Allah will exalt in degree those of you who believe and those who have been granted knowledge.

(Chapter: 58, Verse: 11)

Role of Education and Income in Poverty Alleviation
A Cross Country Analysis

By

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219-SE/MS-Eco1/F09

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Thesis Submitted as a Partial Fulfilment for the Degree of
M.S. Economics

at

School of Economics
International Institute of Islamic Economics
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(February 2011)

Dedicated to my

Parents and Family

ACKNOWLEDGMENTS

Foremost, I humbly thank Allah Almighty, the Merciful and the Beneficent. This thesis would not have been completed without His *Rahmah*. He gave me health, thoughts and cooperative people and enabled me to achieve this goal.

I owe my deepest gratitude to my supervisor Prof. Dr. Pervez Zamurrad Janjua for the continuous support, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better supervisor and mentor for my research work.

Besides my supervisor, I would like to thank Prof. Dr. Sayyid Tahir (IIUI), Prof. Dr. Asad Zamman (IIUI), Prof. Dr. Razzaq Hamza Bhatti, Prof. Dr. G.M. Arif (PIDE), Associate Prof. Dr. Hafiz Muhammad Yasin (IIUI), Assistant Prof. Dr. Abdul Jabbar (IIUI), Assistant Prof. M. Zakaria (PIDE), Assistant Prof. Faiz-ur-Rahim (IIUI), Assistant Prof. Arshad Ali Bhatti (IIUI), Assistant Prof. Saqib Manzoor (IIUI) and Lecturer Mr. M. Ramzan (PIDE) for their encouragement, insightful comments and their help. I am also very grateful to Mr. Gulam Sammad Research Economist (PIDE) and Mr. Tauqeer Ahmed Research Associate (IIUI) for their kind help in research. I would like to thank Mr. Niaz Ali Shah (Admin IIIE) and all other administrative personnel for their great help during the research period.

I am indebted to many of my friends, Mr. Yahya Ilham, Mr. Ahmed Bilal Ghauri, Mr. Saqib Bashir, Mr. Altaf Akbar, Mr. Mahbob-e-Ilahi, Mr. M. Faisal Zia,

Mr. M. Ishfaq Khan and Aamir Nawaz for their support, stimulating discussions, for the sleepless nights we were working together and for every thing we have had during this period.

I am thankful to all those who have contributed toward the strength of this work. However, for possible weaknesses the author takes the sole responsibility.

Usman Ahmed Kamal

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ACRONYMS

CPI	Consumer Price Index
CPR	Chronic Poverty Research
CPRC	Chronic Poverty Research Centre
d.f.	Degree of Freedom
EFA	Education For All
e.g.	For example (exempli gratia)
etc.	And so forth (et cetera)
et al.	And others (Et alii/alia)
FEM	Fixed Effect Method
GDP	Gross Domestic Product
GIC	Growth Incidence Curve
GLS	Generalised Least Square
GNP	Gross National Product
HIES	Household Integrated Economic Survey
Ibid.	As cited before (Ibidem)
ICP	International Comparison Program
i.e.	That is
IFPRI	International Food Policy Research Institute
IQ	Intelligence Quotient
IV	Instrumental Variable
MDG	Millennium Development Goal
Obs.	Observation(s)
OLS	Ordinary Least Square
p-value	Probability Value
PovcalNet	Online poverty calculation software of the World Bank
PPP	Purchasing Power Parity
p.	Page
pp.	Pages
Prob.	Probability

REM	Random Effect Method
SAP	Structural Adjustment Program
Stat.	Statistics
Std. Dev.	Standard Deviation
sq.	Square
TSCS	Time Series Cross Section
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States of America
WDI	World Development Indicators
$	United States Dollar

ABSTRACT

A world with lots of poor is not a satisfactory situation from both social and economic perceptions. For developing countries poverty is the largest hindrance in the process of development. Any serious aspiration to reduce poverty needs to identify the factors that have strong impact on poverty and are also practical from policy perspective. Available cross country studies about poverty often discuss poverty in relation to income variables. However, level of poverty is not only affected by income growth or income differentials rather other factors like education may also affect it. Existing literature on education and poverty mostly consider primary data. The benefits of education are not confined to income only (direct impact). There are many other positive externalities of education (indirect impact), which can help to reduce poverty.

This research is an attempt to explore, does the formal education of a country have a substantial impact on the incidence of poverty and what contributes more towards poverty indices; education, per capita income growth or income inequality. This study uses panel data of 40 developing countries for the period of 1999-2007. In this study Random Effect Method of Generalised Least Square Estimation Technique has been used to test different hypotheses.

Three key findings are, first, income growth although plays a positive role, yet it is not key contributor in poverty alleviation. Second, income inequality plays better role in poverty alleviation than per capita income growth. Third, education at both primary and secondary levels is a significant contributor in poverty alleviation.

However, effect of secondary level education is comparatively more robust than primary level education. Another finding is income based variables are more influential toward poverty magnitude in higher income countries as compared to lower income countries. Findings also show that in those countries where income inequality is high, it contributed considerably in the incidence of poverty. These findings suggest policy measures focusing more on education than income based variables in poverty alleviation. However, countries facing high income inequality, along with education shall also focus on improvement of income equality to experience a hasty shrink in poverty magnitude.

CHAPTER 1

INTRODUCTION

Generally economic enquiry has to address the socioeconomic problems faced by human beings and look for their optimal solutions. In the literature 'poverty' has been considered as one of the most important problems of developing countries. In fact poverty is a complicated, multidimensional and greatly discussed issue throughout the world. There is ongoing debate on poverty from different angles since a couple of decades. Some of core concerns are, why does poverty exist throughout the world? What is happening to the poor of the world? How poverty can be reduced? Particularly, when someone talks about globalization, economic growth and living standards, then one also talks about poverty.

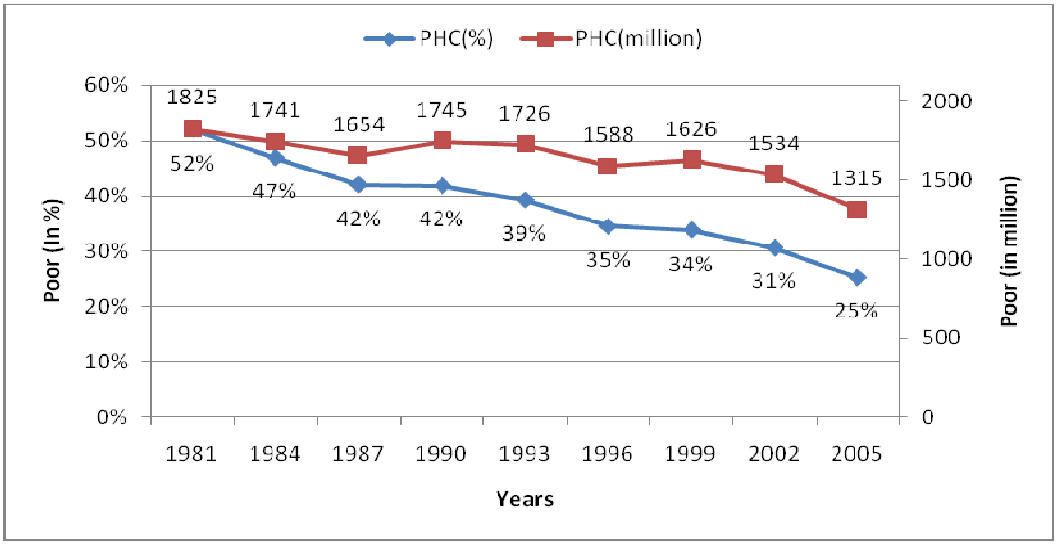
There are many definitions of poverty. For example, 'poverty is a situation in which a person has such a low income that he/she cannot avoid starvation' or 'poverty is a situation in which a person cannot fulfil his/her basic needs for living'. However, irrespective of semantic differences, by all definitions poverty is a despondent and miserable situation. Poor of every society experience the lowest utility band of that society. People living under poverty line are unable to fulfil their basic needs, such as essential nourishment, basic health and education. The biggest obstacle in improving the living standard of a person is poverty. Expansion in the earning of poor leads to better nutrition plan, improved health and better education.

Poverty has been a continuous part of every society although with a difference in its incidence. Available literature on poverty indicates that high poverty rates can disturb the development process of a country in a number of ways. "No society can surely be flourishing and happy, of which by far the greater part of the numbers are poor and miserable" (Adam Smith 1776). Focus given towards poverty in recent decades by global bodies, such as the World Bank and United Nations Organisation, shows the grimness of this issue. Many poverty reduction programs have been practiced in recent decades by developing countries with the assistance of international organizations. At the Millennium Summit (2000) a Millennium Development Goal (MDG) was setup by the World Bank and United Nations Organisation to halve the extreme poverty till 2015 from its level of 1990[1].

A reduction in poverty figures is commonly considered as a progress measure for developing countries. According to WDI (2008) anti-poverty programs are effectively resulting decline in poverty level bringing poverty at half of the level in 1990 as set by MDG. However, there are many serious concerns regarding this claim of success. For example, the achievement in poverty alleviation is not homogeneous throughout the world and elimination of widespread poverty is still a tough goal to achieve for many countries. Latest available estimates of the World Bank about poverty till 2005 reveal that about 25% of population is extremely poor around the world. One out of each four people is poor on the globe. Following figure explains change in the average incidence of poverty between 1981 and 2005 for 116 countries:

[1] Detailed elaboration of MDG goals is available at http://www. developmentgoals.org

Figure 1: Incidence of Poverty (116 countries, at 1.25 US$ per day/person)



* Data source: "PovcalNet", available on the World Bank web site http: //www.worldbank.org
** These estimates were calculated by using poverty line 1.25 US dollar a day for 116 countries.

We can see in figure (1) that during a period of 24 years poverty declined almost 26% (more than a half). When we look at the actual number of poor instead of percentage of poor, the situation seems sluggish rather than optimistic. In Figure (1) percentage of poor has declined continuously. However, actual number of poor showed mixed performance as these numbers increased instead of decreasing between 1990 and 1999. According to the population estimates given by World Bank for these 116 countries in 1981, total population of these countries was approximately 3504 million, which elevated up to 5205 million in 2005. Using these figures, numbers of poor were 1825 million in 1981 and 1315 million in 2005[2]. It shows that the number

[2] Author's calculation, by using World Bank estimates of population and incidence of poverty from the above mentioned data source.

of people under poverty actually fell by 510 million since 1981. Thus, in numbers, achievement is even lesser than 1/3rd since 1981.

