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Economic Welfare in Ethiopia: Growth Scenarios for Exiting Poverty

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Abstract

Poverty alleviation and equitable distribution of benefits among citizens are the overriding welfare objectives of developing countries. Ethiopia has been designing and implementing several development policies and interventions to attain such welfare objectives. However, poverty alleviation is still the primary development agenda of the country and the distribution of poverty across regions and population subgroups is becoming worrisome. In order to generate latest, relevant and reliable empirical evidence on these welfare issues, the third wave (2015) of the Living Standards Measurement Study (LSMS) dataset on Ethiopian was utilized. A sample of 4954 households with 22,296 household members covering all regions and cities were utilized for rigorous distributive analysis. FGT poverty indices and the time taken to exit poverty were estimated and decomposed by population subgroups and expenditure components. A right-censored Tobit model of welfare ratio was employed to identify the correlates of poverty and to predict the intensity and probability of poverty. The results of distributive analysis show that absolute poverty rate in Ethiopia was 22.1 percent with significant variation across regional states. Absolute poverty was also largely different by gender, place of residence (rural-urban), and religion. Similarly, depth and severity of poverty (6% and 2.4%) were varied across regions. Based on different growth scenarios of consumption expenditure per capita assumed (14%, 11%, 8%, and 5), the poor in Ethiopia would take 9.4-26.4 years to exit poverty. The Tobit model outputs indicated that the expected welfare ratio of the poor was 0.783, which was 21.3 percent far below the poverty line (ETB 14758). The likelihood of individuals to be poor was 22.0 percent, which is consistent to the FGT index (22.1%, about 22.1 million population). Poverty decomposition results show that absolute poverty rate in Ethiopia was highly attributable to rural areas (24.1%) with relative contribution of 88.5 percent compared to their counterparts in urban centers (12.7%). Similarly, decomposition of poverty by expenditure components verify

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that the absolute contribution of food consumption expenditure in reducing total poverty was 65.3 percent, whereas nonfood consumption expenditure contributed only 11.4 percent. The findings clearly suggest the need to design and implement relevant poverty reduction interventions for attaining Sustainable Development Goals (SDG) of ending poverty and hunger in all its forms by 2030.

Keywords: Poverty index, decomposition, time-taken to exit, welfare ratio, Ethiopia.
JEL Codes: I31, I32, I38.

1. Introduction

Poverty, as a major indicator of welfare in a society, can be defined as a pronounced deprivation in well-being (World Bank, 2000). Poverty with its multiple dimensions and approaches has been one of the primary research areas of development economics. The basic challenge in poverty analysis is the approach and the methods of measuring poverty as a welfare indicator. Poverty measurement is the production of numbers suitable to assess the overall degree of poverty in a given society and to identify poor and nonpoor members of this society. To decide which measures of poverty to produce, we need a theory about the object we want to measure and an appropriate of poverty indicator.

There are different theories on poverty analysis, of which the dominants are the welfarist school, the basic-needs school, and the capability school. The welfarist school, the dominant approach, sees well-being or poverty as an economic wellbeing. For this school, poverty is said to exist in a given society when one or more persons do not attain a level of economic well-being deemed to constitute a reasonable minimum by the standards of that society (Ravallion, 1994). This poverty concept derives from the assumption that individuals maximize their well-being in the essence of preference ordering over goods representable by a utility function.

The basic-needs approach, which is generally ranked second to the welfarist approach in importance, considers "something" that is lacking in the lives of the poor as a small subset of goods and services identified and deemed to meet the basic needs of all human beings (Asselin and Dauphin, 2001). The focus of basic-needs approach is not utility. Rather, it focuses on individual

requirements relative to basic commodities including food, water, sanitation, shelter, clothing, basic education, health services, and public transportation.

In the third approach, the capability school, the 'something" that is lacking refers to human abilities, or capabilities, not to utility or to the satisfaction of basic-needs. The capability approach differs from welfarist or utilitarian evaluation in considering a variety of doing and being as important in themselves. The perspective of capabilities provides a fuller recognition of the variety of ways in which people can be poor or nonpoor (Sen, 1994; Asselin & Dauphin, 2001).

Poverty is the overriding objective of developing countries including Ethiopia. Ethiopia has been designing and implementing several development policies and interventions to attain objectives of welfare and equity. However, poverty alleviation is still the primary development problem of the country. The design and implementation of poverty reduction strategies requires new and reliable information on poverty and inequality, their spatial and sectoral distribution and the possible sources of poverty and inequality. To analyze poverty and inequality situation in Ethiopia, consumption expenditure per capita and other attributes of 22,296 samples from all regions and cities were utilized in this study. In order to identify priority areas of intervention and relative importance of findings for matching appropriate poverty reduction policy options and strategies, this paper has employed different measures of poverty and inequality and decomposed them into their constituent parts.

2. Data and Methods

2.1 Dataset

This study has utilized the third wave of Living Standards Measurement Study (LSMS 2015) for Ethiopia. The LSMS is the country representative, multi-topic dataset collected at different levels (individual, households, farm plots, etc.) collected by Central Statistical Agency (CSA) of Ethiopia in collaboration with the World Bank. The third wave covers the nine regional states and two administrative towns with 4954 households and more than 23,000 individuals across the country.

The Ethiopian Government monitors regional and national poverty situations by using the Foster-Greer-Thorbecke (FGT) decomposable measures of poverty (head count index, poverty gap index, and poverty severity index). However, the design and implementation of poverty reduction strategies requires

adequate, reliable and detailed information on poverty and inequality and their spatial and sectoral distribution and the possible sources. To generate a new and reliable information on various aspects of poverty and inequality in Ethiopia, this study has utilized 22,296 samples (of which 29% are urban residents) distributed (Table 1).

