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POVERTY MEASUREMENT AND PROFILE IN ETHIOPIA

Part of the Collaborative Project of the AERC on
POVERTY, INCOME DISTRIBUTION AND LABOUR MARKET ISSUES IN ETHIOPIA

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1. Poverty Measurement and Poverty Profile: A Review of the Methodological Issues

1.1. The Constituents of Well-being and The Measurement of Poverty.

The central problem in the measurement of poverty is the lack of precise definition on what constitutes economic well-being and thus poverty, in other words, when do we say a person or his *family* or a household is experiencing poverty as opposed to *low level of standard of living or welfare*. The literature that has rapidly evolved in the last twenty years on the measurement of poverty used current income or expenditure as an indicator of an individual's economic well-being. While the choice of expenditure or income is dictated by empirical necessities, the growing need for clarity on the constituents of well-being are challenging the common measures of poverty based on consumption expenditure or current income. One of the arguments raised against the use of income or expenditure is the issue of correspondence between income and welfare. Some argue that poverty is a living condition that goes beyond the lack of income or having insufficient amount of it. In fact, it signifies human indignity, exclusion, vulnerability, powerlessness and destitution.1 Consumption based measures of poverty are incapable of capturing these dimensions of poverty since they are well beyond the reach of the income space. For instance, it is difficult to perceive how a person who is better off just by one dollar more can have less of indignity, isolation and vulnerability in the consumption measures of poverty. In addition, it is not even clear also how more income means better welfare. The capabilities approach to welfare or as it is commonly called the non-welfarist approach (see Sen 1985, 1986, and Streeten 1994) argues that what is most important at the heart of an individual welfare is that goods and services consumed are means, not ends for a full and healthy life. Welfare measurement needs to anchor on the ends perspective, that is attention is to be paid to how well-fed, well-closed and active an individual is to make minimum participation in economic and social life of the community. Lack of such capabilities entail to isolation, exclusion and destitution2. While the capabilities approach to the measurement of welfare and thus poverty provides a deeper and broader view of poverty, the empirical application has not yet fully developed.

The welfarist approach in contrast is based on a concept of well-being aggregated over individual utilities which are in turn defined over individual consumption expenditure or income. Popular poverty indices developed in the literature are understood as an aggregation

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1 Indignity arising from lack of self-esteem, exclusion from participating in social and political life, powerlessness in the market, against crime, and vulnerability to famine, hunger and thus illness, which leads to destitution of physical and psychological capacity to function fully and productively.

2See Ravallion (1994) for a detailed exposition of the capabilities approach and Quizilbash (1996) for a critique. But, the whole issue here is that income or expenditure indicators of well-being or poverty refer to a narrow domain ignoring such factors as basic human rights and related issues which are largely defined over the domain of public goods.

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of individual utilities to arrive at a summary measure of social welfare. This translation of individual utilities to social welfare is not without intrinsic problem of measurement and comparability.

The fact that observed demand behaviour by an individual can be derived from an ordinal concept of utility has greatly simplified the difficulties encountered in conceptualising and also empirically estimating utilities. But, the cardinal concept of utility, once rejected as irrelevant in the neo-classical choice theory is making a come back in the literature. The problem often encountered in the measurement of welfare or poverty on the basis of individual utilities (either cardinal or ordinal) is that of the non-comparability of individual utilities which implies that the underlying social-welfare is invariant to any monotonic transformation of individual utilities. Once, interpersonal comparison of utilities is assumed, then, one can find a whole class of social orderings that can be represented by individual utility functions.3

The empirical measurement of social welfare and thus poverty on the basis of the preference ordering implied in individual utility functions require a translation from the utility space to an income space. While, some available translations, like Atkinson s (1970) measures of inequality are the basis for social-welfare based measures of income inequality and thus poverty (see Sen 1973, Sapsonic, 1981, and Shorrocks 1983 for the link between social welfare and inequality based on information provided by the income of the population), there is still no strong theoretical basis for such a correspondence. Particularly, the difficulties one has in creating correspondence between the cardinal measures of poverty with the ordinal basis of most social-welfare functions is a difficult one.4

The literature on the measurement of poverty followed apparently two broad routes in deriving aggregate index of poverty that in a way attempts to summarise information regarding who the poor are, how much poverty is being experienced, and the degree of relative deprivation within the poor population. One route is to derive poverty indices using ethically acceptable axioms5, particularly, the popular ones, largely followed the statistical summary approach without a direct recourse to issues of social welfare and individual utility functions in their construction. Such indices as the Sen index originally proposed in Sen(1976), and a reformulation of this index in Takayama (1979), Thon (1979, 1981), Kakwani (1980) and the Foster, Greer and Thorbecke (1984) index. The other route is the social-welfare based poverty indices suggested by Blackbory and Donaldson (1981), Clark et al (1981), Chakravarty (1983), Jorgenson (1991) which use the Atkinson index of inequality as a framework to look at poverty for the population truncated at the poverty line. However, Haggenars (1987) showed that nearly all these poverty measures do implicitly take one or

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3See for instance Pollak (1991) and Jorgenson (1990) for further details.

4See Praag (1991) for the concept of Equivalence Income Evaluation as a method of constructing a cardinal measure of individual welfare from income levels.

5The axioms are mainly those observed by a social welfare function which is quasi-concave and symmetric in its arguments.

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other form of social welfare function which anchors on interpersonal comparability. The question therefore remains that how a social preference ordering which is complete is approximated by the income measure that generally entails to partial ordering of income distribution.

The social welfare basis of poverty measurement is important with respect to policy issues and poverty comparisons. It is common to find that demand behaviours that are observed in poor countries, particularly in rural areas are conditional demand that do not take into account a bulk of own produced consumption goods and freely provided community-based services through solidarity institutions and traditional arrangements, not to mention the public goods provided by governments. The next section highlights the major issues in the empirical estimation of poverty by reviewing the popular measures of poverty.

1.2. Review of popular Aggregate Poverty Indices

The last twenty years witnessed a large body of literature evolving in the wake of the seminal paper by Sen(1976) on the measurement of poverty. Sen set out from the commonly used measures of overall poverty that used average income of an individual as an indicator of welfare or economic well-being. These measures are the Headcount ratio, an index that gives the proportion of the population deemed to be poor and the Income-gap ratio, an index that measures the resource gap implied by the amount of poverty that exists in a population. Formally these measures are given by:

$$H=q/n \quad \text{.....(1)}$$

$$I = \frac{1}{q}\sum_{i=1}^{q}\frac{(z-y_i)}{z} \text{,.....(2)}$$

where, q refers to the number of people earning income level less than a designated poverty line, z, for any underlying distribution given by:

$$y_1 \prec y_2 \prec \text{,.....,} \prec y_{q-1} \prec z_q \prec y_{q+1} \text{,....,} \prec y_n$$

Sen (1976) has shown that these two popular measures of poverty violate one or both of the following appealing axioms:

a) The monotonocity axiom-all other things being equal, a reduction in the income of a person below the poverty line must increase the poverty index;

b) The transfer axiom-all other things being equal, a pure transfer from a person below the poverty line to some one who is richer, but may still be poor, must increase the poverty index. It can be seen quite easily that H violates both monotoncity and transfer axioms while I violates the transfer axiom. In the words of Sen (1976, 1983) any poverty index worthy of consideration should be able to provide three basic information on poverty: it should be able to identify who the poor are, capture their average deprivation and thirdly their relative

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deprivation among themselves. As a result, H captures only who the poor are, or measures the prevalence of poverty, I measures the average deprivation.

Instead, Sen (1976) formulated a poverty index by setting out from what he called a general expression of a poverty index defined as6:

$$Q(x) = A(z, y)\sum_{i\in S(x)}^{q}(z - y_i)v_i(z, y).....(3)$$

Where S(x) is the set of people with income no higher than a designated x, Q(x) is the aggregate income gap, $v_i(z,\mathbf{y})$ is the non-negative weight to the income gap of the i^{th} person; and A(z,**y**) is a normalising factor. Note that y enters as a vector. Sen defines a poverty measure, P=Max Q(x), that is P is the maximum weighted income gap of the poor in a given group or community where the income shortfall of the i^{th} person and the j^{th} person must receive different weights. In doing so, Sen incorporated the ordered rank weight to capture relative deprivation.

If the income of the poor in a population is equal, Sen argued that complete information on poverty can be obtained from an index P=H.I, which according to Sen represent both the identity of the poor and their average deprivation. However, if the level of income of the poor is different, as it is the case in reality, then, the axioms of montonocity, normalisation and ordinal rank order weights are sufficient to generate a poverty index acceptable by a certain social welfare function7. Thus, he suggested,

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6Sen (1976), pp. 224-226.

7(4) is a limiting case when the number of individuals in the population is very large. The basis of (4) is that given the general expression in (3), a poverty index can be written as:

$$P(Y, z) = a\sum_{i=1}^{q}(q + 1 - i)(z = y_i) + b$$

where a and b are appropriate normalisation parameters and the rest are as defined in the text. This expression takes into account the absolute deprivation via the aggregate sum of poverty gap and relative deprivation via the rank-order weight given to each poorer individual. We

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$S=H[I+(1-I)G_p]$,.....[4].

where, G_p is the Gini-coefficient among the poor population. It can be shown that if we allow the index given in [4] to embrace the entire income distribution, it evolves into a measure of relative income inequality in a population. We note that the distinction in the type of poverty being measured rests on the way the poverty line is defined. If the poverty line is meant to represent a level of income barely sufficient to meet basic needs and nothing more, then, the underlying poverty measured is known as absolute poverty, where as if the poverty line is defined as a proportion of mean income of the income distribution, it designates relative poverty, a subject which is taken up in greater detail in Section 2.

The literature following Sen focussed on the refinement of poverty indices by introducing a number of other desirable properties that can fully represent a range of ethical considerations by offering rooms for flexibility.