1.1. Problem Statement

Above stated overall figure describes only a part of the situation of poverty in the world. Rate of poverty reduction is not equal across countries. Some countries experienced high rates of poverty reduction in the past few years while many countries were unable to practice a considerable decline in poverty indices. Moreover, poverty reduction rates were also not constant for many countries during last decade. These differences of poverty alleviation rates among countries or within country over time, could be the results of different factors effecting poverty indices.

When any one thinks about poverty, one certainly comes across two basic questions. First, why the people are poor? Second, how poor can get rid of poverty? To have an appropriate solution for poverty we have to know the causes of poverty. Does growth rate of per capita income influence poverty? Does low income craft poverty? Does income gap of rich and poor create poverty? Does the difference in the earning ability of the low income and the high income groups cause poverty? Thus, empirical investigation about plausible poverty determinants is indispensable.

Many World Bank publications highlighted the significance of income and income inequality as determinants of poverty. A lot of work has been done on the poverty throughout the world using income based determinants, but poverty is not confined only to income or income differentials. In different studies income variables, income growth and income inequality have been discussed as possible

determinants of poverty and the studies showed mixed evidences regarding the robustness of these variables towards poverty. If one ascertains on the basis of empirical findings that income variables explain only a part of poverty alleviation then there is a need to explore other possible determinants of poverty, e.g. lack of education, etc[3].

1.2. Objectives and Hypotheses

Poor do not want to remain poor any more and others have to help them to escape from vicious cycle of poverty. International organizations like World Bank and United Nations are practicing the anti-poverty programs at large scale but situation is still miserable. Most of the time policy makers follow the goal of higher per capita income or reduction of income inequality to achieve the objective of poverty alleviation. However, education level of the earning person in household is an important factor for poverty risk (risk of becoming poor) not only for himself/herself but also to his/her family. As education may effect the earning of a person positively, therefore estimates of educational affect on poverty level will be of much use for anti-poverty policy perspective. The prime intention behind this study is to explore, does the formal education of a country have a considerable impact on poverty magnitude side by side with other variables like per capita income growth and income inequality?

[3] Asset distribution may also affect poverty. However, due to non availability of data and estimational issues, I have excluded it from my investigation.

World Bank has classified all the world countries on the basis of their incomes in four groups, namely low income, lower middle income, upper middle income and high income countries. This study includes all countries except high income countries, because absolute poverty is not a big issue in rich countries. A set of 40 countries will be selected randomly from a population of all those countries for whom data requirements are fulfilled. An econometric model will be estimated to test the following hypotheses:

1. Does number of formally educated people have significant impact on the poverty extent of a country?
2. What contributes more towards poverty indices; education, per capita income growth or income inequality?
3. Do all three variables behave similarly in different income groups of countries?

1.3. Significance of Study

Generally, a theory is validated from empirical evidence and the empirical estimation requires theory as foundation of hypothesis. Therefore, this study is based on both theoretical discussion as well as empirical observations. The study is distinctive because it investigates education as a determinant of poverty in addition to the conventional income based determinants. Absolute poverty is a fundamental barrier to the development, particularly for the developing countries. Developing countries are spending huge funds with the coordination of international organizations in the pursuance of poverty alleviation. An effective and less expensive policy for

poverty eradication is crucial as public resources are not unlimited. Ascertaining the strength of different determinants of poverty can help us to come forward with appropriate policy recommendations.

A world with lots of poor people is not a satisfactory situation from both social and economic perspectives. Pakistan is also one of those developing countries which have to deal with the evil of poverty. The central motivation to work on this issue was the yet unresolved poverty problem of Pakistan. In the literature of economic development it is a prominent view that poor have some common characteristics which make them stay poor, usually known as “poverty trap”. Therefore, useful results can be obtained by analysing the collective data set of different countries to ascertain the causes of poverty. The results from cumulative experience of countries in recent years can provide a better track to move on for developing countries like Pakistan.

1.4. Structure of Thesis

In chapter 2 relevant literature has been reviewed starting from theoretical work to empirical studies. I have mentioned the methods and techniques used for studies and the results they presented.

Chapter 3 include discussion on adopted methodology for this thesis in detail. In this chapter I discussed the theoretical background, definition of used variables, construction of model and the data set.

Chapter 4 deals with the econometric and statistical issues and methods, their implication, estimation and interpretation of the results.

Chapter 5 presents the conclusion of the study and provide some suitable policy recommendations for poverty reduction programs.

The study ends with references and other relevant information provided in appendices.

CHAPTER 2

LITERATURE REVIEW

There is vast literature on poverty, which can be classified into theoretical and empirical approaches. In theoretical approach the discussions are mostly about the types of poverty or different social aspects of poverty. Whereas in empirical literature more focus has been given to find out the evidence for the relationship of poverty and underlying variables from observed statistics. Literature can also be divided on the basis of micro and macro level approaches. In micro level studies primary data is used. However, macro level work mostly uses secondary data.

Ellis (1984) attempted to describe different types of poverty by using a causal relation to community. In her work the nature of 'poverty' is examined in relation to a model of causes affecting the welfare of a community. She suggested that one can operationally distinguish four major dimensions of poverty, namely economic, social, political and legal poverty. Some further social aspects of poverty were also discussed. She stated that the classification of poverty in different types will help to understand problems faced by the community. She further argued that distinguishing the various types of poverty will make easy to identify the areas where actions are needed.

Ravallion (2001) explained the techniques used by the World Bank to measure poverty. He described that the selected common poverty line (1 US$ a day) is typically prevailing poverty line of low income countries. Then he further explained

that this poverty line has been converted to local currencies for consumption surveys by using purchasing power parity (PPP) exchange rates. He stated that World Bank uses the best available consumer price indexes to convert the international poverty line in local currency. He also discussed some other measures undertaken by the World Bank while doing poverty surveys.

In another effort Ravallion (2003) explained how different measures used for poverty or any other variable can lead to dissimilar results and if the approaches are different then these results are not legitimate enough to deny opponent's findings. He also stated that even the difference of data sources can also lead to different findings due to the diverse techniques and methods used for data collection. According to him as incomes of people rise, societies naturally tend to adjust their views about minimum acceptable standards of living. This revision of people's notion asks for a comparable rise in poverty lines.

Squire (1993) in his analysis reviewed the efforts done to reduce poverty in developing world. In his paper he compared empirical statistics and there was no estimation model used to observe the affects of social indicators such as education and health on the poverty. He used country and regional figures of poverty headcount, growth and health measure to compare them. He drew three conclusions; 1) Economic growth should be encouraged to induce productive use of labour so that poor can earn to get rid of poverty, 2) Public spending is an important source to improve health and education attainment of poor and 3) Provision of subsidized social services is better than direct cash transfer.

Ravallion and Chen (1997)[4] showed for 67 developing and transitional economies over 1981-94 the type of correlation between growth of average living standards and poverty by using survey data. They used OLS regression method to obtain the estimates of variables. They found that there is a strong association between the rate of growth in average living standards and the rate at which absolute poverty fell. They stated that almost always poverty fell with growth in average living standards and rose with contraction. They also examined the relationship between living standards and income distribution and found that the higher growth rates in average living standards do not tend to worsen the income distribution.

Ravallion and Datt (1996) decomposed the growth on the basis of sector output to see the impact of growth of different sectors on poverty. They used OLS and IV regression methods in their study. They showed that growth of primary and tertiary sector contributed toward reduction of both urban and rural poverty, whereas secondary sector did not deliver much to the poor of India. They suggested fostering the growth of primary and tertiary sector to reduce poverty. But they didn't suggest the other possible prospect that poor could be enabled to grasp their part from secondary sector providing them the skills and education as secondary sector requires more skilled labour as compared to primary sector.

Ravallion and Datt (2002), by utilizing regression estimation method, estimated the benefit received by India's poor by economic growth of the country. Their results suggested that the incidence of poverty has been falling at a little less

[4] Ravallion and Chen (1997) used income or expenditure as welfare indicators, where income denotes household income per person, and expenditure denotes household expenditure per person.

than one percentage point per year over the main post reform period. They also obtained the results on state wise disaggregated level. They revealed performance diversity in poverty reduction and economic growth across the states of India. They stated that relatively low level of initial development is responsible for low poverty reduction rates across the states. They concluded that economic growth is only one element of an effective poverty alleviation process.

Amjad and Kemal (1997) did a time series analysis of poverty estimates for the period 1963-64 to 1992-93 for both the rural and urban areas of Pakistan. They used HIES survey data for analysis. They also examined the influence of macroeconomic policies and the effects of Structural Adjustment Programs (SAP) on the poverty levels. They used different economic factors like economic growth, agricultural growth and terms of trade for the agriculture sector to observe the influence of these factors on poverty. Their study suggested that the high growth rates explain the changes in poverty over time. They also came to the conclusion that "the policies pursued under the structural adjustment program (SAP) have tended to increase the poverty levels mainly because of decline in growth rates".

In an analogous work Mujeri (2000) focused on trends in poverty headcount and growth during the period of 1983 to 1999 in Bangladesh. He discussed the relationship between the pattern of sectoral GDP growth (agricultural and non-agricultural) and the poverty incidence of Bangladesh. He also discussed the trends in income inequality and incidence of poverty. His work also highlighted the effects of structural adjustments and economic reforms on poverty. He stated that the overall incidence of poverty in the country has been declining at the rate of less than 2% per

year. He concluded that “along with a high growth rate, structure of economic growth is important which determines the mechanisms through which benefits of growth are transmitted to the poor”. He further argued that “pro poor economic growth can enhance income of the poor with direct impact on income poverty”.

Dollar and Kraay (2004) selected a group of developing countries to estimate the effect of growth and trade openness on the poverty indices of those countries. They used standard growth regression by using both OLS and IV techniques to estimate the effect of trade on economic growth. Then they estimated the effect of economic growth on poverty magnitude. They showed that changes in trade volumes have a strong positive relationship to changes in growth rates. Their result showed that increase in growth rates on average leads to proportionate increase in the incomes of the poor. According to them this was the reason that absolute poverty in the globalising developing economies was fallen sharply in the past 20 years.