Table 2: Distribution of samples across regions and place of residence

Region	Rural	Small towns	Medium and large towns	Total
Tigray	1,554	155	708	2,417
Afar	569	53	37	659
Amhara	2,927	405	643	3,975
Oromia	3,273	476	922	4,671
Somalie	1,156	123	163	1,442
Benshagul Gumuz	538	58	0	596
SNNP*	4,083	475	696	5,254
Gambella	505	42	35	582
Harari	661	0	154	815
Addis Ababa	0	0	1,019	1,019
Dire Dawa	578	0	288	866
Country level	15,844	1,787	4,665	22,296

Source: LSMS (2015).

Note: * SNNP denotes southern nations, nationalities and people's region.

2.2 Measuring Poverty

Poverty can be measured at three steps. The first step is to define an indicator of welfare or poverty and the second is to establish a minimum acceptable standard of that indicator, called the poverty line, which is used to separate the poor from the nonpoor. Finally, a summary statistic is generated to aggregate the information from the distribution of this welfare indicator relative to the poverty line (Ravallion, 1998).

2.2.1 Choice of poverty indicator

Income and expenditure are the two important indicators of welfare or poverty with their own pros and cons. Income (potential) as an indicator of welfare is preferred for some reasons. The ease to measure it (mainly due to the limited number of income sources), its ability to measures the degree of command over resources, and the relatively lower costs incurred to collect it are the major merits of income as a poverty indicator. However, the income approach is more likely to be underreported. It is also affected by short-term fluctuations, unobservable income sources, the uncertain link between income and welfare, and failure of reporting period to capture the average income of the household (Haughton and Khandker, 2009).

The expenditure (achievement) approach, on the other hand, shows current actual material standard of living, enables to smooth out irregularities (reflecting long-term average wellbeing), and is relatively less understated (due the ease to recall). However, the use of expenditure as a poverty indicator has various problems as well. Households may not be able to smooth consumption. Moreover, there may be misleading consumption choices made by households, irregularity of some expenses incurred which may lead to noisy data, and the difficulty to measure some components of consumption (like durable goods).

If we choose to assess poverty based on household consumption or expenditure, it is helpful to think in terms of an expenditure function, which shows the minimum expense required to meet a given level of utility, which is derived from a vector of goods at their prices. While using income as a measure of welfare, there are many problems related to its definition (e.g. timing of income whether over years or lifetime) and measurement (or usually understated). Thus, this paper has used consumption expenditure per capita as a measure of poverty and inequality in Ethiopia.

2.2.2 Setting the poverty line

A poverty line[2] for a household, z_i, may be defined as the minimum expenditure needed to achieve at least the minimum utility level u_z, given the level of prices (p) and the demographic characteristics of the household (x) (Ravallion, 1998):

[2] To measure poverty, we need to combine the poverty line with information on the distribution of consumption expenditures. In principle, there are two ways of doing so:

$$z_i = e(p,\ x,\ u_z),$$

Because utility, u_z, or expenditure, e(·), is difficult to measure, there are two practical approaches to determine a poverty line. One approach is to compute a poverty line for each household, adjusting and accounting for household differences, prices differences, and demographic composition. This gives a different poverty line for each household. A second and more widely used approach is to construct one per capita poverty line for all individuals, but to adjust expenditure per capita for differences in prices and household composition. The adjusted per capita is then compared with the poverty line to determine if the individual is living below the poverty line. With this approach, it is easier to talk of the poverty line and present it as a single number.

Poverty has various forms each of them measured differently. Extreme poverty, absolute poverty, or destitution is defined as a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It refers to a condition where a person does not have the minimum amount of income needed to meet the minimum requirements for one or more basic living needs over an extended period of time. It depends on both income and access to services. When the World Bank set the global standard of absolute poverty line in 1990 as living on less than $1 a day, it refers to a standard which is the same in all countries and which does not change over time. This threshold was revised to be $1.25/day (in 2005 prices). The current standard of absolute poverty threshold refers to earning below the international poverty line of $1.90/day (in 2015 prices) (World Bank, 2013). The World Bank has set a new goal to end extreme poverty in a generation which targets to have no more than 3 percent of the world's population living on just $1.90 a day by 2030. Currently the World Bank is using three poverty lines: $1.90 a day for extreme poverty, $3.20 a day for middle-income countries, and $21.70 a day for high-income countries. But national poverty line is the poverty line deemed appropriate for a country by its authorities, which is based on population-weighted subgroup estimates from household surveys.

(a) the welfare ratio method, and (b) the equivalent expenditure method. One can deflate all money incomes by z, so that the indicator of welfare is simply y/z where y is total expenditure. The value of y/z is known welfare ratio.

Relative poverty, on the other hand, is the condition in which people lack the minimum amount of income needed in order to maintain the average standard of living in the society in which they live. It is considered the easiest way to measure the level of poverty in an individual country. Relative poverty is defined relative to the members of a society and, therefore, differs across countries. The relative definitions of poverty see poverty in terms of minimum acceptable standards of living within the society in which a particular person lives.

There are two main methods of estimating objective poverty lines3: the food-energy intake method and the cost-of-basic-needs (CBN) method. The consumption expenditure level at which food energy intake is just sufficient to meet pre-determined food energy requirements is used to determine an objective poverty line using food energy-intake method. Because energy requirements vary across individuals, activity level and over time for a given individual, adjustments need to be made accordingly. The purpose of food-energy intake method is to find a monetary value of the poverty line at which basic needs are met.

