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Utility-consistent poverty in Ethiopia, 2000–11

Welfare improvements in a changing economic landscape

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Abstract: We use Arndt and Simler's utility-consistent approach to calculating poverty lines to analyse poverty in Ethiopia in 2000, 2005, and 2011. Poverty reduction was steady but uneven, with gains greatest in urban areas in the first half of the decade, and in rural areas in the latter half. Other monetary and non-monetary measures of well-being confirm the general pattern of persistent improvements, though the large declines in poverty are not entirely supported by the magnitudes of change in other measures. Nonetheless, data comparability issues warrant that great care be taken in interpreting the degree to which poverty fell.

Keywords: poverty measurement, utility-consistent poverty lines, inequality, Ethiopia
JEL classification: D63, I32, O55,

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1 Introduction

Since the turn of the century, the Ethiopian economy has experienced strong economic growth and structural improvements. Rapid infrastructure growth, increased agricultural production and commercialization, better functioning food markets, and a strong social safety net programme are all part of the changing economic landscape (Dorosh and Schmidt 2010) that is likely to have paid dividends in terms of poverty reduction. Yet measuring these dividends in Ethiopia is complicated by conceptual and practical data-related issues. This is not surprising given the complexity of measuring poverty in a manner that is consistent over time and space, yet is also sensitive to local conditions.

There are two important measurement issues related to the consistency and specificity of poverty estimates over time and space. First, evidence that differing commodity lists (Pradhan 2000) and recall periods (Scott and Amenuvegbe 1990) affect the levels of reported consumption from household surveys highlights the importance of the comparability of the data used to construct nominal household consumption aggregates. Second, the appropriate estimation of poverty lines is also essential not only as a poverty threshold, but also as a cost of living index that allows interpersonal welfare comparisons when the costs of consuming basic needs vary over time and space (Ravallion 1998). The challenge is to estimate poverty lines that are consistent over time and space (that is, the reference standard of living is fixed), and yet are also characterized by specificity in which the poverty lines reflect local consumption patterns and norms (Ravallion and Bidani 1994).

The purpose of this paper is to analyse poverty in Ethiopia between 2000 and 2011 using nationally representative household consumption and expenditure surveys, and applying to those surveys Arndt and Simler's (2010) utility-consistent approach to calculating cost of basic needs (CBN) poverty lines. This method involves calculating region-specific poverty lines based on consumption patterns of the poor in each of the regions to reflect local perceptions of poverty (i.e. specificity). But, to ensure that each of the consumption bundles in the region-specific CBN poverty lines also represents the same level of utility (i.e. consistency), a maximum entropy approach is then employed to reconcile cases where revealed preference conditions are violated. These consistent, yet specific poverty lines, along with consumption aggregates calculated from the household surveys, form the basis of the poverty analysis in this paper.

Another conceptual issue that arises when analysing trends in poverty is that poverty estimates are based on nationally representative household surveys that are not typically conducted every year. As such, they represent snapshots of poverty during the particular years in which the survey took place. The challenge is to disentangle the long-term poverty trends from the short-term shocks that may affect poverty estimates in a particular year. To address this, we place the monetary poverty measures in context by comparing them to other macro- and micro-economic indicators, some of which are collected with more frequency. These indicators suggest that the poverty estimates for Ethiopia are largely a reflection of long-term trends characterized by broad-based growth and improved welfare. Nonetheless, comparability issues related to the main data sources used in this analysis warrant that great care be taken in interpreting the degree to which poverty fell over the course of the first decade of the 21st century in Ethiopia.

The structure of this paper is as follows. In Section 2, we elaborate on the methodology used to calculate poverty and describe the primary data sources. Section 3 provides a description of the economic context during which the surveys took place to better understand the long-term trends. In Section 4, we present the estimates of poverty and inequality based on the utility-consistent

approach to calculating poverty lines, and triangulate these results with other monetary and non-monetary indicators. Section 5 provides concluding remarks.

2 Methodology and data

In this section, we briefly describe the methodology and primary data sources used to measure poverty and inequality in a manner that is consistent over time and space, and which is specific to local consumption patterns and norms.

2.1 Methodology

As with any analysis of poverty, choices need to be made regarding (1) the welfare indicator, (2) the threshold between the poor and the non-poor, and (3) the measure of poverty. While we concentrate primarily on a money measure of welfare—per capita household consumption—we complement this later with macroeconomic data and other measures of well-being such as child nutritional status, infant mortality rates, educational enrolments, and access to basic services. The household consumption aggregate is constructed in a standard manner by aggregating food and non-food expenditures, the estimated value of own produced food and non-food items and of in-kind payments, gifts received, and the estimated use value of durable goods and housing (Deaton and Zaidi 2002).

We briefly outline the procedure used to estimate poverty lines[1] for 20 spatial domains in Ethiopia (Addis Ababa, Harari, and urban and rural areas for the Afar, Amhara, Benishangul-Gumuz, Dire Dawa, Gambella, Oromiya, SNNP, Somali, and Tigray regions). Food poverty lines are estimated first, and are anchored to calorie requirements that are calculated for purposes of specificity separately for each domain based on the demographic structure and fertility patterns in the domain. This is a departure from the common practice for poverty analysis in Ethiopia of using a standard requirement of 2,200 calories per person per day, with the poverty line calculated in 1995/1996 and adjusted for inflation for analysis in later years. An iterative approach is used to find the least cost consumption bundle that meets the domain-specific calorie requirements and that reflects consumption patterns of the poor in the spatial domain. This provides specific initial estimates of the food poverty lines. Revealed preference tests are then conducted to test the utility consistency of these poverty lines (that is, do the consumption patterns in other spatial domains cost no less than the own-domain consumption patterns when both are evaluated at own-domain prices?).[2] When the tests are violated, maximum entropy methods are used to reconcile the differences so that domain specificity is maintained in the new poverty lines, while utility consistency is not violated. Once the region-specific food poverty lines are determined, they are scaled up by the share of non-food consumption representative of the households around the food poverty lines, to get the region-specific poverty lines.

With the welfare indicators and poverty lines in hand, we primarily employ the Foster-Greer-Thorbecke (1984) class of poverty indices to measure levels and changes in poverty. We also move

[1] See Arndt and Simler (2010) and Arndt et al. (2013) for more details about the general procedure. The household consumption aggregates and poverty lines were calculated using the Poverty Line Construction Toolkit developed by Arndt et al. (2013).

[2] We note that revealed preference conditions should also hold over time (that is, do the consumption patterns in the same spatial domain but in different time periods cost no less than the own-domain consumption patterns at a specific time when both are evaluated at own-domain prices for that specific time?). When these conditions are violated over time, similar maximum entropy methods can be used to reconcile the differences (Arndt and Simler 2010).

beyond the use of poverty indices to analyse changes in poverty by employing standard tests of stochastic dominance. In order to do this, we note that poverty lines are more than poverty thresholds, they also serve as cost of living indices that allow interpersonal welfare comparisons. As such, we use the poverty lines to map nominal household consumption to real household consumption using indices constructed from these poverty lines (Blackorby and Donaldson 1987). Once mapped into comparable real values, the distributions of household consumption are then used to conduct dominance tests and to measure inequality.

2.2 Data

The primary data sources used in this analysis are the 1999/2000 (hereafter 2000), 2004/2005 (hereafter 2005) and 2010/2011 (hereafter 2011) Ethiopia Household Income, Consumption and Expenditure Surveys (HICES) and Welfare Monitoring Surveys (WMS). The WMS and HICES, conducted by the Central Statistical Agency (CSA), are nationally representative stratified and clustered surveys that contain information on household characteristics, expenditure, activities, and infrastructure. The WMS were conducted mainly to assess non-income dimensions of poverty, whereas the main objective of the HICES was to provide data on levels, distributions and patterns of household income, consumption, and expenditures. In each of the three years, the HICES interviewed a representative sub-set of the households that were interviewed in the WMS.

The HICES are used to construct the household consumption aggregates for the analysis of monetary poverty. As such, it is important to be aware of comparability issues related to them. Coverage of the three surveys is similar (major urban areas, rural regions, and other urban areas), and although the sample sizes grew from 17,332 to 21,274 to 27,830, for the 2000, 2005, and 2011 surveys, respectively, this is unlikely to affect the comparability of the welfare measures over time. There are, however, other differences in the data collection method that may be problematic. First, although the questionnaires are nearly identical, the item codes used for the expenditure/consumption recall differed for each of the three years. For example, the numbers of food codes used in the data collection process were 252, 872 and 653 in the 2000, 2005, and 2011 surveys, respectively. Evidence that more detailed lists of commodity items are associated with higher levels of reported consumption from household surveys (Pradhan 2000) warrants care in interpreting changes in poverty given that the household consumption aggregates may not be entirely comparable.

