

Original Research Article

Empirical Analysis of the Relationship between Poverty and Growth in
Ethiopia: Micro-Panel Data Evidence from Amhara Region

LIST OF ACRONYMS AND ABBREVIATIONS USED

ANRS	Amhara National Regional State
CBM	Cost of Basic Needs Method
CSA	Central Statistics Authority, Ethiopia
FEM	The Fixed Effects Model
GDP	Gross Domestic Product
HCE	Household Consumption and Expenditure Survey
HICE	Household Income, Consumption and Expenditure Survey
MDG	Millennium Development Goal
PSNP	Productive Safety Net Programme
RGDP	Real Gross Domestic Product
SSA	Sub-Saharan Africa
UNDP	United Nations Development Programme
WB	World Bank

Abstract

Reduction of poverty is still a vital concern and main challenge for Ethiopia, the second most populous country after Nigeria, in the SSA. With the government's consistent implementation of its Poverty-Reduction-Strategy (PRS) Ethiopian households experienced a decade of remarkable progress in wellbeing. Poverty in Ethiopia declined at an annual average of 2.32 percentage points since 1995. Besides, Ethiopia, having registered high economic growth since 2005 at an average of 10.8 percent per annum, stands out as one of the fastest growing economies in the world. Despite all this, Ethiopia is amongst the poorest countries in the world, with a very low human-development ranking, or 174th out of 188 countries according to the UNDP's human development report 2015. According to the estimation of the WB,

About 23 million of Ethiopians live in condition substantially below the basic poverty line and food security remains a major challenge. This study examines the empirical relationship between growth and poverty in Amhara National Regional State (ANRS) of Ethiopia. The study estimated the fixed effects models (FEM) using panel data from four household income, consumption and expenditure (HICE) surveys conducted in the region between the period 1995/96 to 2010/11 by the central statistics authority (CSA) of Ethiopia. The FEM estimation results of this study indicated that growth in average expenditure per capita of a household and change in inequality has a negative and significant and positive significant effect on poverty in the ANRS, respectively, implying that growth plays a pivotal role on reducing poverty and a rise in inequality lead to a rise in poverty in ANRS. The study has also revealed that growth contributes far more towards reducing poverty, keeping inequality constant, than the latter does to increasing poverty, holding the former constant. Besides, estimation of the net effects of growth on poverty indicated that the absolute magnitude of the net elasticity of poverty to growth is smaller than that of the gross elasticity of poverty to growth, implying that some of the growth effect on poverty is offset by the increase in inequality. Based on the finding of this study, we recommend that, at a policy level, in order to deal with poverty problems effectively, the government should implement policies focusing on growth as well as redistributing income in favour of the poor and middle class households in all administrative zones of the region.

Keywords: Poverty, Growth, Fixed Effects Model and Panel Data

1. Introduction

Halving/eradicating extreme poverty and hunger, between 1990 and 2015, is the first goal, among others other MDGs, on which all UN member countries have agreed in 2000. Remarkable success has been recorded, given that it was uneven among countries and regions, at the global level with respect to meeting the target of halving global extreme poverty rates. According to the estimates of the World Bank (2013), extreme poverty has been halved in developing regions already five years ahead of schedule with the proportion of people living below 1.25 US dollar a day having been reduced from 44 percent in 1990 to 22 percent in 2010.

However, the progress has been uneven among countries and regions, with China and India being attributed most of the global poverty reduction and, most notably, the Sub-Saharan African countries lagging behind with a modest drop from 56 percent to 48 percent between 1990 and 2010.

SSA is the region that saw a steady increase in the number of population living in extreme poverty, rising from 290 million in 1990 to 414 million in 2010. Out of the 27 countries that in 2010 are estimated to have extreme poverty rates at 40% or above, 26 are situated in SSA. This disappointing low level of poverty reduction in SSA has occurred despite of relatively strong income growth. SSA had an unweighted average GDP growth of more than 5 percent between 1995 and 2010.

Ethiopia, the second most populous country in Africa after Nigeria, like many other SSA countries, is characterized by very high poverty. With a per capita gross national income (GNI) of USD 590 in 2015, the country is classified as a low income country (WB, 2017). According to the estimates of the WB, approximately about 29.6 percent of the population were living on less than USD 1.25/day in 2011(WB, 2016).

Given the level of poverty in Ethiopia and the importance of growth on poverty alleviation, the relationship between growth and poverty deserves more attention. Therefore, with the aim of examining the relationship between growth and poverty in Ethiopia and adding to the literature on poverty by examining the relationship in the country, the study has been carried out by using four round panel of HICE surveys collected by the CSA of Ethiopia and employed the FEM of panel data analysis.

