas, the teff price index has been higher than 1.0 in almost all months. This is also reflected in Table A.1.1, which shows that teff prices in the second half of 2015 and first half of 2016 were 9 and 13 percent higher than their respective long-term average in hotspot 3 areas. Although teff price indices started increasing in the middle of 2015, prices in the second half of 2015 were either lower than their long-term average (in hotspot 1 and non-hotspot areas) or lower than those in the first half of 2016 (hotspot 2 and 3 areas), at which time prices were higher than their long term average in all areas.

Maize and sorghum price indices were less than 1.0 in all hotspot areas throughout 2015 and 2016. The same held for wheat with the exception of hotspot 3 areas in 2015 and in hotspot 2 and uncategorized areas in the first few months of 2015. Despite the sorghum price index being less than 1.0, it has mostly been increasing since mid-2015. However, sorghum prices are still lower than the long term average at the end of the study period. Maize price indices were much lower than their long-term average in both the second half of 2015 (16 to 27 percent lower) and the first half of 2016 (20 to 26 percent lower). Trends in cereal price indices in Figure A.1.1 and the summary in Table A.1.1 generally reflect what was observed in the four cereal crops individually. The cereals price index was less than 1.0 in all areas and in all months of 2015 and 2016.

The pulses price indices of all hotspot categories were higher than 1.0 from March 2015 and generally increased up until the end of 2015 (Figure A.1.2). Both of these facts are consistent with observed trends in pulses prices (Figure 3.6). Pulses prices, which were at least 20 percent higher than their long-term average in all areas and in the periods considered in Table A.1.1, are unlike all other crops.

Except for the few months in which the enset price index was higher than 1.0 in hotspot 2 and 3 areas, it was less than 1.0 in all areas since January 2014. However, the enset price index fluctuated considerably, as did the root crops price index. The latter, however, has generally increased since the end of 2015, with root crop prices being higher than their long term average in the first half of 2016. Livestock prices have generally been higher than their long-term average in all hotspot categories during the period from January 2014 to June 2016 (Figure A.1.3). Although livestock price indices in hotspot 1 areas were higher than 1.0 for most animal species and in most months during 2015 and 2016, they were lower relative to other areas, which shows the impact of the drought in these hard hit areas.

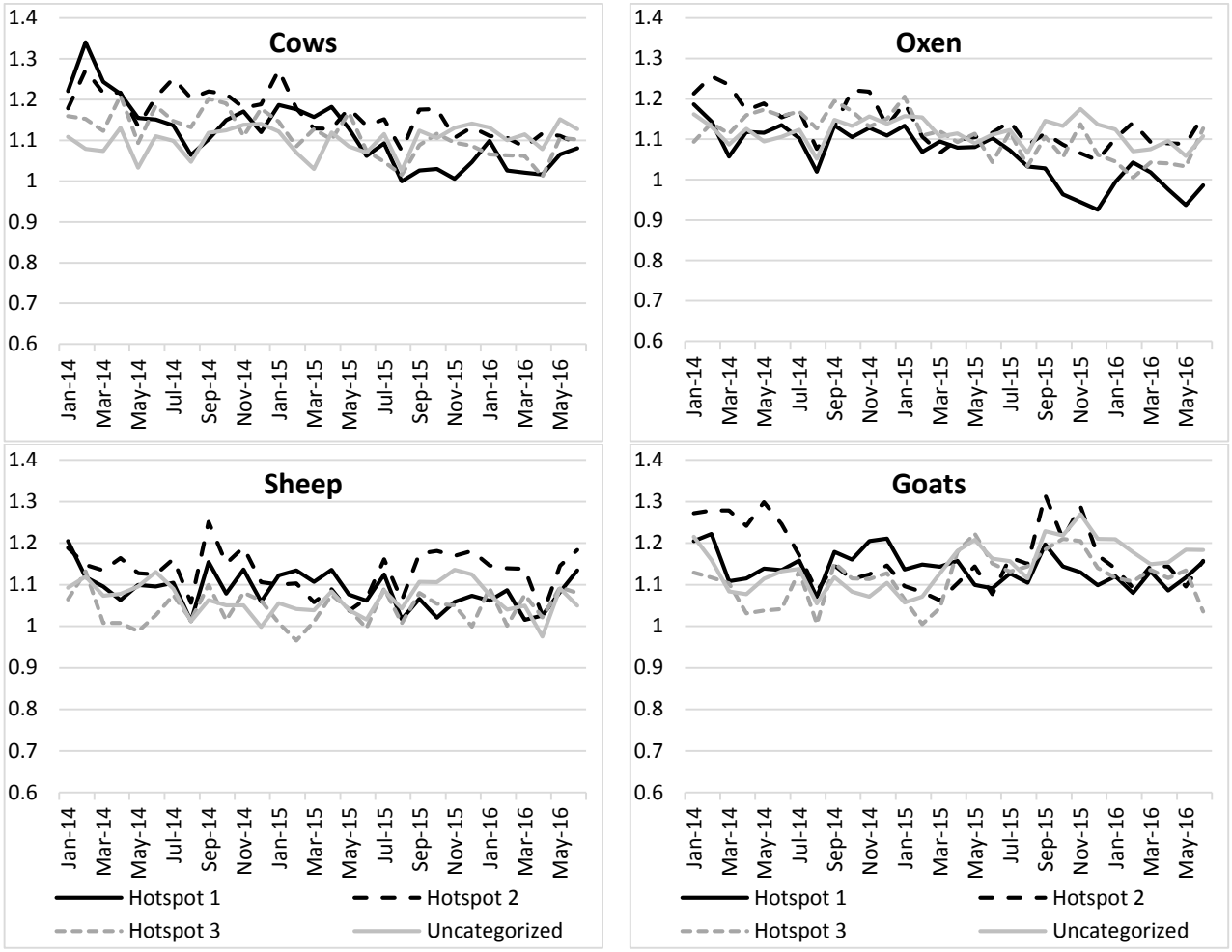
Figure A.1.2—Trends in cereal, pulses, enset, and root crops indices, by woreda hotspot category