Second, the change in the data collection period complicates comparability due to issues of seasonality and inflation. The 2000 and 2005 surveys were conducted in two relatively short and similarly timed rounds (July–August and January–February) during low inflation periods, whereas the 2011 survey was conducted over the course of a year (8 July 2010 to 7 July 2011) that was characterized by inflation of over 30 per cent.[3] Although we do temporally deflate the food consumption aggregate quarterly for the 2011 data using price indices calculated from unit prices in the data to address inflation,[4] even within-quarter inflation may be problematic due to the high rate at which prices rose. Further, it is difficult to gauge the consequences that seasonal variation in consumption patterns may have on the comparability of the 2011 consumption aggregate relative to the aggregates from the earlier surveys. As a form of sensitivity analysis, we estimated poverty lines on the sub-sample of the sample of households in the 2011 survey who were interviewed in the same quarters as those in the 2000 and 2005 surveys. Although the poverty estimates from

[3] Headey et al. (2012) document a rapid rise in urban food prices for the poor during the 2011 survey period that outpaced the growth of urban nominal wages.

[4] See Arndt and Simler (2010) for more details.

this sub-sample do not differ substantively from those of the full sample, we remain cautious about interpreting changes in poverty between these surveys.

2.3 Regional cost of basic needs poverty lines

The utility-consistent regional poverty lines estimated from the HICES (Appendix Table 1) show that between 2000 and 2011, the costs of basic needs rose by over 150 per cent (an average of 9.5 per cent per year). Most of this increase, however, occurred between 2005 and 2011 as costs actually fell between 2000 and 2005 in many regions (most markedly in Addis Ababa where basic needs costs were 28 per cent lower in 2005 than in 2000). In some regions, such as rural Amhara and rural Tigray, the cost of living for the poor rose even further over the decade (230 per cent). Throughout the survey periods, the changes in prices for both food and non-food items contributed to overall changes in costs of basic needs, though non-food costs rose slightly faster than food costs between 2005 and 2011. The poverty lines in Appendix Table 1 also illustrated substantial variation in costs of basic needs. For example, in 2000 the rural Amhara poverty line was 20 per cent below the Addis Ababa poverty line, while the rural Dire Dawa poverty line was 12 per cent higher than in Addis Ababa. These different poverty lines and the differential changes in these poverty lines lend credence to the need for specificity in constructing poverty lines.

3 Context

During the 2000–11 period, Ethiopia witnessed persistent weather shocks, high rates of inflation in the latter half of the decade, and a post-election crisis in 2005. Nonetheless, this period is predominantly characterized by what Dorosh and Schmidt (2010) refer to as 'Ethiopia's changing economic landscape'. In short, fundamental structural changes took place in the economy led by the Ethiopian government's deliberate strategy of Agricultural Development-Led Industrialization (ADLI). In an effort to facilitate 'rapid agricultural growth as a means of accelerating economic transformation and reducing poverty' (MoFED 2008), the government invested substantial resources toward increasing agricultural productivity through the use of modern inputs, and toward developing growth linkages with the rest of the economy through improved roads and other types of infrastructure.

Although increases in agricultural production over the last decade appear to be driven largely by the expansion of cultivated land (Dercon and Hill 2009; Seyoum Taffesse et al. 2013), and overall use of modern agricultural inputs remains low, changes did take place that likely resulted in productivity gains. For example, the Ethiopian government expanded the agricultural extension system to such a degree that by 2010, some 45,000 extension agents were placed in villages. With roughly three extension agents available per *kebele* (ward), Ethiopia now has one of the highest extension agent per farmer ratios in the world (Davis et al. 2010). Further, there is evidence that the use of modern inputs that are distributed through government-established co-operatives, increased over the course of the decade. The gains in modern cereal seed use were largely confined to maize (Spielman et al. 2011), though more improved *teff* (cereal) seeds were also being rapidly adopted by the end of the decade (Minten et al. 2012). Finally, chemical fertilizer use grew to about 650,000 tons in 2012, as the amount of fertilized land dedicated to cereal production more than doubled over the course of the decade (Rashid et al. 2013).

Improving the physical infrastructure has been a central component of the Ethiopian government's development strategy. For example, in 1997, the government embarked on a large road investment programme (the Road Sector Development Program), with a resulting impressive increase in spatial connectivity. By 2011, all-weather surfaced roads connected most of the capitals of the regions. Further, the length of all-weather surfaced roads more than doubled in the 15 years

between 1993 and 2008, from an estimated 19,000 km to 44,300 km, respectively. As a consequence, in 2007 only 12 per cent of the total population were more than ten hours away from a city compared to 31 per cent in 1997, and 38 per cent were over five hours away in 2007 compared to 82 per cent in 1997 (Schmidt and Kedir 2009). Minten et al. (2012) find that this type of road development had important effects on the spatial integration of agricultural markets in the country, as travel times between different wholesale markets in the country and the Addis wholesale market fell on average by 20 per cent over the last decade, from ten hours to eight hours, and transportation costs fell by 50 per cent.

Infrastructure investments were not limited to roads, however. Public resources that poured into the construction of hydroelectric dams prior to 2000 began to pay off in the latter half of the decade. The increase in total generating capacity of 477 megawatts (7 watts per person) at the turn of the century, to 1,917 megawatts (21 watts per person) by the end of the decade (Dorosh and Schmidt 2010), lay the foundation for significant increases in productivity and output (see for example, Ayele et al. 2009). Further, communication infrastructure reached a larger segment of the population as fixed telephone lines more than doubled from 405,000 in 2003, and as mobile subscriptions rose exponentially from 50,000 in 2003 to over 10 million in 2011 (Dorosh and Schmidt 2010; Ethiopia Telecom 2013). Minten et al. (2012) find that the increased access to telecommunications played an important role in reducing marketing margins in the improved food marketing system.

Finally, in 2005, the Ethiopian government and a consortium of donors began implementation of the Productive Safety Nets Programme (PSNP) in response to chronic food insecurity in rural Ethiopia. With the objective of providing 'transfers to the food-insecure population in chronically food insecure *woredas* (districts) in a way that prevents asset depletion at the household level and creates assets at the community level' (Government of Ethiopia 2004), the PSNP targets food-insecure rural households and provides them compensation for their labour on labour-intensive projects designed to build community assets. For labour-scarce households, direct support is provided in the form of cash or food transfers, though this accounts for less than 5 per cent of total transfers. The programme is well-targeted (Coll-Black et al. 2011) and participants with access to both the PSNP and packages of agricultural support provided through the Other Food Security Program are more likely to be food secure (Gilligan et al. 2009). Programmes such as the PSNP appear to have helped reduce food insecurity, and hence poverty, in rural areas since 2005.

4 Poverty and inequality in the 2000s

It is in this context of steady structural changes in the economic landscape of Ethiopia that we analyse snapshots of poverty and inequality in Ethiopia from 2000 to 2011. The general story that emerges from the data is one of steady but uneven progress, with urban areas witnessing the greatest gains in the first half of the decade, and rural areas benefiting more in the latter half. Moreover, other monetary and non-monetary measures of well-being confirm the general pattern of persistent improvements, though the large declines in poverty are not entirely supported by the magnitudes of change in other measures.

4.1 Monetary poverty and inequality

Poverty rates in Ethiopia at the turn of the century were high, but fell substantially (Table 1). In 2000, 51.9 per cent of the population was poor, compared to 44.5 per cent in 2005, and 30.0 per cent in 2011. Poverty is largely a rural phenomenon, with 53.7 per cent of the rural population below the poverty line in 2000, compared to 40.8 per cent in urban areas. Although the rural headcount ratio fell by a remarkable 20.5 percentage points, urban areas as a whole saw even

greater declines in poverty, as the urban poverty rate fell to just under 14 per cent by 2011. Most of the decline in urban poverty took place in the first half of the decade, falling by just over 19 percentage points. Conversely, rural poverty fell only marginally during this period, with the majority of gains occurring after 2005.

Table 1: Monetary poverty in Ethiopia, 2000–11

	Levels			Changes		
	2000	2005	2011	2000–05	2005–11	2000–11
National						
Headcount ratio (P_0)	51.9	44.5	30.0	-7.5	-14.5	-21.9
Depth of poverty (P_1)	14.6	11.7	8.2	-2.9	-3.6	-6.5
Severity of poverty (P_2)	5.7	4.2	3.3	-1.5	-0.9	-2.4
Urban						
Headcount ratio (P_0)	40.8	21.7	13.9	-19.1	-7.8	-26.9
Depth of poverty (P_1)	11.9	4.4	3.4	-7.4	-1.0	-8.5
Severity of poverty (P_2)	4.7	1.4	1.3	-3.3	-0.1	-3.4
Rural						
Headcount ratio (P_0)	53.7	48.2	33.2	-5.5	-15.0	-20.5
Depth of poverty (P_1)	15.1	13.0	9.1	-2.1	-3.9	-6.0
Severity of poverty (P_2)	5.8	4.7	3.7	-1.1	-1.0	-2.2

Note: Poverty measures are multiplied by 100.