Demery and Squire (1996) analyzed six African countries for the relationship of poverty with growth and income inequality. They checked growth effect on poverty by holding inequality constant and then they checked inequality effect by holding growth constant. They found that in all the countries growth was more effectual toward incidence of poverty as compared to inequality. They further argued that poverty was more likely to decline in those countries which improved their macroeconomic balances than other countries, which did not improve their balances. According to them “the critical factor was economic growth: the economy grew more rapidly and poverty declined faster in countries that improved macroeconomic balances, depreciating the real effective exchange rate”. They suggested that to help

the poorest of poor more economic reforms and investment in human capital is essential.

Besley and Burgess (2003) discussed the poverty trends on global scale. They showed where the poor are located on the globe and how their numbers have changed over time. They also discussed the relationship between poverty, per capita income and income inequality by using regression estimation. Their findings confirmed that increases in income per capita are associated with reductions in poverty. They concluded that prevailing economic growth rates by themselves are not enough to cut the poverty by half in much of the world. Their outcome also illustrated a positive and significant association between income inequality and poverty. They also stated that although the proportion of poor is falling but the actual number of poor showed limited reduction.

Bénabou (2003) examined the interactions between income inequality, technological choice and redistributive policies or institutions and showed that "a skill-biased technical change can potentially lead to the unravelling of the welfare state. When technological or organizational form is endogenous, firms respond to greater human capital heterogeneity with more flexible technologies, further exacerbating income inequality". From here we can observe how human capital heterogeneity may result in income inequality via wage inequality mechanism. In this scenario the existence of social contracts, for example educational assistance for the poor, will greatly help to reduce wage inequality.

Jamal (2006) studied the relationship between poverty, inequality and growth in the context of Pakistan. He used time series macro data for the period 1979 to 2002

to find out the elasticity between poverty, growth and inequality. He employed multivariate regression framework to obtain results. He stated that "the empirical findings, namely, high poverty elasticity with respect to inequality measures, confirm the importance of inequality in poverty reducing effort". His findings also showed a significant opposite correlation between per capita GDP and poverty. His results demonstrate that income inequality has more influence on poverty incidence as compared to growth.

The above mentioned literature shows that income growth and income inequality both can play an important role in poverty alleviation. It is logical to consider that an income growth will help less to reduce poverty in the presence of higher income inequality whereas income growth will help more to reduce poverty if income inequality is lesser in the society. Similarly if income inequality is rising as income grows then this income growth will not help the poor of that country. Both effects of income inequality suggest income inequality as a possible key factor in a poverty alleviation process. Following literature review focuses more on education and poverty.

Shirazi (1994) investigated about the incidence of poverty and the socioeconomic profiles of the poor in Pakistan. He also tried to explore the possibility of poverty alleviation through *Infaq* using *Zakah* and *Ushr* collection. He revealed that in Pakistan "the proportion of poor households having highly educated heads is extremely low (and) majority of the educated heads of the poor household falls in the primary or below matriculation category of education". He also

demonstrated that “as the educational level of the head of the household increases the probability of that household being poor decreases”.

Goh, Luo and Zhu (2009) investigated the effect of income growth on poverty during the period of 1989-2004 in eight provinces of China. They used data from China Health and Nutrition Survey. They applied Growth Incidence Curve (GIC) method to estimate the effect of growth and income distribution on poverty headcount. Their result was that growth in income affects the poverty negatively. It showed that income grew for all segments of the population, and as a result, poverty incidence has fallen but the growth was uneven by region. One other finding was that education played an increasingly important role in household income determination for both urban and rural areas. Income gaps have increased between households with more and less human capital endowment.

Fafchamps and Quisumbing (1999) investigated whether human capital affected the productivity and labour allocation of rural households in four districts of Pakistan. They used survey data collected by International Food Policy Research Institute (IFPRI). Coefficients estimates for different equations were calculated by using regression method. Their results showed that “education raises off-farm productivity and induces rural Pakistani households to shift labour resources from farm to off-farm activities. This effect is strong, robust, and demonstrated via both the direct and indirect methods”.

Maitra (2000) compared two data sets from South Africa to examine the effect of household characteristics on poverty and living standards. He estimated the results by using quantile regression. He found that the gap between the educated and the

non-educated has increased in South Africa during the observed period, due to difference in earning capacities. He also concluded that a household, where the head has more than secondary school education, performs significantly better than all other households where the heads were comparatively less educated.

Gundlach, Pablo and Weisert (2002) studied the relationship between education and income inequalities. They utilized OLS and IV regression methods to estimate coefficients. They affirmed that more quality-adjusted education does increase the income of the poor. According to their findings, "education seems to improve the income distribution and thus may allow the poor to benefit from growth to a greater extent". Due to this effect of education they argued about the justification of a focus of economic policies on education to reduce poverty and to speed up development.

Datt and Ravallion (1998) in their paper on selected set of Indian states showed that "differences in trend rates of poverty reduction among states are attributed to differing growth rates of farm yield per acre and differing initial conditions". They hold the view that initial advantages of better infrastructure and human resources were major reasons to observe significantly higher long-term rates of poverty reduction.

According to Orazem, Glewwe and Patrinos (2007) a part of the better farm yield, as mentioned above, can also be considered as an externality of education. The impact of education on earnings and thus on poverty works mostly through the labor market, however education can also add to productivity in other areas, such as peasant farming (Orazem, Glewwe & Patrinos, 2007).

Mitch (2005) made an effort to compare a number of existing studies about the relationship of education (schooling) and economic growth in historical perspective. He found that schooling may or may not have caused economic growth empirically. Movements of rates of schooling and rates of economic growth have been observed in same and opposite direction over the history of last three centuries. According to his analysis human capital development, physical capital accumulation, structural change of economy and foreign trade did play a key role in economic growth. Krueger and Lindahl (2001) attempted to reconcile the micro-econometric and empirical macro literature about the effect of schooling on income and GDP. They showed that micro level positive relation of education and income is also true at cross country level.

Despite the possible difficulties in quantifying the real contribution of education to economic growth (Mitch 2005), education has always been considered a dominant tool for reducing poverty and inequality through productivity enhancement which is also a key factor for the sustainable economic growth. Easterly and Levine (2000) have shown that productivity growth explains most of the economic growth of developed countries and capital accumulation explains only a small part. Many countries continue to accumulate capital even while their economies shrink. Although total factor productivity relates to labor, land and capital, yet the role of labor productivity is more important than all other factors of production. Education and skill promote labor productivity and consequently labor productivity positively influences the productivity of other factors of production.

In literature studies on education and poverty exist in both directions: low education as a cause and as an effect of poverty. Estimating causality is always of

more importance because if we know the robustness of cause toward effect, then we can address the problem effectively. Poverty is strongly correlated with a range of family background variables including parental education, which also influences children's educational outcomes (Berg 2008). Poverty is just one of the many family background factors limiting learning. Chronic Poverty Report (2004) of CPRC referred to evidence showing that formal education has been strongly associated with decreased possibility of chronic poverty. It also indicated that the level of schooling, at which this might happen, can vary between countries. Chronic poverty reports showed that low education is one of key factors to keep people poor over the decades or lifecycle (CPR, 2008). My concern here is absolute poverty so I will not discus literature of chronic poverty as it requires addressing a vast area of non-quantitative aspects of poverty and other social variables.

It is commonly known that absolute poor of developing countries usually have low or even no education. According to EFA (2007) report the children most likely to be out of school and to drop out live in rural areas and come from the poorest households. The underlying aim of Early Childhood Care and Education program was to provide strong foundation in early childhood to escape from poverty in future.

Geda *et al.* (2005) tried to explore the determinants of poverty in Kenya by using household data. They reveled that among all the variables "in all models the most important determinant of poverty status is the level of education. Lack of education is a factor that accounts for a higher probability of being poor". Londoño (1996) suggested that inadequate education was the most important factor holding back Latin American economic growth and thus sustaining high levels of inequality

and poverty. He came to conclude that improved education can bring a large and relatively quick reduction in poverty due to its effect on individual's earning and growth.

Freeman (2003) used pooled time series data to examine the relationship of poverty and the macro economy in different regions of United States. His results indicated a stronger negative relationship between poverty rates and the unemployment caused by business cycle in the 1980s and 1990s. He suggested that poverty solution has less to do with macroeconomic conditions of economy and more to do with changing the characteristics, such as the skills and education levels, of the poor population itself.

Harper, Marcus and Moore (2003) provided a comprehensive review of the literature on poverty reduction. Their discussion covered a number of key social processes which can affect poverty. They also highlighted the significance of education as a means of poverty reduction. They argued that a good quality formal education widens horizons and increases future employment opportunities. They concluded that education can facilitate upward economic and social mobility, a better-paying and safer job and general wellbeing. Their conclusion confirmed the importance of education in breaking different aspects of poverty cycles ranging from individual earning to parental and family effect.

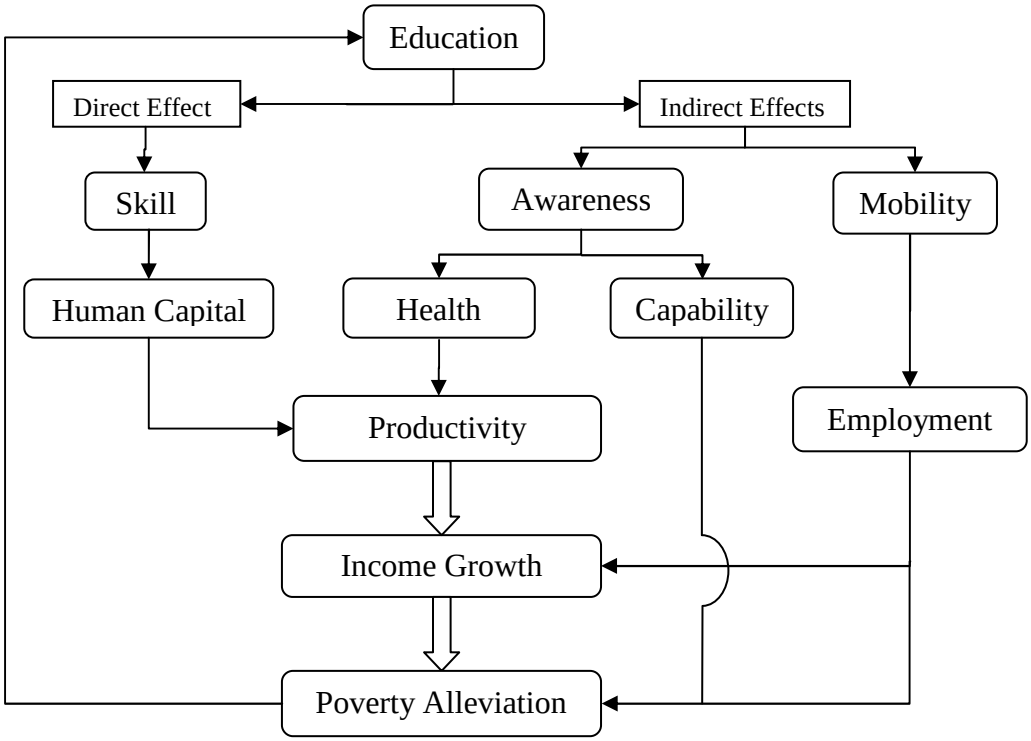
Berg (2008) mentioned that "throughout the world it has been found that the probability of finding employment rises with higher levels of education, and that earnings are higher for people with higher levels of education". According to Berg (2008) "this connection between education and poverty works through three

mechanisms. Firstly, more educated people earn more. Secondly, more (and especially better quality) education improves economic growth and thereby economic opportunities and incomes. Thirdly, education brings wider social benefits that improve economic development and especially the situation of the poor, such as lower fertility, improved health care of children and greater participation of women in the labor force".

