"Who was getting the highest share of the tiny pie? : Robust analysis of poverty dynamics and its decomposition by Ethiopian socioeconomic groups in the period of 1995 - 2000"

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Who was getting the highest share of the tiny pie?

Robust analysis of poverty dynamics and its decomposition by Ethiopian socioeconomic groups in the period of 1995 - 2000

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Abstract

The general distribution of benefit was skewed to major urban centers, educated individuals, employee and individuals headed by formal employee and employers. But in terms of income the economic environment was very effective in avoiding the destitution among the most impoverished but not to rise the over all income among the poor. The economic environment in period 1995 to 2000 seems to discourage the risk takers and failed to improve the welfare of those better off poor. So if better distribution was strong side of this period; inability to raise incomes and discouraged risk taking behavior were the main short comings.

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Robust analysis of poverty dynamics and its decomposition by Ethiopian socioeconomic groups in the period of 1995 - 2000

Chapter one

1.1. Introduction

Although concentrating solely in poverty reduction objective is very weak objective by it self, as concentrating on general welfare in case of developing countries is, understanding the level of poverty reduction achieved through exogenous and indigenous factors is as important as analyzing the change in welfare, if not more important in country like Ethiopia. So answering the question what happens to the poor of the country in between periods and decomposing the source of any change to growth and/or distributional effects is very help full on having vivid bird eye view of the poverty dynamics.

And in country like Ethiopia, where 44% of the population is leaving under the official poverty line of 1075 birr in 1999/2000 (PASDEP, 2005)[1], understanding what happens to this poor which are nearly half of the population is very important research arena. And this will help us on evaluating the past policies in terms of their effect on those with lower potential to benefit form an economic reform. So, although poverty dynamics analysis also is very wrong to take it as developing countries substitute for welfare dynamics analysis than a complement; the complementary importance of poverty analysis is more significant for least developing countries like Ethiopia than any other country.

1.2. Objective of the study

The paper has one main and one secondary objective. The main objective of this paper is to analyze the aggregated and decomposed poverty dynamics of the country between 1995 and 2000. And the secondary objective is to determine, if change in average income or its distribution is the cause for any observed change in poverty.

1.3. Data and Methodology

The data used are the 1995/6 and 1999/2000 Central Statistic Authority of Ethiopia (CSA) data collected form 9 regions and 2 administrative cities. The 1995/6 survey includes 61780 individuals divided in 10022 families making the average family size in to 6.16 persons. And the 1999/2000 data includes 82268 individuals which are classified in to 17283 families making the average family size to 4.76 individuals.

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[1] Our poverty estimates are much higher than this but this could be caused by the choice of adult equivalent in which in our case we give equal weight to all individuals; which is not the case most of the time. The use of individuals than adult equivalent is due to lack of robust and theoretically supported scale for Ethiopia. But it is conventional to give 0.4 of adult for youngsters (< 5 years age), 0.5 for children (4 < age < 15) and 1 for others.

First zonal incomes are deflated by the ratio of zonal food price index of the 20% bottom income bracket divided by national price index of the same bracket, in both periods. Then the 1999/2000 incomes are deflated by the ratio of 1999/2000: 1995/6 national food price index of the bottom 20 of the populations. And the temporal deflator was 1.084; means there was 8.4% increase in all food prices consumed by the bottom 20% population.

For analyzing the dynamics in terms of real expenditure poverty, we use the popular FGT indexes among cardinal measures. And primal 1st to 3rd order stochastic dominance analysis among ordinal measures. But the general use of the cardinal measures in this paper was to quantify the change and ordinal measures to make sensitivity analysis.

1.4. Limitation of the study

There are two main limitations of the analysis. The first limitation of the study is its failure to imply causation than mere association. It is robustly enabled to analyze the change in poverty associated with given socio-economic group; but we can't be sure if the change was caused by that specific character of that socioeconomic group or not. This is because such analysis needs panel data but what we have is two cross-sectional datasets. But classifying the winners of loser of an economic condition in given period is very important research arena by it self. And the second but most series problem of this analysis is lack of robust deflator. The problem is related to the fact that, we can't be sure if our conclusion is influenced by our assumptions and methodologies for calculation of spatial and temporal deflators. This is caused by lack of economic methods to check the robustness of any poverty analysis to deflator chosen[2].

1.5. Organization of the paper

This paper is started with introductory chapter; and chapter two will analyze the under lining theoretical and measurement issues. Chapter three will deal with the actual data; to be summarized and concluded in chapter four.

1.6. Acknowledgments

The author would like to thank Jean-Yves Duclos, Abdelkrim Araar and Carl Fortin from MIMAP program, International Development Research Center, Government of Canada and CREFA, University of Laval for free access to DAD 4.4 software (software for distributive analysis) which is used for analysis in chapter three.

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[2] We can check this for each zone on our case by using different poverty lines but it will fail to compare the robustness of any different disaggregating. Even in the first one the robustness test is very rigid, in which to crate any dominance the dominating curve minimum must be higher than the dominated curve maximum, for all possible poverty lines. Means say if the poverty line ranges from 1000 to 1200 birr, distribution A will dominate distribution B, iff any poverty line chosen by A in range of 1000 to 1200 will show lower poverty compared to any poverty line chosen by distribution B. means when we fix A's poverty line to 1200 birr must show lower poverty compared to B even if we use poverty line of 1000 birr.

Chapter two
2.1. The Theoretical Background for Measurement of poverty dynamics [3]

The analysis of change in welfare of the poor between two periods can be approached form ordinal or/and cardinal point of view. Starting from the second point, we use some measures of poverty like FGT indexes to compare the change in cardinally represented poverty. For example we compare the proportion of people under poverty between two periods for given poverty line, or we compare the average poverty gap or level of severity of poverty between these periods. This method will give us a very simple but vague comparison. The problem is that our choices of poverty line and measurement assumptions can possibly influence our final result. The ordinal method uses order of distribution for given assumptions about welfare function of the poor. And any measure which obey that specific rule, will robustly order the welfare (poverty) change between two periods. The rules are not very specific but wide in scope so will possibly include wide range of poverty (welfare) measures. More over the dependence of our conclusion to the choice of poverty line can be also avoided because ordering is done to all possible poverty lines. The problem of this method is that more often you need to know more than the direction of the change; especially it is important to know the magnitude of the change. So it is wise to use some commonly used measures of poverty like FGT indexes to quantify the change but assure its robustness to the choice of measurement assumptions and poverty line by using ordinal poverty measures. Now let's start from the ethical judgments or rules or principles which enable us to order distributions.

2.2. Ethical welfare judgments

The first ethical judgment is the Pareto principle which states that if any individual get more income, other things hold constant, social welfare must be improved. But given poverty focus axiom which states poverty measures must not change when the welfare of non poor changes, the judgment will be represented in weak form that the welfare of the poor (poverty) must not decrease (increase) when some one's welfare is improved other things hold constant. This is zero order judgment and it is called zero order because it does not deal with distributional issues. This means the first derivative of any welfare function must be positive or the first derivative of any poverty function must be non positive, for all possible poverty lines. Let's define general additive poverty line of the form[4]

$$P(Z) = \int \pi (Q(p); z)\, dp \quad \text{for all} \quad 0 \le p \le 1$$

So zero order measures $\Pi^0 (Z^-, Z^+)$ will be decreasing in income as long as it happens above minimum possible (Z^-) and below maximum possible poverty line (Z^+) or formally

[3] This part highly depends on theoretical exposition of Louis-Marie Asselin and Anyck Dauphin (2001) 'Poverty measurement a conceptual framework' CECI, http//www.ceci.ca; Jean-Yves Duclos (2002)"sampling design and statistical reliability of poverty and equality analysis using DAD' MIMAP program ; Jean-Yves Duclos and Abdelkrim Araary (2005) 'Poverty and Equity: Measurement, Policy and Estimation with DAD" MIMAP program; Kenneth Train (1993); Angus Deaton (1997) the analysis of house hold surveys, 'a micro-econometric approach to development policy' World Bank
[4] This is just for simplicity of exposition but this orders will be applicable to all measures which obey the principle of this class (additive or not)

$$P (Z) \in \Pi^0 (Z^-, Z^+) \text{ if } \pi^1 (Q (p); z) \leq 0 \text{ when } Z^- \leq Q (p) \leq Z^+ \text{ and}$$
$$Z^- \leq Z \leq Z^+$$

Not that the super script in Π represent or order but in other cases it represent derivatives. And all measures which obey this principle will show the same direction of change, if we found that by zero order the change to be robust in one direction. Other important principle is that when the welfare of two individuals is interchanged poverty or welfare measures must not be changed. In other words welfare and poverty measures need to be anonymous or symmetric. And this is first order ethical judgment, which implicitly means that when any one get better, other things hold constant, society must be get better if the individual is named Bekele or Habtom. Means this is the same as Pareto principle, so the conditions will remain the same[5] i.e.

$$P (Z) \in \Pi^1 (Z^-, Z^+) \text{ if } \pi^1 (Q (p); z) \leq 0 \text{ when } Z^- \leq Q (p) \leq Z^+ \text{ and}$$
$$Z^- \leq Z \leq Z^+$$

Note that what we need is that when the welfare (income or expenditure) of some one is improved the social welfare (poverty) function at least does not decrease (increase) if it does not increase (decrease); but it will be robust for any level of non negative (positive) change in welfare (poverty).

The problem is that most of the time, with any change there will be winners and losers; so the above conditions will fail to order welfare (poverty) levels across time. So we need higher order ethical judgments which account some valued judgment about the winners and losers of a given change.

There is good reason to accept that an increase of x amount of income to the poor must increase (decrease) the social welfare (poverty) more than the decrease (increase) on social welfare (poverty) due to the same amount of income taken from the rich person. In other words social welfare must be equity sensitive, but we don't care how much sensitive it is. This is called second order welfare (poverty) dominance. The reason can be partially due to decreasing marginal utility of income and partially due to distribution sensitivity of individuals and society. And given poverty focus axiom, we just need poverty measures not to increase, with mean preserving equalizing transfers or we just need the weak form of Pigou –Dalton principle of transfer to hold. Formally

$$P (Z) \in \Pi^1 (Z^-, Z^+) \text{ if } \pi^1 (Q (p); z) \leq 0 \text{ and}$$
$$\pi^2 (Q (p); z) \geq 0 \text{ when } Z^- \leq Q (p) \leq Z^+ \text{ for which } Z^- \leq Z \leq Z^+ \text{ and}$$
$$\pi (z; z) = 0$$

What is added is the increase in social welfare due to increase in income must have decreasing margin and the poverty function must be continuous at the poverty line. And a poverty measures which does not increase with mean preserving equalizing transfers will be members of this order. But still some times we may be more interested in the welfare of the very poor than the better off poor and may be the actual transfer is not from better off to the poor only, so we need further valued judgments which give more weight to the

[5] this is why poverty dominance ordering is done from first order than zero order.

changes on the bottom of the distribution. This can be done by introducing favorable composite transfer, where an equitable transfer on the bottom of the distribution is matched by inequitable transfer on the high level of the distribution of the same magnitude[6]. This will leave the mean and variance of the distribution unchanged. And any welfare (poverty) measure which increase (decrease) following such transfer will be member of third order poverty measures. But given poverty focus what we need is such composite favorable transfer will not increase poverty. Formally

$$P (Z) \in \Pi^1 (Z^-, Z^+) \text{ if } \pi^1 (Q (p); z) \leq 0 \text{ and}$$
$$\pi^2 (Q (p); z) \geq 0 \text{ and}$$
$$\pi^2 (Q (p); z) \leq 0$$
$$\text{When } Z^- \leq Q (p) \leq Z^+ \text{ for which } Z^- \leq Z \leq Z^+ \text{ and}$$
$$\pi (z; z) = 0 \text{ and } \pi^1 (z; z) = 0$$

What this formula adding is that the decline in marginal poverty of income must decrease at increasing rate. But also the first derivative of poverty function must be continuous around poverty line.

