Inclusive Growth in Africa: Measurement, Causes, and Consequences

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Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition Analysis with Application to Household Budget Surveys’ Data in Tanzania

By
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Abstract
This paper investigates the relationship between economic growth and poverty in Tanzania. The decomposition analysis has been carried out to establish: What would have been the poverty level if only the mean income had changed without any changes in the distribution of income? Secondly, what would have been the poverty level if the distribution of income had changed without changes in the mean income level? The decomposition analysis findings show that if inequality would have been as constant as estimated in URT (2012), then the poverty reduction as measured by the FGT would have decreased more than what is stipulated.

JEL: JEL I32; JEL I31; JEL D31 and JEL D63

Key Words: Decomposition, Redistribution, Growth effects, Poverty, Inequality

1.1 Background Information

There is little doubt that economic growth contributes to poverty reduction. The evidence is drawn from various cross country analyses (Besley and Burgess, 2003; Dollar and Kraay, 2002; Kray, 2006; Lopez 2004); cross regional and time series comparisons (Ravallion and Chen, 2007; Ravallion and Datt, 2002) as well as from the evaluation of poverty evolution using household data (Bibi, 2005; Contreras, 2001; Menezes-filho and Vasconcellos, 2004). It is clear however that the effect of economic growth on poverty reduction is not always the same.

In the poverty-growth relationship there is considerable heterogeneity and understanding these sources of divergence is a growing area of investigation. Thus the intricate relationship between poverty, economic growth and inequality in developing countries has in recent years attracted much attention and interest. The interest arises out of policy related issues such as trickle-down effect of economic growth on poverty reduction.

As a result, many economics studies have emphasized the role of higher economic growth to tackle the problem of poverty. In particular, Dollar and Kray (2002) shows data from nearly 75

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countries, which support the view that higher growth rate of real gross domestic product (GDP) per capita, is associated with a more rapid reduction in poverty. The role of economic growth in poverty reduction has also been supported by Jain and Tendulkar (1995), and Ravallion and Datt (1996), Deaton and Dreze (2001), Bhagwati (2001), and Datt and Ravallion (2002).

Following our assessment on the selected literatures on poverty and growth, two main questions have been asked: First, how much do the poor share in aggregate economic growth? And secondly, what factors explain differences in the impacts of economic growth on poverty?

In order to understand the impact of economic growth on poverty, it is important to decompose a change in poverty into change in average income (growth effect) and change in income inequality (redistribution). The enormity of the two components will give the relative sensitivity of poverty levels for changes in average income and redistribution which can therefore assist policy making decisions on either growth promoting or inequality reducing policies.

This study intends to contribute knowledge by using the FGT poverty indices to determine the extent to which a change in poverty is accounted for by growth in average income and income inequality.

1.2 Statement of the Problem

Economic growth is essential for expanding economic opportunities of the poor people. However, there is a concern that the benefits of economic growth in Tanzania have not reached the poor; since despite the recent increase in economic growth in Tanzania from 0.4 percent in 1993 to 7.4 in 2012 (URT, 2013); there has been no corresponding significant improvement in the reduction of poverty. The increase in GDP per capita was 29.9 percent between 2000/01 and 2007. Despite this growth amid constant inequality, the reduction in poverty has been very little.

The evidence from the Household Budget Surveys’ reveals little progress in the areas of income poverty and inequality while economic growth has made notable change overtime. The change in growth between HBS 1991/92 and 2000/01 was 206 percent while between HBS 2000/01 and HBS 2007 was 15 percent, but the decline in poverty on the same period has only been 2.9 and 2.4 percents for the basic poverty line and 2.9% and 2.2% for the food poverty line in the two periods respectively. The proportion of the population below the basic needs poverty line declined slightly from 35.7 percent to 33.6 percent, and the incidence of food poverty fell from 18.7 percent to 16.6 percent. The economic growth achieved over the period has not translated into poverty reduction despite the fact that the economy recorded a significant change in growth between the two outlined household budget surveys in the study.

In view of these, the assumed negative relationship between economic growth and poverty has not been responsive to the country’s efforts towards poverty reduction despite various strategies to alleviate poverty. This questions the applicability of the reciprocal relationship between growth and poverty and triggers the motivation to undertake the decomposition analysis of poverty changes in Tanzania in order to quantify the relative contributions of growth and redistribution to changes in poverty measures.
1.3 Objective of the Study

The main objective of the study is to assess the impact of growth on poverty in Tanzania by quantifying the relative contribution of growth versus redistribution to changes in poverty measures. Specifically, the study assessed the impact of economic growth on poverty by decomposing change of poverty into growth effects and redistribution effects which relates to change in average income and income inequality using household budget survey data. In addition, the study seeks to explain why economic growth has not led to significant reduction of poverty and finally suggest measures that can speed up poverty reduction in Tanzania.

1.4 Significance of the study

The study seeks to find out why Tanzania is still faced with high rates of poverty while the rate of economic growth is rising and the inequality is constant. The study keenly questions the Tanzanian experience, of how come the notable growth from 2000-2007 did not lead to the reduction in poverty nor did it lead to an increase or decrease in income inequality?