The paper is organized as follows: the second section provides an overview of poverty and economic growth trend in Ethiopia, while the third section reviews the literature. The fourth section discusses the estimation techniques used in the analysis, as well as the regression result. Lastly, the fifth section concludes the study and makes policy recommendations.

2. Trends of Poverty and Economic Growth in Ethiopia

2.1. Trend of Poverty in Ethiopia

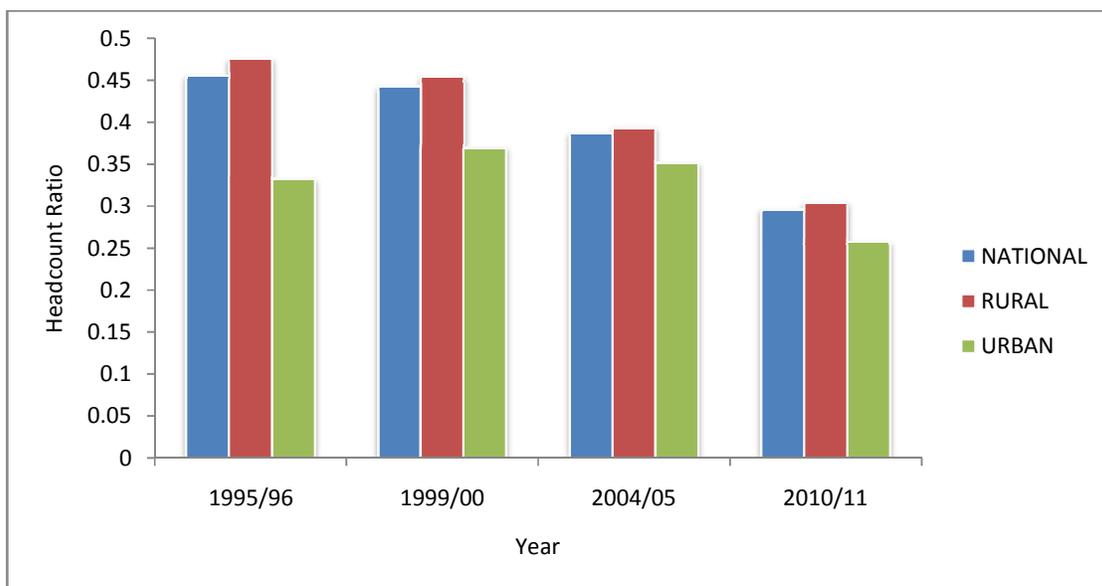
Reduction of poverty is still a vital concern and main challenge for Ethiopia, the second most populous country after Nigeria, with above 90 million inhabitants (CSA, 2015), in the SSA. With the government's consistent implementation of its Poverty-Reduction-Strategy (PRS) pro-poor spending continues to rise 73 percent of total expenditure in 2014/15. As a result, Ethiopian households experienced a decade of remarkable progress in wellbeing. Poverty in Ethiopia declined at an annual average of 2.32 percentage points since 1995. According to the latest available national statistics on poverty, based on head count rate (cost of basic needs method, CBM), the proportion of people living below the national poverty line fell from a baseline of 48.8 percent in 1990 to 45.5 percent in 1996 and 29.6 percent at national level, 30.4 percent in rural and 25.7 percent in urban areas, in 2011, and is estimated to have further declined to 23.4 percent in 2015, which is below the MDG target of 24 percent (African Economic Outlook, 2014).

Despite all this, Ethiopia is amongst the poorest countries in the world, with a very low human-development ranking, or 174th out of 188 countries according to the UNDP's human development report 2015. About 23 million of Ethiopians live in condition substantially below the basic poverty line and food security remains a major challenge. Poverty is mainly a rural phenomenon, as the share of the population below the poverty line in rural areas stood at 30.4 percent, while it was 25.7 percent in urban areas.

The reduction in poverty was driven mainly by agricultural growth, underpinned by high and consistent economic growth. Moreover, the decline in poverty is attributable to the recent implementation of welfare programmes such as the Productive Safety Net Program (PSNP), as well as urban food distribution and subsidies. The PSNP reaches close to seven million chronically food-insecure individuals and has a strong focus on addressing the poverty of

female headed households and encouraging women's participation in public-works activities (African Economic Outlook, 2014). However, progress in poverty reduction is not without its challenges and poverty remains widespread in Ethiopia. The poorest households have become poorer than they were in 2005; high food price that improves incomes for many farmers make buying food more challenging for the poorest. Despite improvements, Ethiopia still has relatively low rates of education enrollement, access to sanitation, and attended births, and challenges remain around investment in the health and education of women (WB, 2015).