We can go on narrowing the welfare judgments by increasing the sensitivity of welfare to inequality and this will increase the possibility of ordering any two distributions, but the problem is that the member measures will decrease with each increase in order. And most of the poverty measures used in literature are member of the second order measures but not higher. But generally any higher order poverty measure (Π^i) needs to add $(-1)^i \pi^i (Q (p); z) \leq$ and $\pi^i (z; z) = 0$ for $i = 0, 1, 2\ldots, s-2$. And as 'i' goes to infinitive, social welfare (poverty) will be the welfare of the poorest of the poor individual, only.

The problem is how do we order distributions with out specifying the specific numeric value of our judgment? This can be done by using dominance curves (cumulative distribution curves) which are closely related to FGT indexes calculated over ranges of poverty line ($Z^- \leq Z \leq Z^+$).

2.3.   Method For Ethical welfare Comparisons

If two distributions A and B are to be compared what we are interested is in finding that $P_A(Z) - P_B(Z) \geq 0$, assuming that B dominates A or poverty is lower in B compared to A.

$$\Delta P (Z) = P_A(Z) - P_B(Z) \geq 0$$
$$\Delta P (Z) = \int [\pi (Q_A (p); z) - \pi (Q_A (p); z)] dp \geq 0 \text{ for all } 0 \leq p \leq 1$$
$$\Delta P (Z) = \int [\pi (y ; z) - \pi (y; z)] dy \geq 0$$
$$\Delta P (Z) = \int \pi (y ; z) \Delta f(y)] dy \geq 0$$

So for first order of poverty measure what is needed is the differential cumulative distribution to be positive ever where or the differential first order dominance $D^1 (Z)$ to be positive every where. Before proceeding note that for $s > 1$

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[6] Note that the donor on the bottom of the distribution needs to have lower income compared to the donor on the higher level of the distribution. And the absolute distance between donors and recipients needs to be equal among both transfers.

$$D^s (Z) = \int D^{s-1}(y)\, dy$$

Or the higher order dominance is the area under the distribution of one less order distribution. So first order condition needs that

$$\Delta P (Z) = \int \pi (y\,;z)\, \Delta D^1 (y)]\, dy \geq 0 \text{ Or}$$
$$D_A{}^1 (y) - D_B{}^1 (y) > 0$$

And any higher order (s) inference needs that

$$\Delta P (Z) = \int \pi (y\,;z)\, \Delta D^s (y)\,]\, dy \geq 0$$
$$D_A{}^s (y) - D_B{}^s (y) > 0$$

And given any dominance curve is related to the FGT index in the following form

$$D^s (y) = \{[1/(s-1)!]\, [\int (z - y)^{s-1}\, dy]\, \}$$
$$D^s (y) = \{[1/(s-1)!]\, [P(z;\, \alpha = s-1)$$
$$D^s (y) = 1/c\, [FGT^{s-1})\, 1/c \text{ where } c = 1/(s-1)!$$

Means dominance curves are monotonic transformations of FGT indexes less than one order. So if we found that α order FGT index for possible poverty lines $(Z^- \leq Z \leq Z^+)$ is higher for A compared to B, we can say all $s = \alpha + 1$ order poverty measures will show higher poverty in A compared to B. In other words to check first order dominance what we have to do is that head count index FGT ^{0} or P^0 is higher in A compared B, for all reasonable poverty lines $(Z^- \leq Z \leq Z^+)$. For second order we can use poverty gap index, for third order squared poverty gap index and soon. And each these indexes are member of the respective order they are robustly comparing.

In this paper when over dominance is lost we will report the poverty line where the FGT indexes are equal. And the reasonable poverty lines are assumed to be in range of 500 to 2000, birr. The choice of wide range is preferred to avoid the idea of poverty discontinuity at given poverty line. Means we are not only making sure that measurement errors are not affecting our result but the assumption of discontinuity, too.

Further more unless more than one crossing point are found in the range of 0 to 2000 birr, only one crossing value is given. And the choice is made on the closeness of the crossing value to the national poverty line of 1075 birr.

2.4. Cardinal measurement of poverty dynamics

Cardinal approaches for poverty takes two general forms. One form explicitly considers poverty as negative social welfare of the poor or reduction on social welfare as censured at given poverty line. The other considers poverty gaps raised to different powers as FGT indexes and does not make explicit inference to welfare of the poor. But as can be seen below the second one can be interpreted as negative welfare off the poor. Let's start from the first one. The utility of an individual at given point of time is generated by consumption of goods and services which are purchased by Y level of income or expenditure. $U = u(Y)$ and for welfare comparison utility functions need to be homothetic means the ratio of two marginal utilities between two individuals stays the same when their income is changed by the same proportion. And one popular form proposed by Atkinson and which satisfy the above condition is the following form

$$U (Q(p); \varepsilon) = [Q(p)^{1-\varepsilon}]/(1 - \varepsilon) \text{ when } \varepsilon \neq 1 \text{ for all } \varepsilon \geq 0 \quad \text{and}$$
$$U (Q(p); \varepsilon) = [\ln Q(p) \text{ when } \varepsilon = 1$$

Note that this is sufficient condition for existence of homothetic but not necessary condition and we could possibly find other utility functions which satisfy the above condition. And for now we are assuming this is the right utility representation. The Epsilon is the equity preference as exposed by declining marginal utility of income Q (p) = Y. Note that the marginal utility is

$$d (U)/ d (Y) = Q(p)^{-\varepsilon} = 1/ Q(p)^{\varepsilon}$$

So the higher ε is the larger will be the decline in marginal utility with increase on base income. Only for $\varepsilon = 0$ we will have constant marginal utility of income no mater the income of the recipient. If we assume social welfare is just sum of all individuals' welfare, we could sum the individual utility function among all population percentiles (p) to obtain social welfare W.

$$W = \int U (Q(p); \varepsilon) \, d p$$

So equality preference is expressed in terms of declining marginal utility. You can increase welfare either by generating more income (growth effect) or giving more of the income to the one which needs it more or the one with higher marginal utility of income (the poor). But people are not only concerned about their income but also about their position on society. The point is that a 1000 earned in country with most of the population earning below 1000 birr will generate higher welfare than the same amount earned in country where the majority of the population earning per capital income more than 1000 birr. In other words people are concerned about their position on population. So a person in lower bracket of income, no matter its absolute level, will generate higher utility for given change of income than a person on higher bracket of income. Or the marginal social welfare is decreasing function of one's position in income distribution (p). So social welfare can take the general form of

$$W = \int U (Q(p); \varepsilon) \, w(p, \rho) \, d p$$

Where $w(p, \rho)$ are weights and are decreasing function of 'p'. Or specifically

$$w(p, \rho) = \rho (1 - p)^{\rho-1}$$

And for values of $\rho > 1$ shows equity preference of society and the large the value the more concerned the society is about un-egalitarian income distribution. And for $\rho = 1$ we find that society is not concerned about the income distribution and social welfare is simply sum of individual welfare. But some of the income is lost due to unequal distribution of income and the same level of welfare could be achieved with lower aggregate income if every one was getting average income. And this ideal level of income is called Equally Distributed Equivalent (EDE) income $\xi (\rho, \varepsilon)$. Formally

$$\int U(\xi (\rho, \varepsilon); \varepsilon) \, w(p, \rho) \, d p = \int U (Q(p); \varepsilon) \, w(p, \rho) \, d p$$

And given egalitarian distribution in the first one or $\int w(p, \rho) \, d p = 1$

$$U(\xi (\rho, \varepsilon); \varepsilon) = = \int U (Q(p); \varepsilon) \, w(p, \rho) \, d p$$

$$\xi \, (\rho, \, \varepsilon) = U^{-1} \, (\int U \, (\, Q(p); \, \varepsilon) \, w(p, \, \rho) \, d \, p)$$
$$\xi \, (\rho, \, \varepsilon) = (1 - \varepsilon) \, (\int U \, (\, Q(p); \, \varepsilon) \, w(p, \, \rho) \, d \, p)^{1/(1+\varepsilon)} \quad \text{for } \varepsilon \neq 1$$

Still we are using the above specified utility function. And

$$\xi \, (\rho, \, \varepsilon) = (\int Q(p)^{1-\varepsilon} w(p, \, \rho) \, d \, p)^{1/(1-\varepsilon)} \quad \text{for } \varepsilon \neq 1$$

By similar analysis it could found that the $\xi \, (\rho, \, 1)$ is

$$\xi \, (\rho, \, 1) = \exp \, [\ln Q(p) \, w(p, \, \rho) \, d \, p]$$

To make use of this index of poverty it is censured around poverty line to be come $\xi \, {}^*(z; \, \rho, \, \varepsilon)$. And a general poverty measure is proposed in the form of

$$P(z; \, \rho, \, \varepsilon) = z - \xi \, {}^*(z; \, \rho, \, \varepsilon)$$

To make the indexes to be transfer sensitive we need $\rho \geq 1$ and $\varepsilon \geq 0$. This is socially representative EDE poverty gap. This is quite general form and for $\rho = 1$ or if society is not concerned about peoples position on distribution of income (but still equity sensitive through ε) we have the CHU second class poverty indices[7].

$$P(z; \, \varepsilon) = z - (\int Q^*(p)^{1-\varepsilon} \, d \, p)^{1/(1-\varepsilon)} \quad \text{for } \varepsilon \neq 1 \text{ and}$$
$$P(z; \, \varepsilon) = z - \exp \, [\ln Q^*(p) \, d \, p] \quad \text{for } \varepsilon = 1$$

When $\varepsilon = 1$ we have Watt index, and for $0 < \varepsilon < 1$ we have indexes proposed by Chakravarity. And when $\varepsilon = 0$ at the general form, we get the Single index Gini coefficients (S-GINI) poverty indexes.

Note that in using this cardinal measures we have to assume about the utility representing function, the level of diminishing marginal utility (ε) and sensitivity of social utility to once position in society. Some times our conclusion is true as our assumptions about this points is. Said so, now let's move to the second approach of poverty gap.