If the expected value of food-energy intake conditional on total consumption expenditure, $E(k/y)$, is strictly increasing in y over an interval which includes energy required, then there will exist a poverty line z such that (Ravallion, 1994)

$$E(k/z) = k',$$

where k is food-energy intake (random variable), k' is the food energy required considered to be fixed, and $E(k/z)$ is the expected value of food-energy intake conditional on the poverty line or food-energy requirement.

In the case of cost-of-basic-needs (CBN) method, a consumption vector assumed to be consistent with choices actually made by some relevant reference group is chosen. Poverty is then measured by comparing actual expenditures to the CBN, which has food and non-food components of measurement of the poverty line[4].

[3] The common practice of estimating poverty lines for measuring income poverty is the threshold of 50-60 per cent of the median (national equalized) household income.

[4] The primary source of subjectivity in measuring poverty lines is the notion of "basic needs" mainly because distinction between necessities and luxuries turns out to be still

2.3 Methods of Analysis

Two methods of measuring poverty were used in this study. The Foster-Greer-Thorbecke (FGT) index of poverty was used to analyze the incidence, depth and severity of consumption poverty. The method of time-taken to exit poverty was also used to estimate the speed at which the poor are expected to exit poverty trap.

2.3.1 FGT poverty indices

There are various summary measures of welfare or poverty situation in a society. The FGT poverty measures are additively decomposable. It is also possible to separate changes in the FGT measures into a component resulting from rising average incomes/expenditures, and a component resulting from changes in the distribution of income/expenditure. As one of the measures proposed by Foster, et al. (1984), it may generally be written as

$$P_a = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{G_i}{z}\right)^a, \; a \geq 0$$

where α is a measure of the sensitivity of the index to poverty and the poverty line. When parameter α = 0, P_0 is simply the headcount index. When α = 1, the index is the poverty gap index P_1, and when α is set equal to 2, P_2 is the poverty severity index. For all α > 0, the measure is strictly decreasing in the living standard of the poor (the higher the standard of living, the less poor one is).

2.3.2 `Time-taken to exit poverty

When thinking about poverty reduction strategies, it may be useful to show how long it would take, at different potential economic growth rates, for the average poor person to exit poverty. It is decomposable by population subgroups and is sensitive to the distribution of welfare indicator, x, among the poor. For

subjective. There are two methods of measuring subjective poverty lines: the minimum income question and developing country setting.

the i^{th} person below the poverty line, the expected time to exit poverty (or to reach the poverty line), if consumption expenditure per capita grows at positive rate g per year, is (Morduch, 1998):

$$t = \frac{\ln(z) - \ln(y_j)}{g} = \frac{W}{g}$$

where W is Watts index.

The time taken to exit is the Watts index divided by the expected growth rate of expenditure of the poor. This measure of poverty indicates the negative relationship between economic growth rates and the speed at which the poor are exiting poverty.

2.3.3 Decomposition of poverty

The FGT poverty index (P) can be decomposed by population subgroups as follows (Araar and Duclos, 2013):

$$\hat{P}(z,\alpha) = \sum_{g=1}^{G} \hat{\phi}(g)\hat{P}(z;\ a\ \ g)$$

where G is the number of population subgroups, $\hat{P}(z,\alpha,g)$ is the estimated FGT index of subgroup g, $\hat{\phi}(g)$ is the estimated population share of subgroup g, $\sum_{g=1}^{G} \hat{\phi}(g)\hat{P}(z;\ a\ \ g)$ is the estimated absolute contribution of subgroup g to total poverty, and $\sum_{g=1}^{G} \hat{\phi}(g)\hat{P}(z;\ a\ \ g)$ is the estimated relative contribution of subgroup g to total poverty.

The total alleviation of FGT poverty into a sum of the contributions generated by separate income/expenditure components can be decomposed. Total alleviation is maximal when all individuals have an income/expenditure greater than or equal to the poverty line. A negative sign on a decomposition term indicates that an income component reduces poverty.

Assume that there exist K income/expenditure sources and that sk denotes source k. The FGT index is defined as (Araar and Duclos, 2013):

$$\hat{P}\left(z;\ a\ \ y=\sum_{k=1}^{K} s_k\right)=\frac{\sum_{i=1}^{n}\left(1-y/z\right)_{+}^{a}}{\sum_{i=1}^{n} w_i}$$

where wi is the weight assigned to individual i and n is sample size.
This estimates the share in total income/expenditure of each source k and the absolute and relative contributions of each source k to the value of $\left(\hat{P}-1\right)$.

2.3.4 Correlates of poverty

One of the most important question in welfare analysis is the attempt to identify the major causes poverty. A poverty profile describes the pattern of poverty, but is not principally concerned with explaining its causes. Haughton and Khandker (2009) have tried to identify the main potential determinants of poverty at different levels (national, sector-specific, community, household, or individual characteristics). Regression techniques can be used to determine the factors "causing" poverty or correlates of poverty. Household and individual level sources of poverty/welfare were identified for empirical analysis in this paper (Table 2).

This paper employed the most common censored regression model, the Tobit model, which expresses the observed level of the outcome in terms of an underlying latent variable. The use of the Tobit model is intuitive because the parameter estimates will be biased and inconsistent if a linear model is used in the presence of zero outcomes (failures or nonpoor in this case) where the bias will increase as the number of observations that take on the value of zero increases. The dependent variable measures the inverse relationship between poverty and welfare. Welfare ratios below one indicates poor individuals (below poverty line) and those on or above one show nonpoor individuals. Accordingly, higher values of the welfare ratio designate higher welfare (lower poverty). The dependent variable was censured from above to deal with the intensity and status of poverty situation in the society.