These findings support the view that these direct and indirect benefits of education result in changes in people's behavior and this behavioral change inevitably has an impact on overall level of poverty. Education influences both the ability of the individuals to earn income and their decisions which increase the probability of success in lifetime.

Thus, the above mentioned direct and indirect impacts of education on poverty can be illustrated in the following flow diagram:

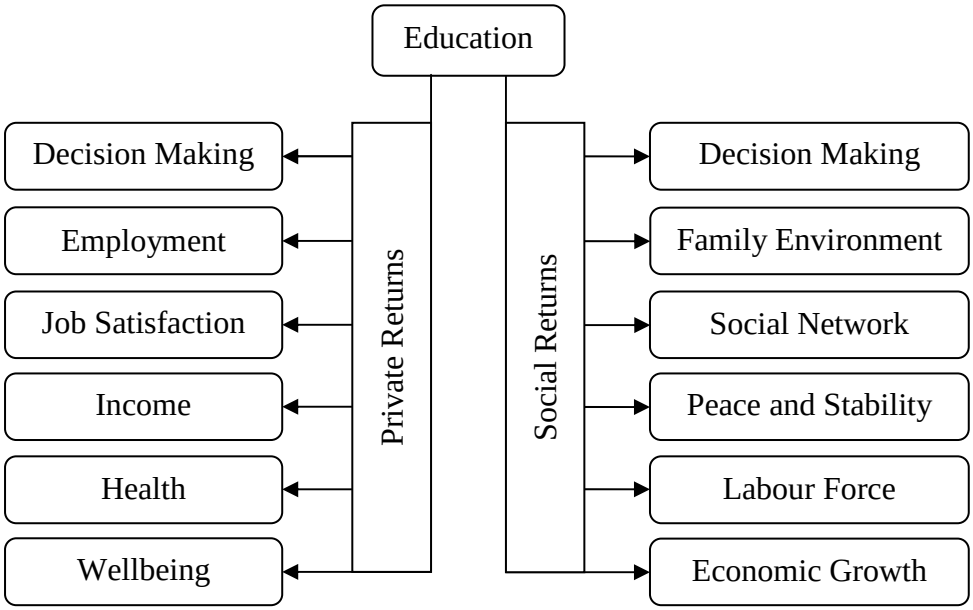
Figure 2: Impact of Education on Poverty Alleviation



From another but similar point of view education pays-off through both private and social returns. A distinction between private and social returns to education is that private returns refer to benefits received by the individual who acquires the additional schooling and social returns refer to benefits gained by society from individual's schooling. Private returns include economic benefits such as higher lifetime earnings, lower levels of unemployment and greater job satisfaction. They may also include consequences such as improved health and longevity. According to human capital theory schooling raises earnings because it enhances workers' skills thus making employees more productive and more valuable to employers. Riddell

(2004) believed that strong positive relationship between education and earnings is one of the most well established relationships in social science.

Figure 3: Private and Social Returns of Education



Above mentioned literature proposes that education can reduce poverty through direct (income) and indirect (externalities) channels. In poverty reduction policy an important choice is the level of education which would be focused. Choosing crucial and most rewarding education level could be a key to success in poverty alleviation program. Based on labor requirement and country's development level Gemmel (1996) found that primary education is most important for economic growth in low income developing countries, secondary education for middle income developing countries, and tertiary education for rich countries.

Self and Grabowski (2004) examined the impact of different educational levels on income in India for the time period 1966-1996. They used time series

technique to obtain results for each level of education. They classified education into three levels, primary, secondary and tertiary. Their result showed that primary education has strong positive causal impact on income growth whereas secondary education has comparatively limited impact on income growth.

Verner (2004) used the education and poverty data of Paraíba and the Northeast Brazil for the period from 1981 to 1999. By using probit analyses he revealed that to break the intergenerational transmission of poverty, education sector needs extensive actions. Low quality education leads to low income, which in turn perpetuates poverty. He concluded that education attainment is the single most important poverty reducing factor. All levels of education from primary to tertiary are significant and negatively associated with the probability of being poor. He suggested that improvements in the access and quality education are keys to poverty reduction in Paraíba and the Northeast Brazil.

Previously, most of the studies on education showed highest return on primary education but recent studies revealed mixed results in favor of both primary and secondary education. It indicates that returns to education vary from country to country with factors such as the level of development, the supply of educated workers and shifts in the demand for skilled workers in the development process.

There is considerable evidence that education can reduce poverty. The literature reviewed exemplify that education can help to reduce poverty in a number of ways. Education can directly reduce poverty through the contribution that productivity enhancement makes to income growth, and indirectly it helps to alleviate poverty through its externalities on individual as well as on society. Thus, there is

sufficient literature available observing positive effect of education on economic growth and rate of return on different levels of education. It supports the view that education can foster the income growth and thus can help to reduce poverty. The literature review leads to three conclusions. First, education can increase the earning of individual by enhancing the productivity and thus can significantly help to reduce poverty. Second, the impact of education on poverty does not work only via income or productivity mechanism (direct impact) but also via a number of externalities (indirect impact), for example through reduced infant mortality, better decisions, improved health and parental education, etc. Third, the impact of education on poverty can vary across regions due to a number of factors including economic circumstances, labour market requirements as well as level and quality of education, etc. These three conclusions suggest "education" as a key variable in poverty alleviation. Thus, there is a space for a study at macroeconomic level to estimate the relationship of education and poverty due to its wide and unambiguous range of impacts on poverty.

CHAPTER 3

METHODOLOGY

This chapter deals with the definition and justification of variables as well as the model used for estimation in the study.

3.1. Definition and Justification of Variables

3.1.1. Concept of Poverty

In reality there is no common definition of poverty for which every one agrees. Although definitions differ on what has to be considered as basic human needs, yet central meaning of poverty in all the definitions revolves around the "lack of fulfilment of basic needs". Poverty has many dimensions, for some it is purely an economic matter for others it has social aspects too. Even within the economic notion ideas of absolute and relative poverty exist. Same is the case with social point of view that there are further sub categories, for example, political and psychological poverty, etc. By using different meanings and concepts of poverty we may come across diverse methods of calculating poverty resulting in dissimilar estimates. From social point of view it is implicit that poverty is lack of resources, lack of access to education and health care, lack of access to clean drinking water, un-fulfilment of needs and little or no opinionated representation. On the other hand economic poverty means having no or few financial resources to fulfil basic requirements of daily life. It is a very difficult task to quantify a social aspect of poverty for

measurement purposes. Therefore, frequently economic measure of poverty is used for empirical research.

Economic poverty is measured in both absolute as well as in relative terms. For both measures poverty can be defined as an inability to afford an adequate level of income or consumption, where this adequate level is defined as bare minimum in former and average in later[5]. The selection of measure mostly depends upon the subject matter of study and the policy point of view. In this study I have used the definition of absolute poverty for the purpose of estimation as it has been used in most of the empirical studies by various authors and leading institutions like the World Bank etc. The justification for using this measure is explained is explained in section 3.2.

3.1.2. Per Capita Income and Poverty

A comprehensive meaning of income in literature is "the consumption and savings opportunity available to an entity usually expressed in monetary terms" (Barr 2004). At aggregate level GDP means domestic income and GNP means national income. People are considered poor when they do not have enough income to fulfil their basic needs. Individual's income plays a key role in his/her poverty status when we consider the economic measure of poverty either absolute or relative because in both approaches the premise behind the measurement is income or expenditure. We can say that same is the case with GDP and GNP per capita of a country at aggregate level with regard to country's poverty echelon. However, impact of growth on

[5] Oxford Dictionary of Economics.

poverty mostly depends upon how this growth has been shared by the population of country.

Empirical studies reported mixed evidence regarding impact of growth on poverty incidence. Some studies exhibit robust poverty reduction effect of growth while some shows slightest impact of growth on poverty. Pro-growth activists are of the view that an increase in the per capita income of a country will ultimately lead to a decrease in the number of poor by increasing the income of individuals and vice versa. It is a familiar notion in literature that higher growth rates of per capita income ultimately leads to poverty reduction. On the other hand it is also the view that observed per capita income growth rates are not entirely capable of achieving the goal of poverty alleviation (Goh, Lou and Zhu 2009; Besley and Burgess 2003). This means even pro growth activists consider growth as a necessary condition, but not the sufficient condition, for poverty alleviation. Generally, growth rate of per capita income has been given a central objective status in poverty reduction programs throughout the world. However, countries experienced poverty reduction through economic growth in fact focused on the productive use of labour, the only asset owned by the poor (Squire 1993). This finding clearly states that pro-poor growth can help to reduce poverty.

3.1.3. Income Inequality and Poverty

Income distribution has been widely discussed in the literature of economics. Classical economists analysed the distribution of income between factors of production. Recent economic literature on income distribution primarily focuses on the income received by individuals or households. This modern visualization about

the income distribution is not strictly distinguished from the earlier theory but the further details of labour's share of income. By definition income distribution means how total income of a country is distributed among its population. It is also known as the "size distribution of income" in development economics (Todaro 2007).

A common and widely used measure of income distribution is Gini coefficient[6]. Value of Gini coefficient ranges between 0 and 1 where 0 shows perfectly equal and 1 shows perfectly unequal income distribution. When Gini coefficient is 0 all the individuals of society have same income and Gini coefficient equals to 1 means only one person has the whole income. Simply we can say that higher the value of Gini coefficient more income inequality exists in the society.