In order to undertake sound, effective and sustainable policies for poverty reduction, it is significant to understand the incidence, causes and composition of poverty. This study is an attempt to offer more investigation of the relationship between growth, inequality and poverty reduction in Tanzania.

2.0 Literature Review

2.1 Theoretical Literature Review

The degree of poverty depends upon two factors which are associated with economic growth. These are the average level of income and the extent of inequality. The increase in average income which is motivated by increase in economic growth reduces poverty and the increase in inequality increase poverty.

The importance of growth and inequality in accounting for changes in poverty is built by decomposition of changes in poverty into growth effect and change in income distribution. Using the headcount ratio of poverty ($P$), we can model poverty $P$ as a function of average income per capita ($Y^*$), poverty line ($Y$) and income inequality ($D$) such that,

$$P = P(Y^*, Y, D)$$

(1)

The poverty line is constant over the period $0$ to $t$, therefore the change of poverty level can be decomposed from period $0$ to period $t$ as follows,

$$\Delta P = P(Y^*_t, D_t) - (P(Y^*_0, D_0))$$

(2)

This can be expanded such as,
\[ \Delta P = \left[ P(Y_t^*, D_t) - P(Y_0^*, D_t) \right] + \left[ P(Y_0^*, D_t) - P(Y_0^*, D_0) \right] \] (3)

The first term on the RHS of equation (3) is the **growth effect**. It measures the change in poverty due to change in the average income over the period 0 to \( t \) for a given income distribution. This shows for a given income distribution (D) and poverty line (Y), growth in average income of the population would lead to reduction in poverty since \( P(Y_t^*, D_t) < P(Y_0^*, D_0) \).

The second term on the RHS in (3) is the **distribution effect**. It measures the change in poverty due to the change in the income distribution. Lowering of income inequality would lead to reduction in poverty \( P(Y_t^*, D_t) < P(Y_0^*, D_0) \) for the equation (3) to hold.

The conclusion derived from the theoretical review on economic growth and poverty is that for most countries, income distribution (inequality) tends to remain relatively stable, and thus decomposition of changes in poverty into growth effect and distribution effect, suggests that growth in income per capita is the main source of reduction in poverty. This has been supported by the work of Agrawal (2008); Dollar and Kray (2002); Datt and Ravallion (2002); Bhagawati (2001) and Ravallion & Datt (1996). It would be interesting to analyze the situation in Tanzania.

### 2.2 Empirical Literature Review

The empirical literature on economic growth and poverty has found that growth in average income is negatively correlated with the incidence and depth of poverty. Ravallion and Chen (1997) studied 67 countries and find that inequality changes were uncorrelated with growth rates between 1981 and 1994 indicating that poverty decreases were strongly correlated with growth in mean incomes. The elasticity of poverty incidence to mean household income was estimated to be about -3. However, Ravallion (2001) find a lower elasticity of poverty incidence of about -2.1 when an econometric correction is made for the measurement of errors in the survey.

Several studies have studied the role of economic growth to deal with the problem of poverty. Agrawal (2008) empirically estimates the relation between economic growth and poverty alleviation in Kazakhstan using province level data. He finds that provinces with higher growth rates achieve a faster decline in poverty. The study revealed that both rapid economic growth and enhanced government spending on social sectors are helpful in reducing poverty. Countries with higher growth rates are likely to experience more reduction in poverty.

Zhang and Wan (2006) analyzed the impact of growth and inequality on rural poverty in China employing a version of Shapley decomposition tailored to unit-record household survey data. They found that changes in poverty are attributed to two proximate causes namely income growth and shifts in income distribution.

Dollar and Kray (2002) studied a sample of 92 countries over four decades and find that growth is good for the poor. The mean incomes of the poorest 20% of the population grew on average at the same rate as overall mean incomes.

Kakwani (1993) explores the relation between economic growth and poverty, developing a methodology to measure separately the impact of changes in average income and income
inequality on poverty. Poverty was found to be highly sensitive to economic growth. With increase in economic growth, poverty decreases faster provided that the growth process does not lead to an increase in income inequality.

Gallup et al (1998) examined the relationship between economic growth and poverty using two different models. The first model used data from 69 countries that include 48 growth periods, with an average growth period of 2.7 years. The second model examines the long term growth episode from the 1960’s to the 1990’s for 54 countries. Their short panel analysis model finds that growth of income of the poor against overall income the elasticity is nearly one. This indicates that where the initial income share of the poor is low, the subsequent growth in the income of the poor is higher than average income growth. This suggests there is a tendency for countries to converge to similar income shares for the poorest quintile.

Kakwani and Pernia (2000) conducted a cross country study on growth, inequality and poverty in 5 African countries. The poverty incidence was decomposed into two components: changes explained by changes in mean consumption levels and changes arising from changing consumption distribution with mean consumption kept constant. Their general findings were that changes in poverty incidence are predominantly due to changes in mean expenditure. It was found that where there has been economic growth, both mean and redistribution effects had the same sign and have been combined to reduce poverty. However, the mean effect dominated the redistribution effect.