Table 3: Definition of variable sand working hypotheses

Correlates of poverty (welfare ratio)	Measurement	Expected effect on welfare
Family size	Counts	-
Number of meals served per day (counts)	Counts	+
Source of safe drinking water	Dummy (1 if safe, 0 otherwise)	+
Access to off-farm activities	Dummy (1 if accessed to)	+
Private ownership of telephone lines	Dummy (1 if owned)	+
Access to credit	Dummy (1 if accessed to credit)	+
Literacy status	Dummy (1 if literate)	+
Incidence of food shortage within last 7 days	Dummy (1 if yes)	-
Source of lighting	Dummy (1 if electricity)	+
Ownership of improved toilet facility	Dummy (1 if owned)	+
Type of house floor	Dummy (1 if clean)	+
Access to washing water	Dummy (1 if yes)	+
Consultation for medical assistance	Dummy (1 if yes)	+
Employment opportunity	Dummy (1 if yes)	+
Number of rooms in the house	Continuous	+
Place of residence	Dummy (1 if rural)	-

The Tobit model can be specified as (Cameron and Trivedi, 2009):

$$y_i = \mathbf{x}\boldsymbol{\beta} + \varepsilon_i$$

and the measurement model

$$y_i = \begin{cases} \mathbf{x}\boldsymbol{\beta} + \varepsilon_{i_i}, & if \quad y_i^* > 0 \\ 0 & if \quad y_i^* < 0 \end{cases}$$

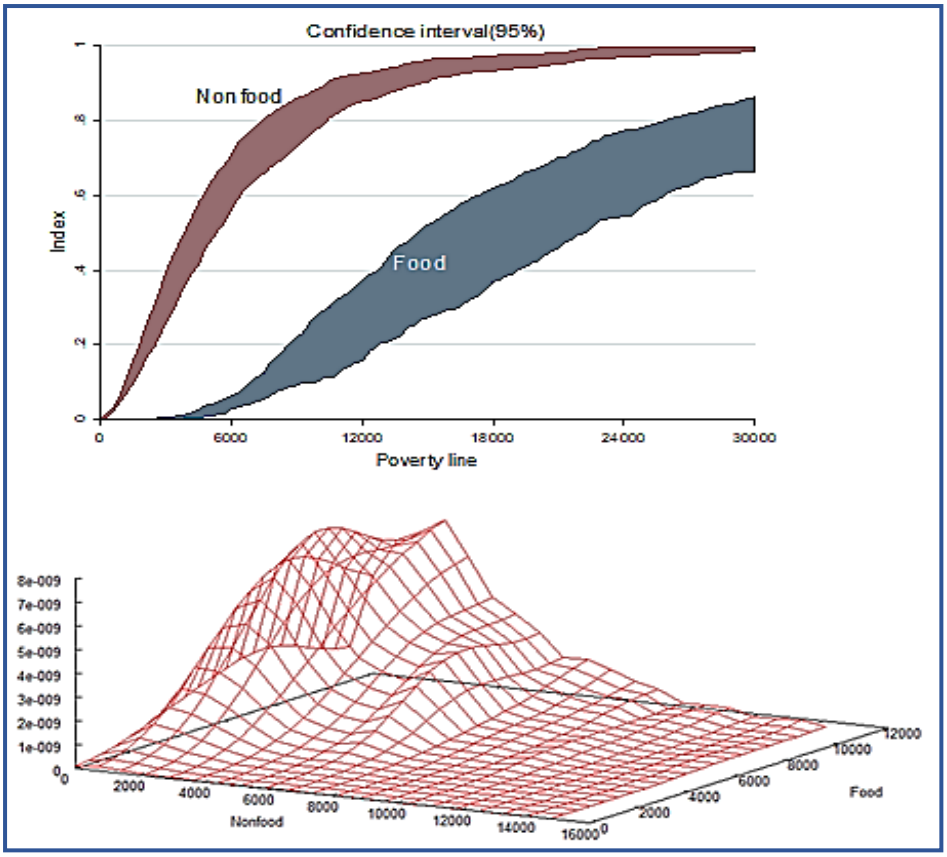
where y_i, the dependent variable (the welfare ratio, which is the ratio of real consumption per capita divided by the poverty line, z) and the x's are vectors of covariates determining the intensity and status of the welfare ration, and $\boldsymbol{\beta}$ is a vector of corresponding parameters to be estimated.

3. Findings

3.1 Consumption and Welfare Patterns

The FGT poverty curves (with confidence intervals) for food and nonfood consumption expenditure were plotted and compared. Food consumption expenditure had contributed higher proportion to total poverty. Nonfood expenditure was relatively higher and increasing with increasing rate for lower poverty thresholds and increasing with decreasing rate for higher poverty thresholds (upper panel of Figure 1). On the other hand, food expenditure, as a necessity, was lower and increasing with decreasing rate. The FGT poverty curves clearly depict how poverty of non-food expenditure was relatively more prevalent.

Figure 1: FGT curves and joint density surfaces for food and nonfood expenditure



Source: Author's computation from LSMS data (2019).

As illustrated by their joint probability density function, food and nonfood expenditure were interdependent (lower panel of Figure 1). As expenditure for one type of consumption increases, the expenditure for the other increase but with different rates. However, food expenditure moves with lower values and remains inelastic for higher values nonfood expenditure for the fact that food is a necessity good.