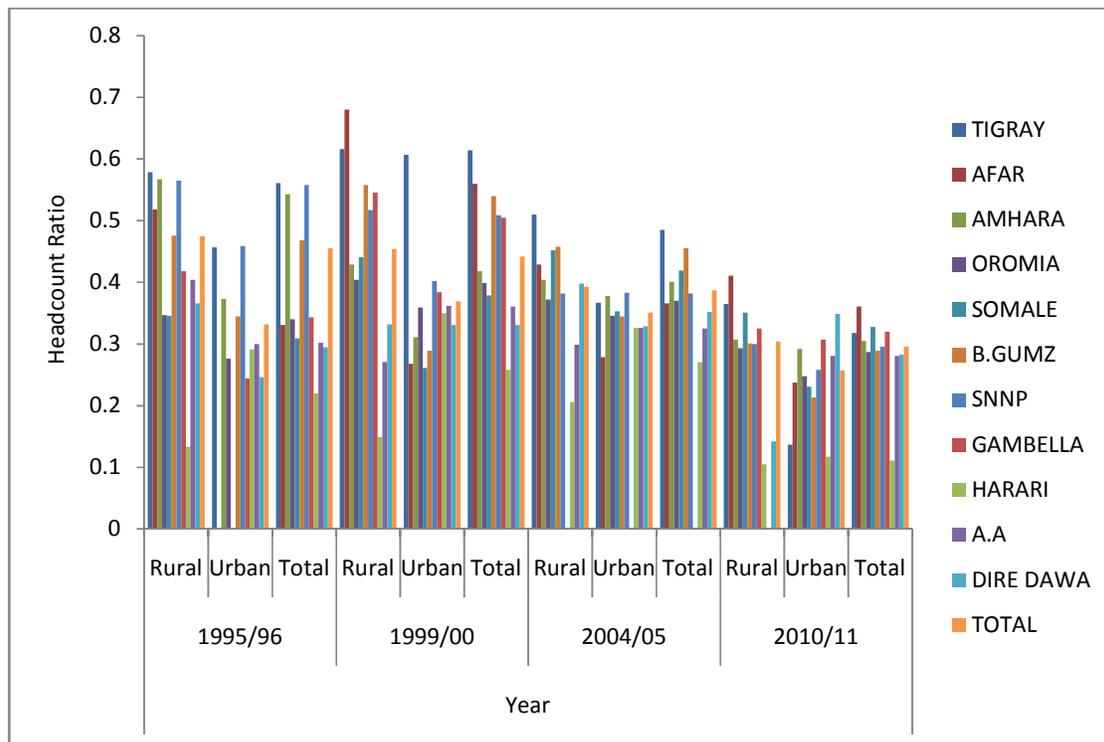
Figure 1: Trends of Poverty Headcount Indices by National, Rural and Urban



Source: HICE survey of 1995/96, 1999/00, 2004/05 and 2010/11

Spatially disaggregated analyses also indicate marked disparities amongst regions, largely attributed to differences in stages of development and to resource endowments. In 2010/11, the poverty headcount index was highest in Afar region (36.1%) followed by Ethiopian Somali (32.8 percent) and Tigray (31.8 percent) regions, while the poverty estimates were lowest in the Harari region (11 percent) followed by the cities of Dire Dawa (28.3 percent) and Addis Ababa (28.1 percent). For poverty to decline significantly, there has to be a concerted effort and perhaps a new approach to address the structural problem of the agricultural sector.

Figure 2: Trends of Regional Poverty Headcount Indices



Source: CSA, HICE Survey of 1995/96, 1999/00, 2004/05 and 2010/11

2.1. Trend of Economic Growth in Ethiopia

Ethiopia, having registered high economic growth since 2005 at an average of 10.8 percent per annum, stands out as one of the fastest growing economies in the world. In 2014/15, real GDP grew by 10.2 percent, keeping the momentum of 10.3 percent growth rate of 2013/14. The country's strong economic performance has mainly been underpinned by public sector led development (WB, 2016). The real gross domestic product (GDP) growth continued to be broad based, with all sectors contributing. The agriculture, service and industry sectors accounted for 38.8 percent, 46.6 percent and 15.2 percent of the real GDP in 2014/15, respectively.