There are several other studies which have been done in Tanzania on growth, poverty and inequality. This included Atkinson and Lugo (2010) and Mkenda et al (2010). Atkinson and Lugo (2010) attempted to show the contribution to the debate about the relationship between economic growth and national objectives and the way in which the achievement of the latter can be assessed by alternative indicators of economic and social performance. The paper found that faster growth of GDP is an instrumental rather than a final goal as has been recognized in recent decades with the emphasis on growth as a vehicle for poverty reduction. The study preferred to work with the per capita figures and considers inequality purely in relative terms. Different from our study, Atkinson and Lugo (2010) is rather a descriptive analysis and does not undertake in detail the decomposition of the change in poverty into its growth and inequality effects as undertaken by this study.

Mkenda et al (2010) writing on Growth and Distribution in Tanzania asked the very key question on how come the impressive growth from 2000-2007 did not lead to the reduction in poverty nor did it lead to an increase in income inequality? Their empirical report gave some clues as to why this reduction appears not to have happened as expected. The main reason is that the rise in household consumption has not been equally shared.

However, Mkenda et al. (2010) tend to dismiss the role of inequality as it noted that the overall inequality did not increase appreciably. However, the study used the absolute inequality measure which means that growth incidence curves have to be seen in a different light. This measure caused the relative measure of inequality to rise slightly. Different from this approach, our study undertake the decomposition analysis to show the contributory effects of growth effects and inequality effects on the changes in poverty in Tanzania assuming one of them is held constant.

The conclusion from the reviewed empirical literature is twofold. Firstly, economic growth is strongly associated with poverty reduction and accounts for a large share of the variance in
performance against poverty. But the impact is not the same across countries or even in the same country within different periods of time.

Secondly, some reviewed empirical studies on economic growth and poverty regressed directly the logarithms of the selected poverty measure on average income and an aggregate inequality measured by Gini index and therefore establishes the marginal impacts of growth and redistribution. This assumes that the three variables are log linear ignoring the fact that Gini index determines inequality only under restricted condition.

3.0 Methodology

Income poverty can be fully expressed in terms of the level of income relative to a benchmark poverty line and the distribution of income. The poverty level can be written as $P = P(z, m, l)$ where $z$ is the poverty line; $m$ is the mean level of income; and $l$ is the Lorenz curve. When poverty line $z$ is kept fixed and there is no ambiguity about it, we shall write the poverty level as simply $P = P(m, l)$. This shows that poverty is a function of only mean level of income and the distribution of income as measured by the Lorenz curve. Thus with a poverty line $z$, poverty at time $t = 0$ will be denoted by $P_{00} = P(m_0, l_0)$ with mean income $m_0$ and Lorenz curve $l_0$ at time $t = 0$.

In the same way, at $t = 1$, poverty will be denoted by $P_{11} = P(m_1, l_1)$. Poverty at time $t = 1$ will be different from poverty at time $t = 0$ most likely because both the mean income level and the distribution of income have changed over time. Key interest is to find what happens if there is only change in income while distribution is constant and vice versa.

We can think of several hypothetical situations to clarify the decomposition of poverty changes. First, if only the mean income has changed from $m_0$ to $m_1$ and the distribution of income was fixed at $l_0$, then poverty would have been $P_{10} = P(m_1, l_0)$. Secondly, if only the distribution of income had changed from $l_0$ to $l_1$, and the mean income is fixed at $m_0$, then poverty would have been denoted by $P_{01} = P(m_0, l_1)$. When the mean income changes from $m_0$ to $m_1$ and the Lorenz curve changes simultaneously from $l_0$ to $l_1$, the total change in poverty is given by

$$P_{11} - P_{00} = P(m_1, l_1) - P(m_0, l_0)$$

(4)

The issue of considerable interest in equation (4) is to determine which part of the total change in poverty is due to the shift in the Lorenz curve. This can be solved by decomposing the total change in poverty with the help of hypothetical poverty levels, $P_{10}$ and $P_{01}$.

Datt and Ravallion (2002) criticized the previous approaches on decomposition analysis by Jain and Tendulkar (1990); Kwakwani and Subbarao (1990) and Kakwani (1993) on the grounds that the decomposition is not path independent. The reduction in poverty due to a change in the mean income depends on whether the mean income is held fixed at time $t = 0$ or at $t = 1$. In order to make each component path independent, they suggest the following type of decomposition
\[ P_{11} - P_{00} = (P_{10} - P_{00}) + (P_{01} - P_{00}) + R \]  

(5)

Where R is named the residual term. The residual measures the difference between the growth and redistribution components evaluated at the final and initial distribution of income.