Thon (1979,1981) argued that Sen's index violates certain kinds of transfer and lead to ambiguity. For instance, it can be shown that a transfer of income from a poor person to some one who was poor and becomes richer because of the transfer decreases poverty as measured by Sen's index. Thon's extension, and later a number of others, (Takayama 1979, Kakwani 1980a 1980b) made an attempt at constructing indices that meet a number of desirable properties. Another strand of research also pursued the construction of poverty indices on the basis of social welfare functions employing the underlying ethical properties. Notable among these are the works of Blackbory and Donaldson (1980), Clark, etal (1981) and Chakarvarty (1983) who truncated the underlying income distribution of a population to the relevant segment and defined poverty as a deviation from an "equally distributed income" among the poor.

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note that the relative weight depends not on the distance poor people have from the poverty line, but on the number of better-off people. It is seen that for a finite population, the above expression yields values that are different if the size of the population is replicated, a situation that does not appeal to common sense. For details see Shorrocks (1994).

The list of requirements that has to be satisfied by a poverty index has grown longer with the literature on the measurement of poverty. The most important properties that are expected to be met by any poverty index, P(y,z) defined over z and the underlying income distribution of the population are the following:8

i. P(y,z) is independent of the incomes of the rich, that is the poverty index is based on censored income distribution. Some times this property is known as axiom of focus.

ii. P(y,z) is increasing in z.

iii. Given other things held constant, a reduction in income of a person below the poverty line must increase the poverty index (monotonocity axiom).

iv. Given other things, a pure transfer of income from a person below the poverty line to anyone who is richer must increase the poverty index, unless the number of persons below the poverty line is strictly reduced by the transfer (weak transfer axiom).

v. Given other things, a pure transfer of income from a person below the poverty line to anyone who is richer must increase the poverty index (strong transfer axiom).

vi. P(y,z) is left unchanged by a permutation of the incomes (impartiality).

vii. P(y,z) is jointly continuous in (y,z).

viii. Additive decomposability: The poverty index for a population can be written as a weighted average of the poverty indices for a set of mutually exclusive and collectively exhaustive sub-populations.

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The issue that whether the poverty indices suggested in the literature meet all these requirements has been a subject of inquiry. Kundu and Smith (1983) demonstrated that if the fixed population axiom is violated, no single poverty index can meet all the properties listed above. Haggenars (1987) showed succinctly that no poverty index can meet all the desirable properties simultaneously and that a choice of a poverty index always implies the preference of some normative judgments over another. It is important for policy makers to draw their selection of a poverty index based on properties consistent with their policy objectives since the same scenario is judged differently by different poverty indices.

The Sen index and its variants (Thon 1981, Takayama 1979, Kakwani 1980) violate the axiom of decomposablity a property thought to be very powerful in the analysis of poverty

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8See Rodgers and Rodgers (1991) and Chakravarty (1983) for details.

profile. But among others, the Sen index violates the continuity, transfer and decomposablity, axioms thought to be very powerful and appealing in empirical work. This feature has greatly diminished the empirical usefulness of the Sen index. In fact, Thon s index and also kakwani s are attempts to redress the violation of the transfer axiom in the Sen index. The fact that the Sen index is discontinuous at the poverty line or points close to the poverty line renders difficulties in case where income is measured with error, especially at levels closer to the poverty line. There is a sudden jump in the value of the Sen index when income approximates the poverty line level. That is, poverty tends to decline in large amount as the income of the poor people approximates the poverty line. While the interpretation of discontinuity of a poverty index is a subject of interest recently (see Boiugrion and Fields 1997)in reflecting the strong definition of poverty, Shorrocks (1995) modified the Sen index by using a slightly modified normalisation procedure so that (4) reduces to:

$$S^{*} = A(H(I + (1 - I)G_{p}))\text{.....(5)}$$

where A is a normalising factor that can ensure continuity and transfer-sensitivity for the Sen index. We note that (4) yielded as a result of the normalisation rule that Sen used on the general expression (3) when the level of income among all the poor population is equal. In that case, the poverty index reduces to:

$$P = HI\text{.....(6)}$$
$$if G_{p} = 0$$

Shorrocks (1995) instead suggested a normalisation procedure:

P=I, if H and G_p=0, so that the Sen index can be re-written to yield:

$$P=I+(1-I)G_{p}\text{.....(7)}$$

and showed that (7) is continuous and satisfies the transfer axiom, that has for long been a basis for not using the Sen index in empirical work. In fact, Shorrocks (1995) defines the modified index as representing the Poverty Gap Profile curve. In this context, Chakravarty (1997) showed that (7) is a special case of the general ethical index suggested in Chakravarty (1983). However, in most common poverty studies, the class of poverty indices discussed above are rarely applied.9

9The exception, to the knowledge of the author, is the application of the Blackbory and Donaldson (1980) index by Szulc (1995) using the Social Welfare function specified in Jorgensen (1990). The relative poverty gap is a variety of the Dalton aggregate measure of inequality, which reduces to a poverty index when applied to a truncated or censored income distribution and is given by:

$$: D = \frac{z - \xi(y_{q})}{z}$$

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where, $\xi(Y_q)$ is defined by the Jorgenson's Social Welfare Function as:

$$\xi(Y_q) = \frac{\sum_{i=1}^{q} y_i}{\sum_{i=1}^{q} m_i} - \gamma(Y)\left[\frac{\sum_{i=1}^{q} m_i \left| \frac{y_i}{m_i} - \frac{\sum_{i=1}^{q} y_i}{\sum_{i=1}^{q} m_i} \right|^{-\rho}}{\sum_{i=1}^{q} m_i}\right]^{\frac{-1}{\rho}}$$

where, y_i represents the income of the ith poor individual, m is the measure of equivalence scale for household size and composition of the ith poor household, p is a measure of sensitivity of society to inequality, and γ is a function satisfying the Pareto Principle of transfer (see Jorgenson 1990 and Szulc (1995) for further details). The Blackbory-Donaldson index that combines both the Head count ratio and the relative poverty gap is given by: BD=HD. The underlying properties of this poverty index are discussed rigourously in Haggenaars (1987) where it was shown that the Blackbory-Donaldson index utilises the utilitarian form of social welfare function which among others considers social welfare to be the average of the individual utility functions in the population.

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1.3. Decomposable and Sub-group Consistent Aggregate Poverty Measures

As the list of axioms that are deemed to be reasonable in poverty measurement grew longer, it also increasingly became difficult to find a poverty index that can meet most of the desirable axioms. This was initially noted in the work of Kundu and Smith (1983) where they showed that if the relevant axioms (even the most basic ones like transfer sensitivity alone) are considered jointly with the what they called the population monotoncity axiom, then no poverty index can be found that can meet these axioms simultaneously.. Haggenaars (1987) investigated in greater detail the types of axioms that are met in a wide class of poverty indices and concluded that the choice of a poverty index depends on the particular interest of the analyst on the poverty condition. One of the most frequently emphasised properties of a poverty index are decomposability and sub-group consistency. Decomposability refers generally to the possibility of looking at the contributions by mutually exclusive sub-groups to overall poverty and the decomposition of total poverty over time into that contributed by changes in the underlying distribution of income and mean income. Sub-group consistency refers to a situation where an increase in the poverty of a sub-group, with poverty remaining in other sub-groups constant should increase overall poverty (see Foster and Shorrocks 1991 for a formal proof of the proposition). This section briefly looks at the popular poverty index which is decomposable and sub-group consistent.

In the literature, poverty indices are summary measures defined over mean income or expenditure, the relevant poverty line, and the parameters characterising the underlying income distribution. The general form is given by:

$$P=P(\mu/z,L).....(8)$$

where μ is mean income of the population, z is the poverty line determined exogenously and L is the parameter characterising the income distribution as measured by the Lorenz function10.

The specification of P as in [8] has enormous advantages from practical considerations. It is

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10The Lorenz function can be represented by a curve with cumulative share of income or expenditure on the horizontal axis and the cumulative percentage of the population on the vertical axis. Thus, if p represents the cumulative percentage of population, then, L(p) offers the corresponding consumption expenditure or income by the poorest p%. See Gastwirth (1972), Kakwani (1980) for mathematical properties of the Lorenz function.

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possible to construct tests of statistical significance (see Kakwani 1991) of a poverty estimate for a given poverty line, it is simpler to decompose changes in poverty into those related with changes in mean income of society and underlying distribution over time and across sub-groups. In addition, one can also compute elasticity values with respect to mean income and inequality parameters easily if the poverty index is specified as in above.

If a poverty index of the form [8] is homogenous of degree zero with respect to the poverty line and the mean income, then the index measures relative poverty, on the other hand, it measures absolute poverty if the poverty index remains unchanged when the same amount of income is added or subtracted from all the incomes and the poverty line itself. That is, a poverty index is called a measure of absolute poverty if it is translation invariant and an index of relative poverty if it is scale invariant (see Foster and Shorrocks 1991 and also Chakravarty 1983 for a formal definition of absolute and relative poverty index). Excepting for the Head-count ratio, all poverty indices known in the literature are measures of relative poverty.11 In most applications, absolute poverty is represented by measuring poverty through a constant poverty line, while relative poverty is represented by a variable poverty line (see Ravallion 1995, 1998).

For poverty measures given by H and I in [3] and [4] one can readily show that by knowing the parameters of the underlying Lorenz function, which gives the consumption expenditure by the poorest p% of the population, $H= \mu(L'(p)$ which is the inverse function of the distribution function $p=F(y)$, and so $L'(H)=z/\mu$. I is then calculated readily using the fact that mean among the poor=mean $L(H)/H$. Given the parameters of the Lorenz function, then, one can have H and I easily read-off the Lorenz curve.

Explicit specification of P has led in the literature to the use of the popular index originally suggested by Foster, Greer and Thorbecke (1984) (hereafter the FGT-index) and later on shown to possess rigorously the desirable properties stated in the preceding section. For

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11Foster and Shorrocks (1991) have shown that a poverty index cannot be absolute and relative at the same time. Zheng (1994) further discussed the issue of relative and absolute poverty by suggesting an index, which he called the headcount- related index that is both scale and translation invariance. But, the suggested index violates the montonocity and transfer axioms. Thus, in effect it means that one cannot find a distribution-sensitive index which is both relative and absolute at the same time. Thus, distribution-sensitive poverty indices fall under the category of relative poverty indices and all other head-count related indices fall under the category that measure absolute poverty.