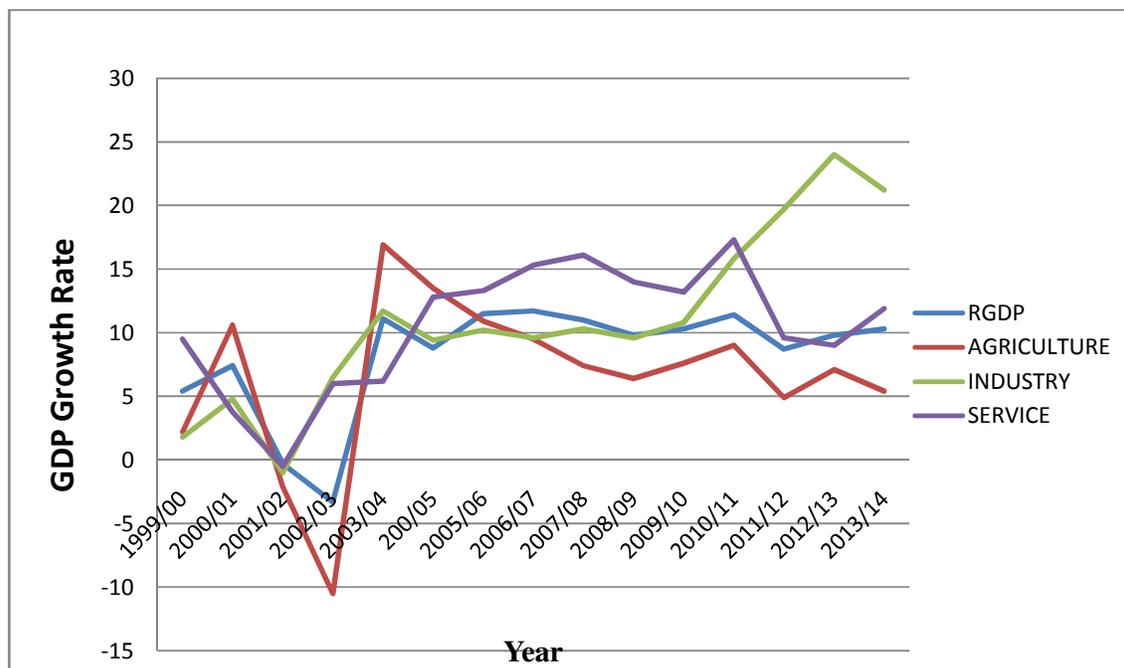
The service sector has been gaining much importance in GDP. Its share has increased from 39.3 percent in 2006/07 to 45.9 percent in 2014/15, mainly due to improvements in hotels and tourism (29.2 percent), transport and communications (13.3 percent), wholesale and retail trade (9.9 percent) and financial intermediation (6.9 percent). According to an employment-unemployment survey by the Central Statistical Agency (CSA) (2012) about half of people

employed in urban areas are absorbed by service sectors. In addition, the informal sector, which is mainly concerned with services, makes up 31.7 percent of urban employment.

The service sector contributed 4.7 percentage points of this growth followed by industry and agriculture contributing 3 and 2.5 percentage points, respectively. While the share of agriculture in the GDP declined over ten years from 47 percent in 2004/05 to 39 percent in 2014/15 that of the service sector increased from 40 percent to 46 percent in the same period. The strong economic growth has been underpinned by the country’s public sector – led development strategy, with its focus on heavy investment in infrastructure.

Despite its declining contribution to GDP over the years, agriculture still remains the leading sector in terms of contribution to the country’s overall economy. Agriculture continues to be the backbone of the Ethiopian economy, contributing 39.9 percent to GDP, about 73 percent of employment and 70 percent of export earnings in 2014/15. Moreover, the sector supplies 70 percent of raw materials requirements of local industries and it is the major source of food for domestic consumption of raw materials for domestic manufacturing industries and of primary commodities export. Ethiopia’s agriculture depends heavily on traditional farming methods and rain-fed farming system, and is vulnerable to environmental and climate related shocks.

Figure 3: Sectoral and Real GDP Growth Trends



Source: Own Computation of data from NBE

Despite the remarkable economic growth registered in the last decade, Ethiopia is still one of the poorest countries in the world (World Economic Outlook, 2014).