If we consider the poverty measure in a given country or region at time \( t \) is measured by

\[ P_t = P(z / m_t, L_t) \]

where \( z \) is the poverty line, \( m_t \) is the mean income and \( L_t \) is a vector of parameters fully describing the Lorenz curve at time \( t \). The level of poverty may change due to a change in the mean income \( m_t \) relative to the poverty line, or due to a change in relative inequalities \( L_t \). A change in poverty over time \( t \) and \( t+n \) can be decomposed into:

\[ P_{t+n} - P_t = G(t, t+n; r) + D(t, t+n; r) + R(t, t+n; r) \]  

(6)

in which the RHS is composed of the growth component \( [G(t, t+n; r)] \), the redistribution component \( [D(t,t+n;r)] \) and the residual \( [R(t,t+n;r)] \). The first two arguments in the parentheses \([t, t+n]\) refer to the initial and terminal dates of the decomposition period, and the last arguments makes explicit the reference data \( r \) with respect to which the observed change in poverty is decomposed.

The growth component \( [G(t, t+n; r)] \) of a change in poverty measure is defined as the change in poverty due to a change in the mean income while holding the Lorenz curve constant at some reference level \( L_r \). The redistribution component is the change in poverty due to a change in the Lorenz curve while keeping the mean income constant at the reference level \( m_r \). The growth component is given as:

\[ G(t, t+n; r) \equiv P(z / m_{t+n}, L_r) - P(z / m_t, L_r) \]  

(7)

And the Redistribution component given as,

\[ D(t, t+n; r) \equiv P(z / m_t, L_{t+n}) - P(z / m_r, L_r) \]  

(8)

The Residual itself does have an interpretation. To see this, it is instructive to note that, for \( r = t \), the residual can be presented as:

\[ R(t, t+n; t) = G(t, t+n; t+n) - G(t, t+n; t) \]  

(9)

The residual \( R(t, t+n; t) \) can thus be interpreted as the difference between the growth components evaluated at the terminal and initial Lorenz curves (mean incomes) respectively. The residual is actually the difference between the growth (redistribution) components evaluated at the final and initial distribution of income. It is important to note that this residual can be negative or positive.

When \( R>0 \); the R represents an unexplained part of the decomposition; whereas when \( R<0 \); then R represents an over explained part of the decomposition. If the mean income remains unchanged over the decomposition period then the residual vanishes. Intuitively, if the total
change in poverty can be expressed completely in terms of the change in mean income level and in terms of the change in the distribution of income, then there is no reason why the decomposition should have any residual.

The empirical analysis follows Datt-Ravallion decomposition analysis which relies on the definitional relationship between average income, inequality and absolute poverty to decompose a change in absolute poverty into a growth effect; redistribution effect and a residual. The relationship is given as, \( \theta = \theta(z, \mu, m) \) where \( \theta \) the selected measure of poverty, \( z \) is the poverty line; \( m \) is the mean per capita income and \( \mu \) inequality of income.

Since the poverty line \( z \) remains fixed in real terms, poverty will be lower when average income is higher (given level of inequality) and higher when inequality is higher (given average income).

Consider \( \theta \) to be a poverty index which is a function of the poverty line \( (z) \), mean per capita income \( (m) \) and inequality of income \( (\mu) \) measured in Gini Coefficient index or represented by a Lorenz curve. When the Lorenz curve is characterized by \( k \) parameters \( m_1, m_2, ... m_k \), then shifts in the Lorenz curve will occur as a result of changes in the parameters. With the poverty line \( z \) is fixed, the total change in poverty index can be written as,

\[
\frac{d\theta}{d\mu} d\mu + \sum_{i=1}^{k} \frac{d\theta}{d m_i} dm_i
\]

(10)

Given that \( d\theta = 0 \) the residual will be given by

\[
R = \frac{\partial \theta}{\partial \mu} d\mu - \sum_{i=1}^{k} \frac{\partial \theta}{\partial m_i} dm_i
\]

(10a)

Dividing (10) through by \( \theta \) and manipulating a little gives, \( \theta = \varepsilon_\mu \mu + \varepsilon_m m \) where \( \theta, \mu \) and \( m \) denotes the growth rates and \( \varepsilon_x = \frac{\partial \theta}{\partial x} \) denotes the elasticity of \( \theta \) with respect to \( x \), where \( x \) is either mean income or income inequality. This shows that the rate of change of income poverty depends on how poverty responds to changes in mean income \( \mu \) and changes in the distribution of income \( (m) \).

Equation (10) shows that changes of poverty \( (d\theta) \) is decomposed into two components which are the impact of growth when the distribution of income does not change and the effect of income redistribution when the total income of the society remains unchanged. These two components are shown on the RHS of equation (10). The first component \( \left( \frac{d\theta}{d\mu} d\mu \right) \) measures the pure effect of growth on selected poverty measure and the second term \( \left( \sum_{i=1}^{k} \frac{d\theta}{d m_i} dm_i \right) \) measures the inequality effect on selected poverty measure \( (d\theta) \). The basic idea behind the growth-redistribution decomposition is that, at any point in time, the income distribution can always be fully described by its mean income and income inequality.