Source: Authors' calculations from HICES (2013).

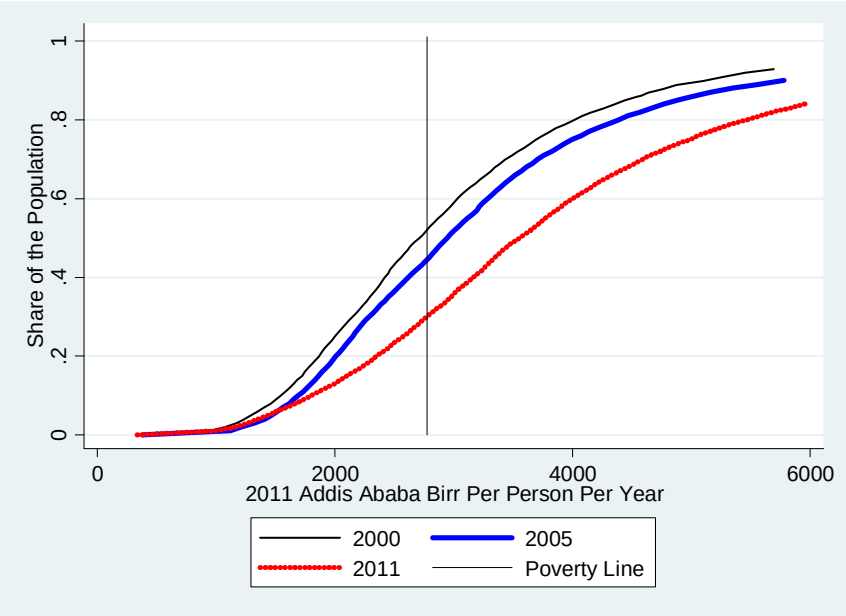
The more distribution-sensitive measures of poverty (depth and severity) are generally consistent with the trends in the headcount ratios, though the magnitude of the declines in the severity of poverty are not as large. The poverty incidence curves shown in Figure 1 illustrate this graphically, as the poorest of the poor were only slightly better off in 2011 than in 2000, and were no better off in 2011 than in 2005. While the real per capita household consumption levels (temporally and spatially deflated by the poverty lines to convert all values to 2011 Addis Ababa values) of the richest 90 per cent of the population rose somewhat between 2000 and 2005 (thick solid blue line below the thin solid black line), they rose even further between 2005 and 2011 (thick dashed red line substantially further below the thick solid blue line). At the same time, however, the slight improvements in real consumption for the poorest 10 per cent of the population between 2000 and 2005 did not continue in the latter half of the decade as real consumption levels for these households stagnated (the thick blue and red lines overlap). In short, while the well-being of most of the Ethiopian population improved significantly, extremely poor households were not as fortunate.[5]

The dramatic fall in urban poverty between 2000 and 2005 is clearly illustrated in Figure 2a by the across-the-board increase in real household consumption levels (thick blue line below the thin black line at all consumption levels). The vertical gap between the poverty incidence curves for these two years indicates that the 19 percentage point decrease in the poverty rate shown in Table 1 is not sensitive to the real poverty line. A whole host of possible poverty lines ranging from less than 2,000 Birr (2011 Addis Ababa prices) per person per year to over 6,000 Birr, would

[5] The overlapping of the 2005 and 2011 distributions indicate that tests of first-order dominance are rejected. Further, because the overlap is at the lower end of the household consumption distribution, this also results in rejection of tests of second- and third-order dominance (see Appendix Figures 1 and 2).

result in estimates of similar magnitudes.[6] This is not the case for the 2005–11 period, however. During this period, most of the urban population also experienced increased real consumption levels, but the gains were not as large (7.8 percentage point decrease in poverty), nor were they distributed as uniformly. In fact, the poorest 10 per cent of the urban population experienced no real change in their consumption levels, despite nominal incomes rising.

Figure 1: Poverty incidence curves, Ethiopia 2000–11



Source: Authors' calculations from HICES (2013).

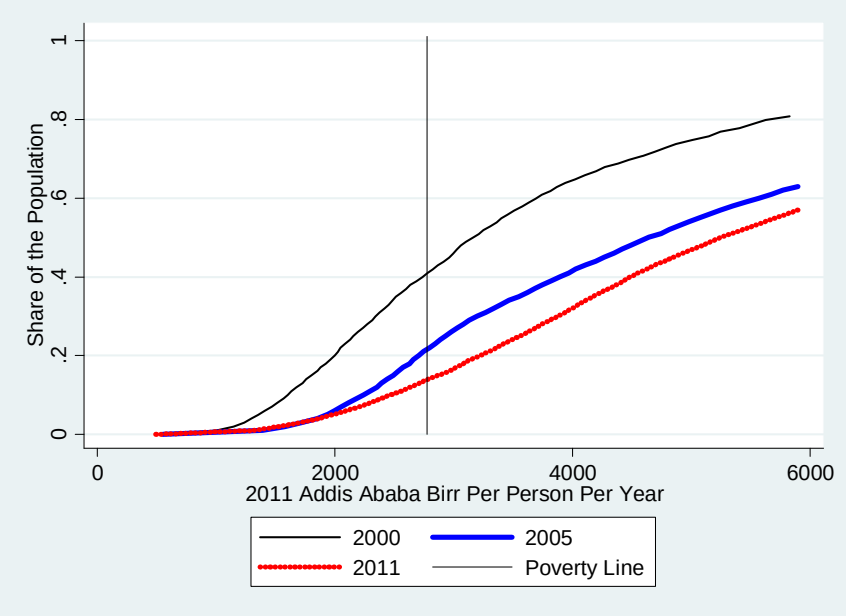
Figure 2b shows that most of the improvements in rural well-being occurred between 2005 and 2011. Although the gains in consumption from 2000 to 2005 were reasonably uniform (thick blue line almost everywhere below the thin black line), they were moderate, with at most a 5 percentage point decrease in headcount ratios, depending on the value of the poverty line chosen. The further and larger shift in the 2011 poverty incidence curve to the right for the top 90 per cent of the rural population illustrates the 15 percentage point decrease in rural poverty along with the 3.9 point decrease in the depth of poverty (Table 1). The smaller 1.0 point reduction in the severity of poverty follows from the poorest 10 per cent of the rural population being no better off in 2011 than in 2005.

Further disaggregation of poverty by region reveals some interesting messages. First, in 2000, urban poverty rates in all of the regions were lower than the poverty rates in all of the rural areas, except for rural Harari, which had a lower share of its population poor (41.7 per cent) than urban areas in Dire Dawa (42.4 per cent), Oromiya (43.5 per cent), SNNP (46.6 per cent), and Somali (50.6 per cent), and for rural Amhara (50.0 per cent) compared to urban Somali.

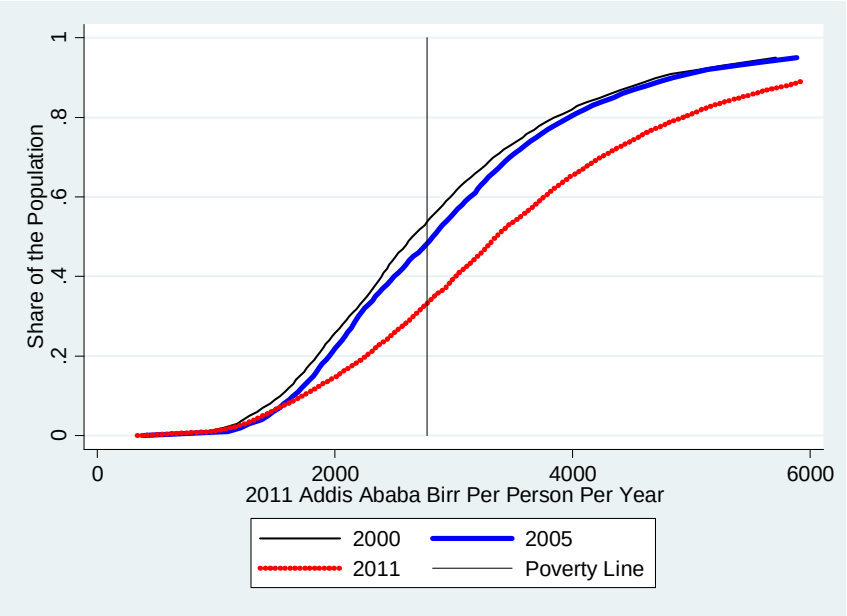
[6] 2,000 Birr is equivalent to US$117.6 and 6,000 Birr is equivalent to US$352.9 at the 2011 average exchange rate (17 Birr/US$).