In theory it has been argued that more unequal distribution (income inequality) will ultimately push low income people into poverty. Underlying common idea is that if some people are sharing very minor part of national income as compared to others then poverty risk is greater for them, which simply means greater the inequality exits in a country more will be the poverty and vice versa. A number of empirical studies verified this positive relationship between income inequality and poverty (Besley and Burgess 2003, Goh, Luo and Zhu 2009).

[6] Gini coefficient was developed by Italian statistician Corado Gini in 1912. In principle, Gini coefficient is a mathematical derivative of Lorenz curve. Gini coefficient, being a measure of income distribution, represents over all structure of income distribution among population. Gini coefficient provides the level of income inequality of the society by calculating the ratio of two areas, area between the line of equality and Lorenz curve divided by the total area of triangle in which the curve lies. If Lorenz curve lies on the line of equality then the value of Gini will be 0 and if Lorenz curve equates the area of triangle then the value of Gini will be 1.

According to Todaro and Smith, extreme income inequality leads to economic inefficiency because low income people are unlikely to qualify for loan and thus leading to inefficient allocation of resources (Todaro 2007). This lack of access to credits or loans will cause no increase in future income of poor and further increases the income inequality in the society. Jamal (2006) argued that transfer of a small proportion of income from rich quintile to poorest quintile will cause a larger proportionate increase in incomes of poor as compared to proportion decrease of rich quintile. If this argument holds in our empirical estimation, the effect of inequality on poverty is expected to be more robust than the effect of income growth. However, the forcefulness of this effect depends upon the underlying distributional change by which inequality reduces. When inequality is reduced due to income gain of middle income quintiles then the impact of inequality on poverty will be very little. On contrary, if poorest quintile gains income then inequality will have strong impact on poverty.

3.1.4. Education and Poverty

Education means acquiring knowledge and skills. Formal education, usually known as schooling, is a process of transferring the knowledge and skills from one generation to another. Education process can be classified in many divisions starting from very basics of reading and writing to most sophisticated spheres of scientific knowledge and skill. Earning ability of individuals depends upon individual's IQ level, education, skills and accessibility of earning opportunities. Earning or return on education can be in terms of services, goods or financial means. The amount of return

on education depends upon the nature and quality of the required skills and knowledge.

People having knowledge and skills are commonly known as human capital and the basic source for acquisition of human capital is formal education. According to human capital theory, education is an investment decision made by individuals, which will help them in future to get returns. In literature it has been argued that economic role of education or human capital is to foster the economic growth by increasing income of masses. Empirical evidence exists in favour of the view that higher the human capital, higher will be the growth rate of income. This is also correct for an individual who earns comparatively more than his/her fellow being who is relatively less educated. On the other hand various studies also support the view that formal education (schooling) does not solely lie behind the economic growth but other factors namely physical capital accumulation, foreign trade and spread of financial services do also promote economic growth (Mitch 2005). This view does not reject the idea that education help people to earn income. Different rates of return for different schooling levels have been calculated through out the world. These rates vary from region to region depending upon various factors. Thus, education may cause distributional changes in income patterns of economy[7].

As discussed in literature review education can impact poverty in many ways other than improving human capital. There are a number of externalities of education

[7] In his introduction to the *Wealth of Nations*, Adam Smith (1776, p. 1) states that the proportion between the annual produce of a nation and the number of people who are to consume that produce depends on "the skill, dexterity, and judgment with which its labour is generally applied."

and these can help poor to get out of poverty status. For example, reading ability can help to understand instructions on a medicine or on a fertilizer bag or even a general health care notice in newspaper. Obviously, instructions on medicine will help to be healthy and instruction on fertilizer bag can help to increase output of an agriculture farm. Similarly, a basic analytical skill may help a person to compare different price packages in market and to prefer one according to his/her need. An educated father prefers education for its next generation due to its realized importance (Harper, Marcus and Moore 2003). These are few examples out of many externalities of education and there are many more externalities which have been discussed widely in the literature on human capital. It can be concluded that income effect and externalities of education help people to improve their life patterns in a number of ways and then these improved patterns help them to get rid of poverty.

3.2. The Model

Absolute and relative measures of poverty vary across countries. Relative type of poverty cannot be used for comparison between countries because no equivalent base line exists in relative poverty measures. Different countries apply different poverty lines for the measurement of absolute poverty but this difference exists only at currency levels. The basic concept behind absolute poverty measures is the "command over commodities" and these commodities are similar in all surveys as supervised by the World Bank. For cross country analysis same reference poverty line will produce better results at aggregate level. Using purchasing power parity (PPP) exchange rates based on CPIs of 1993 of developing countries Chen and

Ravallion (2001) constructed a poverty line of 1.08 US$ per day/person, which is known as "Dollar a Day" poverty line. A revised version of poverty line using data of CPIs of 2005 has also been developed, which is 1.25 US$ per day/person[8].

Although poverty figures are usually collected by surveys which use money based poverty lines but afterwards the practice of calculating poverty statistics varies widely. These practices range from simple "headcount" method to little sophisticated ones like "poverty gap" or "Watts" measure. Headcount measure considers the number of poor whereas other two measures weigh the depth of poverty more. Selection of poverty measure to use in any study depends mostly on the objective or target of the study. Poverty measures are generally used to observe the effects of particular cause on the incidence of poverty.

According to Morduch (2008) "the headcount registers no change when a very poor person becomes less poor. Nor does the headcount change when a poor person becomes even poorer". If we look from another angle this so-called "flaw" of headcount measure is a plus point of using head count. Although this argument is justified on moral grounds, however, as "dollar a day" poverty line is already a minimum survival income then a progress must not be considered until the poor attain income level above the poverty line. By using headcount we can utilize this built in progress check of headcount measure. According to another critique on the measure of headcount "focusing on individuals just below the poverty line may show rapid poverty alleviation and hence can be used as a deceptive tool by policy makers".

[8] Data for both poverty lines were taken from International Comparison Program (ICP).

However, this could be realized if the poverty analysis covers only one point of time. When study covers more than one period, number of poor just below poverty line reduces by each succeeding period which will show less progress in each next point of time. So, overall robustness of cause toward poverty reduction will be adjusted automatically. Above discussion reasonably justify the use of headcount measure.

This common headcount method is based on income/expenditure of individuals and both are commonly used for the measurement of absolute poverty. Headcount can be represented as actual number of poor below poverty line or the percentage of people living below poverty line. Headcount ratio of people living below poverty line is denoted by "P" in this study.

Income growth at country level is usually measured in terms of GDP or GNP, so higher growth means higher income and vice versa. On the other hand we also know that poverty headcount calculates the national individuals below poverty line. So in relation to poverty it is simply preferable to use statistics of GNP instead of GDP as it also works via concept of national product. Another rationale to use GNP is that it also includes the income earned abroad by country's citizens and a bulk of this income also comes to country in the form of remittances. It is also a common fact that many of poor families live on the income sent from abroad by the family member(s). Comparing growth in absolute and per capita GNP, it is obvious that per capita GNP growth is a better measure to use for poverty estimation than absolute GNP growth as it will have the population effect in it.

Income inequality is also another commonly used variable as determinant of poverty in cross country studies[9]. There are different ways to measure income distribution among the population of a society. Hoover index, Theil index and Gini index are indices to measure income inequality. Gini index is most frequently used inequality index in empirical studies because it satisfies four important principles, namely anonymity, scale independence, population independence and transfer principle (Todaro 2007). Besley and Burgess (2003) stated that "although Gini coefficient is one dimensional measure of distribution and even such measures can miss important changes in income distribution, (yet) it represents the only mean of looking at the relationship between inequality and poverty for a broad range of countries" (Besley and Burgess 2003).

In line with Besley and Burgess (2003) and Jamal (2006) following model can be constructed to measure poverty:

$$P_i = \beta_0 + \beta_1 \, PIncome_i + \beta_2 \, Gini_i + \varepsilon \qquad \ldots (1)$$

This model, in general, follows both the studies of Besley and Burgess (2003) and Jamal (2006). However, a minor difference is that both of these studies estimated the elasticity of given variables, whereas, this study use data in percentage form to estimate direct relation of variables. In equation (1), 'P' is the headcount of people (as

[9] Asset inequality can also be a variable which may affect poverty level of a country. However, ratio of asset-rich and income-poor people is very low as compared to income-rich and asset-poor people. Therefore, income inequality measure can fulfil the requirement of inequality variable. Another problem of correlation between both inequality variables may arise when we use both variables in same regression estimation.

percentage of population) below poverty line of *i*th country as '*i*' represents the cross-section units, whereas 'PIncome' denotes per capita income growth of *i*th country. In the equation (1) 'β_0' is intercept term, 'β_1' is the estimate of the effectiveness of per capita income growth on poverty and 'ε' is error term. Most of the existing literature suggests that income growth of a country affects the poverty magnitude of that country in opposite direction which means if income growth is positive, it will reduce poverty headcount or vice versa. Thus the expected sign of 'β_1' is negative. An appealing implication of doubts regarding "trickle down" theory could be that expected negative relation between poverty and per capita income still may exist but its realized robustness is likely to be low[10]. In equation (1) 'Gini' represents the level of income inequality in *i*th country and 'β_2' is a parameter which will provide us the estimates to which extent poverty is driven by income inequality. Most of the evidence from literature is in favour of positive relation of income inequality and poverty stature so the sign of 'β_2' is expected to be positive. This positive relation entails that poverty headcount and income inequality will move in same direction where poverty is stimulated by income inequality.[11]

Sources of education vary between informal sources e.g. libraries, internet and museums and formal sources e.g. schooling and institutional trainings. The number of people within a nation who undergo schooling is usually much higher than the number of people who have gone through trainings. Gross and net enrolment rates

[10] This expected low robustness of income growth can be deemed as an opposition to "trickle down" proposition.

[11] Ravallion and Chen (1997) also showed that growth in average living standards is almost uncorrelated with income distribution.

are common measures which denote the number of students enrolled for schooling. Both enrolment rates are widely used as measure of education for country level investigations. Net enrolment rates are more appropriate way to know how many people go through formal education in a country. The advantage of using net enrolment rates over the gross enrolment rates is that the former does not overstate the numbers as in case of later due to repeaters and replacements. Some one may suggest using literacy rate as a measure of education. However, the definition of literacy rate proposes that only literacy will not help a person to earn enough income to meet his/her essential expenditures[12]. Whereas formal education measures will provide suitable data sets for this purpose.