3. Literature Review

Views on the relationship between economic growth and poverty are generally put into two theories, which are the ‘trickle-down theory’ and the ‘trickle-up theory’. Proponents of the “trickle-down theory” assert that economic growth plays an essential role in poverty reduction in any given country, given that the distribution of income remains constant. They believe that the benefits of higher economic growth in a country trickle down to the poor. Alternatively, the “trickle down hypothesis” suggests that a time lag exists before the poor benefit from economic growth. For example, economic growth may initially generate greater profits for existing firm owners and current employees. Their higher incomes may generate greater demand for products which will result in firm expansion. Firm growth may generate demand for additional employees including the unskilled poor, who may then reap the benefits of economic growth.

On the other hand, proponents of the ‘trickle-up theory’ assert that economic growth does not improve the lives of the very poor; but rather, the ‘growth process’ tend to ‘trickle-up’ to the middle classes and the very rich (Todaro, 1997). This, in turn, results in a worsening of the distribution of income (i.e., increase in inequality) which then increases poverty. Put differently, the theory asserts that there are reinforcing factors that maintain poverty amongst the poor population and impede them from contributing to economic growth.

The literature essentially contends that countries do not grow fast, because they are simply too poor to grow. This is because poverty dampens economic growth by creating a vicious circle of whereby high poverty leads to lower aggregate growth. In turn, low growth results in high levels of poverty. In such a scenario, development policies should be aimed at improving the living standards of the poor, which in turn, would ultimately result in virtuous circles that promote economic growth.

Many studies have been conducted on the relationship between poverty and economic growth to verify the theoretical postulation relating to poverty and growth nexus in both developed and under developing countries. Some of these studies empirically concluded that economic growth has negative significant impact on poverty, while others asserted otherwise. While the

literature on this topic is plentiful, here we present a brief review of studies that are most relevant for our analysis. For instance, De Janvry & Sadoulet (2000) carried out a study to examine the determinants of change in poverty and inequality in twelve Latin American Countries for the period 1970-1994. They found out a negative and significant relationship between poverty and income growth which implies that per capita aggregate income growth leads to a reduction in the incidence of urban and rural poverty. Similarly, Easterly (2001) states that countries with positive income growth had a decline in the proportion of people below the poverty line, and the fastest average growth was associated with the fastest poverty reductions. In Indonesia, for example, which had average income growth of 76 percent from 1984 to 1996, the proportion of Indonesians beneath the poverty line in 1993 was one-quarter of what it was in 1984. Moreover, Bigsten et.al (2003) examined the impact of growth on poverty in Ethiopia using panel data from 1994-1997, which they consider it a period of economic recovery driven by peace, good weather and much improved macroeconomic management. Empirical evidence from their study showed that economic growth has a negative and significant relationship with poverty. This implies that economic growth is key to poverty reduction in Ethiopia. Their result on the decomposition of changes in poverty into growth and redistribution components also indicates that potential poverty reduction due to the increase in real per capita income was to some extent counteracted by worsening income distribution.

Adams (2004) used data collected in 126 countries including 60 developing countries to analyse the elasticity of poverty. He found that economic growth reduces the proportion of poverty; however, the measurement of the relationship between growth and poverty based on cross-country data is often questionable. Tasai & Huang (2007), using time series data from 1964 to 2003, analysed the relationship between growth and poverty in Taiwan. They confirmed that economic growth is a major driving force for poverty reduction in Taiwan. Similarly, Basu & Mallick (2008) have also examined the relationship between poverty and economic growth in India using several measures. They found modest evidence to suggest that economic growth led to a reduction in poverty. In addition, findings from the study conducted by Agarwal (2008) to examine the relation between economic growth and poverty alleviation in the case of Kazakhstan, using province-level data and using Additively Decomposable Poverty Measures, showed that provinces with higher growth rates achieved faster decline in poverty.

A study conducted, by employing the ARDL-Bounds testing approach, to investigate the causal relationship between financial development, economic growth and poverty in South Africa for the period 1960-2006 by Odhiambo (2009a) showed that a unidirectional causal flow from economic growth to poverty reduction existed in South Africa. Similarly, Gelaw (2010) empirically examines the relationship between poverty, inequality and growth in rural Ethiopia using a panel data of Ethiopian Rural Household Survey (ERHS) for the period 1994-2004. The author adopted the fixed effects regression model for estimation. Results of the study show that poverty gap and growth in real per capita consumption has a negative and significant relationship which implies growth in mean consumption reduces poverty gap in rural Ethiopia.