Using Equation (10) we can formulate two main hypotheses. These hypotheses are as follows:
• If economic growth is positive (negative) then the pure growth effect \( \frac{\partial}{\partial \mu} d \mu \) on poverty index will be positive (negative).
• If redistribution of income favors the poor (rich) then the inequality effect term \( \sum_{i=1}^{k} \frac{\partial}{\partial m_i} dm_i \) will be negative (positive) for the poor (rich) and if it favors the rich (poor), it will be positive (negative) for the rich (poor).

To test the hypotheses, we will consider several measures of poverty indices. The most widely used poverty measures are the first three FGT (Foster et al., 1984) poverty indices. The general form of the FGT poverty index is given as follows:

\[
FGT = \frac{1}{Q} \sum_{i=1}^{Q} \left[ \frac{Z-M_i}{Z} \right]^{\alpha}
\]

(11)

Where \( Z \) be the poverty line; \( Q \) is the number of households that live below the poverty line; \( M_i \) be the income level of household \( i \).

Note that when \( \alpha \) is zero the FGT index becomes the Head Count Ratio and when \( \alpha \) is one the FGT index becomes the Income Gap Ratio and when \( \alpha \) is two we have an FGT-Squared Poverty Index. This index is sensitivity to any type of income transfer, and one that takes into account the severity of poverty.

When \( \alpha =0 \), we have the Headcount ratio (\( P_0 \)). Headcount ratio gives the proportion of the population whose incomes fall below the poverty line \( z \). When \( \alpha=1 \); then we have the Poverty Gap index (\( P_1 \)). Poverty Gap Index measures the average income shortfall in meeting the poverty line. When \( \alpha=2 \), then we have the Squared Poverty Gap Index (\( P_2 \)). Squared Poverty Gap Index is the sum of the proportionate poverty gaps weighted by themselves and therefore more sensitive to the income changes of poorer individuals.

The three poverty measures above shows different aspects of the same poverty change measuring the incidence, depth and severity of poverty respectively. Their magnitude and direction of their changes is not always the same, therefore leading to different assessments of the relative role played by income growth in affecting poverty.

To be specific, if we let \( F(Y) \) denote the proportion of the population with incomes below \( Y \) at time \( t \), and \( z \) as the poverty line, \( F_t(z) \) as the headcount ratio and then normalize incomes so that mean incomes equals one; the relative distribution can be denoted by \( F_t(Y) \).

Using Datt-Ravallion Decomposition Analysis (Datt & Ravallion, 1992) a change in poverty (\( P_t \)) at time \( t \) and \( t_0 \) has been given in equation (12) as:

\[
P_t - P_{t_0} = G(t_0, t_n; r) + D(t_0, t_n; r) + R(t_0, t_n; R)
\]

(12)

Where \( t_0 \) is the initial year of the period, \( t_n \) is the final year of the period, and \( r \) is the reference year at which the welfare distribution and mean welfare are held fixed for the growth and redistribution components respectively. If we measure poverty index by Headcount ratio \( H \), between \( t \) and \( t' \) the decomposition equation can be written as:
\[ \Delta H = H_{t'} - H_t = [F_t(z/y_t) - F_t(z/y_t')] + [F_{t'}(z/y_{t'}) - F_t(z/y_t')] \]

where \( y \) mean income and \( H \) is the Headcount poverty at time \( t \) and \( t' \). The first expression in the RHS of (13) is simply the growth effect on poverty – the impact of a uniform increase of all incomes at the previous relative distribution of income (fixed distribution). The second term is the redistribution effect – the change in the relative distribution of income at the new level of mean income.

Using data from household budget surveys, we estimated how changes in poverty are attributed to income growth and change in inequality by using Datt-Ravallion decomposition analysis.
4.0 Findings of the Decomposition Analysis

4.1 Decomposition Analysis into Growth and Redistribution

The decomposition of the poverty change has been done using the headcount ratio; the poverty gap index and the poverty squared index and the household budget survey data for 2000/01 and 2007. The findings of the decomposition are reported in sections below using the poverty indices and basic poverty lines as well as food poverty line. We used HBS 2000/01 as a reference year.

4.1.2 Growth and Inequality Decomposition: Headcount Ratio

Using the basic needs poverty line, the decomposition analysis shows that the headcount poverty has decreased by 2.24 percentage points between the two periods. When we decompose this into the growth and redistribution components, the growth component shows that if the Lorenz curve had remained constant as observed in the HBS 2000/01, the head count poverty index would have decreased by 29.3 percent during the 2007 period of growth. This is the change in poverty that would have occurred if everyone experienced the same rate of growth as at the mean showing that distribution curve shifts but maintained the same shape.

On the other hand, the redistribution component shows if the mean consumption had remained constant as observed in the 2001, then the rise in the inequality would have increased poverty by 42.7% in 2001 and by 27.03% in 2007. In other words, the rise in inequality would have offset gains from growth in reducing headcount poverty. The residual term is small enough to question the results of the decomposition.