In equation (2) 'NE' represents net enrolment rates of formal education in *i*th country and 'β' is a measure of its effectiveness on poverty.

$$P_i = \beta_0 + \beta_1 \text{PIncome}_i + \beta_2 \text{Gini}_i + \beta \text{NE}_i + \varepsilon \qquad \ldots (2)$$

In the following equation I classify net enrolment into primary and secondary level of education that will enable us to identify which level of education is more significant towards poverty reduction.

$$P_i = \beta_0 + \beta_1 \text{PIncome}_i + \beta_2 \text{Gini}_i + \beta_3 \text{NEP}_i + \beta_4 \text{NES}_i + \varepsilon \qquad \ldots (3)$$

In above equation 'NEP' represents net enrolment in primary education and 'NES' denotes net enrolment in secondary education of *i*th country and 'β_3' 'β_4' both

[12] Literacy rate means proportion and number of persons within the population who can both read and write a short simple statement on their everyday life with understanding. (http: //data.un.org/)

are respective parameters of relationship between education and poverty. Based upon earlier discussions, expected signs for parameters 'β_3' and 'β_4' of respective levels of education are negative but the magnitude of both parameters may differ. The underlying difference of rate of return on both education levels can be attributed for the difference of robustness between primary and secondary levels. Secondary level education seems to have more forceful effect towards poverty alleviation of relevant country[13]. Equation (3) can be estimated if we need coefficients in one point of time for all three hypotheses (see section 1). However, my data set comprises of both cross-section as well as time series components. NEP and NES both will be one year lagged values as compared to other variables because common formal education session completes in one year. After the addition of time series representative term 't', the model is given in following equation:

$$P_{it} = \beta_0 + \beta_1 \, PIncome_{it} + \beta_2 \, Gini_{it} + \beta_3 \, NEP_{i(t-1)} + \beta_4 \, NES_{i(t-1)} + \varepsilon \qquad \ldots (4)$$

[13] Professional (vocational and technical) education can effectively contribute in improving human capital. However, due to non-availability of data it is not included in my estimation.

CHAPTER 4

DATA ANALYSIS AND RESULTS

This chapter starts with detailed explanation of data set, sources of data and adopted procedure for compilation of data set. Thereafter suitable method of estimation is thoroughly discussed. At the end estimation figures are presented and the results are interpreted.

4.1. Nature, Sources and Compilation of Data

Coming to discussion on data set, currently the availability of data regarding above stated variables is much easier as compared to 10 to 15 years ago. Also data available now have less discrepancies and errors as compared to past because of improved statistical tools and better survey mechanism of both national and international institutes. These improved data sets have dual implications of facilitating the researchers in empirical studies and widening of research horizons. Now quality and quantity of available data has endorsed more precise empirical testing of the subject matter.

There were some valuable measures which were taken while compiling the data set. Selection of data sources is based on “who is more concerned about what?” This consideration regarding source of data helped me to collect updated, improved and statistically better data in comparison to other alternative sources. Data for poverty headcount and Gini coefficient has been downloaded from the World Bank

online source PoveCalNet[14]. Data for per capita income and net enrolment rates were taken from UN data source[15]. Data for each variable was taken from the same single source across the time series as well as cross-section units. It was necessary because different data sources may have used different techniques and tools for data collection. Moreover, maximum available data for both time series and cross-section units was collected to minimize the artificial effect of interpolation or extrapolation implements.

Apart from above mentioned precautionary measures some specific steps were taken in the collection of data for each variable. While fetching the poverty headcount ratios from the World Bank online source, revised version of poverty line (1.25 US$ per day/person at PPP 2005) was used. Data source permitted me to use per capita income growth at current US$ and per capita income growth at PPP US$. Therefore, both the measures have been collected from UN online data sources. UN data source was also approached for statistics of net enrolment rates because UNESCO had collected the data regarding net enrolment rates by standardizing the years of education at both primary and secondary levels which is advantageous for cross country comparison.

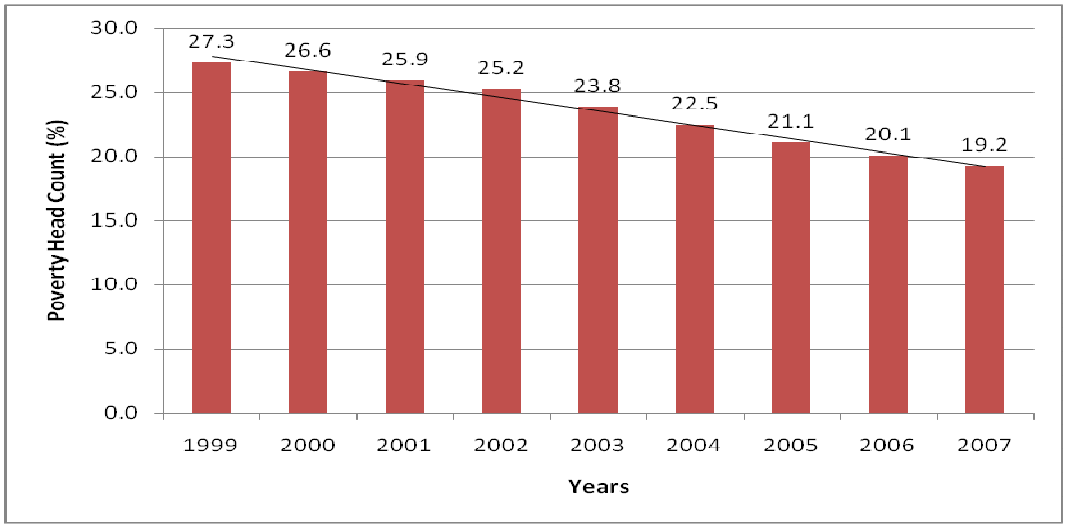
A data set of total population of 51 countries met the above mentioned required criteria. Data set constitutes a randomly selected sample of 40 countries as cross-section units and 9 years as time series units for each cross-section unit starting from 1999 to 2007 (for detailed list of selected sample countries see appendix 1).

[14] http: //www.worldbank.org/

[15] http: //data.un.org/

Following graph shows the average trend of incidence of poverty for 40 selected sample countries at aggregate level during the period of 1999-2007:

Figure 4: Average Trend in Poverty (40 countries, 9 years)



First step of data analysis involves compilation of data set. Data for poverty headcount (P) and Gini coefficient (Gini) was available at frequency of three years with beats of 1999, 2002 and 2005. For data interpolation average annual growth was calculated by using two nearest edge values whereas for extrapolation overall average annual growth was calculated by using all available values. For the variable of per capita income growth (PIncome) there were no missing values. Enrolment rates of primary and secondary levels were missing for few countries in UN data source. Among some of these countries only one or two time series units of data were missing for primary or secondary net enrolments. In no case a country was selected having more than four missing data points in complete time series of any variable. Similar interpolation and extrapolation method was adopted here to generate missing values

for the variables of NEP and NES. Completion of data set not only provides missing values but it also balances the panel data set[16].

4.2. Method of Estimation

Method specification is an important stage in any research work. In most of empirical studies method in its nature is either mathematical or statistical. In this study a statistical method named as "regression" has been adopted to obtain useful results. By definition regression is a technique of fitting an equation to observed data points. It explains the relationship of independent variable(s) with dependent variable. It is also known as a process by which we can quantify an existing relationship between variables. Gujarati says "regression analysis is concerned with the study of dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables" (Gujarati, p.18).

In this study I have used regression analysis to obtain useful results by considering poverty as dependent variable on the left side and income, income inequality as well as education as independent variables on the right side (see equation 4). My data constitutes both cross-section and time series statistics. This multidimensional type of data is called time series cross section data (TSCS), longitudinal data or panel data. Yafee (2003) describes analysis of panel data as "panel analysis is a method of studying a particular subject within multiple sites, periodically observed over a defined time frame". There are various advantages of

[16] A panel is described as balanced if there is an observation for each variable for each time period, and as unbalanced if some observations are missing (Dougherty 2007, p.409).

using panel data[17]. First, it provides better chance of studying the dynamics of change due to larger sample size. Second, due to combination of cross-section and time series units it captures both spatial and temporal dimensions. Third, it can effectively capture the complexity of human behavior. Fourth, it may offer a solution to the problem of multicollinearity.

GLS is applied when the classical assumptions of heteroscedasticity and correlation are not fulfilled. Due to its composition, GLS estimators are known to be efficient (Gujarati 2005, pp. 394-397). The two well-known techniques used for panel data in GLS method are; Fixed Effect Method (FEM) and Random Effect Method (REM). Both techniques have there own advantages, shortcomings and conditions to apply. FEM is appropriate in situations where the individual specific intercept may be correlated with one or more regressors. A disadvantage of this method is that it consumes a lot of degree of freedom when the number of cross-sectional units is large as more dummy variables are required (Yafee, 2003). Another major disadvantage (also in my case) of FEM is that "time-invariant variables and slowly moving variables can produce high standard errors or insignificant results" (Wilson and Butler 2007). Whereas, REM assumed that the intercept of an individual unit is a random error from a mean value. Due to assumption of random intercepts, REM requires a randomly selected sample from a given population. It is appropriate in a situation where the intercept of each cross-sectional unit is uncorrelated with the regressors. One advantage of REM in contrast to FEM is that it uses less degree of

[17] For further explanation see Gujarati (2005) p. 638, Cua (2007) & Dougherty (2007) p. 409.

freedom. Moreover, slowly moving or time-invariant variables can also be included while applying REM in contrast to FEM (Yafee, 2003).

It has been suggested in literature that if sample is non-random then we should use FEM whereas if sample is random then Hausman test will provide decisive indication regarding suitable method[18]. Underlying hypothesis in Hausman test is whether correlation between the unobserved cross-section specific random effects and the regressors is significant or not. If Hausman test shows no significant correlation then random effect method is said to be finer than fixed effect method. Considering the above aspects, REM followed by Hausman test will be a proper choice as the sample will be drawn from larger population of countries and the problem of large degree of freedom can also be evaded. Final equation for estimation will be:

$$P_{it} = \beta_0 + \beta_1 \, PIncome_{it} + \beta_2 \, Gini_{it} + \beta_3 \, NEP_{i(t-1)} + \beta_4 \, NES_{i(t-1)} + \mu_{it} \qquad \ldots (5)$$

Where error term μ_{it} consist of both the errors, error from intercept term and the error from regressors.