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

The results in this section indicate that crop prices have been generally lower than their long-term average for most of the months of 2015 and 2016, particularly, in the second half of 2015 and first half of 2016. Important exceptions to the latter are pulses (in both 2015 and 2016) and root crops (in 2016). Moreover, livestock prices have been generally higher than their long-term average in all hotspot areas, although in areas that were most affected by the drought, this increase in livestock prices was less pronounced or prices were even lower. These results, together with higher crop and lower livestock prices expected during periods of severe drought, suggests that the drought in 2015 and 2016 in Ethiopia appears to have had a lower impact on prices compared to earlier droughts of comparable severity (Section 3.3).

Figure A.1.3—Trends in livestock price indices, 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.

Appendix 2: Cereal output growth and trends in wheat imports

Table A.2.1—Annual cereals output growth rate between 1996/97 and 1999/2000 and between 2012/13 and 2015/16, percent

Crop	1996/97-97/98	1997/98-98/99	1998/99-1999/2000	2012/13-13/14	2013/14-14/15	2014/15-15/16
Cereals	-24.7	18.2	0.8	9.8	9.4	-2.0
Teff	-34.7	25.6	4.6	17.4	7.5	-5.9
Wheat	10.5	0.6	8.9	14.3	7.8	-0.3
Maize	-23.8	25.3	4.5	5.4	11.5	-1.2
Sorghum	-46.7	23.5	-10.6	6.2	13.3	-0.4
Pulses	-15.3	7.6	31.1	3.9	-6.5	3.6
Oilseeds	-13.9	-8.1	12.7	-2.1	6.9	3.3

Source: Authors' computation using CSA output data (CSA, 1997-2000; 2013-2016).
Note: The data includes cereal production by smallholder farmers in the main agricultural season of meher.

Table A.2.2—Volume of wheat imports between 1997 and 1999 and between 2013 and 2016, thousands of metric tons

	1997	1998	1999	2013	2014	2015	2016
All wheat imports (UN-Comtrade)	**8.1**	**223.3**	**338.4**	**1411.1**	**927.3**	**1305.1**	**-**
Grain	7.9	217.6	328.6	1393.3	892.4	1259.0	-
Flour	0.2	5.7	9.8	17.8	34.9	46.2	-
AKLDP estimate of wheat imports	-	-	-	-	-	-	**2006.2**

Source: Authors' computation using data from Ethiopian Revenues and Customs Agency (2016), UN-Comtrade (2016), and AKLDP (2016)

Appendix 3: Nominal cereal price comparisons between Central Statistical Agency and Ethiopia Grain Trade Enterprise price series

Table A.3.1—Annual average nominal cereal price between 2014 and 2016 by dataset, birr/kg

		Teff			Wheat			Maize			Sorghum		
Region	Year	EGTE	CSA-Producer	CSA-Retail	EGTE	CSA-Producer	CSA-Retail	EGTE	CSA-Producer	CSA-Retail	EGTE	CSA-Producer	CSA-Retail
Four regions	2014	12.5	10.9	12.8	8.7	7.8	9.4	5.1	4.9	5.6	7.6	5.9	7.2
	2015	13.3	11.7	13.4	9.4	8.2	10.1	4.5	4.5	5.1	6.7	5.5	6.8
	2016	15.6	13.5	15.8	8.5	7.7	10.0	4.9	4.6	5.5	7.9	6.0	7.4
Tigray	2014	11.5	11.4	13.4	8.5	8.0	9.5	5.4	5.5	6.3	7.0	6.6	7.4
	2015	12.7	12.2	13.6	9.6	8.6	10.0	4.7	5.2	5.4	6.0	5.9	6.5
	2016	14.9	13.8	15.5	10.4	8.5	10.2	5.2	5.7	5.7	8.1	7.3	7.6
Amhara	2014	12.3	11.8	12.5	8.7	8.5	9.5	5.2	5.5	6.0	7.8	6.8	8.0
	2015	13.1	12.3	13.2	9.2	8.6	9.8	4.4	4.9	5.3	7.1	6.4	7.4
	2016	15.0	13.9	14.7	8.1	7.8	9.4	4.8	4.9	5.6	8.3	7.5	8.5
Oromia	2014	12.5	10.4	12.9	8.7	7.3	9.1	4.9	4.5	5.6	7.7	5.4	7.4
	2015	13.3	11.4	13.7	9.4	7.9	9.9	4.5	4.2	5.3	6.3	5.2	7.1
	2016	16.0	13.0	15.9	8.6	7.4	9.7	4.8	4.3	5.5	7.1	5.2	7.6
SNNP	2014	13.5	10.8	12.7	9.2	7.9	9.5	5.2	4.7	5.2	7.8	5.3	6.5
	2015	14.3	11.5	13.4	9.8	8.3	10.5	4.8	4.3	4.9	-	4.9	6.3
	2016	16.5	14.1	16.5	8.4	8.1	10.5	5.1	4.6	5.2	-	4.9	6.5

Source: Authors' computation using CSA producer price data (CSA 2016a), CSA retail price data (CSA 2016b), and EGTE wholesale price data (EGTE, 2016).

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