Figure 2: Poverty incidence curves, Ethiopia 2000–11

a. Urban



b. Rural



Source: Authors' calculations from HICES (2013).

Second, in 2000, the poverty rates were lowest in Addis Ababa[7] (31.7 per cent) and urban Harari (34.5 per cent), which is not surprising given that the former is the national capital as well as the commercial hub of the country, and the latter is located in a moisture-reliable agroecological zone and benefits from *chat* production.[8] The poorest regions, with more than twice as much poverty as

[7] Because all areas in Addis Ababa were categorized as urban in the 2011 survey, no distinction is made between urban and rural areas for Addis Ababa for all three survey years.

[8] *Chat* (or *khat*) is shrub leaves that are chewed as a stimulant.

the least poor, are located in the rural areas of Dire Dawa and Afar. The former, situated in drought-prone lowlands inhabited by pastoralist Somali tribes, and the latter, situated in lowland pastoralist areas, are both repeatedly affected by droughts and periodic tribal conflicts.

Table 2. Regional poverty in Ethiopia, 2000–11

	Percent poor			Changes		
	2000	2005	2011	2000-05	2005-11	2000-11
Addis Ababa	31.7	9.6	10.6	-22.1	1.0	-21.1
Afar (rural)	77.6	33.4	42.8	-44.3	9.4	-34.9
Afar (urban)	36.4	11.1	13.1	-25.3	2.1	-23.2
Amhara (rural)	50.0	48.4	37.6	-1.6	-10.8	-12.4
Amhara (urban)	37.7	30.1	14.8	-7.7	-15.2	-22.9
Benishangul (rural)	61.8	56.6	26.6	-5.2	-30.0	-35.2
Benishangul (urban)	35.1	32.1	15.3	-3.1	-16.8	-19.9
Dire Dawa (rural)	68.0	56.2	14.3	-11.8	-41.9	-53.7
Dire Dawa (urban)	42.4	14.3	21.3	-28.1	7.0	-21.0
Gambella (rural)	60.9		27.1			-33.9
Gambella (urban)	38.2		24.4			-13.8
Harari (rural)	41.7	13.4	6.5	-28.3	-6.9	-35.2
Harari (urban)	34.5	18.6	7.8	-15.9	-10.8	-26.7
Oromiya (rural)	50.8	46.6	33.6	-4.3	-13.0	-17.3
Oromiya (urban)	43.5	22.9	17.5	-20.6	-5.4	-26.1
SNNP (rural)	59.9	51.1	26.5	-8.9	-24.6	-33.5
SNNP (urban)	46.6	34.3	11.5	-12.3	-22.8	-35.1
Somali (rural)	52.4	37.8	30.9	-14.6	-7.0	-21.6
Somali (urban)	50.6	18.8	13.2	-31.8	-5.5	-37.4
Tigray (rural)	61.5	49.5	40.3	-12.0	-9.2	-21.3
Tigray (urban)	59.7	22.8	9.8	-36.9	-13.0	-49.9
Urban	40.8	21.7	13.9	-19.1	-7.8	-26.9
Rural	53.7	48.2	33.2	-5.5	-15.0	-20.5
National	51.9	44.5	30.0	-7.5	-14.5	-21.9

Source: Authors' calculations from HICES (2013).

Third, although poverty fell in all of the regions between 2000 and 2011, the changes in poverty were not uniform, nor were they necessarily consistent with the observed changes at the more aggregated urban and rural levels. For example, while urban areas generally exhibited greater declines in poverty between 2000 and 2005 than did most rural areas, the rural areas in Afar experienced the greatest decline in poverty among all of the regions as a result of 2000 being a particularly bad year and 2005 being a good year there. Further urban poverty in Benishangul-Gumuz declined only moderately during this period, but fell substantially in the latter half of the decade. Finally, some regions did remarkably better than others in terms of poverty reduction. For example, poverty rates in rural Dire Dawa and urban Tigray fell by 50 percentage points or more over the course of the decade, while poverty rates in urban Gambella and rural Amhara fell by less than 14 percentage points—which is still quite good. As a consequence of these differential experiences, rural Afar continues to have the highest level of poverty, while Addis Ababa no longer has the lowest.

Clearly, the differing poverty rates indicate that not all regions in Ethiopia are equal. We now turn to how the differing consumption levels for different regions translates into overall inequality of household consumption in the country as well as in urban and rural areas. The first thing to note is that the degree of inequality in Ethiopia is in the low range for African countries (World Bank 2011), as the Gini coefficient was 0.29 in 2000 (Table 3). Second, inequality rose over the course of the decade as indicated by the Gini coefficient increasing from 0.29 in 2000 to 0.33 in 2011, and the Theil index rising from 0.16 to 0.22. This is not surprising given the observation in Figure 1 that the poorest 10 per cent of the population did not fare as well as the rest.

Table 3. Inequality in Ethiopia, 2000–11

	2000	2005	2011
Gini coefficient			
National	0.289	0.327	0.326
Urban	0.388	0.439	0.388
Rural	0.260	0.254	0.276
Theil Index			
National	0.161	0.260	0.220
Urban	0.288	0.460	0.319
Rural	0.121	0.117	0.136
Percentage due to…			
Within-group inequality	94.0	80.0	84.4
Between-group inequality	6.0	20.0	15.6

Source: Authors' calculations from HICES (2013).

The degree of inequality in urban areas was considerably higher than in rural areas throughout the decade. Further urban inequality initially rose between 2000 and 2005, and fell back to nearly the same level in 2011 as in 2000. While the Gini coefficients from 2000 and 2011 are both 0.388, the Theil index for 2011 (0.319) is slightly larger than for 2000 (0.288). Conversely, rural inequality fell slightly by 2005, before rising in 2011.

Despite urban consumption levels being roughly 50 per cent higher on average than in rural areas in 2000, 94 per cent of total inequality in 2000 was due to within-group inequality (Table 3). This follows largely from the rural population accounting for over 85 per cent of the national population. As with poverty, rural inequality largely drives national inequality. Nonetheless, the more rapid growth experiences in urban areas as a whole compared to rural areas contributed to the overall rise in national inequality. This is illustrated by the contribution of between-group inequality to overall inequality rising from 6.0 per cent in 2000 to 15.6 per cent in 2011.

4.2 Poverty, GDP, and inflation

National poverty rates in 2000, 2000, and 2011 are consistent with trends in real per capita GDP over the decade, suggesting that at the more aggregated levels, the declines in poverty capture long-term growth trends in Ethiopia rather than short-term shocks. As illustrated in Table 4, growth of real GDP per capita in the first half of the decade was punctuated by periods of negative growth in 2002 and 2003. As such, despite otherwise respectable growth rates in other years, per capita GDP was only 18 per cent higher in 2005 than in 2000. By the end of the decade, however, overall growth remained high as per capita income increased by 50 per cent over the 2005 level. This shadows the poverty rates that fell by 7.5 percentage points between 2000 and 2005, and even further by 14.5 percentage points between 2005 and 2011.