The number of meals served per day can be considered as an indicator of poverty situation (Table 3). The mean annual real consumption expenditure per capita was compared to the number of meals to verify if they are related. About 17.1 percent of the samples were served with two or lower meals per day. These group of respondents spent greatest proportion (83.3%) of their expenditure on food. The greatest majority of samples (77.4%) were served with three meals per day and spent 76 percent of their expenditure on food. However, only 5.5 percent of the respondents were served with more than three meals per day and spent about 71.9 percent of their expenditure on food.

The results imply how people with low level of real consumption expenditure per capita were forced to get relatively lower number of meals per day and spend larger proportion of their money on food. he variation in the number of meals served per day generally explains the relative difference in their mean annual consumption expenditure.

Table 4: Real annual consumption expenditure per capita and meals served per day

Number of meals served per day	Proportion of samples (%)	Expenditure share (%)	
		Food	Nonfood
Twice or lower per day	17.1	83.3	16.7
Three times	77.4	76.0	24.0
Above 3	5.5	71.9	28.1
Total	1.00	76.7	23.3
Observations	22296		

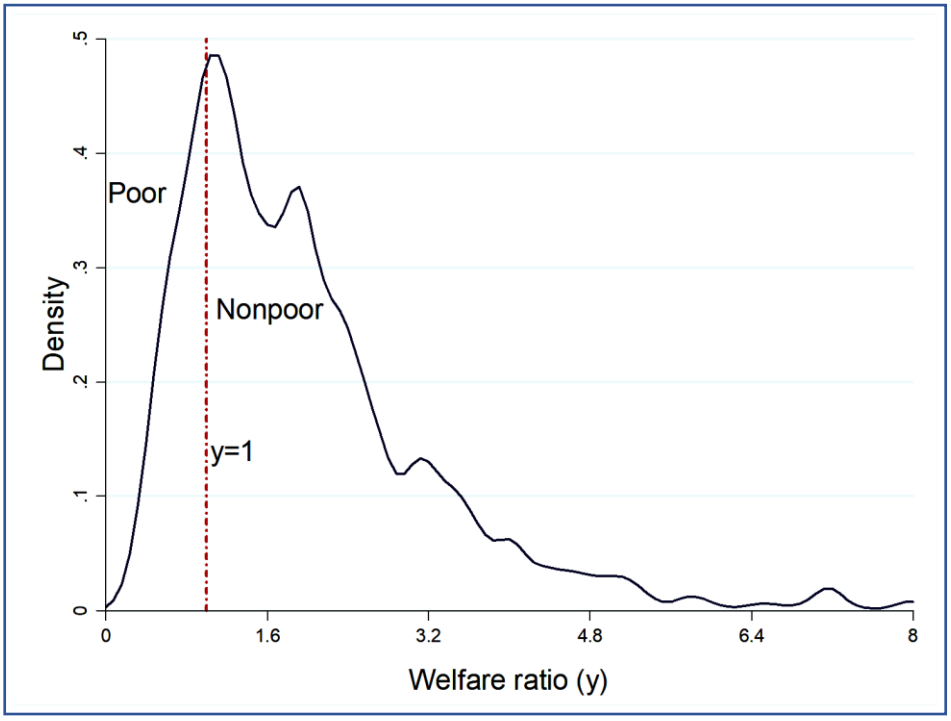
Source: Author's computation from LSMS data (2019).

The median real annual expenditure per capita was about ETB 4177. People with two or lower number of meals per day (with annual mean food expenditure of ETB 3594) were constrained to spend below the median

expenditure (only 86% of the median expenditure on food). However, individuals served with more than three meals per day were able to spend higher than the median expenditure per capita (ETB 5100). The results clearly imply that poor individuals with a few numbers of meals per day (17.1%) were forced to consume less.

The density curve of welfare ratio indicated in Figure 2 depicts the proportion of the samples above and below poverty line (at welfare ratio of 1) indicated by the vertical broken line. The density curve of welfare ratio was right-skewed indicating the greatest majority of respondents were (above the poverty line).

Figure 2: Density curve of welfare ratio (at poverty line=14758)



Source: Author's computation from LSMS data (2019).

3.2 Poverty Indices

3.2.1 Absolute poverty

As reported below, the incidence or prevalence of absolute[5] consumption poverty rate in Ethiopia in 2015/16 was 22.1 percent with significant difference across regional states, which is equivalent to 22.1 million population of the country (Table 4). This poverty rate was by far lower than the Sub-Saharan Africa (SSA) average (41.1%) (at 2011 PPP) indicating the substantial change Ethiopia has brought in poverty reduction. The poverty gap observed in Ethiopia was 6.0 percent, which was better-off compared to the SSA average (15.8%). However, the spatial (region) distribution of poverty rate was relatively higher in Gambella region (41.9%) followed by Amhara (30.9%) and SNNP state (29.9%). Poverty rate in all the other regions and cities were below the national poverty rate (22.1%).

Table 5: Spatial distribution of poverty in Ethiopia (poverty line =14758)

Region	Incidence (α=0)	Depth (α=1)	Severity (α=2)
Tigray	0.193	0.056	0.023
Afar	0.054	0.015	0.006
Amhara	0.309	0.085	0.033
Oromia	0.160	0.041	0.017
Somali	0.116	0.027	0.010
Benshagul-Gumuz	0.419	0.138	0.063
SNNP	0.299	0.082	0.035
Gambella	0.137	0.026	0.008
Harari	0.128	0.037	0.015
Addis Ababa	0.127	0.032	0.013
Dire Dawa	0.153	0.034	0.012
Population level	0.221	0.060	0.024

Source: Author's computation from LSMS data (2019).