Young (2012) uses estimates of the level and growth of real consumption to investigate changes in poverty in 29 sub-Saharan and 27 other developing countries. The author found that living standards in Sub-Saharan African countries have improved during the last two decades—there by implying a reduction in poverty. Ijaiya et. al (2011) examined the impact of economic growth on poverty reduction in Nigeria by taking into consideration a time subscript and a difference-in-difference estimator that describes poverty reduction as a function of changes in economic growth. Using a multiple regression analysis, the result obtained indicates that the initial level of economic growth is not prone to poverty reduction, while a positive change in economic growth is prone to poverty reduction. The study suggest that to improve and sustain the rate of economic growth in Nigeria from which poverty could be reduced measures, such as, stable macroeconomic policies, huge investment in agriculture, infrastructural development and good governance are to implemented. In a similar case, Mulok et.al (2012) determined the empirical relationship and importance of growth for poverty reduction in Malaysia. The results showed that growth explains much, but not all, about the evolution of poverty. They stated that economic growth is necessary but not sufficient for poverty reduction, especially if the objective is a rapid and sustained poverty reduction. If a policy objective is focused on poverty alleviation, it is necessary to consider additional variables such as income distribution.

Furthermore, Nurudden & Ibrahim (2014) examined the relationship between poverty, inequality and economic growth in Nigeria using a secondary time series data from 2000-2012. Employing bound testing to cointegration and granger causality techniques, result of the study show that there is a unidirectional causal relationship running from RGDP to

poverty, which means that an increase in GDP in Nigeria causes high level of poverty. Similarly, Kolawole et.al (2015) empirically investigated the relationship among poverty, inequality and economic growth in Nigeria using a time series data over the period from 1980 to 2012. By employing the Ordinary Least Squares (OLS) regression equations, result of the study reveal that growth has a negative significant effect on poverty which implies growth has crucial role in reducing poverty in the country.

As expected some of these studies provide empirical evidence to support the negative and significant relationship between poverty and economic growth while others provide otherwise. Unlike to the above mentioned findings, an empirical study conducted in Nigeria by Aigbokhan (2000) to investigate the relationship between poverty, inequality and economic growth for the period 1986 to 1996 revealed a positive and significant relationship between growth and poverty which implies that the remarkable growth of the Nigerian economy from 1986 to 1992 exacerbated the level of poverty in the country. His findings suggest that the so-called “trickle down” phenomenon, underlying the view that growth reduces poverty and inequality, is not supported by Nigeria’s data. In a similar case for Nigeria, Stephen & Simeon (2013) conducted a research on economic growth and poverty in Nigeria and the results revealed that there is positive and significant relationship between economic growth and poverty which implies that economic growth does not reduce poverty.

From the literature review above, it could be seen as plenty of studies have been conducted in on relationship between poverty and economic growth. Using different methods such as OLS, ARDL-Bounds testing approach, etc. The results from these previous studies are mixed. But majority of these results support a negative and significant relationship between poverty and economic growth. In addition, the number of studies in Ethiopia which tries to figure out the relationship between poverty reduction and economic growth are few. In view of this problem in mind, it is the intent of this paper to fill in the identified gap.

4. Data and Methodology

4.1. Data

The study made use of panel data from the Household Income, Consumption and Expenditure (HICE) surveys of year 1995, 2000 and 2005 and Household Consumption and Expenditure (HCE) survey of the year 2010 collected by the Central Statistics Agency (CSA) of Ethiopia.

The HICE survey is representative at national, regional and administrative zone level representative covering a total of about 2982, 3338, 3656, and 3038 households for the survey year of 1995, 2000, 2005 and 2010, respectively. Mean per capita household expenditure is used as a welfare measure to proxy incidence of poverty and growth in Amhara National Regional State (ANRS) of Ethiopia.

Panel data (also known as longitudinal or cross-sectional time series data) is a dataset in which the behaviour of entities is observed across time. Studies on cross sectional and time series data have faced certain problems and limitations. To avoid such limitations of each cross section and time series data, the present study utilizes panel data to analyze the trends of different cross section over time. Hsiao (2003) and Klevmarken (1989), as cited in (Badi, 2005), list several benefits of using panel data which include the following: (a) they provide more efficient estimations of parameters by considering broader sources of variations, (b) they outsource more information to the analyst, and (c) they allow the study of the dynamics behaviour of the parameters (d) Pooling increases the number of observations. (e) Panel data permits controlling for some types of unit heterogeneity. (f) Panel data allows testing theories that make forecasts in space and time. (g) Panel data allows to explicitly modelling dynamics.