Table 1: Growth and Inequality Poverty Decomposition: Headcount Ratio – BNPL

<table>
<thead>
<tr>
<th></th>
<th>HBS 2000/01 Base Year 1</th>
<th>HBS 2007 Base Year 2</th>
<th>Average Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Headcount Poverty Rate (P_o)</strong></td>
<td>35.63</td>
<td>33.5</td>
<td></td>
</tr>
<tr>
<td>Change in Headcount Poverty</td>
<td>-2.23</td>
<td>-2.23</td>
<td>-2.23</td>
</tr>
<tr>
<td>Growth Component</td>
<td>-29.27</td>
<td>-44.94</td>
<td>-37.10</td>
</tr>
<tr>
<td>Redistribution Component</td>
<td>42.70</td>
<td>27.04</td>
<td>34.87</td>
</tr>
<tr>
<td>Interaction Component</td>
<td>-15.67</td>
<td>-15.67</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Author’s calculation using HBS 2000/01 and HBS 2007

In the Table 1 above, base year 1 column uses the HBS 2000/01 as the reference year holding the Lorenz curve constant for the growth component and the mean per capita expenditure constant for the redistribution component. Base year 2 column uses 2007, the year of the second data set - HBS 2007 as the reference year. The table has decomposed the change in poverty into headcount index using the basic needs poverty line. The interaction terms shows that about 15 percent of the change in poverty cannot be contributed to either growth or redistribution components.

Using the food poverty line, the results of the decomposition for the head count poverty are summarized in Table 2 below. The headcount poverty index for HBS 2000/01 is 18.4 and for the HBS 2007 is 16.7 as closely stipulated by official statistics (URT, 2010).
The results show that headcount poverty using food poverty line has decreased by 1.97 percentage points between the two periods. If the Lorenz curve had remained constant as observed in the HBS 2000/01, the headcount poverty would have decreased by 16.3 percent during the 2007 period of growth.

At the same time, the redistribution component shows that if the mean consumption had remained constant as observed in HBS 2000/01 (HBS 2007), then an increase in the variance of distribution would have increased poverty by 40.9 percentage points (14.35). With the food poverty line, about 26.5 percent of the change in poverty cannot be contributed to growth or redistribution.

**Table 2: Growth and Inequality Poverty Decomposition: Headcount – FPL**

<table>
<thead>
<tr>
<th></th>
<th>HBS 2000/01 Base Year 1</th>
<th>HBS 2007 Base Year 2</th>
<th>Average Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Headcount Poverty Rate (P₀)</strong></td>
<td>18.43</td>
<td>16.45</td>
<td>-1.97</td>
</tr>
<tr>
<td>Change in Poverty Gap</td>
<td>-1.97</td>
<td>-1.97</td>
<td></td>
</tr>
<tr>
<td>Growth Component</td>
<td>-16.89</td>
<td>-42.87</td>
<td>-29.6</td>
</tr>
<tr>
<td>Redistribution Component</td>
<td>40.89</td>
<td>14.35</td>
<td>27.62</td>
</tr>
<tr>
<td>Interaction Component</td>
<td>-26.54</td>
<td>-26.544</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Author’s computation using HBS 2000/01 and HBS 2007

**4.1.2 Growth and Inequality Decomposition: Poverty Gap Index**

Using the basic needs poverty line to decompose the poverty gap index into growth and redistribution components shows that if the Lorenz curve had remained constant as observed in 2000/01 (HBS 2007), the poverty gap index would have decreased by 9.2 (24.5) percent during the period of growth.

The redistribution component shows that if the mean consumption had remained constant as observed in the 2000/01 (2007), the rise in inequality would have increased poverty by 23.9% in 2000/01 and by 8.5% in 2007. Again, the rise in inequality offset gains from growth in reducing the poverty gap index.

The interaction terms shows that about 15.3 percent of the change in poverty gap using the basic needs poverty line cannot be attributed to either growth or inequality components. This is shown in Table 3 below.

**Table 3: Growth and Inequality Poverty Decomposition: Poverty Gap: BNPL**

<table>
<thead>
<tr>
<th></th>
<th>HBS 2000/01 Base Year 1</th>
<th>HBS 2007 Base Year 2</th>
<th>Average Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poverty Gap (P₁)</strong></td>
<td>10.556</td>
<td>9.893</td>
<td>-0.66</td>
</tr>
<tr>
<td>Change in Poverty Gap</td>
<td>-0.66</td>
<td>-0.66</td>
<td></td>
</tr>
<tr>
<td>Redistribution Component</td>
<td>23.91</td>
<td>8.54</td>
<td>16.23</td>
</tr>
<tr>
<td>Interaction Component</td>
<td>-15.37</td>
<td>-15.37</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Author’s computation using HBS 2000/01 and HBS 2007

Similar results are also reported if we use the food poverty line to decompose the change in poverty gap index for the HBS 2000/01 and HBS 2007. The findings shows that if the Lorenz
curve had remained constant as observed in 2000/01 (2007), the poverty gap index would have decreased by 4.2 (17.0) percentage during the period of growth.