[5] The official national poverty lines in 2015/16 determined by the government of Ethiopia were ETB 7184 for overall poverty and ETB 3772 for food. This poverty threshold was highly underestimated mainly due to very low threshold used for 2015 (US$ 1.25 per day). The international absolute poverty line in 2015 revised by the World Bank is USD 1.90 (ETB 40.43 per day). This leads to an overall absolute poverty line of ETB 14758 per year (with an exchange rate of ETB 21.28 in December 2015).

Poverty incidence[6] was also significantly varied by place of residence, gender of household heads, marital status, and religion (Table 5). The poverty rate ranged from 12.7 percent to 15.5 percent in small, medium and large towns to 24.1 percent in rural areas. Poverty rate in rural areas was 11.4 percent higher than the poverty rate observed in urban areas. The overall absolute poverty gap was 6.0 percent.

Poverty rate was also 12.1 percent higher among female-headed households compared to their male counterparts. Similarly, depth of poverty among female-headed households was nearly threefold higher than the intensity of poverty observed among male-headed households, suggesting that gender differential was one of the major sources of poverty in Ethiopia.

Table 6: Distribution of poverty by population subgroups

Population subgroups	Incidence (α=0)	Depth (α=1)	Severity (α=2)
Place of residence			
Rural	0.241	0.064	0.026
Small town	0.155	0.052	0.022
Medium and large towns	0.127	0.034	0.014
Gender			
Female	0.357	0.129	0.064
Male	0.236	0.066	0.027
Marital status			
Single	0.192	0.049	0.019
Married (monogamy)	0.225	0.061	0.025
Divorced	0.372	0.131	0.062
Religion			
Orthodox	0.199	0.055	0.022
Muslim	0.163	0.048	0.021
Protestant	0.278	0.070	0.029
Population level	0.221	0.060	0.024

Source: Author's computation from LSMS data (2019).

[6] The relative poverty lines routinely computed at 60% of the median expenditure per capita is ETB 14884. The relative poverty rate estimated at this threshold is 22.4%, which is not significantly different form the absolute poverty rate (22.1%). The same thing is true for relative food poverty (22.3% at poverty line of ETB 10980).

The three major forms of marital status widely practiced in Ethiopia (single, married, and divorced) were investigated for their implications on the economic wellbeing of people. Single and married persons generally cover greater proportion of marital status in the population in Ethiopia (47.8% single and 40.6% married). Divorce, however covering small proportion of the population (only 3.5%) was found to potentially create major social problem by pushing people to poverty. The poverty rate for divorce persons was 15.1 percent higher compared to the national poverty rate (22.1%) and the poverty rate observed in other forms of marital status (near or below the national average, 22.5% for married and 19.2% for single).

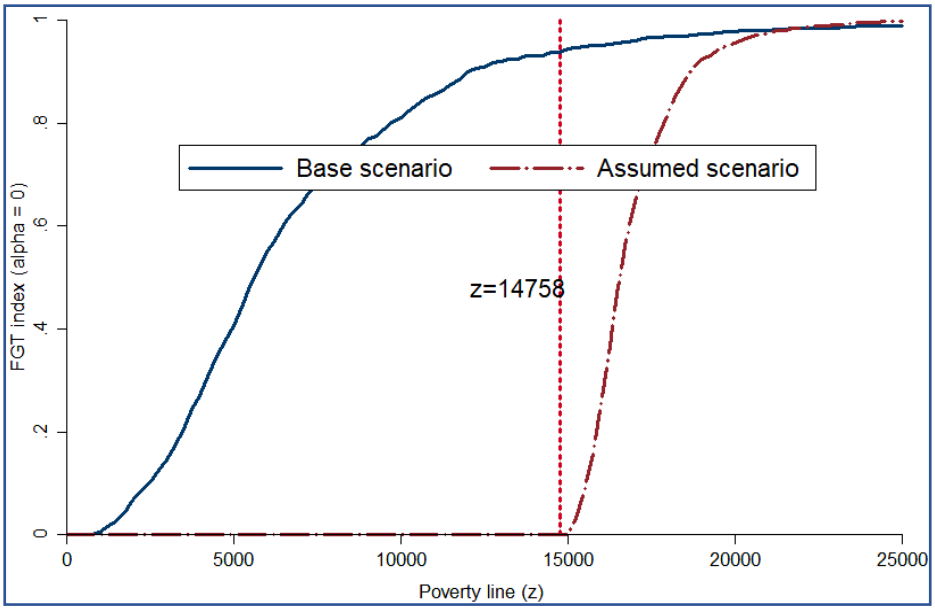
For reasons currently unidentified by the researcher, the incidence, depth and severity of poverty were substantially different in subpopulations following different religions[7], the highest poverty rate being among Protestants (27.8%). Poverty was relatively less prevalent and below the national poverty rate among Orthodox Christians (19.9%) and Muslims (16.3%). These differences might be attributable to the proportion of population following the specific religion and age of the religion since its introduction in Ethiopia. Religions with wider coverage and longer age in Ethiopia (Muslims and Orthodox Christians) could be more likely to be better off in their resource endowments and social capital, leading to better welfare conditions of their followers.