4.3. Estimation and Results

The empirical analysis starts with table 1 which contains summary statistics for the variables used in this study:

[18] Dougherty, (2007) p. 421, Wooldridge (2002) p. 288, and Baltagi (2005) p. 66.

Table 1: Summary Statistics of Whole Sample (40 countries)

	P	PIncome	GINI	NEP (-1)	NES (-1)
Mean	23.07	10.70	43.07	83.99	51.93
Median	17.09	9.99	42.58	91.42	55.12
Maximum	80.33	55.82	74.33	99.94	93.58
Minimum	0.00	-37.50	10.44	26.41	2.66
Std. Dev.	21.55	13.19	10.84	17.13	26.90
Total Obs.	320	320	320	320	320

Table 2 shows the regression estimates of coefficients for whole data set. In this table (as well as in subsequent tables) I have presented selected statistics for both individual variables and over all model[19].

Table 2: Estimation Results of Whole Sample (40 countries)

	PIncome**	GINI*	NEP(-1)***	NES(-1)***
Coefficient	-0.037628	0.169875	-0.276409	-0.362505
Std. Error	0.016951	0.087908	0.045424	0.046140
t-Statistic	-2.219798	1.932415	-6.085040	-7.856647
Prob.(t-Stat.)	0.0271	0.0542	0.0000	0.0000
Adjusted R^2	0.399805			
F-statistics	54.12356			
Prob.(F-stat.)	0.000000			

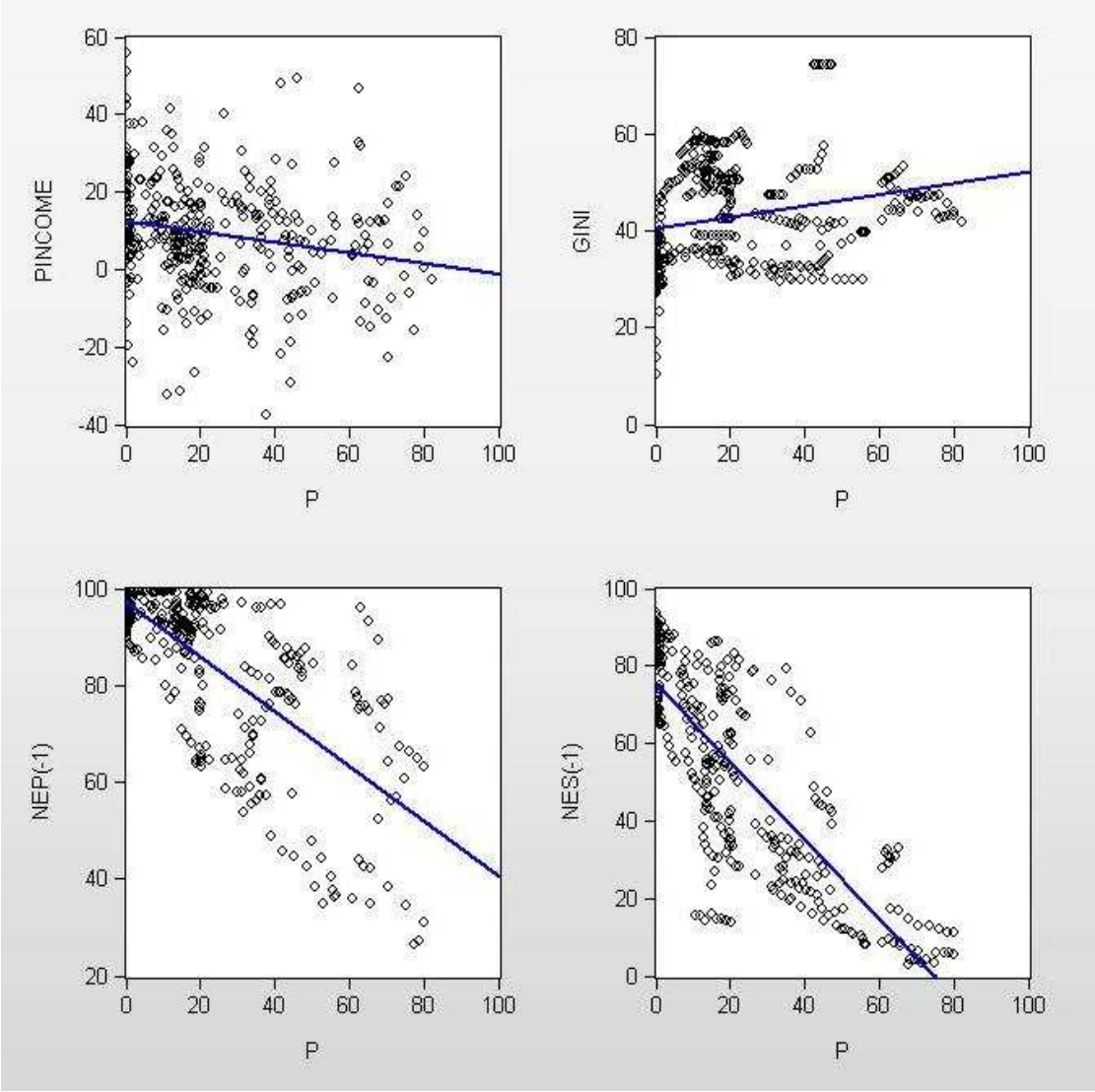
*, **, *** shows significance at 10%, 5% and 1% respectively

[19] Higher p-value of Hausman test suggested Random Effect Method (REM) as more suitable method for estimation than Fixed Effect Method (FEM). See Appendix 3

Above table shows that PIncome is inversely related to poverty headcount for whole data set. Both t-statistics and p-value show that coefficient of PIncome is significant. Although the sign of coefficient of PIncome favours the view that growth of per capita income reduces poverty but magnitude of coefficient shows that per capita income growth has minor influence in poverty reduction as compared to other variables. A unit increase in per capita income will lead to only 0.04 unit reduction in poverty[20]. Whereas, magnitude of coefficient of Gini shows that income inequality was more dominant towards poverty reduction as compared to PIncome. Sign of the coefficient proves the expected positive relation between income inequality and poverty. In this case a unit decrease in income inequality will lead to 0.17 unit reduction in poverty. It is again significant if we see t-statistics and the p-value for Gini coefficient. We can observe that both the education related coefficients are dominant as compared to other coefficients in magnitude and also strongly significant as shown from t-statistics and p-values. A unit increase in primary and secondary education will lead to 0.28 unit and 0.36 unit reduction in poverty, respectively. It is also clear from results that secondary education was more helpful in poverty alleviation as compared to primary education. Last three rows in table 2 show the overall significance of estimated model where R^2 is almost 0.4 and both F-statistics and its p-value show that it is also statistically significant. Following are the graphs of regression lines for each variable against poverty headcount:

[20] As all the variables in data set are in the form of percentage, so term "unit" refers to "percentage point".

Figure 5: Graphical Illustration of Relationship between Poverty and Independent Variables



Upper right diagram shows that significant positive relation exists between income inequality and poverty. Whereas, upper left and both lower figures show a negative relation of per capita income growth and education with poverty. However, steeper slopes of lower two figures express the strong negative relationship of education and poverty as compared to the modest negative relation of per capita

income and poverty as shown in upper left diagram. Within educational variables secondary education appeared to be more influential in poverty alleviation process.

Estimates for whole data set were calculated by using both per capita income growth at PPP US$ and per capita income growth at current US$. By using per capita income growth at current US$ prices, results of coefficients of "PIncome" were statistically significant in contrast to results obtained by per capita income growth at PPP US$[21]. However, minor differences were found in the estimated coefficients of all other variables in both estimations.

For the first hypothesis the results from whole sample provided evidence in favour of the view that formal education has robust and significant effect on poverty status of sample countries. The results showed that the education at both levels is most prominent in poverty alleviation among all variables. For second hypothesis the results showed that the coefficient of PIncome is significant at 5%, coefficient of Gini is significant at 10% and both educational variables are significant at 1% significance level. We can observe that all the variables are statistically significant. However, according to their robustness we can rank them from most robust to least robust as secondary education, primary education, income inequality and per capita income growth.

Thereafter, selected 40 countries were divided in three different income groups, namely low income, lower middle income and upper middle income countries and the same model was estimated for all three groups. This income level grouping is

[21] Probably it could be the inflation impact which reflects better in GNP calculated at current prices. For results using per capita income growth at PPP US$ see Appendix 2.

based on the World Bank's country classification. Followings are the results of regression estimation for low income group:

Table 3: Estimation Results of Low Income Group (12 countries)

	PIncome	**GINI**	**NEP(-1)*** **	**NES(-1)*** **
Coefficient	-0.002184	0.457750	-0.351523	-0.537247
Std. Error	0.033318	0.371015	0.065179	0.102844
t-Statistic	-0.065548	1.233779	-5.393167	-5.223905
Prob.(t-Stat.)	0.9479	0.2205	0.0000	0.0000
Adjusted R^2	0.524724			
F-statistics	27.22095			
Prob.(F-stat.)	0.000000			

*, **, *** shows significance at 10%, 5% and 1% respectively

In low income group the relation of per capita income as well as income inequality with poverty is not significant, whereas the magnitude of the coefficients of education, both primary and secondary, with poverty alleviation is more robust than the result of total sample. The insignificance of both income based variables suggest that in low income countries a usual income growth and improved income distribution cannot reduce incidence of poverty. As most of the countries in this group have per capita income below 456.25 US$ (i.e. annual poverty line) thus even a perfect income equality or moderate growth of per capita income will not help much to reduce poverty. The overall significance of model in this sample is also improved.

The estimation results for lower middle income group are presented below:

Table 4: Estimation Results of Lower Middle Income Group (16 countries)

	PIncome*	GINI*	NEP(-1)	NES(-1)***
Coefficient	-0.063593	0.225422	-0.017473	-0.300353
Std. Error	0.032585	0.118929	0.101239	0.078828
t-Statistic	-1.951595	1.895439	-0.172589	-3.810246
Prob.(t-Stat.)	0.0533	0.0604	0.8633	0.0002
Adjusted R^2	0.219230			
F-statistics	9.914976			
Prob.(F-stat.)	0.000001			

*, **, *** shows significance at 10%, 5% and 1% respectively

In case of low middle income countries the magnitude of relation between per capita income and poverty has increased as compared to the results of total sample. A unit increase in per capita income reduced 0.06 unit of poverty. The robustness of coefficient of Gini is also more in this sample as compared to the whole sample. However, primary education turned out to be insignificant, whereas the coefficient of secondary education remained significant. It means an increase in per capita income shifts the importance of education from primary to secondary level.