The second approach for poverty measures did not directly deal with social welfare but concentrate on the shortfall of income from poverty line (on income gaps)

$$P_\alpha \, (z, \, \alpha) = 1/N \, \Sigma \, (z - x_i)^\alpha \quad \text{for } i = 1, \, 2, \, 3, \, \ldots \ldots p$$

This is un-normalized FGT poverty index, in which x_i's are the measures of welfare (income for example) of individual below poverty line, N is total population and P is number of poor. And the **FGT** index is calculated by dividing the above gap by poverty line (normalized by poverty line) so the formula will be

$$P_\alpha \, (z, \, \alpha) = 1/N \, \Sigma \, [(z - x_i)/z]^\alpha$$

Actually **α** can take from **0** to **∞**, but most of the time α values used in literature are 0, 1 and 2. This is because of unclear interpretation of results calculated by higher powers. If **α = 0**

$$P_0 \, (z, \, 0) = 1/N \, \Sigma \, [(z - x_i)/z]^0$$
$$P_0 \, (z, \, 0) = (\Sigma \, 1) \, /N$$
$$P_0 \, (z, \, 0) = P/N$$

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[7] After Clark, Hemming and Ulph's.

And this is the commonly used head count index which simply shows the proportion of individuals below specific poverty line as fraction of total population. And this can be easily interpreted as social welfare of the poor with appropriate change of sign. This means every individual which is having welfare level below the minimum will lead to decrease of social welfare by one unit. But every person's welfare above the minimum will not affect the social welfare function. Unfortunately, it will not satisfy the transfer criteria even with in the poor individuals. If resources are drown from the poorer to the better off poor to make him cross the poverty line, the index will show decrease in poverty and increase in welfare. And if $\alpha = 1$

$$P_1(z, 1) = 1/N \Sigma [(z - x_i)/z]$$

And this is poverty gap index or intensity index which show us the average shortfall of all poor as ratio of the poverty line. Say P_1 of 0.3 shows that at average 30% of the poverty line is the average shortfall of the poor. In other words if there is cost free transfer of resource it is the average amount of resources needed to eliminate poverty at point of time. But the problem with the above measure is that it did not satisfy the transfer principle except in its weak form, even among the poor. Means any mean preserving equalizing transfer will not increase the poverty index but will not necessarily reduce it. This is because if transfer is made from poorer to another better off poor, which dose not enables him/her to cross the poverty line, the index will remain the same. This is resulted from the fact that the measure gives equal weight to every shortfall from the poverty line. To avoid this we use the squared poverty gap in which $\alpha = 2$

$$P_2(z, \alpha) = 1/N \Sigma [(z - x_i)/z]^2$$

This will give more weights to shortfalls from the bottom of the living standards so will satisfy the transfer principle with in the poor; but still in its weak form because any mean preserving transfer among two non poor individuals will not effect the social welfare function and the same is the case for Pareto condition. And this measure is known as severity index. It is possible to use values of α up to infinitive in which our concern will be on the welfare the poorest of the poor. But the problem for **FGT** index for values of α **>1** is lack of easy interpretation of the results. What does it mean to find P_2 **=0.2**? So the use of **Pα** behind α **=1** will be for developing profile, which give more weight to the poverty of the poorest of the poor, than quantifying poverty, as such. Better understanding can be made for α **>1** if we use EDE interpretation but it will not add much for this paper.

In this paper given their simplicity we will use the FGT index's but we will make sure that their conclusion is robust to all measures of the related class by make use of stochastic dominance analysis explained above. And these measures are also simple in their decomposition as any total poverty can be explained by weighted poverty of any sup group; as weighted by their respective population share.

$$P(z; \alpha) = \sum w_i P_i(z; \alpha) \text{ in which}$$
$$W_i = n_i / N$$

Where n_i is the population in any mutually exclusive sup group and N is total population.

2.5. Conceptual frame work of decomposition of change in poverty in to growth and distribution effect

For given level of distribution of income an increase in aggregate income is the only way out of poverty. And for given level of aggregate income, improved distribution could result in reduced poverty or improved welfare of the poor. If we assume resources are fully employed and the market is perfect there could be trade off between growth and distributional objectives on maximizing social welfare. But if resources are sup optimally utilized and if the potential value of marginal product of the poor is higher than the potential value of marginal product of the better off; and if the improved redistribution can improve the utilization of under utilized poor peoples' potential, it is possible to achieve both distributive and growth objective with out making any trade off. But given poverty focus axiom, poverty measures did censure the welfare of individuals above poverty line to zero. So measures which are not even distributive sensitive will be affected by distributive changes among all society. Taking head count index which makes no value judgment about distributional issues did also react to distribution changes, for example. When resources are transferred from better off to the poor, the lose on the better off welfare will be censured to zero but the improvement on poor will be given the value of 1 if it enable him to cross poverty line. So, even head count or any other first order measures can also react to distributional changes. So understanding weather better distribution or increases in average income are responsible for the observed change in poverty is crucial policy analysis area. This is done by using the Shapley decomposition as formally given below

$$P^*_B(z; \alpha) - P^*_A(z; \alpha) = 0.5 \times \{[P^*_A(z\mu_A/ \mu_B; \alpha) - P^*_A(z; \alpha)] + [P^*_B(z; \alpha) - P^*_B(z\mu_B/ \mu_A; \alpha)]$$
$$+$$
$$[P^*_B(z\mu_B/ \mu_A; \alpha) - P^*_A(z; \alpha)] + [P^*_B(z; \alpha) - P^*_A(z\mu_A/ \mu_B; \alpha)]\}$$

The first one is growth effect[8], in which each distribution is first raised to the alternative mean income, and the difference from the original and deflated/inflated distribution will give us two alternative growth effects and their average will give us the real growth effect. And in second one, mean incomes are equalized so the differences will be poor distributional effects. Accordingly we will have two potential distribution effects and their average will give us the real distributional effects.

This will conclude this chapter but it is important to notice decomposition in this paper is done in terms of change in welfare (negative poverty of poor); this has mere advantage of interpreting positive values as welfare increasing but interpreting as poverty reduction will not make any difference. Said so, now let's analyze the data for poverty dynamics in period of 1995 to 2000.

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[8] the * is used to imply normalized index

Chapter three
3   Poverty dynamics in the period of 1995 - 2000
### 3.1.   Dynamics of poverty at national level

Between 1995 and 2000 G.C. the real per capital expenditure deflated by food price index as faced by the bottom 20% of the population declines by 67 birr per capital in real terms or a decline of 5.7%. But as can be seen from table 1 below it seems[9] that there was better income distribution in 2000 compared to 1995, as the income share of 5%, 25%, 50% and 75% of the population is increased but the reverse was the case for the 95%.

Table 1Mean and percentile distribution of real income

Year	mean		5 %		25 %		50 %		75 %		95 %	
	value	St. de.	share	St. de.	share	St. de.	share	St. de.	share	St. de.	share	St. de.
1995	1174	4	0.0115	1E-04	0.1001	5E-04	0.2733	1E-03	0.5263	0.001	0.841	0.002
2000	1107	4	0.016	1.E-04	0.120	4.E-04	0.300	9.E-04	0.545	1.E-03	0.834	1.E-03

And as can be seen from figure 1 and 2, below the share of the bottom population (up to ≈ log 6.5 or 665.14159 birr) is higher in 2000 compared to 1995. But there is no clear dominance of one distribution over the other for the whole income levels. Means without making valued judgment about the appropriate utility function, the decline on marginal utility of income and the level of dependence of individual welfare on their position on income distribution, one can't objectively analyze the change on welfare between the two periods. And this can be clearly seen in the stochastic dominance analysis given, below.

Figure 1 Kernel density graph for real income distribution with epanechnikov width function
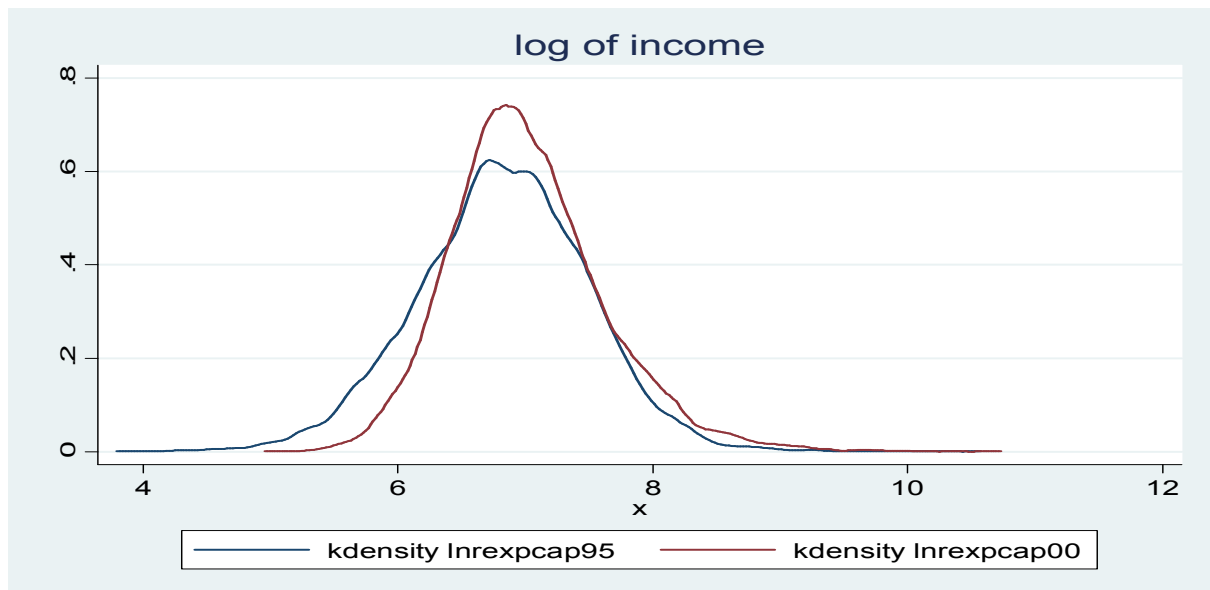
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Figure 2 Kernel density graph for real income distribution with fixed 0.1 widths
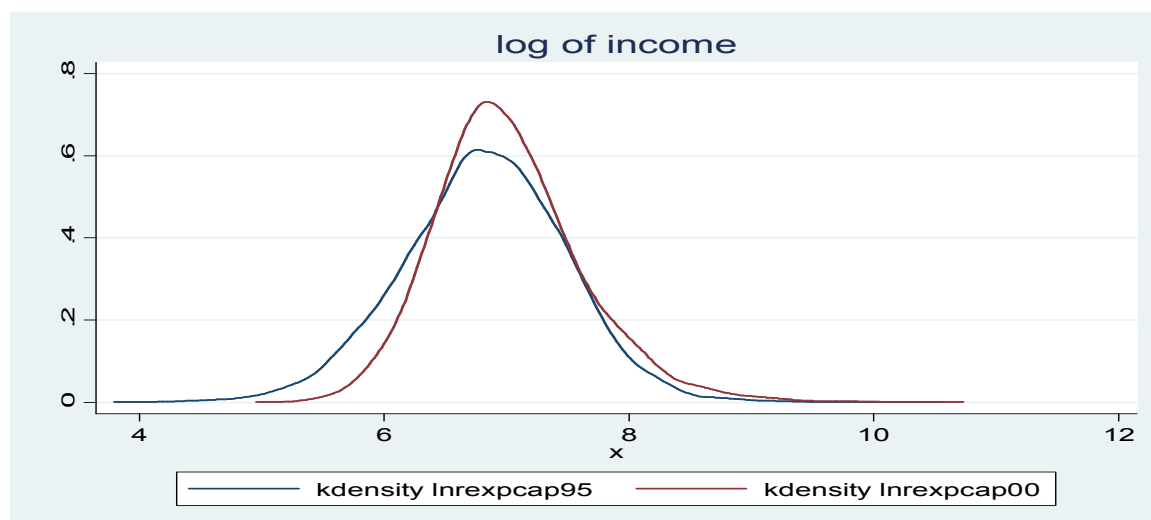
Table 2's stochastic dominance result did clearly show that all poverty and welfare measures which accept the Pareto and unanimous principle of social welfare (head count index for example) will fail to order the above distributions with out making ethical judgment upon above specified issues. But for poverty dynamics, some robustness can be achieved by dividing the poor in to poor of the poorest and better off poor. Based on head count poverty, for example, the welfare of the poorest of the poor (those individuals with per capital income less than 758 birr) is improved in 2000 compared to 1995. And if we narrow our domain of welfare and poverty functions to those which obey the Pigou-Dalton principle of transfer means to those which show increase in welfare (decline in poverty) with favorable composite transfer we would not able to make robust ordering of welfare levels with out specifying the welfare function. But for all poverty lines below 1153 birr the intensity of poverty is lower in 2000. And severity of poverty is still lower for all poverty lines less than 1649 birr.