Table 4: Production and inflation in Ethiopia, 2000–11

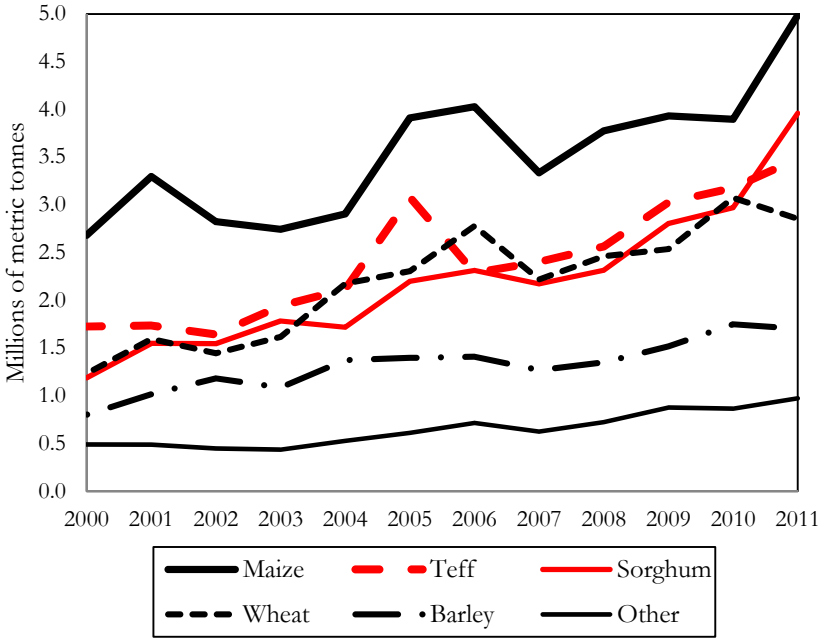
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Per capita GDP (2010 Birr)	2,594	2,729	2,692	2,559	2,824	3,071	3,312	3,592	3,875	4,106	4,397	4,596
Real per capita GDP growth	3.1	5.2	-1.4	-4.9	10.4	8.7	7.8	8.5	7.9	6.0	7.1	4.5
GDP (billions of 2003 Birr)												
Agriculture	111.9	109.8	98.3	115.0	130.5	144.8	158.5	170.3	181.2	195.0	212.6	223.1
Industry	18.9	20.5	21.8	24.3	26.6	29.3	32.1	35.4	38.8	43.0	49.4	56.1
Services	72.0	74.3	78.7	83.7	94.4	106.9	123.3	143.1	163.2	184.7	207.9	230.9
Real GDP growth												
Agriculture	9.6	-1.9	-10.5	16.9	13.5	10.9	9.4	7.5	6.4	7.6	9.0	4.9
Industry	5.1	8.3	6.5	11.6	9.4	10.2	9.5	10.1	9.7	10.8	15.0	13.6
Services	5.2	3.3	6.0	6.3	12.8	13.3	15.3	16.0	14.0	13.2	12.5	11.1
Food inflation	-5.5	-14.4	2.5	27.7	3.0	13.7	14.3	22.1	60.3	3.3	1.7	38.4
Non-food inflation	4.5	0.3	0.1	1.8	3.9	7.2	11.5	11.8	22.0	18.2	19.2	24.7
General inflation	-1.5	-8.2	1.7	17.8	3.2	11.7	13.6	18.0	44.4	8.5	8.2	33.2

Source: MoFED (2008, 2013) and CSA (2013) and authors' computation from CSA (2013) consumer price index estimates.

A sectoral breakdown in GDP is instructive vis-à-vis the differential impact of the sources of growth. First, with the exceptions of 2001 and 2002, the real value of agricultural production in Ethiopia grew by roughly 9 per cent per year on average. Given the dominance of agriculture in the livelihoods of rural dwellers, the doubling of real agricultural GDP between 2000 and 2011 (Table 4) was an important driver of rural poverty reduction. Much of this growth was driven by increases in the production of cereals, which account for three quarters of the cultivated area (Dorosh and Schmidt 2010). As illustrated in Figure 3, production of all major cereal crops grew steadily over the course of the decade. In the 1990s, despite stagnating yields, increases in areas cultivated drove increases in cereal production. In the 2000s, however, yields grew by 3.5 per cent per year and contributed to the 7 per cent annual growth in cereal production during this time period (Dorosh and Schmidt 2010). This type of growth was a key objective of the government's ADLI strategy.

Although the population remains largely rural, with some 80 per cent employed in agriculture, the service sector grew so much over the decade (12 per cent per year on average) that by 2011 it accounted for a greater share of GDP than agriculture. With financial services, real estate, and wholesale and retail trade leading the way, especially between 2005 and 2011 (MoFED 2012), urban dwellers are the most likely beneficiaries. Further, given that much of the growth in the service sector occurred in the latter half of the decade (average annual growth of 13.6 per cent compared to 7.8 per cent in the first half), the performance of this sector is consistent with the greater decrease in urban poverty observed during this period. Finally, industrial production more than doubled over the decade, but it started from such a low base that it accounted for only 10 per cent of GDP by 2011.

Figure 3: Cereal production, Ethiopia 2000–11



Source: MoFED (2008, 2013)

Inflation and price volatility are problems that faced Ethiopian households during this period, and created challenges for accurately measuring poverty. While non-food inflation was low between 2000 and 2005, it rose steadily over the latter half of the decade, reaching as high as 25 per cent in 2011. However, the major source of uncertainty for poor households, who spend more than half of their incomes on food, was related to food prices. During the period between 2000 and 2011, food prices were volatile[9] and at times rose substantially. Following annual average declines in the beginning of the decade, food prices swung upward and food price inflation reached peaks of 28 per cent in 2003, 60 per cent in 2008, and 38 per cent in 2011. As such, it is surprising that poverty fell to the degree shown in Table 1. This is especially the case for urban areas where poor households are primarily net buyers of food. In rural areas as well, inflation may have negatively affected the poor, as the detrimental effect of food price inflation tends to dominate the effect of rising producer prices given that the poor are generally net food buyers (Ticci 2011).

In terms of accurately measuring poverty, the high rate of inflation (33 per cent for general inflation and 38 per cent for food inflation) during the year-long data collection for the 2011 HICES may have contributed to overly inflated consumption aggregates for households surveyed later in the year compared to those surveyed earlier. Although we did deflate the food consumption component of the household consumption aggregate by a quarter during the data collection period, we warn that the poverty estimates for this year may be too low due to intra-quarter inflation and non-food inflation.

4.3 HICES poverty and other data sources on monetary poverty

Although the HICES are the only nationally representative surveys for which monetary poverty in Ethiopia can be assessed, there are other smaller surveys that can be used to describe poverty in

[9] Bellemare et al. (2013) also document the seasonal volatility of food prices and find that households in select rural communities are willing to pay 6–32 per cent of their income to eliminate price volatility, though the welfare gains from price stability accrue disproportionately to the non-poor.

specific localities. One example is the Ethiopian Rural Household Survey (ERHS) conducted by the Department of Economics of Addis Ababa University in collaboration with the International Food Policy Research Institute (IFPRI) and Oxford University. This survey followed 1,450 households from 15 rural villages for seven rounds (1994, 1995, 1997, 1999, 2004, and 2009), and focuses largely on Ethiopian highland farming systems that are often drought-stricken. It does not include the pastoral areas.

The observed trends in poverty among the ERHS households are not exactly the same as those from the HICES (Table 5), but are not entirely inconsistent either. Dercon et al. (2012) find that although poverty in the ERHS villages did fall significantly between 1994 and 2004 (for example, the headcount poverty fell from 48 per cent to 35 per cent, respectively), it rose again sharply between 2004 and 2009 (to 52 per cent poor), contrary to the patterns found in the HICES. Two factors contributed to the very high levels of poverty measured in 2009, and hence the rise in poverty in these villages—year-specific short-term weather and food price shocks that were not experienced at the time of the HICES. First, more than half of the villages are located in drought-prone areas and were negatively affected by droughts in the year leading up to the survey. Second, most households in the ERHS villages are net food buyers and were hit hard by the food price hikes in 2008 (Dercon et al. 2012). It is thus important to be cautious when comparing the poverty estimates from the ERHS with those of the HICES because (a) the latter are nationally representative and the former are not, and (b) surveys taken in a particular year may reflect time-specific shocks, rather than overall long-term trends.

Table 5: Poverty in select rural communities in Ethiopia, 1994–2009

	Median consumption per capita	Headcount ratio (P_0)	Depth of poverty (P1)	Severity of poverty (P2)
1994	51.9	0.48	0.21	0.12
1995	45.3	0.55	0.24	0.14
1997	70.1	0.33	0.12	0.06
1999	64.3	0.36	0.13	0.06
2004	65.7	0.35	0.13	0.06
2009	48.6	0.52	0.20	0.11

Source: Dercon et al.'s (2012) calculations from the ERHS.

4.4 Poverty and non-monetary measures of well-being

The Demographic and Health Surveys (DHS) for Ethiopia provide a nationally representative set of non-monetary indicators that complement the poverty estimates from the HICES. The collection of these data coincide with the HICES and provide a sense of consistency between the patterns of the changes in monetary poverty measured in the HICES and long-term trends in overall welfare. The magnitudes of the changes differ, however, as the improvements in non-monetary welfare are not as large as the declines in poverty. Consider, for example, child under five stunting rates over the three survey years (Table 6). The high level of malnutrition in 2000 with over half of all young children stunted, is consistent with the high poverty rates in the country at the time, when over half of all individuals were poor. Further, while the declines in stunting were substantial (12.6 percentage points between 2000 and 2011), they were not as large as the fall in poverty (21.9 percentage points). As with poverty, stunting rates are lower in urban areas, and they fell by more there than in rural areas. Moreover, urban stunting rates fell by more in the first half of the decade than in the latter half, whereas they fell by more in the latter half of the decade in rural areas. These patterns are remarkably similar to the patterns of change in poverty, despite the differences in the magnitudes.