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continuous income distribution, the FGT-index of general class is given as:

$$P_\alpha = \int \{[z - y]/z\}^{\alpha} f(y)dy \quad \ldots\ldots\ldots\ldots(9)$$

$$\alpha \geq 0$$

It is observed that for α=0 and 1, the FGT-index reduces to H and I, which are interpreted respectively as poverty indices measuring the prevalence and intensity of poverty (see Ravallion, 1992). for α=2 the FGT-index has been interpreted to offer the severity of poverty. As the value given to α increases, then the underlying poverty index offers more weight to the distribution of income found at the lower end.

The FGT-index is the most popular index estimated in the recent literature. Its attraction lies in the fact that while capturing the most desirable properties of a poverty index, it is also decomposable and sub-group consistent. That means, if there are n mutually exclusive sub-groups of households, classified either along regions of residence, sector of employment or some other means of classification, then, the FGT allows that the over all poverty can be expressed in terms of poverty within each sub-group. That is, if P_s represents poverty estimated within each sub-group s, then overall poverty is given by:

$$P = \sum_{i=1}^{n} w_s P_s \quad \ldots\ldots\ldots\ldots(10)$$

where, w_s represents the population share of the s sub-group to total population.12

The task of measuring poverty is complete once the appropriate poverty line is determined and the poverty index is chosen. The latter part of the task is treated at some length in this section. What remains is to review the developments in the literature concerning the estimation of the poverty line.

The derivation of poverty measures from consumption expenditure allows to separately calculate the effects of economic growth as measured by changes in mean income and changes in redistribution as measured by changes in the underlying distribution of income. This is basically a result of estimating poverty indices from parameterized Lorenz functions.

The decomposition of a poverty index into growth and redistribution components is suggested by Kakwani (1990) and further explored by Datt and Ravallion (1991). Given a poverty measure fully characterised by the poverty line, mean income, and Lorenz curve, we can write poverty measure P_t,at date or period t, as:

12The issue of decomposability and sub-group consistency is an important area in the measurement of poverty. For a detailed discussion see Haggnears (1987) and Foster and Shorrocks (1991).

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$$P_t = P(z/\mu_t, L_t), \ldots\ldots\ldots [11].$$

It can be seen that the level of poverty can change because of a change in μ or a change in L_t. The growth component of a change in the poverty measure is defined as the change in poverty due to a change in the mean while holding the Lorenz curve constant at some reference period or level. The redistribution component of the change in poverty due to a change in the Lorenz curve while holding the mean income constant at the reference level.

Following Ravallion and Datt (1991) we can write as follows for two periods, t and t+1,

$$P_{t+n} - P_t = \underset{\text{Growth Component}}{G(t,t+n;r)} + \underset{\text{Redistribution component}}{D(t,t+n;r)} + \underset{\text{Residual}}{R(t,t+n;r)}$$

in which the growth and residual components are given by :

$$G(t,t+n;r) = P(\frac{z}{\mu_{t+n}}, L_r) - P(\frac{z}{\mu_t}, L_r)$$

$$D(t,t+n;r) = P(\frac{z}{\mu_r}, L_{t+n}) - P(\frac{z}{\mu_r}, L_t)$$

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The residual exists whenever the particular index utilised is not additively separable between μ and L, that is whenever the mean and the Lorenz curve jointly determine the change in poverty then the residual will not vanish. The way the residual is treated in the decomposition exercise raises some differences in interpretation. Datt and Ravallion (1991) interpret the residual as the "difference between the growth (redistribution) components evaluated at the terminal and initial Lorenz curves (mean incomes), respectively.

A contentious issue in the decomposition of poverty measures over time into growth and redistribution components is the assumption that the poverty line is held fixed in the Datt-Ravallion decomposition. It has been argued, quite aptly that poverty lines, even when defined in absolute terms are subject to changes due to relative prices, taste, preference and other socio-cultural attributes.

A number of empirical works (e.g. Ravallion et al 1993) have shown that the poverty line changes with mean income and that poverty comparison over time is sensible only when account is given to the empirical fact that the poverty line should be made a function of mean income of society. This point was brought home by Ali (1996, 1997a) where it was shown that if the poverty line is allowed to vary, then the Datt-Ravallion decomposition has to be modified as follows:

$$G(t,t+n;r) = P(z_{t+n}/\mu_{t+n},L_r)-P(z_t-\mu_t,L_r),$$

$$D(t,t+n;r) = P(z_{t+n}/\mu_r,L_{t+n})-P(z_t/\mu_r,L_t).$$

Note also that the growth component in poverty is now conditional on the size of the elasticity of poverty line with respect to mean income. If the poverty line is inelastic with respect to mean income, then, for a constant degree of inequality, growth will be expected to lead to a reduction in poverty (Ali, 1996). The alternative decomposition suggested by Ali (1996) has serious policy implications. In a recent paper (see Ali 1997b) it has been shown that the Datt-Ravallion decomposition overestimates the relative contribution of growth and underestimates that of redistribution. In the African context, where the initial distribution is highly skewed and the rate of growth of per-capita income is low, one would obtain a highly baised change in the level of poverty over time. Further more, allowing the poverty line to be constant does not guarantee the basic concept behind a fixed standard of living. As mean income increases, and development takes place, it is an empirical fact that the basket of commodities falling under basic needs undergo changes in quality and cost. Even within a cross-section scenario, it has been observed that the poverty line applying for urban areas cannot serve the same purpose for households living in rural areas. 13

The fact that households are often classified into mutually exclusive sub-groups for the purpose of poverty analysis and construction of poverty profiles enabled policy makers to learn a number of issues regarding the effect of a policy on poverty and to set poverty alleviation strategies. So far, decomposition in a cross-section context is made across sub-group of households (see section 1), regions (e.g., between urban and rural) or sectors. The class of poverty indices available in the literature, like the FGT index are decomposable and sub-group consistent (see Foster and Shorrocks, 1991).

Sub-group decomposition assists in computing the relative contribution of a specific sub-group to overall poverty. Suppose, there are s sub-groups in a population, then, the FGT measure of poverty in a sub-group is given by:

$$P_{s\alpha} = (q_s / n_s)\sum_{i=1}^{m}[(z - y_{is})/z]^{\alpha}$$

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13 The issue whether the poverty line should remain constant overtime or be adjusted to changes in the factors underlying the construction of the poverty line has been a subject of discussion. The question however has not been yet properly addressed for there are issues central to the debate that remain unanswered so far. One is theoretical, that is how do we conceptualise the poverty line as a measure of welfare or lack of it, second how do we allow for differences in the factors that give rise to individual levels of deprivation (for details see below).

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Since
the P_α is decomposable it is possible to express the overall poverty in terms of the sub-group poverty levels, that is in terms of $P_{s\alpha}$, so that:

$$P = \sum_{s=1}^{n} w_s P_{s\alpha}$$

where w_s is the population share of sub-group s from the total. Similarly, the relative share of sub-group s in total poverty is the ratio of poverty in the sub-group to total poverty weighted by the population share.

The other form of decomposition is sectoral decomposition which assists our understanding of the sectors with high potentials of reducing poverty (see Ravallion 1992). The sectoral decomposition takes into account the movement of people from one sector to another and also the contribution of each sector to total mean income.

Following Ravallion (1992), let P_{it} denote the FGT poverty measure (or any other additive measure) for sector i with population share n_i at date t, where there are m such sectors, and t=1,2. Then,

$$P_{t+1} - P_t = \sum (P_{it+1} - P_{it}) n_{it} + \sum (n_{it+1} - n_{i1}) P_{it} + \sum (P_{it+1} - P_{it})(n_{it+1} - n_{it})$$

where all summations are over i=1,..,s sectors in the economy and the first term of the right hand side captures the inter-sectoral effects, the second term the population shift effects and the last term the interaction effect of poverty changes across sectors (Ravallion, 1992, pp 56).

Finally, sub-group decomposition is useful in evaluating poverty implication of some policies or in formulating poverty alleviation policies. Kanbur (1987, 1988) suggested that given that the poverty index is decomposable and sub-group consistent, then it is easy to develop a poverty alleviation rule. Suppose there are two sub-groups of interest, say A and B, each with population share of n_A and n_B and respective poverty levels14. The aggregate poverty can be written as: $P = n_A P_A + n_B P_B$.. For a fixed transfer of income from one sub-group to another it can be shown that poverty will fall faster in the sub-group where the -1 poverty index is highest.

14See Lipton and Ravallion (1995)

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In summary, the additive poverty measures in the class of the Foster, Greer and Thorbecke (1984) are the most frequently applied because of the properties of decomposability and sub-group consistency exhibited by these measures. In a comprehensive poverty comparison, however, it is advisable to estimate a few more indices that have similar attraction with the Foster, Greer and Thorbecke indices, but with different results on the sensitivity to depth and severity of poverty.15 Perhaps a final point of interest in poverty measurement is the choice of an indicator for poverty comparisons. It is for instance customary to compute food poverty and total poverty in most consumption based poverty studies.16 That is, even after deciding to use consumption expenditure or income, there are practical issues of what components of income or expenditure to include in the poverty measurement. This is particularly of interest when the available data and the extent of measurement error in computing the different components of income or expenditure is limited and hugely variable. The question therefore to be addressed is how robust can our poverty comparison be due to the choice of a welfare indicator. The issue is of greater significance in the context of poor countries, like Ethiopia, where household expenditure are based essentially on memories of respondents instead of recorded budgets or expense accounts. For instance, there is a high chance of accuracy in computing household expenditure on food, as compared to non-food items, and also, in rural areas, there is a high chance of recording expenditure on non-food items instead of on food items because of the dominance of own-produced food items. Also, one tends to miss significant amount of resources of households that cannot be accounted for clearly. For instance, the imputed value of family labour that goes into preparing daily meals,

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15The Foster-Greer-Thorbecke class of poverty indices have rather some features that has raised some concerns (e.g. Ray 1987). That is, the distribution- sensitive measures with $\alpha \geq 1$ decline montonically with the value of α, a situation that in numerical sense is difficult to understand. For instance, in the case of the Head-count ratio, if all people have no positive income or everybody s income falls short of the designated poverty line, that is in a situation of total deprivation, the value of poverty according to the head-count ratio becomes 1. But, if there is only one person above the poverty line, and no body else has a positive income, then, poverty defined by the Poverty Gap ratio is equal to the Head-count ratio. That is all distribution-sensitive poverty indices of the P_α class take the value of the Headcount ratio in the limit as the income of the poor approach zero. That is it is difficult to find logical consistency where prevalence of poverty has more value than depth of poverty which itself has more value than severity of poverty and so on. Interestingly enough, the Sen index, as modified by Shorrocks (1994) takes the value of 1 in the above extreme case. Another observation about the Foster-Greer-Thorbecke class of poverty measure is that they do not summarize the attributes of poverty in one single index. One has to calculate for instance three separate values for the prevalence, depth and severity of poverty, while indices such as the Sen index incorporate in one single index these attributes of poverty. In terms of poverty comparison between states using the Foster-Greer-Thorbecke class of indices, it is recommended to take the ratio of say headcount to poverty gap to evaluate differences instead of the absolute values of each measure of the Foster-Greer-Thorbecke class of indices. In addition it is logical to compare these measures with alternatives such as the Sen index to get a better picture of the poverty condition.