Table 2 stochastic dominance analysis of welfare (poverty) change

year	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Crossing values	758 3636 9475 10930	8 116 1168 115	1153	30	1649	59
First case	2		2		2	

Note 1 case 1 is that before 1995 welfare is higher or poverty at 1995 is lower

case 2 is that before 2000 welfare is higher or poverty at 2000 is lower

Note 2 if the first is case 1or 2 the next will be case 2 or 1, respectively by default

Given the wide robustness (in terms of poverty line) achieved by the using those poverty measures which decrease with favorable composite transfer, severity of poverty index for example, our comparison between the two periods at national level will be based on severity index. But note that the conclusions that we reach using the severity index will

be robust for all poverty measures of a third order or measures which obey the rule of unanimous principle, Pareto principle, Pigou-Dalton transfer principle and which show increase in welfare (decrease in poverty) with favorable composite transfer. But their poverty line must be lower than 1649 birr which is 150 % of the official poverty line.

Table 3 the change in national poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr national poverty line

measure	Change poverty (2000 – 1995)			Decomposition of welfare change			Significance	
	value	Standard error	signific ance	Growth contribution	Distribution contribution	Common Standard error	G	D
Incidence	0.06249881	0.00375205	0	-0.04547942	-0.01701939	0.00094823	0	0
Intensity	-0.00498953	0.00174777	0.002	-0.02265797	0.02764750	0.00194043	0	0
severity	-0.01472449	0.00108282	0	-0.01265521	0.02737969	0.00107055	0	0

Based on source wise decomposition of severity of poverty, there was decrease in poverty and this is mainly caused by improved income distribution among the poor than increase in average income. So the polices which are followed in the period of 1995 to 2000 were more effective on achieving better income distribution in favor of the poor than on increasing the per capital income. But the national picture can obscure the real picture on disaggregated level. So we will analyze the change in poverty and possibly welfare at different level of disaggregating and socio-economic classification. Let's start from regional dis-aggregation given below.

3.2. <u>Dynamics of poverty at regional level</u>

But as can be seen from table 4 below, any inequality sensitive welfare comparison between the two periods is robust to measurement assumptions in all cases, except for regional states of Oromia and SNNPR. For poverty comparison the researcher believes that 500 birr is too low and 2000 birr is too high, so SNNPR can also be taken as robust for poverty comparison using intensity index and to some extent using severity index.

Table 4 stochastic dominance analysis of regional poverty dynamics between 1995 and 2000

region	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Tigray	796	23				
Afar	4991	21				
Amharia	9501	408				
Oromia	500	11	649	24	789	34
Somali	10673	5				
Benishangul-Gumuz	2193	67				
SNNPR	305	3	402	16	515	29
Gambela	1366	26				
Harerr	3034	60				
Addis Ababa	31918	0				
Dire Dawa	17701	0				

However for all welfare measures which does not make valued judgment up on distributional issues, welfare comparison will be dependent on measurement assumptions made. But for restricted dominance of poverty comparison in range of 500 to 2000 birr, only Tigray's and Gambela's comparison are measurement assumptions dependent. Taken this picture in to consideration, now let's analyze the change on regional poverty based on official poverty line of 1075 birr.

Table 5 the change in regional incidence of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

region	Change in head count poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Tigray	0.004138	0.016418	0.4	0.02658540	-0.03072977	0.00237962	0	0
Afar	0.332934	0.032253	0	-0.22148260	-0.11145106	0.01810952	0	0
Amharia	-0.11159	0.009928	0	0.13758558	-0.02599859	0.00270664	0	0
Oromia	0.147053	0.009217	0	-0.15357119	0.00651771	0.00247893	0	0.004
Somali	0.351193	0.019642	0	-0.29309555	-0.05809803	0.00774927	0	0
Benishangul-Gumuz	0.27456	0.03066	0	-0.17982401	-0.09473623	0.00869931	0	0
SNNPR	0.202801	0.011153	0	-0.20393711	0.00113630	0.00374721	0	0.38
Gambela	-0.02255	0.028848	0.217	0.02754274	-0.00499579	0.00385155	0	0.097
Harerr	-0.17798	0.020434	0	0.13194698	0.04603720	0.00533823	0	0
Addis Ababa	-0.31728	0.012187	0	0.35702629	-0.03975122	0.00459294	0	0
Dire Dawa	-0.25532	0.017885	0	0.33991484	-0.05933557	0.00699351	0	0

Tigray's and Gambela's change in incidence of poverty was not only un-robust to the choice of poverty line and measurement assumption but also what ever change there is, at the national poverty line, is statistically insignificant. But the cause of the insignificance was different in both states. For Tigray it was due to the fact that improved per capital income among the poor is matched by deteriorating distribution, how ever for Gambela it has to do with higher standard error which can be caused by small number of observations.

In this period the highest increase in head count poverty is observed in Somali, Afar and Benishangul-Gumuz[10]. Furthermore in these three states not only the average income did decline but also the distribution of income gets worst, to lead to such increase in head count poverty. And they are followed by SNNPR (for poverty line greater than 305) and Oromia (for poverty line greater than 500 birr). For SNNPR the change was due to deteriorated per capital income, with more or less unchanged distribution; but for Oromia the negative impact of decline in average income is some how mitigated by improved distribution in favor of the poor.

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[10] Here we are comparing two periods of the same region and we are not comparing two regions, so we are not inferring any order of magnitude but just robust direction of change

The highest decrease in incidence of poverty is observed at Addis Ababa, Dire Dawa, Harerr and Amharia. And in all cases, except Harerr, the cause of the improvement in the welfare of the poor was higher increase in per capital income with some how deteriorated distribution of income. In case of Harerr not only the average per capital income did rise but also its distribution toward the poor was improved.

Table 6 the change in regional intensity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

region	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Tigray	-0.01447	0.00845	0.043	0.01519650	-0.00073002	0.00687858	0.013	0.457
Afar	0.149757	0.01042	0	-0.11041932	-0.03933652	0.01246961	0	0
Amharia	-0.10871	0.00519	0	0.09772258	0.01098838	0.00474271	0	0.01
Oromia	0.036042	0.00365	0	-0.06347524	0.02743407	0.00285491	0	0
Somali	0.077915	0.00512	0	-0.07155546	-0.00635938	0.00493783	0	0.098
Benishangul-Gumuz	0.097691	0.01189	0	-0.06897999	-0.02871069	0.00838554	0	0
SNNPR	0.085096	0.00527	0	-0.11384113	0.02874549	0.00344790	0	0
Gambela	-0.07235	0.01399	0	0.02099878	0.05135274	0.01047598	0.022	0
Harerr	-0.13882	0.00815	0	0.05703369	0.08178221	0.00675686	0	0
Addis Ababa	-0.18556	0.00529	0	0.19270447	-0.00714210	0.00701971	0	0.154
Dire Dawa	-0.19156	0.00895	0	0.21604142	-0.02448438	0.00923332	0	0.004

But if we are to accept the Pigou-Dalton principle of transfer, or in our case take the intensity of poverty in addition to its incidence, the lowest decline in poverty is observed in Dire Dawa, Addis Ababa, Harerr, Amharia, Gambela and Tigray. In case of Tigray and Dire Dawa there was higher growth which out weights the negative impact of deteriorating income distribution. In other cases there was improvement in both average income and its distribution, the exception being in case of Addis Ababa in which there was no statistically significance change in distribution.

The dynamics of poverty and its causes did not change for Somali, Afar and Benishangul-Gumuz even, if we take the intensity of poverty into considerations. SNNPR (for poverty line great than 402 birr) and Oromia (for poverty line higher than 649 birr) have experienced increase in incidence of poverty. How ever in both states there was improvement in distribution of income, but can't out weight the higher decline in per capital income.

Becoming more distribution sensitive, by allowing the poverty measures to respond negatively for composite favorable transfer like using severity index, did not change the dynamics in states with improved poverty. But the cause of the change was both improved average income and its distribution among the poor in all except Addis Ababa,

which experienced insignificant change in distribution and Dire Dawa which have deteriorated distribution which is significant at 6.2% but not at conventional 5%.

Table 7 the change in regional severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

region	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Tigray	-0.02024	0.0053	0	0.00902153	0.01121391	0.00412418	0.014	0.003
Afar	0.069365	0.0053	0	-0.05150672	-0.01785862	0.00605374	0	0.001
Amharia	-0.0786	0.00346	0	0.05941281	0.01918590	0.00297233	0	0
Oromia	0.010649	0.00201	0	-0.03178860	0.02113921	0.00136419	0	0
Somali	0.025259	0.00221	0	-0.02406848	-0.00119054	0.00194444	0	0.27
Benishangul-Gumuz	0.043924	0.00595	0	-0.03377254	-0.01015142	0.00379557	0	0.003
SNNPR	0.039068	0.00325	0	-0.06426669	0.02519898	0.00174484	0	0
Gambela	-0.05667	0.00936	0	0.01179852	0.04486648	0.00587624	0.022	0
Harerr	-0.08927	0.00475	0	0.02830877	0.06096024	0.00364495	0	0
Addis Ababa	-0.1141	0.0032	0	0.11124934	0.00284744	0.00420794	0	0.249
Dire Dawa	-0.12114	0.00565	0	0.13015975	-0.00901753	0.00587611	0	0.062

And in the rest of the states except SNNPR and Oromia, the increase in severity of poverty is caused not only by decline in income but also by deteriorating or unchanged income distribution. In the states of SNNPR and Oromia, the increase in poverty is not independent of poverty line as was seen in table 4, above; but for poverty line above 515 birr for SNNPR and above 789 birr for Oromia, there was increase in severity of poverty which is caused by depressed per capital with littlie improvement in distribution.