3.2.2 Time-taken to exit poverty

The length of time required, for the average poor person, to exit poverty at different potential expenditure per capita growth rates is an important information for designing and implementing poverty reduction strategies. The real consumption expenditure per capita of people in the base scenario (2015) was considered to predict four different growth scenarios (5%, 8%, 11%, and 14%). Depending on the annual growth scenarios assumed, the time taken to exit poverty varies from nine to 26 years (Figure 3). The higher the annual growth rate (g) of expenditure per capita, the shorter time-taken (t) to exit poverty.

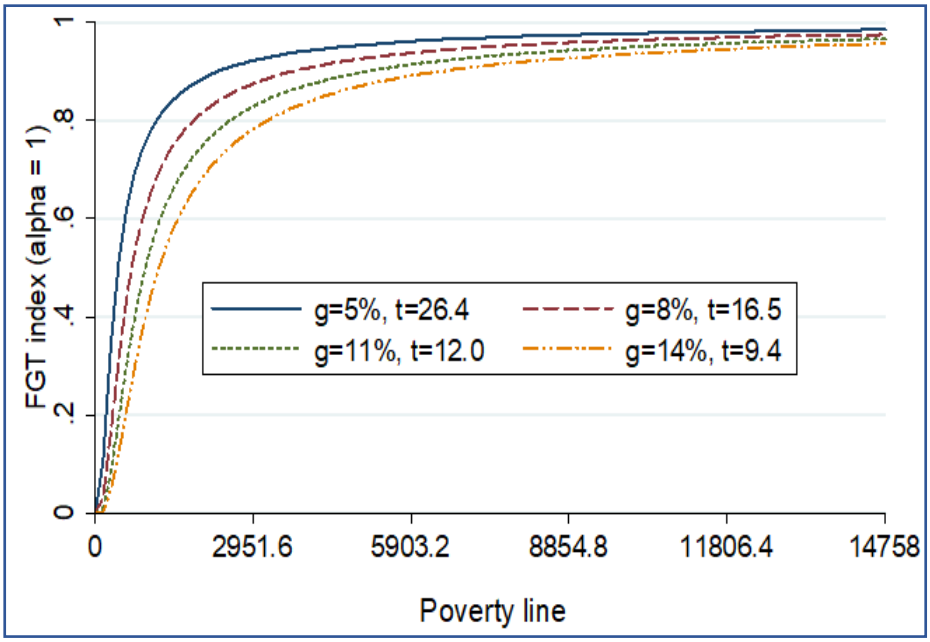
[7] According to the LSMS (2015/16) dataset, the population shares of religions in Ethiopia were 46.5% (Orthodox), 31.4% (Muslims), 19.7% (Protestant), 1.2% (Catholic), and 1.1% (other religions including Catholic, Traditional, Waketeta, Pagans, etc.).

Figure 3: Incidence of poverty and time-taken to exit poverty



Accordingly, the mean annual expenditure per capita of the poor at the given growth scenarios and predicted time-taken to exit poverty converges to ETB 16260 (Figure 4). If Ethiopia is able to achieve an annual growth of real expenditure per capita of eight percent, it will take 26.4 years to attain the first two Sustainable Development Goals (SDG) of the United Nations (UN) (ending poverty and hunger) by 2032 (2-years later). If 11 percent annual growth of expenditure per capita (ETB 519 per year) is attained, the average poor person requires about 12 years to exit poverty trap (by 2027). However, lower annual growth rates of expenditure per capita (5% and below) will take the country longer than two and half decades to exit poverty.

Figure 4: Intensity of poverty and time-taken to exit poverty



3.3 Correlates of Poverty

As reported in Table 6, the Tobit model outputs were consistent with other nonparametric analytical results discussed in this paper. Out of 16 hypothesized correlates of poverty, 14 of them were identified to be statistically significant sources of intensity of poverty and probability of being poor in Ethiopia.

Family size, number of meals served per day, source of safe drinking water, access to off-farm activities, private ownership of telephone lines, access to credit, literacy status, ownership of improved toilet facility, type of house floor, consultation for medical assistance, number of rooms in the house and place of residence were positively correlated with welfare and negatively related to intensity of poverty. On the other hand, incidence of food shortage and source of light were negatively correlated with welfare by aggravating poverty and by depleting income which would have otherwise been allocated for other consumption items.

The overall marginal effect of these covariates on the ratio was 0.787, which is the expected welfare ratio of the poor. On average, poor individuals were

expected to be 21.3 percent far below the poverty line8. The most important variables largely correlated to intensity of poverty were telephone ownership (5.1%), source of light (-3.7%), type of house floor (3.7%), and incidence of food shortage (-3.1%).

Table 7: Correlates of poverty in Ethiopia

Correlates	Coefficient	Standard errors	Marginal effects	
			Intensity	Probability
Family size (counts)	0.074***	0.002	0.017	-0.059
Number of meals served per day	0.045***	0.008	0.010	-0.036
Source of safe drinking water	0.045 ***	0.008	0.010	-0.036
Access to off-farm activities	0.025*	0.013	0.006	-0.019
Private ownership of telephone lines	0.216***	0.008	0.051	-0.179
Access to credit	0.067***	0.009	0.015	-0.052
Literacy status	0.059***	0.008	0.014	-0.048
Incidence of food shortage	-0.127***	0.009	-0.031	0.109
Source of light	-0.153***	0.008	-0.037	0.130
Ownership of improved toilet facility	0.030***	0.008	0.007	-0.024
Type of house floor	0.176***	0.014	0.037	-0.123
Access to washing water	-0.011	0.018	-0.003	0.009
Consultation for medical assistance	0.018***	0.008	0.004	-0.014
Employment opportunity	0.016	0.064	0.004	-0.013
Number of rooms in the house	0.043***	0.004	0.010	-0.035
Place of residence	0.035***	0.011	0.008	-0.028
Constant	0.405***	0.027	-	-
Marginal effects: E(y/y<1), Pr(0<y<1)-			0.787	0.220
Pseudo R2			0.2734	
LR chi2(16)			5515.14***	
Observations			19577	
Left-censored observations			0	
Uncensored observations			5194	
Right-censored observations			14383	

Note: *** and *, respectively, denote strong (1%) and weak (10%) significance levels.
Source: Author's computation from LSMS data (2019).