16See for instance, Greer and Thorbecke (1986)

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participation in communal activities (be it productive or service-oriented), leisure, freely accessed water and energy supplies, etc.. In this context, it may be important to think of the extent to which poverty comparisons are affected as the underlying indicator of welfare is changed. Recently, there have been attempts to investigate the implications of using different welfare indicators on poverty comparison . It is shown that (e.g. Lanjouw and Laang 1997) the choice of a welfare indicator may not matter much when interest is in measuring the *incidence* of poverty provided that there are no huge differences in the price structures underlying different data bases, no measurement errors and the poverty measure (in this case the headcount ratio is montonically increasing with expenditure. But, for distribution-sensitive measures of poverty, there is a difference in the choice of indicator to the measurement of poverty. Thus, it may be important in this study to apply alternative definition of consumption on the basis of the characteristics of the data collection procedure and behaviour of respondents.

1.3. Setting the Poverty Line

Definition

Poverty line is understood as a level of standard of living below which a household is designated as being in poverty. The exact location of a poverty line is difficult to perceive and varies across a spectrum of factors peculiar to individual households. Inherently, poverty line remains subjective and relative when the host of factors determining the standard of living of a household are taken into consideration. A given household can be considered poor by some measure of a standard of living and as non-poor by another indicator.

Welfare Implications

The welfarist approach anchors the concept of poverty line on the link between income and utility or standard of living which offers an opportunity to interpret the poverty line as the minimum cost of achieving a certain level of utility defining poverty. This money metric utility is derived from neo-classical theory of consumer behaviour.

It is well known that given a utility function u defined over exhaustive commodities $x_1, ..., x_n$ and respective market prices, $p_1,...p_n$, and a fixed income of a consumer, y, the consumer's problem can be stated as:

$$Max U(x_1,...x_n)$$

$$Subject:$$

$$y \geq \sum_{i=1}^{n} x_i p_i, ...(12)$$

Solution to the constrained problem leads to the indirect utility function V(**P**,y), where **P** is a vector of prices and y is the level of income. The inverse of the indirect utility function or the dual of the maximizing problem in [8] provides the Expenditure function given by: y=E(**P**,u). If we define u^r to represent a reference utility level designating poverty, then, the poverty line z is given by : z= E(**P**,u^r), which is defined as the money cost of achieving a certain level of

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utility defining poverty.

Thus, it is analytically possible to link the determination of the poverty line from underlying demand systems that are derived from neo-classical choice theory. But, implementing this approach is beset with a number of measurement and identification problems. On the one hand, the reference utility level defining poverty is difficult to establish. Some works (e.g., Lewis and Ulph, 1988) suggested that poverty can be thought of a discontinuity in the utility function for lack of certain commodities or services. The demand functions that emerge from such an approach are very difficult to estimate empirically because of identification problems.

The difficulties encountered and the complexities arising from the conceptualisation of poverty line reduced its estimation to a single indicator in the literature: observed income or expenditure sufficient to meet a certain level of basic needs as defined by local standards. A recurring problem in the use of income or total expenditure to set the poverty line is the issue of family size and scale of economies in the process of consuming a range of goods and services.

Equivalence Scales

Households are composed of family members with different age and sex, leading to differences in need, consumption habits and preferences. The same level of income cannot serve equally the needs of households which are different in composition. Some households can attain basic needs with relatively lower income than others.

In the theory of demand, this problem is known as the problem of scales of economies in consumption expenditures, and various methods have been suggested to adjust differences in the composition of households using the concept of equivalence scales (see, Deaton and Muellbauer 1980 for a comprehensive survey). The equivalence scale concept is based on the assumption that households having different composition reveal their preferences in the market for given income and price structure. It is thus, possible to establish equivalence in the consumption needs of households having different composition. One of the most popular equivalence scale suggested in the literature is adult equivalence which establishes an equivalence in the consumption of an adult, a child, etc.17 It is argued however that (Lipton and Ravallion, 1995) in a situation where the poor consume both marketable and non-marketable goods, it is difficult to use equivalent scales generated from preferences revealed only from marketable goods. On the other hand, some also staunchly argue that equivalence scales should be estimated from the data itself (see Coutler, et al, 1992) since the measurement error arising from the use of ready-made equivalence scale can severely affect the measurement of poverty.

But, the main issue in the measurement of poverty is not in the precision of our estimate of the poverty line perse but, in being able to compare precisely poverty among households. One

17World Health Organisation has constructed an adult equivalence ratio for a range of household size and sex to be used for comparing consumption expenditure.

has to be careful not to classify households earning the same income into poor and non-poor, leading to the absence of robustness of poverty measurements. In this connection, the literature is also apprehensive of the implications in the definition of poverty line. That is, if a person is above the poverty line by one extra dollar, the implication is he crosses a life style from being poor to non-poor. Such instant gradation causes discontinuity in the poverty measurement at the poverty lines for which the justification is far from satisfactory (see Atkinson 1987, Lipton and Ravallion 1995).

Setting Poverty Lines: Practical Methods.

Despite the conceptual complexities in perceiving poverty lines, the tradition of fixing a certain basic needs as minimum to avoid poverty (say minimum wage legislation) or defining a basket of consumption goods as representing basic goods is not a recent phenomenon. The basic question remains that is it possible to have a poverty line that can offer a poverty profile which is consistent- That is the relative position of households remain unchanged whichever sub-group they belong to.

In the current literature the most popular methods of estimating poverty lines are the Food-energy intake method and the Cost of Basic needs method.

The Food-Energy Intake (FEI) Method

This method of setting the poverty line stipulates the cost of attaining a predetermined level of food energy intake. There are a number of ways of estimating the total expenditure needed to arrive at the stipulated food energy intake. The common procedure is to run a regression of cost of a basket of commodities consumed by each household over the calorie equivalent or the food energy implied from the basket of goods. Then, to proceed to calculate how much it would cost to buy a basket of commodities that would be considered as sufficient. The energy intake is a predetermined value expressed in terms of calorie equivalents. Another procedure is to take a sub-sample of households with total expenditure equivalent or close to the stipulated calorie level and compute a simple average. The FEI method provides automatically the total expenditure implied by the level of food expenditure that provides the stipulated calorie intake, since the latter are dependent variables in the regression equation. Thus, for a specified level of calorie, a corresponding total expenditure is obtained immediately18.

This method has been extensively applied in the literature (see for instance Omani 1982 and

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18Suppose c_i is the total calorie obtained by household i with a total expenditure of E_i. Then, the FEI method goes on establishing a regression equation between c_i and E_i:

$c_i = a + b \ln E_i + e_i$

Suppose we have 2400 as a minimum calorie intake for an individual. It will be easy to infer the total Expenditure implied for a household sufficient to afford the minimum Calorie.

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Greer and Thorbecke 1986). Despite its simplicity in estimation there are some caveats to be considered when one uses this method. One is the fact that the FEI method has the difficulty of mapping calorie intakes into expenditure spaces in a manner consistent with preferences and taste of consumers. Ravallion and Bidani (1994) argued that the FEI method may not offer a consistent and robust poverty profile as a result of the effects of the above factors. There is no provision in the FEI method for differences in relative prices, tastes and preferences across sub-groups. Instead, they suggested the Cost of Basic Needs approach that anchors on the estimation of relevant Engle functions consistent with the neo-classical theory of demand.

The Cost of Basic Needs Approach (CBN).

The measurement of a poverty line based on basic needs is not new in the literature. It dates back to the work by Rowntree (1901) who attempted to construct a poverty line by defining a basic needs basket to study poverty in New York (see Atkinson, 1987 for comments). Since then, the Basic Needs approach to define the poverty line gained practical application in various research works. But, the fact that the definition of basic needs remained elusive conceptually and has become difficult to reconcile with proper theory of choice, the FEI method swayed for much of the later works in the construction of poverty lines.

The approach developed by Ravallion and Bidani (1994) is to estimate the Engle function for food expenditure by regressing food share on the logarithm of total expenditure19, taking care of differences in household size and composition and other exogenous variables. Ravallion and Bidani (1994) have compared and contrasted the two methods of constructing poverty lines using the Indonesian data and concluded that the CBN methods offers a consistent and robust poverty profile.

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1.4.Poverty Comparisons without Poverty Lines

1.4.1. Stochastic Dominance, Welfare and Poverty :A Review

A look at the body of the literature on the measurement of poverty that emerged since the pioneering work of Sen (1973), it is not difficult to see the immediate and strong influence of the literature on the measurement of inequality, which itself owed a great deal to the classic work of Atkinson (1970), in craving out some of the analytical constructs that linked the statistical measures of income inequality and their welfare interpretations (see Haggenars 1987).