So although to make robust comparative static analysis at national level one need to use third order poverty measures; at regional levels the urban centers of Addis Ababa, Dire Dawa and Harerr did experience improvement in welfare of the poor, independent of the measurement assumptions or poverty line in range of 500 to 2000 birr. The reverse was the case for the underdeveloped regions of Afar, Somali and Benishangul-Gumuz. Some how improvement is observed in Gambela and Tigray but for Oromia and SNNPR the observed increase in poverty is some how measurement assumption and poverty line dependent, un less we restrict our lower poverty line to higher than 789 birr for Oromia and 515 birr for SNNPR. But, although there are losers and winners of the economic condition of the 1995 to 2000 era, the over all national poverty seems unchanged, unless we are willing to give more weight to the poverty of the poorest of the poor.

Another important observation is that in regions with trend of increasing poverty, the decline in income and deterioration on distribution happened at the same time. For regions with improved poverty trend, income distribution moves against income growth for measures which obey Pigou-Dalton principle like poverty gap but more in the same

direction for measures which show increase in welfare with composite favorable transfer like severity index. So it may not be always the cause that increase in income can be achieved only at deteriorating distribution, especially if we give more weight to the distribution among the poor of the poorest. And fortunately any improvement on regional poverty is un-proportionally happened among the poorest of the poor than among the better of poor.

3.3. Poverty dynamics in rural – urban dimension

In rural areas the change in poverty (welfare) seems in opposite direction for the poor of the poorest and the rest of the rural residences. For urban areas, however, robust welfare comparison in general or poverty comparison in particular can be done by all measures which accept the principle of unanimous and Pareto principles. In other words almost all measures of poverty proposed in the literature will be robustly order the level of urban welfare (poverty) between the two periods.

Table 8 stochastic dominance analysis of urban- rural poverty dynamics between 1995 and 2000

Location	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Rural	506	6	654	21	797	32
Urban						

And as can be seen from table 9 below, urban poverty did decline in this period measured by incidence, intensity or severity. And although some better off poor are able to cross the poverty line through transfer from the poorest of the poor in urban areas; the general economic changes of urban areas introduced in this periods were both income generating and egalitarian in character.

Table 9 the change in rural - urban poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

measure ment	locati on	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
		value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
								G	D
Incidence	Rural	0.123103	0.005948	0	-0.139	0.0163	0.002	0	0
	Urban	-0.30989	0.008697	0	0.3185	-0.009	0.004	0	0.012
Intensity	Rural	0.032018	0.002667	0	-0.07	0.038	0.002	0	0
	Urban	-0.22886	0.004945	0	0.2085	0.0204	0.005	0	0
severity	Rural	0.009337	0.001579	0	-0.038	0.0287	0.001	0	0
	Urban	-0.15944	0.003661	0	0.1359	0.0235	0.003	0	0

Measured at national poverty line, there was increase in rural poverty, measured by its incidence, intensity or severity. And this was caused by negative growth of per capital income and some how mitigated by improved income distribution. But the dynamics in poverty will be reversed for poverty line less than 506 birr for incidence, 654 for intensity

and 797 for severity. So the welfare of the poorest of the poor in rural area and all urban poor population was improved at 2000 compared to 1995. How ever the status of the middle and better off rural poor was worsened in 2000 compared to 1995.

3.4. Poverty dynamics in terms of gender
3.4.1. Own sex wise dynamics

In terms of own gender the change in poverty is not robust for measurement assumptions and choice of poverty line in range of 500 to 2000 birr (see table 10, below). And especially the comparisons in terms of measures of second order, like poverty gap, are generally unreliable given the crossing is close to the national poverty line. The comparison in terms of severity index which decrease with favorable composite transfer is more robust if we restrict the poverty line in to less than 1563 birr for male and 1737 for female. More over the comparison first order indexes like head count can also be robust if we divide the poor in to the poorest of the poor and better off poor. Said so, let's analyze the poverty dynamics decomposed by gender.

Table 10 stochastic dominance analysis of own Gender wise poverty dynamics between 1995 and 2000

Gender	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Male	738	12	1113	37	1563	76
Female	777	12	1193	46	1737	92

Based on head count index the incidence of poverty among the better off poor did increase among both genders, which is caused by declining income in face of deteriorating distribution. But the other side of the same coin did also mean that the incidence of poverty among the poorest of the poor, evaluated at poverty line lower than 738 birr for male and 777 birr for female, did improve.

Table 11 the change in own gender wise poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

measurement	Own gender	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
		value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
								G	D
Incidence	Male	0.065968	0.00757	0	-0.04652506	-0.01944274	0.00134931	0	0
	female	0.059501	0.00745	0	-0.04576194	-0.01373869	0.00134912	0	0
Intensity	Male	-0.00252	0.00352	0.237	-0.02284904	0.02537142	0.00274738	0	0
	female	-0.00731	0.00535	0.085	-0.02268857	0.02999815	0.00274655	0	0
severity	Male	-0.01305	0.00217	0	-0.01273869	0.02578839	0.00151322	0	0
	female	-0.01638	0.00215	0	-0.01269639	0.02907158	0.00151646	0	0

And based on severity index there was improvement in welfare of the poor of both sex, which mainly caused by better distribution and some how mitigated by negative income growth. This is further indication of the fact that the poorest of the poor in both genders

did benefit in the period. And this is the same as the national picture given in table 3, above.

3.4.2 Head sex wise dynamics

For female headed individuals both second and third order measures are robust for poverty lines in range of 0 to 2000 birr. But for welfare comparison of all female population only third order measures are robust. To make comparison using first order measures we need to divide the poor population in to better off poor (i.e. income > 929) and other poor (i.e. income < 929). Among male headed first order comparison can be made if we divide the poor population in to poorest of the poor (income < 710) and the better off poor (income > 710). Second order dominance is less robust given the crossing is very close to the national poverty line and third order will need to restrict poverty line in to less than 1434 birr.

Table 12 stochastic dominance analysis of own Gender wise poverty dynamics between 1995 and 2000

Head Gender	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Male	710	9	1048	30	1434	52
female	929	25	2528	2576		

In terms of incidence of poverty both male and female headed individuals did face increase in poverty. But the causes for male headed are both decreased income with deteriorating distribution but for female headed one, it is high deterioration in income distribution in face of slowly increasing income. The intensity index did decrease as caused by better distribution, which show the gain in income to the very poor was much higher than the loss to the better of poor female headed individuals.

Table 13 the change in Head gender wise poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

measurement	Head gender	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
		value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
								G	D
Incidence	Male	0.071493	0.0059	0	-0.05942744	-0.01206565	0.00114563	0	0
	female	0.024865	0.012151	0.02	0.00295600	-0.02782139	0.00115508	0.005	0
Intensity	Male	0.001556	0.002736	0.284	-0.02875526	0.02720116	0.00216077	0	0
	female	-0.03422	0.005777	0	0.00111748	0.03310235	0.00440345	0.399	0
severity	Male	-0.00992	0.001673	0	-0.01600199	0.02592599	0.00118518	0	0
	female	-0.03669	0.003699	0	0.00063904	0.03604849	0.00251779	0.399	0

In terms of severity of poverty at national poverty line there was welfare improvement among individuals headed by both male and female heads. But the difference was on that although the mean income of the male headed individuals did decline but over

compensated by improved distribution; the mean income of female headed[11] individuals did improve to augment the positive impact of improved distribution.

So based on the above results, the economic wide changes introduced in period of 1995 to 2000 did not at least increase the gender discrimination against females or female headed individuals, if they were not biased on their favor.

3.5. Poverty dynamics in terms of Marital Status
3.5.1. Own Marital wise dynamics

Based on own marital status only the comparison among widowed individuals will be robust to the choice of measurement assumptions (excluding Pareto and unanimous principles or assumptions) and choice of poverty line. For married and divorced one we can make robust comparison if we divide the population to poorest of the poor and the better off poor. And the dividing lines will be the crossing values given in table 14, below. For separated individuals comparison can be made only for those with per capital income of 939 and less. And for unmarried the poor need to be split in to more and less poor around 904 birr per capital income. But both values are close to the national line so making comparison based on these measures is not advisable.

Table 14 stochastic dominance analysis of own Marital status wise poverty dynamics between 1995 and 2000

Own Marital status	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Never married	904	40	1789	297		
Married	735	15	1081	46	1479	79
Widowed						
Divorced	776	48	1198	252	1820	433
Separated*	939 1333 1445 1484	60 81 26956 231				

- **We reported four values because there were more than 1 crossing with in 0 and 2000 birr range**

And if we assume society is sensitive to distribution of income, we can make robust order among separated. More over if society is more sensitive to distribution among the poorest of the poor compared to the better of poor; we can make robust comparison among marriage age but unmarried individuals, too. For divorced and married individuals, the crossing values are very close to the national poverty line so it is better not to make any comparison based on the national poverty line. How ever for unmarried if we restrict the poverty line to less than 1789 birr, we can make robust comparison using second order measures like intensity index.

To make comparison among married individuals using severity index or any poverty measure of third order we need to restrict our poverty line to less than 1479 birr and

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[11] Now the income of the very poor is given higher weight in measuring the mean income

among divorced individuals we need to restrict it to less than 1820 birr. Given this facts now let's analyze the data at national poverty line of 1075 birr.

Table 15 the change in Own marital wise incidence of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own marital status	Change in incidence of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Never married	-0.03091	0.03661	0.199	0.0968184	-0.06591	0.0081178	0	0
Married	0.074205	0.00584	0	-0.066441	-0.00776	0.0011728	0	0
Widowed	-0.04234	0.021721	0.025	0.0737189	-0.03138	0.0037722	0	0
Divorced	-0.04542	0.036277	0.105	0.0103509	0.035066	0.0039207	0.004	0
Separated	0.141635	0.028293	0	-0.013066	-0.12857	0.0045701	0.002	0

For widowed individuals the incidence of poverty did decline which are caused by increased average income at face of deteriorating distribution (see table 15 above). The incidence of poverty among better off married individuals did increase and decreased among better off divorced individuals. And on both cases distribution and income did work in the same direction, either to increase or decrease poverty. But according to above stochastic dominance analysis, the incidence of poverty among the poorest of the poor married individuals did decline and the reverse is the case for the poorest of the poor divorced individuals.

Table 16 the change in Own marital wise intensity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own marital status	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Never married	-0.04441	0.017634	0.005	0.0497325	-0.005321	0.0132458	0	0.343
Married	0.002602	0.002692	0.166	-0.032787	0.0301905	0.0021239	0	0
Widowed	-0.09438	0.011687	0	0.0531806	0.0412022	0.0089932	0	0
Divorced	-0.04874	0.016334	0.001	0.0055115	0.0432319	0.0140733	0.347	0.001
Separated	0.03286	0.016249	0.021	-0.007463	-0.025396	0.0136728	0.292	0.031

Based on intensity of poverty the improvement on poverty among widowed individuals was caused by both improved distribution and increased income. And for separated individuals the same forces work in different direction to increase the intensity of poverty. But the intensity among unmarried did improve as caused by improved income on face of unchanged distribution. And this is robust for all poverty lines less than 1789 birr.