The estimation results for upper middle income group are given below:

Table 5: Estimation Results of Upper Middle Income Group (12 countries)

	PIncome* **	**GINI*** **	**NEP(-1)** **	**NES(-1)*** **
Coefficient	-0.033941	0.273263	-0.169287	-0.210999
Std. Error	0.010810	0.096731	0.077341	0.037256
t-Statistic	-3.139673	2.824994	-2.188853	-5.663490
Prob.(t-Stat.)	0.0023	0.0058	0.0312	0.0000
Adjusted R^2	0.578999			
F-statistics	33.66321			
Prob.(F-stat.)	0.000000			

*, **, *** shows significance at 10%, 5% and 1% respectively

In this group the coefficients of PIncome and Gini are comparatively robust and significant. Education related coefficients, although statistically still significant, appeared to be less robust toward poverty reduction. It means a further increase in per capita income may shift the importance of education from both primary and secondary level to tertiary level. Overall significance of the model also increased in upper middle income group as compared to total sample. Another important finding is that as the per capita income increases, the income based variables, namely per capita income growth and income inequality, become more significant. In theory we can infer that a high income country needs to be more curious about income and income differentials as compared to low income country.

Thereafter 12 countries were selected from total data set which experienced high rates of poverty reduction during 1999 and 2007 to observe the most significant determinants of poverty alleviation. Following table shows estimation results of these countries.

Table 6: Estimation Results of Countries which Experienced High Rates of Poverty Alleviation (12 countries)

	PIncome	GINI	NEP(-1)**	NES(-1)***
Coefficient	-0.073518	0.087660	-0.323435	-0.441040
Std. Error	0.045501	0.187290	0.098122	0.117783
t-Statistic	-1.615737	0.468043	-3.296268	-3.744518
Prob.(t-Stat.)	0.1096	0.6409	0.0014	0.0003
Adjusted R^2	0.392962			
F-statistics	16.37442			
Prob.(F-stat.)	0.000000			

*, **, *** shows significance at 10%, 5% and 1% respectively

Interestingly estimates show that PIncome and Gini both are statistically insignificant in this group of leading poverty reducing countries. However, coefficients of education, both at primary and secondary level, are more robust as compared to whole data set and also highly significant.

Next, 12 countries were selected in which income inequality was rather high and these countries were on the top in the selected sample from inequality point of view. In this group all those countries were included in which the value of Gini was more than 0.50. These selected countries have large space for distributional policies regarding income distribution in contrast to other countries due to high income inequality.

Table 7: Estimation Results of Countries Having Income Inequality Higher than 0.50 (12 countries)

	PIncome**	GINI**	NEP(-1)	NES(-1)***
Coefficient	-0.025417	0.307783	-0.020376	-0.285297
Std. Error	0.011964	0.140562	0.048028	0.050800
t-Statistic	-2.124406	2.189670	-0.424249	-5.616080
Prob.(t-Stat.)	0.0363	0.0311	0.6724	0.0000
Adjusted R^2	0.462133			
F-statistics	21.40589			
Prob.(F-stat.)	0.000000			

*, **, *** shows significance at 10%, 5% and 1% respectively

The findings show that in these countries income inequality played the most important role in the incidence of poverty as compared to other variables. Both the magnitude of coefficient of Gini and its statistical significance is greater as compared to whole data set. In these countries a unit decrease in income inequality will reduce poverty by 0.30 units. It is shown from the coefficient of per capita income that in these countries presence of high income equality also limits the strength of per capita income towards poverty alleviation as argued in theory.

Finally, a sample of 12 countries was selected which experienced continues decline in income inequality throughout sample period of 9 years.

Table 8: Estimation Results of Countries Which Experienced Continues Decline in Income Inequality (12 countries)

	PIncome* **	**GINI** **	**NEP(-1)*** **	**NES(-1)*** **
Coefficient	-0.07796	0.43867	-0.31932	-0.29310
Std. Error	0.02105	0.19210	0.06992	0.07958
t-Statistic	-3.70271	2.28354	-4.56673	-3.68306
Prob.(t-Stat.)	0.0004	0.0247	0.0000	0.0004
Adjusted R^2	0.565184			
F-statistics	31.87078			
Prob.(F-stat.)	0.0000			

*, **, *** shows significance at 10%, 5% and 1% respectively

All the coefficients are highly significant in this group. Coefficient of per capita income appeared to be strongest as compared to all previously estimated coefficients of per capita income. This result is in accordance with expectations. The argument that income growth may help more to reduce poverty in the presence of low income inequality seems to be factual. These results also provide the evidence that a pro poor growth can facilitate poverty reduction programs.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Above extensive results enable us to draw certain conclusions. It can be ascertained from the results that as over all income level of a country rises, income based variables become more influential toward poverty magnitude of the country. Another finding is that in those countries where income inequality is high, the distribution of income contributed considerably in the incidence of poverty. Three major conclusions can be drawn from above estimates of whole data set. First, per capita income growth was not key contributor in poverty alleviation in selected countries during the observed period. Second, decrease in income inequality played better role in poverty reduction than per capita income growth. Third, education at both primary and secondary levels emerged as main contributor in poverty alleviation. However, secondary level education was comparatively more helpful than primary level education.

As discussed earlier, enhancement of earning ability of people is due to education. Education interestingly may influence the poverty to decrease even if there is low growth in overall per capita income and little change in income inequality of a country. For example, as most of illiterate people are poor in developing countries, a policy pursuing more educated population will cause increased supply of skilled labour in the economy, which will tend to decrease wage rate inducing increased demand for skilled labour which consequently leads to raise total wage bill.

Due to increased income of the poor, even at low income growth and with little improvement in income distribution, poor can be uplifted in a sustainable way, whereas mere income supports or subsidies to poor will help the poor for shorter period. This is the difference between “making people enable” and “making people capable”.

The most suitable way to give a share from growth to local poor is to provide him required education and skills. This will also be a permanent barrier to prevent people going back into poverty trap because less productive workers with lower skills are likely to be laid off first, when ever any business goes for contraction. Keeping in view the above mentioned conclusions the economic policy in developing countries, without neglecting income growth and income distribution, shall primarily focus on promoting education. In low income countries more emphasis shall be given on the enhancement of primary and secondary level of education. Whereas, in lower and upper middle income countries secondary education shall be given priority. Countries with high income inequality may have comparatively favourable policy choice with distributional goals as a result of two reasons. First, if income inequality is already high then it is comparatively feasible to improve income distribution. Second, a reduction in income inequality in these countries can respond more to reduce poverty as compared to other countries. Along with education these countries shall also focus on improvement of income equality to experience a rapid decline in poverty.

No study is perfect from every aspect. Therefore, each study provides some further scope for research. As mentioned before, there were data constraints which placed some confines on the extent of this study. Although this study signifies the

key role played by education in poverty alleviation in sampled developing countries, however, still there is space for study which may include more developing countries or may include larger time period. There is also scope for further study which may consider other classifications of educational levels, e.g. tertiary education or/and vocational education.

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APPENDICES

Appendix 1: Detailed List of Selected Sample Countries

S. No	Ids	Country Name	Income Group
1	ALB	Albania	Lower Middle Income
2	ARM	Armenia *[22], ♦[23]	Lower Middle Income
3	AZE	Azerbaijan *	Lower Middle Income
4	BLR	Belarus♦	Upper Middle Income
5	BOL	Bolivia •[24]	Lower Middle Income
6	BRA	Brazil •, ♦	Upper Middle Income
7	BGR	Bulgaria	Upper Middle Income
8	BFA	Burkina Faso *, ♦	Low Income
9	KHM	Cambodia	Low Income
10	CPV	Cape Verde •	Lower Middle Income
11	COL	Colombia •	Upper Middle Income
12	ECU	Ecuador •	Lower Middle Income
13	SLV	El Salvador •	Lower Middle Income
14	ETH	Ethiopia *, ♦	Low Income
15	GMB	Gambia	Low Income
16	GHA	Ghana *	Low Income
17	GTM	Guatemala •	Lower Middle Income
18	JOR	Jordan	Lower Middle Income
19	KAZ	Kazakhstan	Upper Middle Income
20	KEN	Kenya	Low Income

[22] '*' Countries witnessed high rates of poverty reduction during observed period.

[23] '♦' Countries witnessed continuous decline in income inequality.

[24] '•' Countries having income inequality (Gini) more than 0.50.

21	LPD	Lao People's Democratic Republic *,♦	Low Income
22	LSO	Lesotho ●,♦	Lower Middle Income
23	MDG	Madagascar *	Low Income
24	MYS	Malaysia ♦	Upper Middle Income
25	MRT	Mauritania *	Low Income
26	MEX	Mexico ♦	Upper Middle Income
27	MNG	Mongolia *	Lower Middle Income
28	MOZ	Mozambique	Low Income
29	NAM	Namibia ●	Upper Middle Income
30	NIC	Nicaragua ●	Lower Middle Income
31	NER	Niger *	Low Income
32	PAK	Pakistan	Lower Middle Income
33	PER	Peru ●	Upper Middle Income
34	POL	Poland	Upper Middle Income
35	MDA	Republic of Moldova *	Lower Middle Income
36	LCA	Saint Lucia	Upper Middle Income
37	SWZ	Swaziland ●,♦	Lower Middle Income
38	TJK	Tajikistan *	Low Income
39	UKR	Ukraine ♦	Lower Middle Income
40	VEN	Venezuela ♦	Upper Middle Income

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Appendix 2: Estimation Results of Whole Sample (40 countries) Using Per Capita Income Growth at PPP US$

	PIncome	GINI**	NEP(-1)***	NES(-1)***
Coefficient	-0.065851	0.178538	-0.276740	-0.379912
Std. Error	0.047044	0.088753	0.045870	0.045255
t-Statistic	-1.399780	2.011636	-6.033117	-8.394935
Prob.(t-Stat.)	0.1626	0.0451	0.0000	0.0000
Adjusted R^2	0.397490			
F-statistics	53.61304			
Prob.(F-stat.)	0.000000			

*, **, *** shows significance at 10%, 5% and 1% respectively

Appendix 3: Estimation Results of Hausman Specification Test

Chi-sq. Statistics	Chi-sq. d.f.	Prob.
5.835279	4	0.2118