Atkinson (1970) integrated the notion of social welfare functions in the comparison of different situations with the statistical summary measures of income distribution so that such popular summary measures as the Lorenz curves and the Gini-coefficient imply an underlying social welfare function that net certain regularity conditions. Thus, Atkinson, invoking the Stochastic Dominance concept popular in the finance literature showed that if two income distributions have the same mean and if one of the distribution Lorenz dominates another, then social welfare (which is quasi-concave in income) in one distribution is higher than in the other . Sen (1973) demonstrates that if two distributions have unequal mean, then Lorenz dominance does not offer any welfare inference. But, Rotchild and Stglitz indicated (1973) that comparison of welfare under a situation of unequal mean can be made on the basis on the income received by the kthpoorest people. Sapsonic (1983) proved this proposition so that rank dominance of absolute incomes of Lorenz curves is sufficient and necessary to generate welfare dominance, irrespective of the level of mean income. This is what is known as first degree stochastic dominance. Rank dominance utilises efficiency criterion alone between distributions, since dominance follows if the income of individual in each deciles is higher than the distribution being compared, regardless of the level of inequality within each distribution . To go around this problem, Shorrocks (1983) and later on Cachinnate (1984) came up with a partial comparison of welfare on the basis of rank orders allowed by the underlying Lorenz ordinates of any income distribution regardless of the size of the mean income, which later on was to be known as ordering on the basis of Generalised Lorenz curve (a Lorenz curve scaled by mean income of the population) with relative concern to equity.

Thus, Rank Dominance, a situation where the cumulative income of one Lorenz curve lies above another for all ordinates of the Lorenz curve is equivalent with first-degree stochastic dominance as in the finance literature where expected returns on different investment opportunities are ranked. The application of rank dominance to income distribution was facilitated by the development and simplification of distribution-free test procedure in Beach and Davidson (1983), Beach and Richmond (1985) and Beach et al (1994). Following this, Bishop, et al (1991) and others applied rank dominance to the comparison of welfare on the basis of he ordinates of Lorenz curves. The application to poverty was self-evident. Atkinson (1987) and Foster and Shorrocks (1988) proved that for all additive poverty indices, that is for those based on a utilitarian social welfare function, a dominance of distribution within a given range of poverty lines is equivalent to the poverty ordering implied by the poverty indices. Bishop et al (1992) applied stochastic dominance testing to poverty comparison for selected countries with promising potential for future application.

As is well known, the task of poverty measurement involves two distinct but interrelated aspects :the identification of the poor, and the measurement of how much poverty t6here is. The first

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aspect is mainly concerned with the setting of poverty line, which divides the population into poor and non-poor. The conceptual and empirical basis of setting poverty lines for long has been relegated to the back ground in the literature of poverty measurement (see Ravallion, 1998 for a recent discussion of this issue). Emphasis has been give to the construction of aggregate poverty indices that meet certain ethically consistent criterion. However, in empirical application and as well, in policy analysis, the estimation of the poverty line became increasingly a subject of grate dissatisfaction. Most measure are quite sensitive t the level of the poverty line and thus, the accuracy of the measurement of poverty line denied the poverty indices the robustness needed for poverty comparison.

Most studies approach the estimation of the poverty line arbitrary without much concern as to how it can distort poverty profiles and analysis. In works where attention is give to detail in constructing the poverty line, the amount of effort and the sensitivity of the poverty lines to slight changes in household welfare, become a constant challenge. The application of dominance testing offered an opportunity to partially rank poverty results by taking a wider range of a poverty line. If for the specified range of poverty line, one distribution rank dominates another distribution, then the amount of poverty, whichever way measured is higher in the rank dominated distribution.

More formally, the stochastic dominance test criterion may be described as follows:
Suppose F(y) is distribuion function or cumulative density function of income f(y) (so that F(y)=, $\int$(fy)dy) where y is a vector of household income arranged in ascending order such that y1<,..,Xyn,.. The inverse distribution function or quintiles function, y(p):inf{ F(y)$\geq$p}, p$\in$[0,1], yields individuals' incomes in increasing order. If W_p denotes the class of anonymous, increasing welfare functions, then following Sapsonik (1981), for two distributions, X and Y, we have the following theorem:
$X >_R Y$ (X rank dominates Y) iff w(X) > w(Y) $\forall$ p$\in$[0, 1] X(p)=Y(P), then X and Y have the same income distribution and standard of living. If X(p)>Y(p) for some p, and X(p)<Y(p) for some p, the distributions are non-comparable and cannot be ordered using the rank dominance criterion.

Atkinson (1987) and Foster and Shorrocks (1988) showed as a corollary to the above dominance theorem that a) rank dominance for all z, the poverty line, implies that the Head –court ratio, defined as the range specified for the poverty line. b) rank dominance implies higher order dominance which extends also to dominance for additive poverty indices, such as the pa class defined as $P\propto=\int\{z-f(y)/z\}^{\propto}dy$, were z represents the poverty line, f(y) is the density function of he income distribution, and a is distributive parameter(see Foster et al , 1984 for the derivation of poverty index . In fact, in the current poverty literature, this class of poverty indices is popularly known as the Foster-Greer –Thorbecke indices).

The interpretation is that rank dominance is sufficient condition for higher order dominance, but is neither necessary nor works backwards. Generally, rank dominance, that is a simple dominance comparison of two Lorenz curves has an indicative appeal if the mean income in both distributions is the same. If that is not the case, then, dominance testing fails to account for higher level of income , which by itself is a welfare improving phenomenon, given that distributions are held unchanged. Thus, Dasgupta, Sen and Starrett (1973) proposed the generalised Lorenz dominance criterion, which was further explored by Shorrocks (1983) and Kakwani (1984). The extensions to a situation of unequal mean in income also imposed stricter regularity conditions on the underlying social welfare functions: which has to be scur-concave and additive over individual income . Empirical results (e.g., Bishop, et al , 1991) generally supported the

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dominance of distributions with higher mean income because of the bias give to efficiency considerations. This prompted Tam and Zang (1996) to suggest a Lorenz dominance criterion of ß-20order that give allowance to equity considerations when mean income of two distributions are significantly different from each other.

The Generalised Lorenz dominance (called the second degree dominance, see for instance, Bishop, et al, 1991, 1992) is simply scaling up the ordinates of he ordinary Lorenz curve by mean income at account for differences in the level of mean income It is to be recalled that the slope of the Lorenz curve does not change if all of its ordinates are multiplied buy a scalar. Generalised Lorenz dominance in terms of poverty measurement is equivalent with comparing the poverty gap measure (or the depth of poverty) between two distributions regardless of the poverty line.

By this recursive process, third degree stochastic dominance is equivalent to dominance of poverty severity between two distributions. Thus, if we have first degree dominance for the relevant range of the poverty line, then, it means the head-count ratio is also significantly different between the two distributions. Second degree dominance implies that the depth of poverty in one distribution is higher than the other regardless of where the poverty line is fixed, and so on.

The statistics necessary to conduct the dominance testing is quite straight forward following the work of Beach and Davidson (1983). Consider a situation that the individual incomes, yi are in ascending order and divided into p quintiles, which in the case of deciles is p1-.1, p2=.2, ..,p10=1. Given the assumption that the mean and variance of the distribution exits and are finite, an income quintiles, ξp, corresponding to abscissa p ($0 \le p \le .1$)on a Lorenz curve is defined implicitly by $F(\xi p)$, where F is montonoic. Thus, corresponding to abscissa p($0<p1<p2<,..,pk-1$, we have a set of k-1 population income quintiles, $\xi p1, \xi p2, \ldots, \xi pk-1$, and a set of K cumulative means, $\gamma i \equiv E(Y/Y \le \xi pi)$, for incomes less than equal to ξpi. We can also define the conditional means $\mu_i = E(Y/Y \le \xi pi)$. The test procedure for dominance is based on these estimators. Until the paper by Beach and Davidson (1983), inference based on the ordinates of the Lorenz curve had to rely on parametrised Loenz functions, which is not adequate to undertake the joint test (mean income and Lorenz ordinates) of dominance. It has been proved in Beach and Davidson (1983) that the above ordinates of the Lorenz curve are asymptotically normal with mean zero and a variance-covariance matrix $\Omega=(wij)$, where:
$Wij=pi[\lambda^2 I + (1-pj)(\xi pi-\Upsilon i)(\xi pj-\Upsilon j)+(\xi pi-\Upsilon i)(\Upsilon j-\Upsilon i)$is the asymptotic variance of the k cumulative means. Beach, et al (1994) showed that a statistical test based on the basis of the conditional mean of the Lorenz ordinates can be constructed to test the hypothesis of dominance between two Lorenz (say distribution 1 and 2)using the concept of statistical test for mean difference. The test statistic for large samples can be written as: Ti=(μi1-

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20 Normally, Generalised Lorenz curve is defined as $G(P)=\mu L(P)$, where, L9p) is the ordinary Lorenz curve. Notice that $L(p)=\int pd(p)/\mu$. Thus, the ordinates of the Generalised curve are given by the vector γ : $(p_1\Upsilon_L p_2\Upsilon_2,\ldots,p_k\Upsilon_k)$. What Tam and Zang (1996) suggested is that instead of multiplying the ordinates of the Lorenz curve by the mean of the total distribution, μ , we can use μ^β, where $0 \le \beta \le 1$, so that preference can be given to equity even in a situation of unequal means. It is noticed that scaling up the Lorenz curve by a constant does not chage the relative inequality in a distribution. If $\beta=1$, then, the β-order Lorenz curve reduces to Generalised Lorenz curve. If $\beta<1$, then, preference to equity is considered along with efficency (that is higher income is always better for given levels of inequality).

μi2)/{var(μi1)N1+var{μi2)/N2}, where Ti can be looked upon as t-ratio. The null hypothesis is to accept that the relevant quintiles have conditional mean which is equal. If this is accepted for the entire range of the distribution, then the two distributions are said to have equal welfare ranking whatever is the level of the poverty line. If there is a crossing, then, further criterion has to be imposed. Bishop, et al (1989, 1991) have stated that if two distributions cross, and the and the crossing is statistically significant, then, ranking the two distributions will not be possible according to some social welfare functions. Dominance exists if for all quintiles the distribution exhibits equal mean and has at least one dominance in either direction if it is statistically significant. If there are two ordinates with different signs and are statistically significant, then, dominance testing cannot rank the distributions according to criterion underlying quasi-concave social welfare functions.

2. POVERTY PROFILE OF ETHIOPIA

2.1. THE DATA

The poverty profile of Ethiopia is based on panel data on household budget survey conducted jointly by the Department of Economics, Addis Ababa University with the Centre for the Study of African Economies, Oxford University for rural households and School of Economics, Gothenberg University for urban households. The figures for the estimation of poverrty are extracts from recent papers by Mekonen (1998) and Mekonen, Berekt and Abebe (1998).