Table 17 the change in Own marital wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own marital status	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Never married	-0.03229	0.011186	0.001	0.0256433	0.0066449	0.0073112	0	0.181
Married	-0.00972	0.001641	0	-0.018234	0.0279502	0.0011559	0	0
Widowed	-0.07756	0.008326	0	0.0324979	0.0450595	0.005703	0	0
Divorced	-0.03929	0.009957	0	0.0031777	0.0361157	0.0081486	0.348	0
Separated	0.001769	0.010875	0.435	-0.004489	0.00272	0.0081785	0.291	0.369

Based on severity of poverty the status of separated individuals did not statistically change at the national poverty line, although the comparison was robust. Fortunately, the welfare of unmarried and widowed poor individuals did improve between the two periods. And the cause of the change was due to better income growth but augmented by improved distribution in the latter case. Restricting the poverty line to lower than 1820 birr the improvement among divorced poor individuals' welfare is due to better income distribution alone and of those married the improvement due to better distribution is some how mitigated by decline in per capital income.

So the main gainers are widowed and unmarried poor but the status of separated individuals did not show significant improvement on both periods. But if assume inequality is bad but all inequality is equally bad, then the status of separated individuals did get worst and it is caused by both deteriorating income and worsening distribution. So the main losers among both periods are the better off poor among the separated and married individuals but not the poorest of the poor separated or married individuals.

3.5.2. Head Marital wise dynamics

As can be seen from table 18 below the change in poverty will be more visible, if approached from head's marital status point of view. From this point of view robust welfare analysis on individuals headed by unmarried, widowed and divorced head can only be made if we assume that society prefers equitable income to skewed income distribution. How ever, for poverty analysis and poverty line in rang of 0 to 2000 any measure will robustly show the change in poverty, especially for individuals headed by unmarried and widowed head. The change mainly on individuals headed by separated head (especially for third order poverty measures) and those headed by married one (especially for second order poverty measures) is highly dependent on measurement assumptions that one is willing to make. For divorced headed one robust comparison will need to assume that mean preserving equitable transfer among poor will reduce poverty or restrict poverty line in to less than 1524 birr. Given this facts now let's analyze the change in poverty in terms of head's martial status.

Table 18 stochastic dominance analysis of Head Marital status wise poverty dynamics between 1995 and 2000

Own Marital status	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Never married	9535	101				
Married	701	9	1033	30	1407	47
Widowed	5991	1715				
Divorced	1524	98				
Separated	519	49	777	285	1039	150

Unmarried and widowed headed poor individuals experience increase on average per capital income, at national poverty line of 1075 birr, which over compensate the negative impact of deteriorating distribution. But the final change in poverty at national line is significant for widowed headed individuals only. For divorced headed ones, avoiding poverty lines greater than equal to 1524 birr, there was insignificant decline in poverty which is caused by significant change in both improving average living standard and its distribution. And avoiding lower poverty lines i.e. less than 701 birr for married headed and less than 519 birr for separated headed individuals, the reverse was the case and all changes are significant.

Table 19 the change in head's marital wise incidence of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own marital status	Change in incidence of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Never married	-0.03091	0.03661	0.199	0.0968184	-0.065911	0.0081178	0	0
Married	0.074205	0.00584	0	-0.066441	-0.007764	0.0011728	0	0
Widowed	-0.04234	0.021721	0.025	0.0737189	-0.031378	0.0037722	0	0
Divorced	-0.04542	0.036277	0.105	0.0103509	0.0350661	0.0039207	0.004	0
Separated	0.141635	0.028293	0	-0.013066	-0.128569	0.0045701	0.002	0

If we assume society prefers equity, the welfare of individuals headed by unmarried, widowed and divorced head did improve between this periods (see table 20, below) and this will be the case no matter the poverty measure chosen. With in the intensity index the change was caused by significant change in income with unchanged distribution among individuals headed by married head. And the reverse was the cause of the change for those headed by divorced head. The welfare of individuals headed by widowed head's was changed due to double bless of improved distribution in face of increasing income. And avoiding lower poverty lines 777 birr and less, the deterioration in individuals headed by separated head is caused by worsens income distribution in face of stagnant income.

Table 20 the change in head's marital wise intensity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own marital status	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Never married	-0.04441	0.017634	0.005	0.0497325	-0.005321	0.0132458	0	0.343
Married	0.002602	0.002692	0.166	-0.032787	0.0301905	0.0021239	0	0
Widowed	-0.09438	0.011687	0	0.0531806	0.0412022	0.0089932	0	0
Divorced	-0.04874	0.016334	0.001	0.0055115	0.0432319	0.0140733	0.347	0.001
Separated	0.03286	0.016249	0.021	-0.007463	-0.025396	0.0136728	0.292	0.031

Restricting our poverty measures in to third order poverty measures, did not change the direction of the change or the causes of the change among individual headed by unmarried, widowed and divorced heads. But for poverty lines less than 1407 birr the improvement in welfare of individuals headed by married head as measured by severity index is caused by improved distribution in face of declining per capital income.

Table 21 the change in head's marital wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own marital status	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Never married	-0.03229	0.011186	0.001	0.0256433	0.0066449	0.0073112	0	0.181
Married	-0.00972	0.001641	0	-0.018234	0.0279502	0.0011559	0	0
Widowed	-0.07756	0.008326	0	0.0324979	0.0450595	0.005703	0	0
Divorced	-0.03929	0.009957	0	0.0031777	0.0361157	0.0081486	0.348	0
Separated	0.001769	0.010875	0.435	-0.004489	0.00272	0.0081785	0.291	0.369

So the main gainers of the period are individuals headed by unmarried, widowed and divorced heads. And the poorest of the poor who are headed by married head and to some extent separated head. The losers are those which are headed by married and separated head but are better off poor. Now let's analyze the gainers and losers in terms of educational achievements.

3.6. Poverty dynamics in terms of educational Status
3.6.1. Own educational status wise dynamics

As can be seen from table 22 below, although for any temporal welfare comparison among those 4 grades and above we need to assume that social welfare is increasing function of income equality, for poverty comparison among those grade 7 and above we can robustly measure the temporal change using all measure of first order. In other words if we use head count, intensity or severity index we will reach the same

conclusion about the change in poverty; and almost all poverty measures proposed in the literature will give the same direction of change.

Table 22 stochastic dominance analysis of own educational status wise poverty dynamics between 1995 and 2000

Educational level	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Illiterate	632	7	906	27	1202	44
1-3 grade	911	27	1675	170	2995	713
4-6 grade	1251	41				
7-8 grade	31918	0				
9-11 grade	25181	24				
12 complete	31918	0				
Post high	31918	0				

The change in poverty (welfare) of the illiterate will be highly measurement assumption and poverty line dependent. For grade 1-3 we can robustly measure the change, if we assume society prefers equality among the poorest of the poor compared to equality among the better off poor, using severity index for example. And if we restrict our poverty measure to less than 1675 birr we can make comparison based on those measures which assume society is better off if distribution is improved, holding other things constant. Given this let's analyze the change in poverty.

Table 23 the change in Own education wise incidence of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own education	Change in incidence of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	significance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Illiterate	0.092762	0.00674	0	-0.093292	0.0005303	0.0015259	0	0.364
1-3 grade	0.043255	0.018354	0.009	-0.026119	-0.017137	0.0030779	0	0
4-6 grade	-0.03825	0.021469	0.037	0.0426145	-0.004364	0.0037753	0	0.123
7-8 grade	-0.14812	0.030091	0	0.1581111	-0.009994	0.0078022	0	0.1
9-11 grade	-0.24979	0.033835	0	0.2321791	0.0176105	0.010228	0	0.042
12 complete	-0.3243	0.030247	0	0.2947121	0.0295861	0.0106322	0	0.002
Post high	-0.26475	0.041918	0	0.3068901	-0.042143	0.0155847	0	0.003

The number of people of living in poverty is reduced, if they were having educational level of grade 7 and above. And this is caused by double bless of increased income with improved income distribution for those high school complete and incomplete. The improvement of junior high school level was due to increase in mean income with unchanged distribution; but for those with post high Scholl level the positive impact of increase in income is some how mitigated by deteriorating distribution.

For illiterate one the increase in poverty, at national poverty line, is caused by larger decline in income with statistically unchanged distribution. And for 1-3 grades the deterioration in both average income and its distribution was the cause of the problem. But for poverty line lower than 632 birr, there was decrease in poverty among illiterate and the relative figure for 1-3 grades is less than 911 birr. For 4 - 6 grade individuals, the deteriorating income distribution, which is out weighted by improved average income, failed to reverse the decrease in head count poverty. But for poverty line above 1251 birr there would be increase in poverty.

So the above results show that most of the benefit in terms of crossing poverty line happened among those with educational level of junior high school incomplete and above. In other cases although there is no robust order, it did also show that there is no evidence of improved poverty incidence. Unfortunately given increase in national incidence of poverty and decline in incidence among all post grade 6 individuals, it is imperative to infer that what ever increase there is at national level must be observed by those with elementary and less educational level.

But if we assume society prefer less skewed income distribution or we use the second order poverty measures including poverty gap; the intensity of poverty among individuals with education level of grade 3 and above did decline. And it was caused by double bless of improved income distribution at face of increasing per capital income, the only exception being among the post high in which there was no statistically significant change in equality.

Table 24 the change in Own education wise intensity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own education	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Illiterate	0.012006	0.003149	0	-0.047722	0.035718	0.0024091	0	0
1-3 grade	-0.03284	0.00844	0	-0.011602	0.0444433	0.0065889	0.039	0
4-6 grade	-0.06371	0.009544	0	0.0216412	0.0420662	0.0074283	0.001	0
7-8 grade	-0.1204	0.012682	0	0.0798415	0.0405606	0.0121271	0	0
9-11 grade	-0.15466	0.013902	0	0.1080702	0.0465938	0.0132917	0	0
12 complete	-0.15768	0.012953	0	0.1272231	0.0304552	0.0123484	0	0.006
Post high	-0.09746	0.01299	0	0.110388	-0.012932	0.0129421	0	0.158

For poverty line less than 1675 birr and less, there was decrease in intensity of poverty among grade 1-3, which is caused by improved distribution and some how mitigated by decrease in mean income. For illiterate there was increase in poverty caused by higher decrease in income distribution which out weighted the improvement in distribution effect. But for those with income of 906 birr and less there were welfare improvement measured by intensity of poverty (see table 22, above).

Considering severity of poverty, or giving more weight to the inequality among the poorest of the poor, did show that at national poverty line, the welfare of the poor is

improved at all educational levels. And this is robust for choice of poverty line and other measurement assumptions for all except illiterate (see table 22, below). For illiterate we need to restrict our poverty line to less than 1202 birr. The causes for the above changes are the same as the cause for intensity; but now, of course, the distribution impact out weights the income impact for illiterate.

Table 25 the change in Own education wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own education	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Illiterate	-0.00427	0.00194	0.013	-0.026672	0.0309437	0.001301	0	0
1-3 grade	-0.03632	0.005239	0	-0.006282	0.042605	0.0035472	0.038	0
4-6 grade	-0.05084	0.005784	0	0.0121012	0.0387424	0.0041751	0.001	0
7-8 grade	-0.08234	0.007694	0	0.0442657	0.0380712	0.0068814	0	0
9-11 grade	-0.09789	0.008283	0	0.0589879	0.0389021	0.007772	0	0
12 complete	-0.0865	0.007931	0	0.065543	0.0209609	0.0066648	0	0
Post high	-0.04875	0.006654	0	0.0528106	-0.004061	0.0066755	0	0.271

The above result show that in terms of education the increase in poverty was sucked by those illiterate but better of poor and to some extent by 1-3 grades better off poor. Fortunately poverty was reduced on all educational class excluding, the above two.