The redistribution component shows that if the mean consumption had remained constant as observed in 2000/01 (2007), the rise in inequality would have increased poverty gap by 16.8 (4) during the period of growth. These findings are reported in the table 4 below:

Table 4: Growth and Inequality Poverty Decomposition: Poverty Gap: FPL

<table>
<thead>
<tr>
<th></th>
<th>HBS 2000/01 Base Year 1</th>
<th>HBS 2007 Base Year 2</th>
<th>Average Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poverty Gap ((P_1))</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Poverty Gap</td>
<td>-0.21</td>
<td>-0.21</td>
<td>-0.21</td>
</tr>
<tr>
<td>Growth Component</td>
<td>-4.21</td>
<td>-17.0</td>
<td>-10.63</td>
</tr>
<tr>
<td>Redistribution Component</td>
<td>16.84</td>
<td>4.0</td>
<td>10.42</td>
</tr>
<tr>
<td>Interaction Component</td>
<td>-12.84</td>
<td>-12.84</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Author’s calculation using HBS 2000/01 and HBS 2007

4.1.3 Growth and Inequality Poverty Decomposition: Poverty Squared Index

Lastly, we decomposed the change in poverty into the poverty squared index or the poverty severity first using the basic needs the food poverty lines. The findings shows that if the Lorenz curve had remained constant as observed in the 2000/01 (2007), the poverty squared index would have decreased by -4.03 (-14.60) percent during the period of growth.

The redistribution component shows that inequality would have increased poverty by 23.91 in 2000/01 and by 8.54 percent in 2007. This is summarized in Table 5 below.

Table 5: Growth and Inequality Poverty Decomposition: Poverty Squared - BNPL

<table>
<thead>
<tr>
<th></th>
<th>HBS 2000/01 Base Year 1</th>
<th>HBS 2007 Base Year 2</th>
<th>Average Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poverty Severity ((P_2))</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Poverty Severity</td>
<td>-0.22</td>
<td>-0.22</td>
<td>-0.22</td>
</tr>
<tr>
<td>Growth Component</td>
<td>-4.03</td>
<td>-4.60</td>
<td>-9.31</td>
</tr>
<tr>
<td>Redistribution Component</td>
<td>14.37</td>
<td>3.80</td>
<td>9.09</td>
</tr>
<tr>
<td>Interaction Component</td>
<td>-10.56</td>
<td>-10.56</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Author’s calculation using HBS 2000/01 and HBS 2007

Using the food poverty line to decompose the change in poverty severity into growth and inequality components the findings shows that if inequality had remained constant as observed in 2000/01 (2007) the poverty severity would have decreased by 1.6 (8.6) percentage points during this period of growth. On the other hand, if the growth in consumption had remained constant as observed in 2000/01 (2007), then the rise in inequality, would have increased poverty by 8.67 (1.63) percentage points. These are summarized in Table 6 below:
Table 6: Growth and Inequality Poverty Decomposition: Poverty Squared - FPL

<table>
<thead>
<tr>
<th>Povert Severity ($P_2$)</th>
<th>HBS 2000/01 Base Year 1</th>
<th>HBS 2007 Base Year 2</th>
<th>Average Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Poverty Severity</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.003</td>
</tr>
<tr>
<td>Growth Component</td>
<td>-1.63</td>
<td>-8.68</td>
<td>-5.15</td>
</tr>
<tr>
<td>Redistribution Component</td>
<td>8.67</td>
<td>1.63</td>
<td>5.15</td>
</tr>
<tr>
<td>Interaction Component</td>
<td>-7.04</td>
<td>-7.04</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Author’s calculation using HBS 2000/01 and HBS 2007

The findings from the above decomposition show that redistribution has an important role in the change in poverty. It shows that inequality would have reduced poverty far than the growth effects. Inequality in Tanzania as measured by Gini coefficient does not show changes over the period of study (URT, 2012). However, this findings shows that if inequality would have been as constant as estimated in URT (2012), then the poverty reduction as measured by the FGT poverty index would have decreased more than what is stipulated. However, these findings emphasized the importance of inequality in the poverty reduction. Inequality plays a key role in the poverty reduction efforts.

4.2 Poverty Elasticity with respect to Inequality

In order to grasp the degree of responsiveness of poverty with regard to inequality, the decomposition of poverty with respect to inequality was undertaken. The decomposition analysis as reported in Table 7 below shows that inequality has increased in the urban areas during the HBS 2007. In addition, the estimation for the responsiveness shows that poverty is more elastic with inequality in the urban areas than in the rural areas as reported in the Table 7 below. In order to reduce poverty, the government should increase the effort to reduce inequality especially in the urban areas.
Table 7: Decomposition of inequality by urban and rural areas