The rural household survey started in 1994 and so far three panel sets have been formed covering the periods 1994, 1995 and 1997. The sampling method, the distribution of survey sites are discussed in detail in Dercon and Kirishnan (1998).The survey sites were selected on the basis of initial clusters that were identified bearing in mind the farming systems prevailing in the country and regional diversity. Thus, the clusters represented all the farming systems available in Ethiopia, except for the purely pastoral or nomadic regions. Given the size of the country its relatively large population and the intensive information designed in the questionnaire, cluster sampling was a natural choice to design the survey.21 Village sites were selected on the basis of their proximity to the farming system characterising the particular region. For instance, if grain-plough is the specific farming system in question, then, a village from such a cluster that represent best this feature will be chosen as a survey site. Households living in this site are selected by a random sampling method.

The survey questionnaire consist of information on living conditions in general (consumption, health, nutrition, education, etc..), production, labour allocation, land-use, livestock production, etc..Thus, it offers opportunity to closely investigate the rural economy and livelihood in general. The survey in addition, has information on perception of wealth and poverty among villagers in the form of a wealth ranking exercise. A brief description of the survey sites is found in Appendix 1.The total size of households interviewed in all rounds is about 3,00022.

21**For details of the advantages and disadvantages of cluster sampling see Deaton (1997). For the Ethiopian case, the justifications for using cluster sampling is found in Dercon and Pramila (1998).**

22 **To be precise, the rural household panel is for 1,477 households and the urban panel for 1230 households. Generally, the attrition rate in the panel for three rounds, that is for**

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The urban survey covers seven towns in Ethiopia, and the size of households in each town was selected on the basis of the proportion of the population in the town to the total urban population. The surveys were conducted over a period of four successive weeks (during a month considered to represent the average conditions) in each round in the seven major towns of Ethiopia.

2.2. Poverty Conditions in Ethiopia

Consumption poverty for Ethiopia according to the head count index was estimated to be approximately 41.5% in 1994. That is, 41.5% of the population in 1994 was living in absolute poverty as defined by local standards. The corresponding figure for rural and urban households was, respectively 41.3% and 42.9% (Table 1). This figure increased to 48% in 1995, registering an increase of about 6.5% in one year. This is mainly because the headcount for rural households increased from 41.3% to 49.3%. In addition, if we take the ratio of the poverty gap index to the head count ratio, we find that during the two periods it increased from 35% to 40%, further demonstrating the increase in the intensity or depth of poverty23. A decile distribution of the data is given in AT2, along with estimates of the respective Gini coefficients. As can be seen, the Gini increased from 39.3% to 46.8% between the two periods24. In fact, the 1995 figure on the Gini coefficient more or less conforms with what was also estimated based on a Welfare Monitoirng Survey (see below).

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1994, 1995 and 1997 has been very low. Thus, the number of replacements in each survey are quite small, something in the range of 3-4%.

23 The maximum value of the poverty gap index is in the case when the distribution of income is characterised by (0,0,..zq,yq+1,...yn), (but, z is below the mean income) that is if all people below the poverty line earn a zero income. This situation leads to a value of the poverty gap equal to the Head count ratio.

24 This result is robust to our effort to take account of extreme values while working on the unit record as well as the grouped data.

Table 1: Estimates of Poverty in Ethiopia: 1993/94-1994/95(%)

Region	1994			1995			1995*		
	P0	P1	P2	P0	P1	P2	P0	P1	P2
Rural	41.3	15.0	7.2	49.3	21.3	12.3	47.5	13	5
Urban	42.9	16.8	9.0	40.9	15.6	8.1	33.2	10	4
National	41.5	15.3	7.5	48	20.4	11.7	45.5	13	5

Source: Integrated Household Rural and Urban Surveys: Department of Economics, Addis Ababa University
*This is based on the Welfare Monitoring Survey, Poverty Situation in Ethiopia, Februray 1999, Welfare Monitoring Unit

The available evidence on poverty condition in Ethiopia is accumulating as new household surveys are conducted in recent years. As Table 1 shows, the condition of poverty as reported by the Welfare Monitoring Unit based on a sample of 12,000 households who are nationally representative, the rate comes closer with ours, except for urban poverty. The distinction is marked for headcount estimate of urban households and the depth and severity of poverty. According to the Welfare Monitoring Unit, depth and severity of poverty in Ethiopia is comparatively low which implies that a large segment of the poor population is concentrated around the poverty line. Thickness of the income distribution around the poverty line implies that estimated poverty rates are extremely sensitive to the estimation of the poverty line.

In terms of the growth of real per-capita consumption expenditure, we could see that at the national level between 1994 and 1995, there was a 7.04% increase, and for urban households it increased at about 4.56% while for that of the rural households it grew at 7.68% (Table 3). The implications are that rural and urban poverty between the two periods have shown an increase or little change due to a worsening of the level of inequality.

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Table 2: Household average real per-capita consumption expenditure

	1994(Birr)	1995 (birr)	% change
Rural	76.28	82.4	7.68
Urban	114.29	119.42	4.56
National	81.97	87.73	7.04

*Estimate of mean per-capita consumption expenditure is based on sub-sample. It is slightly smaller than for the entire sample.

Source: Integrated urban and rural household surveys

The regional distribution of poverty during this period also showed a pattern consistent with the agro-ecological and economic conditions of the regions. In rural areas, poverty in the predominantly *Enset* (false banana) growing areas recorded a significantly higher incidence as compared to cereal growing areas. The strange disparity in the level of poverty in these two rural regions could be explained in terms of the consumption habit, farming systems and preference of the households. *Enset* is a type of food that is frequented by the farmers raising the plant and is generally a non-traded good. In addition, farmers in these areas grow little of other crops and livestock ownership, as a means to supplement farm income, is not very common as in the cereal growing regions.

Table 3: Regional Distribution of poverty in Ethiopia: 1994-1997

	1994			1995			1997		
	P_0	P_1	P_2	P0	P1	P2	P0	P1	P2
Rural									
Cereal growing areas	35.8	13.0	6.2	39.0	16.4	8.8	----	----	----
Enset growing areas	51.2	18.6	9.0	67.7	33.9	20.5	----	----	----
All rural	41.3	13.4	7.0	49.3	21.3	12.3	----		----
Urban.									
Addis Ababa	49.8	19.9	10.7	46.4	17.3	14.2	39.9	15.4	8.0
Awassa	49.1	21.4	12.9	40.4	14.2	6.5	33.0	16.7	10.4
Bahir Dar	26.2	9.4	5.3	26.1	9.0	5.0	24.0	8.7	4.1
Dessie	36.9	14.1	6.8	37.2	14.6	7.0	37.8	14.4	7.6
Dire Dawa	18.2	5.8	2.24	28.6	8.6	3.6	36.6	12.3	5.8
Jimma	36.7	12.1	5.8	25.6	10.6	5.3	42.9	15.3	6.9
Mekele	30.9	12.1	6.2	36.4	20.5	13.9	34.9	11.8	5.9
All urban	42.9	16.8	8.9	40.8	15.5	8.1	37.7	14.4	7.4
National	.415	.134	.079	.480	.192	.105	---	---	---

*The urban poverty estimates are based on full sample, while that reported in Table 2 is based on sub-samples while combining the urban and the rural data to compute national estimates.

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Urban areas have also showed a pattern of poverty incidence consistent with the specific characteristics of the regions. Addis Ababa, the capital of the country had 50 % of its population falling below the designated absolute poverty level in 1994, showed a decline of 4% and 9%, respectively in 1995 and 1997. Provincial towns like Dire Dawa and Dessie recorded a consistent increase in the level of poverty over the survey periods. Dire Dawa is a typical business area and for the greater part of the past three decades a significant entry point to illegal border trade. Recently, however the town is increasingly experiencing a slow down in business activities, partly because of the more liberalised trade policy in place and partly because of the change in political administration, which denied the town its previous importance. Similar argument can be given to Dessie, which also lost its previous status of being the seat of provincial government that might have affected the town's prospect of employment, etc.. Awassa and Jimma are towns at the heart of the rural regions that thrive on cash crops such as coffee and some of the effects of the coffee boom that occurred in 1994/95 was reflected in the decline of poverty by nearly 10 and 8 percentage points, respectively.

Poverty remained relatively low and constant during the survey periods in Bahir Dar, a provincial town in the Northern part of the country and slightly increased in Mekele, another provincial town in the North.

In terms of the intensity of poverty, an interesting picture is that of Dire Dawa, a town which in 1994 had the least level of intensity of poverty, experienced a deterioration in 1995 and 1997.Other towns like, Dessie and Mekele recorded a sharp increase in the depth of poverty between 1994 and 1995.

In general, it could be observed that poverty in Ethiopia generally is massive and showed no improvement between 1994 and 1995 despite an increase in real consumption expenditure.. In addition, regional perspective of poverty offered a scenario consistent with the agro-ecological nature of the rural areas and the socio-economic background of urban areas.

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Sectoral Decomposition Analysis.

At the heart of the Ethiopian Economic Reform Programme is the range of monetary, fiscal and exchange rate policies that aim at establishing a real exchange rate that allows the competitiveness of Ethiopian exports and locally produced import-substitutes. The process might lead to a situation where in general households engaged in the production of tradeable tend to benefit from the price reform while households in the non-tradeable sector tend to lose or gain less than those engaged in the tradeable sector. Thus, if the Economic Reform Programme achieved its objectives, then, a pattern would have to appear in the distribution of poverty experienced by households belonging to different sectors (see Grooteart, 1995 and Kanbur, 1996 and a better classification in Killick, 1997 and Stewart, 1995).

Accordingly, households in the sample were classified into the following sub-groups which are assumed to be mutually exclusive: For rural areas, we have, Grain Producers, Cash Crop Producers, Other Farm Output Producers, and those engaged in Off-farm Activities and Other Activities. For urban areas, households were classified under Private Business/Employer, Own

account worker, Civil servant, Public enterprise employee, Private sector employee, Casual worker, Pensioner, Unemployed and Others. The poverty profile with respect to occupation for rural and urban households is given in Tables 4, 5 and 6.