3.6.2. **Head's educational status wise dynamics**

Based on head's education and poverty line in range of 500 to 2000 birr, robust comparison using any measure of poverty of first order can be made only for those headed by high schools complete and above. To use first order poverty measures like head count we need to restrict the possible poverty lines in to less than 1589 birr for 9-11 grade headed, in to less than 1102 birr for those7-8 grade headed, in to less than 983 birr for 4-6 grade headed, in to less than 1072 birr for those 1-3 grade headed and in to less than 651 birr for illiterate headed. But the restrictions on poverty line for those headed by 1 to 8 grade level head are too close to the national poverty line which is clear indication inference based on national poverty line and head count index is useless.

Table 26 stochastic dominance analysis of Head's educational status wise poverty dynamics between 1995 and 2000

Educational level	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Illiterate	651	7	954	1	1286	41
1-3 grade	1072	13	1716	157	2905	595
4-6 grade	983	27	1470	75	2293	264
7-8 grade	1102	97				
9-11 grade	1589	30				
12 complete	25222	0				
Post high	31918	0				

Using second order poverty measures like poverty gap index, the comparison between illiterate headed individuals of the two periods is not robust. But for grade 1-3 headed individuals, we need to restrict the poverty line in to less than 1716 birr and for 4-6 grade headed individuals in to less than 1470 birr. The comparison based on both second and third order measures is robust for all headed by grade 7 and above head. If we are more interested in eliminating the inequality among the poorest of the poor than among the better off poor, only the comparison among illiterate headed individuals will not be robust to the choice of measurement assumption and poverty line[12]. Given this now let's analyze the comparative static analysis of poverty dynamics.

Table 27 the change in Head's education wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Head's education	Change in incidence of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signific ance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Illiterate	0.092342	0.006174	0	-0.093267	0.0009244	0.0014228	0	0.257
1-3 grade	0.019299	0.018838	0.152	-0.061879	0.0425805	0.0045416	0	0
4-6 grade	0.033645	0.01841	0.033	-0.040693	0.0070472	0.0039111	0	0.035
7-8 grade	0.003599	0.027264	0.447	0.0034153	-0.007014	0.0014025	0.007	0
9-11 grade	-0.0666	0.038158	0.04	0.0449313	0.021667	0.0060588	0	0
12 complete	-0.31235	0.029869	0	0.2723115	0.0400377	0.009621	0	0
Post high	-0.21095	0.024982	0	0.251097	-0.040146	0.0097882	0	0

As can be seen from table 27 above, the incidence of poverty did decline among both high school complete and above headed individuals. But the distribution of income seems to get worst with individuals headed by post high level but not with 12 complete. The patterns of those headed by high school incomplete are the same with high school complete headed except to the fact that to be robust the poverty line must be less than 1589 birr, as was seen above. For illiterate headed individuals there was increase incidence of poverty which is mainly caused by declining average income and some how mitigated by improvement on distribution of income. But for poverty line less than 651 birr the reverse will be the case (see table 26, above)

If we use poverty gap to measure poverty, we find an improvement in intensity of poverty for individuals headed by grade 7 and above head. But the cause was different: i.e. for 7-8 grade headed it was better distribution, for high school level it was both growth (for 9 - 11 the growth effect is significant at 6.1% only) and better distribution, but for post high school headed it was only growth with statistically unchanged distribution. Accepting the above restrictions on grade 1-6 level, there was reduction on poverty which is caused by better distribution, but some how partially mitigated by decline in average income.

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[12] In this paper the appropriate poverty line is assumed to be in range of 500 to 2000 birr.

Table 28 the change in heads education wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Head's education	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Illiterate	0.009054	0.002933	0.001	-0.049705	0.0406506	0.0023509	0	0
1-3 grade	-0.03348	0.008162	0	-0.018855	0.0523291	0.0056465	0	0
4-6 grade	-0.03299	0.007784	0	-0.017844	0.0508373	0.0050205	0	0
7-8 grade	-0.04968	0.011642	0	0.00261	0.0470724	0.008278	0.376	0
9-11 grade	-0.06	0.014986	0	0.0166144	0.043382	0.0107579	0.061	0
12 complete	-0.15306	0.015972	0	0.1072964	0.0457629	0.0103966	0	0
Post high	-0.07853	0.007697	0	0.0835232	-0.004989	0.0073469	0	0.248

At 1075 birr poverty line although the causes of poverty (welfare) for illiterate headed act as those of 1- 6 grade headed one, the negative effect of income was stronger than the positive impact of better distribution to result on higher intensity of poverty in year 2000. But as can be seen from 26 above for those earning below 954 birr, the dynamics was in reverse or the intensity of poverty among the poorest of the poor is reduced even among illiterates headed individuals.

Table 29 the change in heads education wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Head education	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Illiterate	-0.00738	0.001834	0	-0.028084	0.0354632	0.0012795	0	0
1-3 grade	-0.02732	0.004662	0	-0.010054	0.0373786	0.00297	0	0
4-6 grade	-0.03275	0.004717	0	-0.00955	0.0422969	0.0026892	0	0
7-8 grade	-0.04672	0.007065	0	0.0014023	0.0453164	0.0044682	0.376	0
9-11 grade	-0.04424	0.008452	0	0.0083926	0.0358445	0.0057685	0.072	0
12 complete	-0.08845	0.010388	0	0.0544819	0.0339709	0.0062614	0	0
Post high	-0.03849	0.003878	0	0.0376864	0.0008001	0.0035468	0	0.41

Taking severity of poverty into consideration or giving more weight for the inequality resulting in the bottom of the distribution did not change the conclusion, for all individuals headed by a head with formal education. The exception being the fact that: all temporal comparisons are robust for all other measurement assumptions, as long as poverty line is in range of 0 to 2000 birr. But in case of those headed by illiterate head the severity of poverty did decline for all measures as long as the poverty line is lower than 1286 birr.

So here also the main benefit accrued to those headed by educated head and those in bottom of the income distribution, even among the illiterate. And for those headed by low level educated head the improvement was mainly due to better distribution but as the

education level is raised the cause was found to be raised average income and some times augmented by better distribution. So the real increase in purchasing power must be skewed to ward the more educated sector of the society.

3.7. Poverty dynamics in terms of employment
3.7.1. Own employment wise dynamics

As can be seen from table 30 below, using all poverty or social welfare measures with some preference to equitable distribution (no matter the level of preference) will robustly order the level of poverty (welfare) between the two periods for employer, employee and the composite group of others. The use of such analysis will be less robust for self employed and unpaid family workers. For this group we need two further restrictions, first we need to restrict the poverty line in to less than 1305 birr for self employed and less than 1462 birr for unpaid family worker. Second we need further measurement assumption of that society is more concerned about the inequality among the poorest of the poor than inequality among the better off poor. Means for the first three the change measured by the poverty gap will be robust for all measures of second order. And for the last two the use of severity index or any third order measure will be robust, with above stated restrictions on range poverty lines.

Table 30 stochastic dominance analysis of own employment wise poverty dynamics between 1995 and 2000

Own employment	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Employer	898 1243 1336 1932	129 75 318 68				
Employee	31918	0				
Self employed	658 38959	17 0	971	59	1305	88
Unpaid family worker	698 18787 41456	24 7 0	1068	65	1462	125
Others	773 912 934 1328	259 815 771 134				

In table 30 above, we give four crossing value than the usual one. This is due to the fact that more than one crossing values are found in range of 0 to 2000 birr, which was not the case in preceding ones. And reporting all of them will help us on not making unwarranted farther restricted comparison among the poorest of the poor and the better of poor. For employer the comparison using first order poverty measures will be robust, if we use poverty line less than 898 birr but not above. And the relative figure for the composite employment of 'others' is less than 773 birr. Fortunately for self employed individuals, we can divide the poor in to the poorest of the poor, with per capital income of below 658 birr and better off poor having income above that. And for unpaid family worker the relative per capital income will be 698 birr. For the employee the comparison will be

robust for all poverty lines in range of 0 to 31918 birr in which, of course, the restricted range of 500 to 2000 will be a subset. Given this fact now let's analyze the data below.

Table 31 the change in own employment wise incidence of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own employment	Change in incidence of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Employer	0.015426	0.065081	0.406	0.1088603	-0.124286	0.0145984	0	0
Employee	-0.17476	0.025262	0	0.2691727	-0.094413	0.0081458	0	0
Self-employed	0.08587	0.013005	0	-0.100204	0.0143341	0.0030322	0	0
Unpaid family worker	0.063957	0.012508	0	-0.075201	0.0112435	0.0027148	0	0
Others	0.023894	0.150567	0.436	0.1375064	-0.161401	0.0440046	0	0

In terms of incidence of poverty, the main gainers of the period are the employee, which are able to earn higher per capital income which over compensate the negative impact of skewed distribution. And the reverse was the case for the self employed and unpaid family workers, which is caused by worsening average income which over weights the improvement in distribution. But as was seen in table 30 above, the poorest of the poor of the two employments did also gain in this period. The temporal comparison of employer or the composite employment of 'others', is not only un-robust but also statistically insignificant. But at national poverty line the insignificant increase was caused by improvement on average income which is balanced by increasingly skewed distribution income.

Table 32 the change in own employment wise intensity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own employment	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Employer	-0.02091	0.025663	0.207	0.0500539	-0.029144	0.0214411	0.009	0.087
Employee	-0.0955	0.01119	0	0.1361269	-0.040629	0.0093729	0	0
Self-employed	0.007019	0.005895	0.116	-0.050062	0.043042	0.0046459	0	0
Unpaid family worker	0.000295	0.00569	0.479	-0.037177	0.036883	0.0043315	0	0
Others	-0.0237	0.078136	0.38	0.086268	-0.062571	0.0483561	0.037	0.097

In terms of intensity of poverty all employer, employee and 'others' did face decrease in intensity of poverty but only of the employee's change is statistically significant. The cause was improved average income in all cases, which is some how mitigated by worsening income distribution (even here only employee's change in distribution is statistically significant at 5% level). In the national poverty line there was no significant change in poverty of the self employed and unpaid family workers. But what ever increase there is, is caused by decline in average income which is having much stronger

effect compared to the effect of improved distribution. But for those with per capital income of 971 birr and less in self employed and 1068 birr and less in unpaid family workers, there will be at least no change in intensity of poverty if not improvement (see table 30, above).

But if we are much concerned about the equality in the bottom of the distribution, the severity of poverty is significantly reduced for employees and the cause are the same as above. The decrease in severity among employer was significant at 0.073 % but not at 5%. And this is caused by improved income at face of unchanged distribution. Similar change in the cause was found to insignificantly change the severity of poverty among the composite employment of 'others'. In case of self employed and unpaid family workers for restricted poverty lines of less than 1306 and 1462 birr, respectively; the improvement in distribution did able to over weight the negative effect of decrease in income to lead to significant reduction in severity of poverty.