<table>
<thead>
<tr>
<th></th>
<th>HBS 2007</th>
<th></th>
<th></th>
<th>HBS 2000/01</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GE(0)²</td>
<td>GE(1)</td>
<td>GE(2)</td>
<td>GE(0)</td>
<td>GE(1)</td>
<td>GE(2)</td>
</tr>
<tr>
<td>Total</td>
<td>54.3</td>
<td>75.3</td>
<td>266.1</td>
<td>37.0</td>
<td>48.1</td>
<td>185.5</td>
</tr>
<tr>
<td>Urban</td>
<td>53.1</td>
<td>73.7</td>
<td>275.6</td>
<td>36.8</td>
<td>48.7</td>
<td>195.3</td>
</tr>
<tr>
<td>Rural</td>
<td>55.6</td>
<td>77.8</td>
<td>241.4</td>
<td>31.0</td>
<td>38.1</td>
<td>91.9</td>
</tr>
<tr>
<td>Within-group inequality</td>
<td>54.0</td>
<td>75.1</td>
<td>265.9</td>
<td>34.6</td>
<td>45.8</td>
<td>183.4</td>
</tr>
<tr>
<td>Between-group inequality</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>2.4</td>
<td>2.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Between as share of overall</td>
<td>0.4</td>
<td>0.3</td>
<td>0.1</td>
<td>6.4</td>
<td>4.7</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Source: Authors computation using ADePT Software and the HBS 2000/01 and HBS 2007

Table 8: Elasticity of Poverty with Respect to the Inequality

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic needs poverty line</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>2.39</td>
<td>2.15</td>
<td>-0.24</td>
<td>4.00</td>
<td>3.70</td>
<td>-0.30</td>
<td>5.31</td>
<td>5.02</td>
<td>-0.29</td>
</tr>
<tr>
<td>Rural</td>
<td>0.84</td>
<td>0.95</td>
<td>0.11</td>
<td>2.24</td>
<td>2.38</td>
<td>0.14</td>
<td>3.42</td>
<td>3.55</td>
<td>0.13</td>
</tr>
<tr>
<td>Total</td>
<td>1.16</td>
<td>1.15</td>
<td>-0.02</td>
<td>2.59</td>
<td>2.74</td>
<td>0.14</td>
<td>3.82</td>
<td>3.96</td>
<td>0.14</td>
</tr>
<tr>
<td><strong>Food poverty line</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>4.88</td>
<td>3.91</td>
<td>-0.97</td>
<td>6.04</td>
<td>5.77</td>
<td>-0.27</td>
<td>7.21</td>
<td>6.97</td>
<td>-0.25</td>
</tr>
<tr>
<td>Rural</td>
<td>2.33</td>
<td>2.25</td>
<td>-0.09</td>
<td>4.13</td>
<td>4.13</td>
<td>0.00</td>
<td>5.41</td>
<td>5.46</td>
<td>0.05</td>
</tr>
<tr>
<td>Total</td>
<td>3.08</td>
<td>2.73</td>
<td>-0.35</td>
<td>4.57</td>
<td>4.59</td>
<td>0.02</td>
<td>5.85</td>
<td>5.90</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Source: Authors Computation using ADEPT programme and HBS 2000/01 and HBS 2007

22 General Entropy (GE) measures can vary their sensitivity to income differences in different parts of the distribution. GE(0) is the mean logarithmic deviation; GE(1) is the Theil Index and the GE(2) is the half the square of the coefficient of variation.
4.3 Conclusion

The findings from the above decomposition show that inequality would have reduced poverty far more than the growth effects. Inequality in Tanzania as measured by Gini coefficient does not show changes over the period of study (URT, 2012). However, this findings shows that if inequality would have been as constant as estimated in URT (2012), then the poverty incidence as measured by the FGT would have decreased more than what is stipulated. Therefore, these findings emphasized the importance of inequality in the poverty reduction. Inequality plays a key role in the poverty reduction efforts. Policies should be aimed to reduce the income inequality if we want to have a significant decrease in the poverty level.

4.4 Policy Implications

The implication of the Datt & Ravallion Decomposition; is that though the growth effect is important in poverty reduction, yet, redistribution would have a significantly positive impact on poverty alleviation. The growth in mean income, amidst constant inequality would have substantial impact on poverty changes. If inequality did not change as reported in the official statistics, then the reduction in poverty indices was supposed to be more than what has been reported. There is a need therefore to relook on how the inequality indices have been estimated. This could explain why, despite the fact that Tanzania adopted various strategies to boost up economic growth and alleviate poverty; the changes in the reduction of poverty in terms of the headcount ratio; the poverty gap and the poverty squared index have been minimal (URT 2012).

Furthermore, the decomposition of the total change in poverty further implies that distribution of income was the single most important factor that would have significantly contribute to the decline of poverty in Tanzania. The distribution component in our decomposition put an upward pressure on the poverty levels and especially in the rural areas. As a result the potential of growth in reducing poverty was not fully realized. The total change in poverty is more contributed the change in redistribution rather than by the change in mean income level. For the policy reduction strategies to be effective there should be emphasis on the policies that reduces inequality.

Lastly, for the future studies on decomposition in Tanzania, it would be interesting to decompose the change in poverty into growth and redistribution effects along the FGT measures, both in region wise and on rural urban locations in order to suggest more specific policy options for the specific areas.
Selected References


Bibi, Sami and Chatti, Rim (200 5) “Public Spending, Pro-Poor Growth and Poverty in Tunisia: A Multilevel Analysis”, Working Paper, University of Tunis.