Table 4: Sectoral Decomposition of Poverty: Rural Households

Major Activity	Head count index		Poverty gap index		Squared gap index	
	1994	1995	1994	1995	1994	1995
Grain Producer	38.9	47.1	14.8	21.3	7.3	12.3
Cash crop producer	40.6	44.6	11.2	17.1	4.3	9.2
Other farm produce	52.7	62.5	19.6	32.3	9.7	20.2
Total	41.5	15.3	7.5	48.0	20.4	11.7

If we compare the level and change of poverty between the cereal and cash-crop or export crop producing rural households we see that households who grow cereals had a lower level of poverty in 1994 than the export-crop producing households, but, in 1995 the rate at which poverty increased among the export-crop producers was smaller than for those of grain producers. One important point to note is the fact that in 1994/95, Ethiopia experienced a price boom that would only come once in twenty years.25 It is natural to expect a reduction in the poverty level of coffee growers in the face of such a boom. But, we observe here an increase of poverty by about 4% among coffee growers. Households engaged in other farm activities recorded a very high rate of poverty, followed by cash-crop farmers. In terms of relative contribution to poverty, it can be seen that cereal crop growers accounted for nearly 64% of overall rural poverty while cash-crop growers accounted for 15% of total poverty in 1994. In 1995, similarly, cereal crop growers contributed 65% to total poverty while cash crop growers accounted for 14%. Even if the rural survey is not representative of the rural population, it can be inferred that given the sufficient agro-ecological coverage that the sample has made, we could still argue that the contribution of cash crop growers to total rural poverty is smaller than that of the cereal crop growers.

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Table5:Contribution to Poverty by Occupation:Rural Households

Major Activity	% contribution to Headcount		No of observations
	1994	1995	
Cash-crop producers	15.0	13.7	217
Grain Producer	64.3	65.7	965
Other farm produce	20.6	20.6	229
Total	100	100	1411

Source:Integrated Household Survey

In terms of poverty alleviation strategies, it becomes obvious that a significant reduction of poverty among the cereal crop growers can lead to a substantial reduction in total poverty and thus national poverty. The implication is that the macroeconomic context may have to target

25 **See Collier and Kidane-mariam, 1995**

cereal crop producers instead of the export crop producers if rapid and sustained reduction in poverty is one objective of the Economic Reform Programme. Well, another lesson to be drawn is the fact that the Economic Reform Programme did not benefit the rural poor between the survey period as is shown by the small rate at which growth occurred and also the increase in the incidence of poverty, even among supposed to be the direct beneficiaries of the reform programme.

The disaggregated estimates of poverty for urban households reveal a situation where between 1994 and 1995 poverty levels increased for households whose heads were employed in public enterprises (5%), the private sector (12%), the unemployed (6%), own account workers (9%). Poverty made a substantial decline for household heads in the civil service, which during this period received a substantial increase in the wage rate and also growth in the sector following the Federal structure introduced about that time26. Of course, household heads who owned private business and employed others had a very low rate of poverty to begin with and the figure also declined by 4% between 1993/94-1994/95.

Table 6: Sectoral Decomposition of poverty for urban households: 1994-1995

Main activity	Head-count Index		Poverty Gap index		Squared Poverty Gap index	
Private business employer	18.4	15.4	4.5	6.3	2.1	3.8
Own account worker	41.9	34.6	17.4	13.8	9.4	5.6
Civil servant	35.8	24.4	11.3	9.6	4.9	4.8
Public enterprise employee	25.6	35.4	9.6	11.4	4.7	5.2
Private sector employee	25.4	36.3	8.4	9.3	3.3	3.5
Casual worker	64.2	59.7	30.5	22.6	18.9	11.6
Unemployed	57.4	56.4	26.2	26	15.2	15.4
Others	47.14	51.07	17.94	21.06	9.5	11.31
Total	42.9	37.7	16.8	14.4	8.9	7.5

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Overall it can be said that the sectoral decomposition of poverty indicated that within the observed short period of time, household heads employed in most sectors have recorded an increase in the level of poverty. Whether this fits into the pattern of the Economic Reform Programme is too early to say. For one thing, the Ethiopian situation is quite different in the sense that the civil service reform for instance might not lead to a substantial reduction in wage

26 The average wage rate for the entire civil service increased from Birr 301 in 1993/94 to Birr 360 in 1994/95 (see Abebe, 1996), Recent Trends and Policy Issues in The Macroeconomy of Ethiopia, unpublished.

bills, since for years civil servants had been the least paid employees in urban areas. But, the increase in poverty levels of the unemployed, own account workers and private sector employees could be explained in terms of the Economic Reform Programme by noting the fact that urban unemployment increased during the survey period, because of, among other things, retrenchment in 1992 and 199327. Own account workers are largely engaged in the non-tradeable sector of the economy and might find it difficult to make it under the increasingly liberalised price structure caused mainly by the reform process. But, it is too early to make conclusions.

Descriptive Analysis of Poverty Dynamics.

The dynamics of poverty would have been understood better with a longitudinal data where poverty spells can be estimated to underscore the persistence of poverty. In countries such as Ethiopia, the question that poverty is largely chronic and structural seem to be reasonable from casual observation.

It is thus instructive to look at the mobility of households within the poverty threshold to infer some opportunities for gradation and how poverty conditions change among different households.

For rural households, the highest improvement was observed among producers of Cash crops, who had 16% of households moved out of poverty in the period in question. On the other hand, households who produced mainly Other products experienced the highest percentage of movement into poverty (27.9%).

Table 6: Movements in and Out of Poverty for Rural Households by Major Activity*

Main Activity	% of Non-poor in '94 who became poor in '95	% of poor who were poor in '94 and became non-poor in '95	% of households who remained poor in '94 and '95.
Grain Producer	20.2	9.9	27.9
Cash crop	18.4	16.5	25.2
Other farm produce	21.9	9.4	40.6
Total	19	10.4	27.5

*The percentage points refer to the proportion within the sector. That is x% of households within the total number of households in the same sector.

The pattern of mobility is a witness of the vulnerability of households belonging to some activities, like those engaged in Other farm produce and Off-farm activities. On the other hand, cash-crop producers experienced only a net movement of about 1.5% on the side of falling into poverty, while all the other major activities led to a very high rate of slipping into poverty.

27 Unemployment rate in urban areas increased during the relevant periods by an average of 13% a year, Abebe (1996)

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Perhaps, it may be argued that some elements of the Economic Reform Programme are favouring export-crop farmers when looked at the favourable prices they got for their products during the survey period.

In urban areas, we report here that the movement of households into and out of poverty for the year 1994-1997, a period longer than for what was reported for rural households. As Table 7 shows, the highest percentage of movement into poverty was recorded for households who were employees of the Private sector and Own account workers, followed by Public Enterprise employees and Casual workers. The percentage of households who remained poor in both periods was highest among Casual workers, the Unemployed and Pensioners. Perhaps, this might give some idea of the chronic nature of poverty among households in these sectors. And, it is important to acknowledge the fact that households who remained poor in both periods constitute significant proportion of the total sample and have contributed substantial amount of urban poverty incidence.

Results of Stochastic Dominance Criterion

An application of the Stochastic Domiance Criterion to compare welafare and poverty changes between 1994-1997 was made for urban households and a comparison was also attempted between rural and urban households for the 1994 period.

Results generally showed that poverty, thus, welfare remained unchanged in urban areas between 1994-1997, though there was an increase in per-capita expenditure figures for the panel households (see Annex Table3). But, there was a welfare dominance for the Generalised Lorenz criterion (second degree dominance), which occurred at the tenth decile.

Regional comparison was also attempted to get a better picture of the profile of poverty on the basis of the dominance criterion. Generally, poverty remained unchanged in Addis Ababa in spite of an increase in per-capita expenditure which was statistically significant (see Annex Table 4). For the Generalised Lorenz Criterion, however, Addis Ababa showed a substantial improvement in overall welfare and poverty would have declined for poverty line above the 4th decile, which is much higher than the absolute poverty line estimated for the unit record data.

A classification of urban areas into Northern and Southern regions was attempted to see how the relative advantages of being a provincial town and a zone of cash-crop could bring out some of the features of poverty. The exercise did not make any distinction between the two regions.

An interesting picture, though consistent with the estimate on unit record data was observed between rural and urban poverty. For the bottom decile, rural distribution dominated urban ones, while for the top twenty income group urban distribution dominated the rural one. As a result, it was difficult to infer poverty and welfare levels between the two sectors.

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Summary and Conclusions

The chapter attempted to offer a brief look at the poverty condition and profile in Ethiopia between 1994-1997. During this period, a large amount of data sets have been collected leading to a better understanding of poverty in the country and on the other hand a proliferation of different estimates of poverty. Such differences could substantially underestimate the policy relevance of most results and difficulty of inferences. The ultimate objective of this chapter is to provide a comprehensive analysis of the poverty situation on the basis of alternative methods and sources of data.

In its final version, it is expected that most of the difficulties in the construction of poverty profile and estimation of poverty rates shall be made. In general however, the empirical evidence suggest that poverty in Ethiopia is massive, deep and severe. Its condition at best in the period under investigation remained unchanged in spite of increases in per capita expenditure. Part of the reason for the constancy of poverty is an increase in the level of income inequality.

Attempt was made to decompose poverty into regions, occupations of households and the relative changes over time. The observation is there has been little movement over the period under investigation implying the chronic nature of poverty. Household characteristics of poverty showed that in urban as well as in rural areas, the poor have little productive assets, generally illiterate, have big family sizes with high dependency ratio.

Alternative estimate of poverty showed that poverty generally is a rural phenomena in Ethiopia. But, urban poverty is also substantial. In fact, in 1994, urban poverty was higher than rural poverty, a situation confirmed by alternative methods of estimation.