4.2. Methodology

FE model of panel data analysis was used to explore the relationship between explained and explanatory variables within an entity. FEM assumes that some factors within the entity may have impact on explained variables. FEM controls these factors by introducing dummy variables for time invariant characteristics *i.e.*, religion and race *etc.* Time invariant features are unique and exclusive for each cross section. It is not correlated with other individual characteristics. So, each entity is different, therefore, error and intercept terms of each entity is not correlated with others. FEM has constant slopes and different intercept term for each cross section unit. It can also be said that Fixed Effects Estimator treated the entity specific or group specific. This means that it allows the different constant for each entity. The functional form of FEM is presented as follow:

$$Y_{it} = (\alpha + u_i) + X'_{it}\beta + v_{it}$$

Where: Y is the dependant variable; α represents intercept for each cross section unit; X is an explanatory variable; i stands for each cross section entity or unit; and t is time period and u represents an error term or disturbance term.

To empirically examine the relationship between economic growth, measured by the average per capita expenditure of a household, poverty, measured by incidence of poverty, and inequality, measured by Gini coefficient of mean per capita expenditure, the Fixed Effects Model (FEM) was applied, following Cheema & Sail (2012), to estimate the following equation:

$$\ln POV_{it} = \alpha_0 + \alpha_1 \ln(APE_{it}) + \alpha_2 \ln(GC_{it}) + u_i + \varphi_t + \varepsilon_{it} \dots \dots \text{Equation 1}$$

$$H_0: \alpha_1 = \alpha_2 = 0$$

$$H_1: \alpha_1 < 0 \text{ and } \alpha_2 > 0$$

Where: $i = 1, \dots, N$ refers to the cross-section of the administrative zones; $t = 1, \dots, T$ refers to the number of years; POV_{it} denotes to the poverty incidence, measured by the poverty headcount ration, of administrative zone i in year t ; APE_{it} denotes to the average per capita household expenditure of administrative zone i in year t ; GC_{it} i in year t ; u_i represents area fixed or random effects; φ_t is a time specific factor and ε_{it} is an error term such that $\varepsilon_{it} \sim IID(0, \delta^2 \text{ for all } i \text{ and } t)$.

Furthermore, the net growth elasticity of poverty was estimated given that inequality changes during the growth process. According to the literature on the relationship between poverty and growth, a rise in inequality will affect poverty adversely since inequality is assumed to negatively affect the poverty reducing role of economic growth. However, if inequality declines, it will reinforce the growth impact on poverty and resultantly, poverty will decline more than if inequality were to remain unchanged. Hence, it is important that we estimate the net growth impact of growth on poverty while allowing inequality to change. The following equation was specified to empirically estimate the net growth elasticity of poverty in ANRS of Ethiopia.

$$\ln POV_{it} = \alpha_0 + \alpha_1 \ln(APE_{it}) + u_i + \varphi_t + \varepsilon_{it} \dots \dots \dots \text{Equation 2}$$

$$H_0: \alpha_1 = 0$$

$$H_1: \alpha_1 < 0$$

The empirical model (equation 2) for the relationship between poverty and economic growth is specified based on the assumption that inequality may increase or decrease during the

growth process although the growth elasticity of poverty is always negative when inequality is fixed.

5. Result and Discussion

There are significant differences among administration zones and even between urban and rural areas in ANRS. Hence, the study has employed two panel data techniques; which are the Fixed Effects (FE) model and the Random Effects (RE) model.

F-test has been conducted for the FE model we estimated to find out whether it is applicable or not. The null hypothesis states that both dummy parameters, group and time, are equal to zero. The validity of the variables used in FEM can be checked through performing the F-test. The F statistic rejects the null hypothesis in favour of the fixed group effect ($P < 0.0033$).

Similarly, the Breusch-Pagan LM test was carried out for the estimated random effects model (REM) to ascertain whether it can be applied or not. Breusch and Pagan's (1980) Lagrange multiplier (LM) test examines if individual (or time) specific variance components are zero. The null hypothesis states that the variance across group and time is equal to zero. With the chi-squared of 0.02, we accept the null hypothesis in favour of the FEM ($P < 0.8891$).

Therefore, the results of the F-test and LM-test renders the estimates from the FEM are statistically preferable than the estimates from the REM. For that reason, without conducting the Hausman specification test we decide to employ the fixed effects model.

The gross growth elasticity of poverty shows the percentage change in mean annual household expenditure per capita, keeping inequality constant. It is quite possible, however, that inequality may increase or decrease during the growth process. Thus, it is essential to estimate the net elasticity of poverty to growth, which indicates the percentage change in poverty to a 1 percentage change in mean annual per capita household expenditure (APE). The result of the FEM, the statistically preferred model according to the relevant tests, is presented in table 1.