[8] The intensity of the welfare ratio for the poor (22.0%) is consistent to the FGT poverty index (22.1%) estimated in this study above, confirming the explanatory power of the top-coded Tobit model.

The likelihood of people to be poor was 22.0 percent. The most important variables largely reducing the probability of being consumption poor were telephone ownership (by 17.9%), type of household floor (by 12.3%), and family size (by 5.9%). But their likelihood to be poor was largely and positively corrected with source of lighting (by 13.0%) and incidence of food shortage (by 10.9%).

3.4 Decomposition of Poverty

3.4.1 Rural-urban decomposition of poverty

The alleviation of FGT poverty was decomposed by population subgroups (place of residence) and the results are as reported below (Table 7). The incidence, depth and severity of poverty in Ethiopia was mainly attributable to place of residence. The absolute effect of rural areas on the incidence of poverty was by far higher (19.6% and more) than the rest two areas of residence. About 88.5 percent of poverty incidence observed among persons was in rural areas of Ethiopia. Similarly, the relative contribution and depth and severity of poverty were very high (87.7% and 87.3%) in rural areas of Ethiopia. In order to attain national poverty reduction targets of the country, the decomposition results clearly suggest the urgent need to reduce poverty in rural areas of Ethiopia.

Table 8: Rural-urban decomposition of poverty

Place of residence	FGT index	Absolute contribution	Relative contribution
Incidence (α=0)			
Rural	0.241	0.196	0.885
Small towns	0.155	0.008	0.038
Medium and large towns	0.127	0.017	0.076
Country level	0.221	0.221	1.000
Depth (α=1)			
Rural	0.064	0.052	0.877
Small towns	0.052	0.003	0.047
Medium and large towns	0.034	0.005	0.075
Country level	0.060	0.060	1.000
Severity (α=2)			
Rural	0.026	0.021	0.873
Small towns	0.022	0.001	0.049
Medium and large towns	0.014	0.002	0.078
Population level	0.024	0.024	1.000

Source: Author's computation from LSMS data (2019).

3.4.2 Poverty decomposition by expenditure components

FGT poverty indices were also decomposed by expenditure components (food and nonfood) using the Shapley value (Table 8). As expected, the absolute contribution of each expenditure component had negative signs. Food consumption expenditure had the largest absolute effect in reducing incidence (65.3%), depth (71.3%) and severity (68.8%) of poverty

The relative contribution of food expenditure is also in line with the results of the absolute contribution. About 85.2 percent of the poverty incidence, 76.3 percent of the poverty gap, and 70.6 percent of severity of poverty in Ethiopia were attributable to food consumption expenditure.

Table 9: Decomposition of poverty by expenditure components using the Shapley value

Expenditure components	Expenditure share	Absolute contribution	Relative contribution
Incidence (α=0)			
Food consumption	0.785	-0.653	0.852
Nonfood consumption	0.215	-0.114	0.148
Total	1.00	-0.767	1.000
FGT index		0.233	
Depth (α=1)	1.000		
Food consumption	0.785	-0.713	0.763
Nonfood consumption	0.215	-0.222	0.237
Total	1.000	-0.936	1.000
FGT index		0.064	
Severity (α=2)			
Food consumption	0.785	-0.688	0.706
Nonfood consumption	0.215	-0.286	0.294
Total	1.000	-0.974	1.000
FGT index		0.026	
Poverty line		14758	

Source: Author's computation from LSMS data (2019).

4. Concluding Remarks

Ethiopia has been designing ambitious policies and undertaking several development interventions for alleviating poverty. These policies have brought substantial improvements in the welfare of the society but with different implications. However, there are multiple controversies on poverty estimates mainly arising from inconsistent research findings. These controversies and inconsistent findings are mainly related to the coverage and reliability of data, poverty measures used and the methods of poverty estimation.

To account for these limitations and sources of controversy, this paper has utilized a country-representative dataset of the LSMS and generated poverty estimates using rigorous distributive analysis (with DASP software). Real expenditure per capita of samples drawn from all over the country were used. Alterative indicators of poverty were estimated to check for consistency and reliability of the findings. Moreover, poverty estimates were decomposed into their constituent sources for identifying possible options of alleviating poverty.

The findings indicate that poverty in Ethiopia was significantly differentiated across population subgroups, including regional states, gender, and place of residence. These differences among population subgroup require poverty reduction strategies to be differentiated across regions, contributing to rural-urban transformation, and securing gender balance in all dimensions of poverty. Appropriate poverty alleviation policies and equitable allocation and use of available resources between and among population subgroups and selection of relevant interventions need to be the primary foci of policy makers and other stakeholders.

Alterative scenarios of real expenditure per capita growth rates were assumed and the corresponding time taken to exit poverty were estimated. Estimates of these alterative scenarios suggest the need to accelerate growth of disposable income to attain the SDGs of ending poverty and hunger in all its forms by 2030. In order to attain such SDGs of the United Nations, Ethiopia should design and implement poverty alleviation policies and interventions enabling to register eight to 11 annual growth rates of real expenditure per capita of citizens.

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