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Annex Table 1:Household Characteristics and Poverty in Urban Ethiopia

	1994		1995		1997	
Household Characteristics	%Poor	%Non-poor	% poor	% Non-poor	% poor	% non-poor
Household Head Age Structure						
19-24	20	80	40	60	26.7	73.7
25-39	36.4	63.6	32	68	34.9	65.1
40-59	44.4	55.6	41	59	41.5	58.5
60 and above	41	59	44.9	55.1	39.1	60.9
Sex of Household Head						
Male	36.9	63.5	36.5	63.5	36.1	63.9
Female	48.4	51.6	44.9	55.1	44.1	55.9
Household Family size						
1	20	80	32	68	28	72
2-5	33.6	66.4	31.9	68.1	31.2	68.8
6-10	46.3	53.7	45.4	54.6	44.5	55.5
>10	54.4	45.6	44.3	55.7	48.1	51.9

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	1994		1995		1997	
Education of Household Head						
Never attended school	44.6	55.4	42.3	57.7	41.9	58.1
Religious/traditional schooling	31.2	68.8	31.9	68.1	28.4	71.6
Primary school (not complete)	24	76	24	76	36	64
Primary School	25	75	8.3	91.7	16.7	83.3
Grade 12 complete	50	50	50	50	---	100
Vocational/technical	---	100	33.3	66.7	16.7	83.3
College and above	---	100	---	100	---	100
Occupation of Head of Households						
House wife	42.9	57.1	28.6	71.4	42.9	57.1
Own account worker	28.2	71.8	27.1	72.9	27.1	72.9
Household female	66.7	33.3	33.3	66.7	44.4	55.6
Civil servant	9.1	90.9	21.2	78.8	21.2	78.8
Public sector employee	23.1	76.9	23.1	76.9	38.5	61.5
Casual worker	---	100	20	80	20	80
Looking for work	66.7	33.3	66.7	33.3	66.7	33.3
Marital Status by Head of Household						
Single	14.3	85.7	21.4		25	
Married	39.6	51.4	39.8		38.2	
Widowed	50.4	49.6	42.8		41.1	
Divorced	41.1	58.9	35.6		43.3	
Separated	51.3	49.7	53.8		51.3	

* Columns 2 and 3 refer to the percentage of households who are poor and non-poor belonging to a certain demographic or other characteristics. It does not compare with overall characteristics.

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Annex Table 2: Characteristics of Households who moved in and out of Poverty in Urban Ethiopia

	1994 to 1995		1995 to 1997		1994 to 1997	
Household Characteristics	% Non-poor to poor	% poor to non-poor	% Non-poor to poor	% poor to non-poor	% Non-poor to poor	% Poor to non-poor
Household Head Age Structure						
19-24	20	---	---	13.3	20	13.3
25-39	10.3	14.7	14.7	11.8	12.1	13.6
40-59	11.8	15.2	10.9	10.3	12.8	15.6
60 and above	18	14.1	11.3	17.2	16.4	18.4
Sex of Household Head						
Male	12.6	13.1	10.7	13.7	12.5	13.4
Female	13.7	17.2	11.1	14.5	15.5	19.7
Family Size						
1	24	12	4	8	20	13.3
2-5	13.1	14.7	12.1	12.8	12.1	13.6
6-10	13.3	14.2	11.6	12.5	12.8	15.6
>10	7.6	17.7	13.9	10.1	16.4	18.4
Education of Household Head						
Never attended school	13.6	15.9	12.6	12.9	13.5	16.2
Religious/traditional schooling	10.6	9.9	7.1	10.6	12.1	14.9
Primary school (not complete)	8	8	16	4	16	4
Primary School	---	16.7	8.3	---	8.3	16.7
Grade 12 complete	---	---	---	50	---	50
Vocational/technical	33.3	---	---	16.7	16.7	---
College and above	---	----	---	---	---	---
Occupation of Head of Households						
House wife	---	14.3	14.3	---	---	---
Own account worker	7.1	8.2	8.2	8.2	7.1	8.2
Household female	---	33.3	11.1	---	11.1	33.3
Civil servant	12.1	---	12.1	12.1	15.2	3
Public sector employee	---	---	15.4	---	15.4	---
Casual worker	20	---	---	---	20	---
Looking for work	---	33.6	33.3	---	--	---

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Marital Status by Head of Household						
Single	12.5	5.4	10.7	7.1	17.9	7.1
Married	13.3	13.1	10.6	12.1	12.5	13.9
Widowed	13.1	20.8	14.8	16.5	13.6	22.9
Divorced	11.1	16.7	14.4	6.7	18.9	16.7
Separated	12.8	10.3	10.3	12.8	12.8	12.8
Household size						
1	0.5	-	4	8	20	12
2-5	31.5	45.3	12.1	12.8	14.2	16.6
6-10	56.3	47.8	11.6	12.5	12.5	14.4
>10	12	7.4	13.9	10.1	15.2	21.5
Dependency Ratio in the family						
.1	---	33.3	---	---	---	---
.2	6.8	----	11.4	13.6	6.8	20.5
.3	18.2	11.8	18.2	9.1	27.3	----
.5	13.5	15.5	10.8	10.1	12.8	14.2
.7	25	---	---	---	25	---
.8	16.7	33.3	33.3	16.7	16.7	16.7
1.0	30.8	30.8	7.7	15.4	23.1	30.8

Source: Panel household Survey, Addis Ababa Univeristy, Department of Economics

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AT3 . Real expenditure deciles means and mean differentials: All urban centres 1994-1997

Deciles	Conditional mean 94 (μ_{94})	Conditional mean 95 (μ_{95})	Conditional mean 97 (μ_{97})	$\mu_{95}-\mu_{94}$	t-ratio	$\mu_{97}-\mu_{95}$	t-ratio	$\mu_{97}-\mu_{94}$	t-ratio	G L Ordinates 1994 (γ_{94})	1997 (γ_{97})	$\gamma_{94}-\gamma_{97}$	t-ratio
1	20 76	21.46	21.05	0.7	0.539	-0.41	-0.217	0.71	0.36	2.146	2.105	-0.041	-0.321
2	37.4	37.56	37.33	0.16	0.073	-0.23	-0.15	-0.07	-0.031	5.908	5.864	-0.044	-0.154
3	50.84	50.96	50.42	0.12	0.042	-0.54	-0.259	-0.42	-0.146	11.01	10.911	-0.099	-0.218
4	63.49	63.53	64.85	0.04	0.012	1.32	0.559	1.36	0.373	17.36	17.388	0.028	0.043
5	76.55	76.93	79.23	0.38	0.081	2.3	0.665	2.68	0.553	25.075	25.32	0.245	0.281
6	91.06	93.32	98.33	2.26	0.354	5.01	1.091	7.27	1.046	34.38	35.166	0.786	0.671
7	112.57	115.5	125.62	2.93	0.262	10.12	1.572	13.05	1.102	45.92	47.698	1.778	1.071
8	144.27	148.51	157.18	4.24	0.281	8.67	0.881	12.91	0.84	60.784	63.44	2.656	1.325
9	192.89	197.71	209.91	4.82	0.227	12.2	0.784	17.02	0.771	80.586	84.465	3.879	1.463
10	378.6	367.04	442.12	-11.56		75.08		63.52		116.75	128.52	11.77	2.358
Overall mean	116.75	117.16	128.52	0.41	0.295	11.36	2.33	11.77	2.33				

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AT4: Urban real expenditure deciles means and mean differentials - Addis Ababa 1994-1997

Deciles	Conditional mean 94 (μ_{94})	Conditional mean 95 (μ_{95})	Conditional mean 97 (μ_{97})	$\mu_{95}-\mu_{94}$	t-ratio	$\mu_{97}-\mu_{95}$	t-ratio	$\mu_{97}-\mu_{94}$	t-ratio	G L Ordinates 1994 (γ_{94})	1997 (γ_{97})	$\gamma_{94}-\gamma_{97}$	t-ratio
1	18.95	21.33	21.05	2.38	1.508	-0.28	-0.161	2.1	1.277	1.895	2.105	0.21	1.656
2	32.78	35.92	36.55	3.14	1.206	0.63	0.23	3.77	1.421	5.174	5.76	0.586	1.975
3	43.57	47.66	48.28	4.09	1.29	0.62	0.178	4.71	1.392	9.408	10.59	1.182	2.34
4	54.86	58.99	62.38	4.13	0.926	3.39	0.729	7.52	1.392	15.132	16.828	1.696	2.251
5	67.17	69.45	75.69	2.28	0.424	6.24	1.044	8.52	1.555	21.85	24.395	2.545	2.505
6	78.56	83.6	93.33	5.04	0.711	9.73	1.131	14.77	1.436	29.706	33.732	4.026	2.942
7	95.73	103.27	119.33	7.54	0.701	16.06	1.303	23.6	1.796	39.277	45.661	6.384	3.519
8	127.18	133.15	150.7	5.97	0.343	17.55	0.933	23.52	1.939	52	60.736	8.736	3.699
9	176.92	186.62	206.5	9.7	0.342	19.88	0.648	29.58	1.285	69.687	81.378	11.691	3.708
10	366.63	354.94	464.27	-11.69		109.33		97.64		106.35	127.81	21.46	5.469
Overall mean	106.35	109.49	127.81	3.14	0.563	18.32	2.781	21.46	3.176				

AT 5

Rural and urban real expenditure decile means, mean differentials and generalised Lorenz ordinates 1994

Decile	Mean		$\mu_u - \mu_r$	t-ratio	Generalized Lorenz ordinates		$\gamma_u - \gamma_r$	t-ratio
	Urban (μ_u)	Rural (μ_r)			Urban (γ_u)	Rural (γ_r)		
1	20.61	25.04	-4.43	-3.66	2.061	2.504	-0.443	-3.665
2	37.18	38.27	-1.09	-0.547	5.784	6.33	-0.546	-2115
3	50.37	49.08	1.29	0.502	10.818	11.247	-0.429	-1.029
4	62.91	61.24	1.67	0.478	17.104	17.352	-0.248	-0.405
5	75.87	74.55	1.32	0.31	24.725	24.81	-0.085	-0.107
6	90.07	87.9	2.17	0.38	33.719	33.618	0.101	0.099
7	111.22	104.35	6.87	0.844	44.981	44.051	0.93	0.631
8	143.16	128.26	14.9	1.281	59.224	56.872	2.352	1.368
9	190.88	161.82	29.06	1.646	78.246	73.044	5.202	2.354
10	374.05	278.73	95.32	1.178	115.53	100.9	14.63	3.794
Overall mean	115.53	100.9	14.63	3.782				

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