Table 6: Stunting rates in Ethiopia, 2000–11

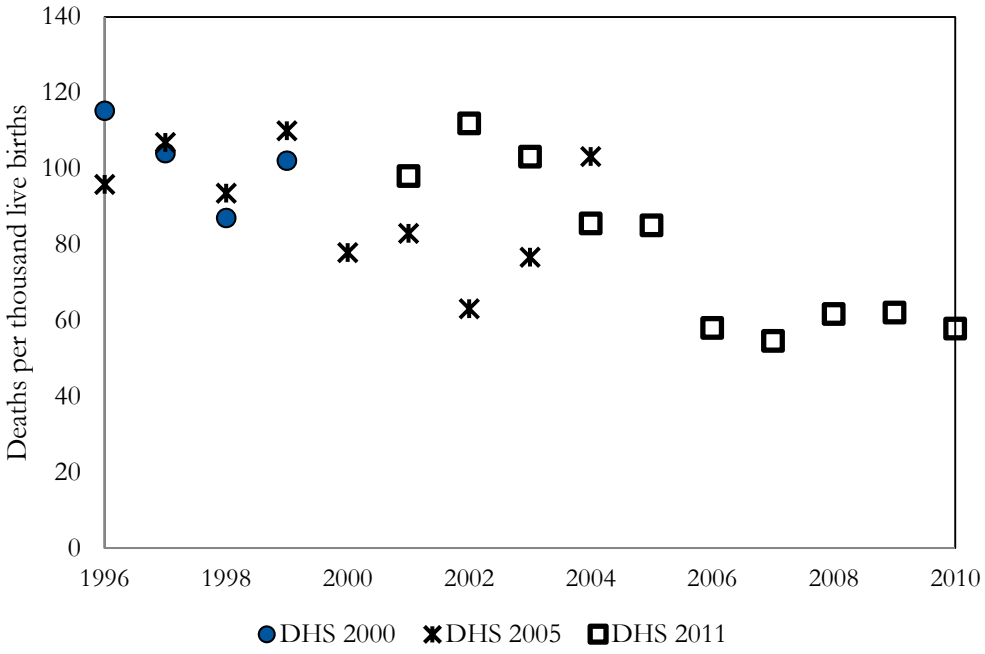
	Levels			Changes		
	2000	2005	2011	2000–05	2005–11	2000–11
National	51.3	46.4	38.6	-4.8	-7.8	-12.6
Gender						
Male	52.0	47.2	39.3	-4.7	-8.0	-12.7
Female	50.6	45.6	38.0	-5.0	-7.6	-12.6
Residence						
Urban	41.7	31.8	25.8	-9.8	-6.0	-15.9
Rural	52.4	47.6	40.4	-4.8	-7.2	-11.9

Note: Sample of children under age five.

Source: Authors' calculations from DHS (2000, 2005, and 2011).

Birth history data collected in the DHS enable us to construct retrospective estimates of infant (under age one) mortality rates (IMR) for each of the eight years prior to, but not including, the survey year. The plot of these IMRs shows two things. First, mortality rates are high, which is not surprising given high monetary poverty in Ethiopia. For example, in 2000, roughly 100 children per 1,000 live births died before they reached their first birthday. Second, there is evidence of a long-term trend of improvements consistent with the stunting and poverty data. But unlike the stunting data, because we estimate IMR for each year, not just the survey years, the longer-term trend is more obvious. In this case, IMR declined on average by four deaths per thousand live births each year, such that by 2011, the IMR was 60.

Figure 4. Annual infant mortality rates, Ethiopia 1996–2010



Source: Authors' calculations from DHS data.

As with the other non-monetary measures of well-being, net primary schooling enrolment rates calculated from the WMS data showed persistent improvements between 2000 and 2011 (Table 7) that are consistent with the decreases in monetary poverty. For example, the net primary enrolment rate rose from 33.8 per cent in 2000 to 62.4 per cent in 2011. Although primary enrolment rates rose faster in rural areas than in urban areas, the levels are much lower in rural areas (59.2 per cent)

than in urban areas (84.8 per cent) in 2011. In line with the Millennium Development Goal of equal access to education for girls, primary enrolment rates for girls rose faster than for boys over the decade. In fact, by 2011, girls' primary enrolment rates were higher than for boys in rural areas, and girls nearly made up the 6 percentage point difference in primary enrolment rates that existed at the beginning of the decade in urban areas.

Table 7: Net school enrolment rates in Ethiopia, 2000–11

	Primary			Secondary		
	2000	2005	2011	2000	2005	2011
National	33.8	37.8	62.4	11.6	14.5	10.8
Male	35.8	38.9	60.7	12.2	16.6	11.4
Female	31.6	36.8	64.3	10.9	12.4	11.1
Rural	28.0	32.8	59.2	3.9	8.3	4.9
Male	30.7	34.2	57.3	5.0	10.6	5.6
Female	25.2	31.2	61.2	2.6	5.9	4.2
Urban	72.9	77.2	84.8	48.4	44.5	35.7
Male	76.0	78.8	85.4	52.2	50.1	39.4
Female	70.2	75.8	84.1	45.3	40.1	32.9

Source: Authors' calculations from WMS (2000, 2005, and 2011).

These comparisons are complicated by the fact that the structure of primary education changed after the 2005 survey. Primary school now includes grades 1–8 rather than grades 1–6. This is likely to result in estimates of both primary and secondary enrolment rates that are lower, or at least no higher, than would have been the case had the change not occurred. This follows from dropout rates increasing as children get older, which is illustrated by the degree to which enrolment rates dropped between primary and secondary school in the 2000 and 2005 data (33.8 per cent to 11.6 per cent, respectively in 2000, and 27.8 per cent to 14.5 per cent, respectively in 2005). As such, the measured increase in primary school enrolment rates between 2005 and 2011 likely represent lower bounds.

Secondary school net enrolment rates, which are much lower than primary school enrolment rates (10.8 per cent compared to 62.4 per cent in 2011, respectively), exhibited ambiguous changes. Although they rose from 11.6 per cent in 2000 to 14.5 in 2005, they appear to have fallen below the 2000 level to 10.8 per cent in 2011. Part of this is likely a consequence of the official restructuring of primary and secondary schooling. As such we do not read too much into the apparent drop in enrolments. Nonetheless, the restructuring does not explain the decline in secondary enrolment rates in urban areas between 2000 and 2005. Finally, although urban secondary enrolment rates (35.7 per cent in 2011) are higher than in rural areas (4.9 per cent in 2011), they remain very low and girls have yet to catch up to boys.

A broad-based measure of basic educational attainment that is not sensitive to the change in the schooling structure—the literacy rate—shows considerable improvements over the decade (Table 8). While less than 30 per cent of the over-ten population could read in 2000, this number rose to 46.7 per cent by 2011. This increase is particularly noteworthy because general literacy rates change more slowly than enrolment rates given that literacy rates are a measure of the stock educational attainment of the population while changes in these rates take place mostly at the margin among children in school, not among adults who are out of school.

Table 8: Literacy rates in Ethiopia, 1998–2011

	National	Urban	Rural
Total			
2000	29.2	69.9	21.7
2005	37.9	74.2	30.9
2011	46.7	77.9	39.7
Male			
2000	39.7	81.8	32.8
2005	49.9	86.2	43.4
2011	56.2	87.6	49.7
Female			
2000	19.4	60.6	11.0
2005	26.6	64.4	18.7
2011	37.6	69.6	30.0

Note: For all persons ten years of age and older.

Source: CSA (2013).

Literacy increased over time in both rural and urban areas, and for both males and females. Most of the increase in literacy took place in rural areas (18 percentage point increase, compared to 8 percentage points in urban areas) where rates were very low to begin with (21.7 per cent in 2000). Although there remains roughly 20 percentage points differences in literacy rates between men and women, the gap did close by about two percentage points over the decade as a consequence of more girls enrolling in schools (Table 7).

4.5 Poverty and access to public goods

A final set of indicators that can be used to triangulate the monetary poverty estimates are measures of access to public goods such as electricity, drinking water and sanitation (Table 9). Access to each of these types of public goods increased over the decade in a manner consistent with improved well-being. As with the non-monetary measures, however, the improvements are generally more muted than those of poverty.

As noted in Section 3, Ethiopia's electricity generating capacity improved substantially since 2000, with most of the gains taking place after 2005. This is clearly evident in Table 9, where the very low initial level of access into the home of less than 5 per cent in 2000, increased to over 9 per cent in 2011, with the bulk of the increase being realized between 2005 and 2011. Most access to electricity is in urban areas, rather than in rural areas (45 per cent compared to 2 per cent in 2011). As such, most of the gains were realized there as well (10 per centage point increase between 2005 and 2011).