Table 1: Relationship between Poverty and Growth, FEM

Fixed Effects Model Estimates		
	Equation 1	Equation 2
<i>lnAEP</i>	-1.1217*** (.1613)	-0.9736*** (.1381)
<i>lnGC</i>	.4140 (.2480)	
_Cons	12.3816*** (1.3350)	10.8796*** (1.0112)
F-test	5.54**	5.18**
DF	34	35
<i>R</i> ²	0.9387	0.9448
N	40	40

Source: Own Computation of 1995, 2000, 2005 and 2010 HICE surveys, ANRS

*Standard errors in parenthesis; **Statistical significance: *** significant at 1% level and ** significant at 5% level

The FEM fits the data well at the 0.05 significance level (F=5.54 and P<0.0033 for equation 1 and F=5.18 and P<0.0046). R-Square of .9387 for the first equation states that the model accounts for about 94 percent of total variance in the change in poverty. Similarly, the R-square of .9448 for the second equation says that the about 95 percent of total variance in the change in poverty. The regression equations are,

$$\ln PoV_{it} = 12.3816 - 1.217 \ln AEP_{it} + .4140 \ln GC_{it} \dots \dots \dots \text{Equation 1, and}$$

$$\ln POV_{it} = 10.8796 - .9736 \ln AEP_{it} \dots \dots \dots \text{Equation 2}$$

The growth elasticity of the poverty variable has its expected signs. The result in table XXX show that growth has a significant negative relationship with poverty, keeping in inequality fixed, whereas inequality has a significant positive relationship with poverty, holding growth constant. The result for the gross growth elasticity of poverty indicate that a 1 percent increase in mean per capita expenditure leads, on average, to a 1.122 percent decrease in the proportion of people living below the determined poverty line, holding inequality constant (P<0.0000). This indicates that economic growth has led to reduction in poverty in ANRS over the past 15 years, implying that the various policies and reforms implemented in the region since the 1995 have positively impacted the incomes of the poor. The table also show shows that a 1 percent rise in inequality in average expenditure per capita, keeping mean

expenditure per capita constant, raise the incidence of poverty by 0.4140 percent implying inequality has a positive significant relationship with the incidence of poverty in the region. Moreover, the results imply that the growth elasticity of poverty is substantially larger than the inequality elasticity of poverty.

Furthermore, estimation results for equation 2, in the same table, also show that growth has a negative and significant impact on poverty, keeping inequality flexible. This result suggests that the increase of every one percentage point in per capita household expenditure decreases incidence of poverty by .9376 percentage points in the region ($P < 0.0000$).

A comparison of the gross and net growth elasticities of poverty shows that the absolute magnitude of net growth elasticity of poverty (-0.9376) is smaller than that of the gross growth elasticity of poverty (-1.1217), implying that some of the effect of growth on poverty is lost due to the rise in inequality.

Findings of this study are consistent with the findings of De Janvry and Sadoulet (2000), Odhiambo (2004), Bigsten et.al (2003), Tsai and Huang (2007), Agarwal (2008), Gelaw (2010), Ijayat et.al (2011), Young (2012), Nuruden and Ibrahim (2014) and Kolawole et.al (2015). Empirical findings from these studies indicated that economic growth has a negative and significant relationship with poverty which implies economic growth, in general, plays a pivotal role in poverty reduction.

6. Conclusion and Recommendation

The study has estimated a FEM to determine the relationship between poverty and economic growth in ANRS, Ethiopia, using a panel data from four household income, consumption and expenditure (HICE) surveys compiled between 1995/96 and 2010/11 by the Central Statistics Authority (CSA) of Ethiopia. The result shows that there is a significant negative relationship between poverty and economic growth in ANRS, Ethiopia.

The Fixed Effect estimation result shows that growth and change in inequality significantly affected the incidence of poverty in the region. The study has revealed growth contributes far more towards reducing poverty, keeping inequality constant, than the latter does to increasing poverty, holding the former constant.

The study also investigated the net effects of growth on poverty. The absolute magnitude of the net elasticity of poverty to growth is smaller than that of the gross elasticity of poverty to growth, implying that some of the growth effect on poverty is offset by the increase in inequality.

Results of the study have important policy implication in that appropriate measures need to be taken to reduce the existing inequality to achieve a pro-poor growth. Despite the fact that economic growth has contributed to reduction in poverty levels and improved standard of living in the region, the study has shown that income inequality is still a major constrain to that positive relationship. In order to deal with poverty problems successfully, the issues of income inequality must also be dealt with. We propose that, government should implement policies that aim at redistributing income in favour of the poor and middle class households.

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