Table 33 the change in own employment wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Own employment	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Employer	-0.02016	0.013878	0.073	0.0253715	-0.005209	0.0111532	0.011	0.32
Employee	-0.05823	0.007017	0	0.0764054	-0.018177	0.0055629	0	0
Self-employed	-0.00746	0.003573	0.018	-0.027605	0.0350619	0.0024622	0	0
Unpaid family worker	-0.00906	0.003416	0.003	-0.020312	0.0293724	0.0023037	0	0
Others	-0.02904	0.051303	0.285	0.0583185	-0.029278	0.0355583	0.05	0.205

So the economic condition of the period was mainly conducive to the employee poor. Some non poor employers and those under 'others' did cross increasingly in to poverty line, but this happen to those near the poverty line and the fate of the poorest of the poor in this sector was better in 2000. For the employment group of self employed and unpaid family workers which include the vast majority of rural population, we have no idea what the incidence dynamics would be. But there is increase in intensity but not in severity; means what ever lose in this period is sucked by the better of poor with in these employments. Actually the life of the poorest of the poor was improving even in these employments.

This is very discouraging result for county which is trying to promote self employment and job creation. This is because what is happening in the ground is more favorable to the bureaucrat than the entrepreneur. Now let's analyze the final desegregation in terms of heads employment.

3.7.2. head's employment wise dynamics

Using head count index or all other first order poverty measures in range of 0 to 2000 (or 500 to 2000 birr) only those headed by employee can be robustly compared temporally (see table 34, below). For individuals headed by self employed head we can make comparison, but we need to separate the poor in to the poorest of the poor (with income less than 623 birr) and the better off poor (with income greater than 623 but less than 2000 birr). For employer headed individuals we need to restrict the poverty line in to less than 1398 birr. But for unpaid family worker headed and composite group of 'others' headed individuals, it is wise not to make comparison based on head count index or any other first order poverty measure. And note that in all cases robust first order welfare comparison can't be done. But if we assume society prefers equity those individuals headed by employer, employee and unpaid family workers can be robustly compared between the two periods. With assumption of equity preference of society we need to separate the self employed headed poor in to poorer and less poor earning average income of less and greater than 884, respectively. For composite group of "others' headed individuals, the poverty line need to be restricted in to less than 1202 birr. Means our comparison based on second order measure is less robust.

Table 34 stochastic dominance analysis of own employment wise poverty dynamics between 1995 and 2000

Head's employment	First order		Second order		Third order	
	value	Standard error	value	Standard error	value	Standard error
Employer	1398 1931 31918	13 26 0				
Employee	20971 30083	12 0				
Self-employed	623 38965	5 0	884	24	1175	36
Unpaid family worker	769 915 4586	22 29 0				
Others	760 1583 2526 2758	71 42 1210 21	1202 2870	211 2206	2171 3219	9469 11097

But if we assume that society is more concerned about the inequality among the poorest of the poor than the better off poor, the temporal comparison of those headed by self employed will be assumption dependent. The reason is that the crossing value is close to the national poverty line. But for those headed by head working in composite employment of 'others', we can make robust comparison but we need to make sure the change is statistically significant, given the crossing values (at more than 2000 birr) are not significant implying small number of observations. Given this let's analyze the change in poverty but keeping in mind the above results, which shows the robustness of the results found at national poverty line of 1075 birr, to the choice of poverty line and other measurement assumptions.

Table 35 the change in head's employment wise incidence of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Head employment	Change in incidence of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance G	D
Employer	-0.02379	0.027429	0.192	0.1241972	-0.100403	0.006426	0	0
Employee	-0.23631	0.015874	0	0.2855187	-0.049205	0.0053572	0	0
Self-employed	0.099887	0.006183	0	-0.106675	0.0067877	0.0015235	0	0
Unpaid family worker	0.046586	0.087023	0.296	-0.096655	0.0500686	0.0197719	0	0.005
Others	0.107153	0.108096	0.16	0.0372206	-0.144374	0.0358577	0.149	0

Individuals headed by employee head did face significant decrease in incidence of poverty, which is caused by increase in income which over weights the deterioration in distribution. The same is the cause and effect for employer headed one, except the decline in incidence of poverty was not significant and the change is only robust for poverty lines in range of 0 to 1398 birr. For self employed the decline in income was mach stronger to dominate the improvement in distribution and to cause significant increase in incidence of poverty. But as was seen in table 34 above, the poorest of the poor headed by self employed will be better position in terms of incidence of poverty. For the rest of individuals we can't be sure about the change in incidence of poverty.

Table 36 the change in head's employment wise intensity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Head's employment	Change in intensity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance G	D
Employer	-0.04519	0.011178	0	0.0614911	-0.016303	0.0095132	0	0.043
Employee	-0.12623	0.00787	0	0.1542873	-0.028061	0.006675	0	0
Self-employed	0.014574	0.002865	0	-0.05623	0.0416574	0.0022847	0	0
Unpaid family worker	0.029714	0.042791	0.243	-0.05426	0.024546	0.0264093	0.019	0.176
Others	-0.01674	0.059071	0.388	0.0127013	0.0040386	0.0215431	0.277	0.425

But if we take the intensity of poverty or we make our poverty measure equity sensitive, both individuals headed by employer and employee did face decrease in intensity of poverty which is caused by higher income increase in face of deteriorating distribution. For unpaid family worker headed there was decrease in average income and unchanged distribution, but the resulted increase in intensity of poverty at national poverty line was not significant. For the self employed head headed individuals the same causes did lead to significant increase in intensity of poverty, but the fate of those lower and middle income poor was better at 2000 (see table 34 above). And still for individuals headed by individual working in composite employment of others we can't be sure if intensity of poverty is increasing or decreasing.

Table 37 the change in head's employment wise severity of poverty between 1995 and 2000; and its decomposition at national poverty line of 1075 birr

Head's employment	Change in severity of poverty (2000 – 1995)			Decomposition of welfare change				
	value	Standard error	signifi cance	Growth contribution	Distribution contribution	Common Standard error	Significance	
							G	D
Employer	-0.03326	0.006238	0	0.0312462	0.0020158	0.0050687	0	0.345
Employee	-0.07474	0.005359	0	0.0885638	-0.013826	0.0038983	0	0
Self-employed	-0.00376	0.00175	0.015	-0.031326	0.0350861	0.0012216	0	0
Unpaid family worker	0.028349	0.028059	0.156	-0.029372	0.0010237	0.0132003	0.013	0.469
Others	-0.04811	0.038039	0.102	0.009384	0.0387223	0.0188055	0.308	0.019

Giving more weight to the poverty (inequality) among the poorest of the poor did not change the result for those headed by employee and unpaid family workers. But for those headed by employer the effect of distribution was not statistically significant. The change in severity of poverty among those headed by composite employment of 'others' was negative but as suspected insignificant. But what ever change there is caused by better distribution. For self employed headed individuals, there was decline in severity of poverty which is caused by improved income distribution and mitigated by some decrease in average income. But this is true for poverty lines in range of 0 to 1175 birr only so we can to be sure if severity poverty is higher or lower in this period (because the upper bound it too close to the national poverty line).

So in this period the benefit in terms of reduced poverty accrued to those headed by employee and employer. Among those individuals headed by employer most of the benefit did accrue to those with lower per capital income. The clear losers are the one headed by unpaid family workers and the better off poor among self employed. But the dynamics of those headed by head working under composite employment of 'others' can't be surely known. The only change introduced from viewing poverty form heads employment side than own employment side is that employer heads did able to improve the fate of their family but not all employers.

Chapter our
4. Summery and conclusion
4.1. Summery

The summery of the last chapter are given at different level of aggregation below:

National: the polices which are followed in the period of 1995 to 2000 were more effective on achieving better income distribution among the poor than on increasing the per capital income of the poor

Regional: At regional levels the urban centers of Addis Ababa, Dire Dawa and Harerr did experience improvement in welfare of the poor, independent of the measurement assumptions and poverty lines in range of 500 to 2000 birr. The reverse was the case for the underdeveloped regions of Afar, Somali and Benishangul-Gumuz. Some how improvement is observed in Gambela and Tigray but for Oromia and SNNPR the observed increase in poverty is some how measurement assumption and poverty line dependent, un less we further restrict our lower poverty line to 789 birr for Oromia and 515 birr for SNNPR.

Urban – Rural: the welfare of the poorest of the poor in rural population and all urban poor population was improved at 2000 compared to 1995. How ever the status of the middle and better off rural poor was worsened in 2000 compared to 1995.

Gender: The economic wide changes introduced in period of 1995 to 2000 did not at least increase the gender discrimination against females or female headed individuals, if they were not biased to ward them.

Marital status: The main gainers are widowed and unmarried poor but the status of separated individuals did not show significant improvement in the period. But if we assume inequality is bad but all inequality is equally bad, then the status of separated individuals did get worst and it is caused by both deteriorating income and worsening distribution. So the main losers among both periods are the better off poor among the separated and married individuals but not the poorest of the poor separated or married individuals. The main gainers from head's marital status point of view are individuals headed by unmarried, widowed and divorced head, and the poorest of the poor, who are headed by married head and to some extent separated head. The losers are those poor individuals which are headed by better off married and separated poor head.

Education: The above result show that in terms of education the increase in poverty was sucked by those illiterate but better of poor and to some extent by 1-3 grades better off poor. Fortunately poverty was reduced on all educational class excluding, the above two. And in terms of head's education the main benefit accrued to those headed by educated head and those in bottom of the income distribution even among the illiterate.

Employment: So the economic conditions of the period were mainly conducive to the employee poor.   Some non poor employers and those under 'others' did cross

increasingly in to poverty line, but this happen to those near the poverty line and the fate of the poorest of the poor in this sector was better in 2000. For the employment group of self employed and unpaid family workers which include the vast majority of rural population, we have no idea what the incidence dynamics would be. But there is increase in intensity but not in severity; means what ever lose in this period is sucked by the better of poor with in these employments. Actually the life of the poorest of the poor was improving even in these employments. Viewed form head's employment angle, the benefit in terms of reduced poverty accrued to those headed by employee and employer. Among those individuals headed by employer most of the benefit did accrue to those with lower per capital income. The clear losers are the one headed by unpaid family workers and the better off poor among self employed. But the dynamics of those headed by head working under composite employment of 'others' can't be surely known. The only change introduced by viewing poverty form heads side than own employment is that employer heads did able to improve the fate of their family but not all employers.

4.2. <u>conclusion</u>

So the general distribution of benefit was skewed to major urban centers, educated individuals, employee and individuals headed by formal employee and employers. But in terms of income the economic environment was very effective in avoiding the destitution among the most impoverished but not to rise the over all income among the poor.

The general economic environment seems to discourage the risk takers and failed to improve the welfare of those better off poor. So if better distribution was strong side of this era; inability to raise incomes and discouraged risk taking behavior were the main short comings.

But it is important to note the fact that we are not inferring a given educational level or given type of employment is leading to lower poverty, but only much of the improvement in terms of reduced poverty happens on individuals with specific socio-economic character.

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