Table 9. Access to public goods in Ethiopia, 2000–11

	National			Urban			Rural		
	2000	2005	2011	2000	2005	2011	2000	2005	2011
Electricity access	4.9	5.7	9.1	31.6	34.3	44.9	0.6	0.4	2.1
Drinking water									
Piped		7.1	8.7		40.4	48.6		0.8	0.7
Communal tap		14.3	20.3		47.4	40.6		8.1	16.4
Protected well		11.3	19.3		4.4	5.0		12.6	22.1
Low-quality*		67.3	51.7		5.2	5.8		78.4	60.8
Toilet facilities									
Flush	1.7	2.4	1.8	6.9	8.7	10.2	0.8	1.1	0.2
Pit latrine	15.7	27.1	65.7	64.4	71.6	76.8	7.7	18.9	63.5
No facility	82.5	70.5	32.5	28.6	19.7	13.0	90.7	79.9	36.3

Note: * Low-quality drinking water is unprotected well, river, lake, pond, or rainwater.

Source: Authors' calculations from WMS (2000, 2005, and 2011).

Access to clean sources of drinking water also improved. Since information on sources of drinking water was not collected in the 2000 WMS, our analysis is limited to the 2005–11 period. Nonetheless, the improvements over this period are substantial. Although more than half of the population had access to only low-quality sources of drinking water (unprotected wells, rivers, lakes, ponds, or rainwater) in 2011, this is a vast improvement from the more than two thirds of the population in the same situation in 2005. Patterns of improved access to clean sources of drinking water were markedly different in urban and rural areas. For example, in urban areas, where nearly 90 per cent of the population had access to a communal taps or direct piped water, the gains were made in the form of 8 percentage points more households with piped water. These households were generally those who previously relied on communal taps in 2005, but had since gained access to piped water. In rural areas, where the percentage of households with access to only low-quality sources of water fell from 78 per cent to 61 per cent, the gains were in the form of newly built protected wells and communal taps. Piped water in rural areas is effectively non-existent.

Finally, access to sanitation facilities improved substantially, and along with greater access to clean sources of drinking water, is likely to have contributed to the lower stunting and mortality rates discussed previously. Whereas 82.5 per cent of the population had no toilet facilities in 2000, by 2011, only 32.5 per cent were in a similar situation. Almost all of these gains follow from the construction of pit latrines (15.7 per cent in 2000 to 65.7 per cent in 2011) as a result of the implementation of the health extension system, which allocates two health extension workers per *kebele* (ward), especially in rural areas where more than half of the population benefited. Flush toilets effectively only exist in urban areas with one in ten individuals having access in 2011.

5 Concluding remarks

In this paper, we analyse poverty in Ethiopia in 2000, 2005, and 2011 using Arndt and Simler's (2010) utility-consistent approach to calculating CBN poverty lines. This method involves calculating region-specific poverty lines based on consumption patterns of the poor in each of the urban and rural areas in the nine provinces (regional states) and two city administrations to reflect local perceptions of poverty (i.e. specificity). To ensure that each of the consumption bundles used to construct the region-specific CBN poverty lines also represents the same level of utility (i.e. consistency), a maximum entropy approach is employed to reconcile cases where revealed preference conditions are violated. These consistent yet specific poverty lines, along with

consumption aggregates calculated from nationally representative household surveys, form the basis of the monetary poverty analysis in this paper.

The general story that emerges from the data is one of steady but uneven progress, with urban areas witnessing the greatest gains in the first half of the decade, and rural areas benefiting more in the latter half. According to our estimates, national poverty fell remarkably from 51.9 per cent in 2000, to 44.5 per cent in 2005, and finally to 30.0 per cent in 2011. Poverty is considerably higher in rural areas (53.7 per cent) where more than 80 of the population lives, compared to urban areas (40.8 per cent). Although the rural headcount ratio fell by a remarkable 20.5 percentage points, urban areas as a whole saw even greater declines in poverty, as the urban poverty rate fell to just under 14 per cent by 2011.

These patterns of declining poverty took place in the context of what Dorosh and Schmidt (2010) describe as 'Ethiopia's changing economic landscape', in which fundamental structural changes took place in the economy. Improvements in the country's physical infrastructure, better access to improved agricultural inputs, and widespread social safety nets have created an environment that is conducive to poverty reduction. Moreover, other monetary and non-monetary measures of well-being confirm the general pattern of persistent welfare improvements, though the large declines in poverty are not entirely supported by the magnitudes of change in other measures. These indicators suggest that the poverty estimates for Ethiopia are largely a reflection of long-term trends characterized by broad-based growth and improved welfare. Nonetheless, comparability issues related to the main data sources used in this analysis warrant that great care be taken in interpreting the degree to which poverty fell over the course of the first decade of the 21st century in Ethiopia.

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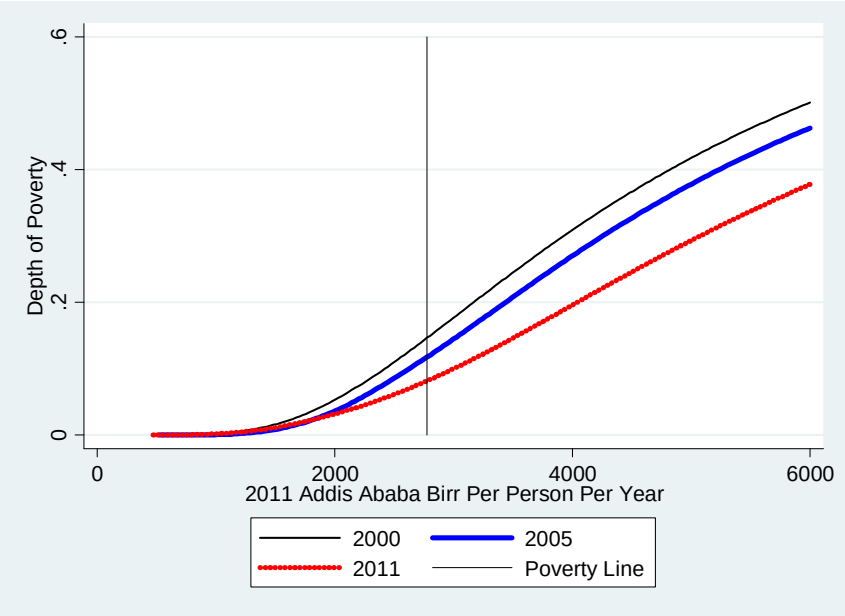
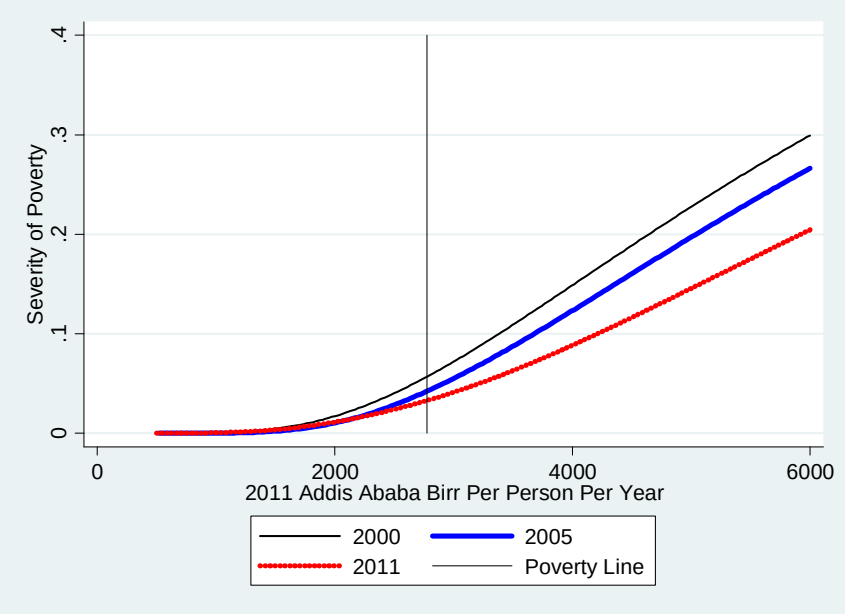
Appendix figures

Appendix Figure 1: Test of second-order dominance, Ethiopia 2000–11



Appendix Figure 2: Test of third-order dominance, Ethiopia 2000–11



Appendix tables

Appendix Table: Original and utility-consistent (UC) poverty lines, Ethiopia 2000–11

Birr per person per day

	2000			2005			2011		
	Orig.	UC	**% Diff.**	Orig.	UC	**% Diff.**	Orig.	UC	**% Diff.**
Addis Ababa	4.58	3.08	**-32.7**	5.13	2.22	**-56.8**	16.10	8.83	**-45.2**
Afar (rural)	3.05	2.92	**-4.2**	3.59	2.89	**-19.5**	10.58	8.79	**-16.9**
Afar (urban)	3.05	3.11	**2.0**	3.59	2.60	**-27.6**	10.58	7.67	**-27.5**
Amhara (rural)	2.68	2.46	**-8.3**	3.47	3.77	**8.5**	9.83	8.13	**-17.3**
Amhara (urban)	2.68	2.71	**1.0**	3.47	3.23	**-6.8**	9.83	8.52	**-13.3**
Benishangul (rural)	2.65	2.58	**-2.5**	3.71	4.47	**20.6**	9.92	7.64	**-22.9**
Benishangul (urban)	2.65	2.75	**3.8**	3.71	3.94	**6.3**	9.92	8.04	**-18.9**
Dire Dawa (rural)	3.45	3.46	**0.2**	3.90	3.67	**-5.9**	12.90	8.57	**-33.5**
Dire Dawa (urban)	3.45	3.30	**-4.4**	3.90	2.60	**-33.3**	12.90	8.99	**-30.3**
Gambella (rural)	3.01	2.73	**-9.3**				11.03	8.62	**-21.8**
Gambella (urban)	3.01	2.78	**-7.8**				11.03	7.60	**-31.1**
Harari (rural)	3.76	3.35	**-10.9**	4.54	2.80	**-38.4**	12.71	8.95	**-29.6**
Harari (urban)	3.76	3.35	**-10.9**	4.54	2.80	**-38.4**	12.71	8.95	**-29.6**
Oromiya (rural)	2.66	2.61	**-2.0**	3.52	3.91	**11.0**	10.16	8.55	**-15.9**
Oromiya (urban)	2.66	2.84	**6.8**	3.52	3.17	**-10.1**	10.16	8.41	**-17.3**
SNNP (rural)	2.52	2.55	**1.3**	2.93	3.68	**25.5**	9.39	6.97	**-25.7**
SNNP (urban)	2.52	2.86	**13.5**	2.93	3.25	**10.9**	9.39	7.54	**-19.7**
Somali (rural)	3.25	2.83	**-13.0**	3.82	2.94	**-23.1**	11.73	8.01	**-31.7**
Somali (urban)	3.25	3.34	**2.8**	3.82	2.71	**-29.0**	11.73	8.48	**-27.7**
Tigray (rural)	3.82	2.78	**-27.1**	4.67	3.32	**-29.0**	10.71	9.27	**-13.5**
Tigray - urban	3.82	3.03	**-20.6**	4.67	2.87	**-38.4**	10.71	8.28	**-22.7**

Notes: Orig. indicates original poverty lines calculated by CSA. UC indicates Arndt and Simler (2010) utility-consistent poverty lines.

Source: CSA and authors' calculations from HICES (2013).

Appendix Table 2: Original CSA poverty estimates, Ethiopia 2000–11

	CSA estimates			Difference with utility-consistent estimates		
	2000	2005	2011	2000	2005	2011
National						
Headcount ratio (P_0)	44.2	38.7	29.6	7.7	5.8	0.4
Depth of poverty (P_1)	11.9	8.3	7.8	2.7	3.4	0.4
Severity of poverty (P_2)	4.5	2.7	3.1	1.2	1.5	0.2
Urban						
Headcount ratio (P_0)	45.4	39.3	30.4	-4.6	-17.6	-16.5
Depth of poverty (P_1)	12.2	8.5	8.0	-0.3	-4.1	-4.6
Severity of poverty (P_2)	4.6	2.7	3.2	0.1	-1.3	-1.9
Rural						
Headcount ratio (P_0)	36.9	35.1	25.7	16.8	13.1	7.5
Depth of poverty (P_1)	10.1	7.7	6.9	5.0	5.3	2.2
Severity of poverty (P_2)	3.9	2.6	2.7	1.9	2.1	1.0

Note: Poverty measures are multiplied by 100.

Source: Authors' calculations from HICES (2013).

Appendix Table 3: Region- and time-specific minimum calorie requirements

				Difference from CSA standard (2,200)		
	2000	2005	2011	2000	2005	2011
Addis Ababa	2,289	2,314	2,305	89	114	105
Afar (rural)	2,172	2,177	2,226	-28	-23	26
Afar (urban)	2,276	2,253	2,232	76	53	32
Amhara (rural)	2,157	2,164	2,186	-43	-36	-14
Amhara (urban)	2,191	2,224	2,259	-9	24	59
Benishangul (rural)	2,141	2,179	2,146	-59	-21	-54
Benishangul (urban)	2,179	2,210	2,217	-21	10	17
Dire Dawa (rural)	2,168	2,138	2,146	-32	-62	-54
Dire Dawa (urban)	2,212	2,285	2,249	12	85	49
Gambella (rural)	2,201		2,172	1		-28
Gambella (urban)	2,193		2,205	-7		5
Harari (rural)	2,202	2,190	2,175	2	-10	-25
Harari (urban)	2,202	2,190	2,175	2	-10	-25
Oromiya (rural)	2,132	2,127	2,142	-68	-73	-58
Oromiya (urban)	2,192	2,213	2,246	-8	13	46
SNNP (rural)	2,151	2,134	2,141	-49	-66	-59
SNNP (urban)	2,219	2,196	2,263	19	-4	63
Somali (rural)	2,171	2,151	2,131	-29	-49	-69
Somali (urban)	2,186	2,170	2,142	-14	-30	-58
Tigray (rural)	2,118	2,151	2,173	-82	-49	-27
Tigray (urban)	2,144	2,176	2,192	-56	-24	-8

Source: Authors' calculations from HICES (2013).

Appendix: Comparison of original and utility-consistent poverty estimates

The poverty estimates in this paper based on utility-consistent poverty lines (UC) differ considerably from CSA's original estimates (MoFED 2008, and MoFED 2012). As illustrated in Appendix Table 2, the original national headcount ratio estimates are lower than the UC estimates by 7.7 percentage points for 2000 and by 5.8 percentage points in 2005, and they are nearly identical for 2011. The urban UC poverty estimates are all lower than the CSA estimates, while the rural UC estimates are all higher. The differences are less stark for the more distribution-sensitive poverty measures—the depth (P1) and severity (P2) of poverty.

Both approaches indicate that poverty fell substantially in Ethiopia over the course of the 2000s. But the UC-consistent poverty estimates suggest that poverty fell by even more than the original CSA estimates did. The fact, however, that differences in the estimated declines are greatest for the headcount ratios than for the distribution-sensitive poverty measures suggests that the two approaches estimate real household consumption levels that are more similar at the lower end of the distribution than around the poverty line.

What accounts for these differences? Both approaches use similar methods to construct the nominal household consumption aggregate (Deaton and Zaidi 2002), and indeed the nominal household consumption aggregates are similar. The source of the differences thus follows from the handling of the poverty lines and deflation.

The original CSA approach to maintaining consistency with regard to the poverty line was to use 1995 as the benchmark. The national poverty line was calculated for 1995/1996 in Addis Ababa values. In subsequent years this poverty line was scaled up to 2000, 2005, and 2011 prices using the consumer price index. The inflated 1995/1996 poverty line was then applied to the 2000, 2005, and 2011 regionally deflated household consumption aggregates to calculate poverty. The consumption aggregates were regionally deflated using price indices calculated in each stratum relative to the consumption basket for the capital (Addis Ababa) using the maximum number of common items (i.e. items consumed in all of the strata). This differs from the UC approach in that the latter estimates poverty lines for each region for each year and relies on revealed preference tests and maximum entropy methods to maintain consistency.

Further, the original 1995/1996 national food poverty line, which forms the basis of the national poverty line, was estimated as the cost of consuming 2,200 calories per adult per day based on the consumption patterns of poor households ranked by the consumption aggregate. This also differs from the UC approach, which does not fix the calorie requirements to be the same across all regions. Rather, it allows the demographic characteristics of the particular region to dictate the differing calorie requirements. As illustrated in Appendix Table 3, the UC minimum calorie requirements differ across regions and range from 114 calories higher than the CSA standard 2,200, to 82 calories lower. One would thus expect, ceteris paribus, that the UC poverty lines would be higher than the original when the minimum calorie requirement of the former is greater than 2,200, given that the former is based on the estimated cost of acquiring more calories than the latter. Conversely, one would expect the UC poverty lines to be lower when the UC minimum calorie requirement is less than 2,200. This, however, is only the case for half of the comparisons. But this is not the case. Indeed, as illustrated in Appendix Table 1, the UC poverty lines range from being 21 to 46 per cent lower than the de facto original regional poverty lines (calculated by deflating the national poverty line to region-specific prices).

The source of the lower UC poverty lines thus must follow from the composition of the basket used to value the region-specific calorie requirements. Unfortunately, the original code used to construct the 1995/1996 poverty line and regional deflators is not available. Thus we cannot compare the consumption baskets used to create the UC poverty lines with the original from 1995/1996.