ADDIS ABABA UNIVERSITY

DEPARTEMENT OF ECONOMICS

WHAT DETERMINE CHILD LABOR IN RURALETHIOPIA? (PANEL DATA ANALYSIS)

A Thesis Submitted to the Department of Economics of Addis Ababa University in Partial Fulfillment of the Requirement for the Degree of Master of Science in Economics (Economic Policy Analysis)

By

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Approved by the Board of Examiners

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DEDICATION

This thesis would be incomplete without a mention of the support given to me by my beloved uncle, Mr. Mitikie Zelibanos to whom this thesis is dedicated for he kept my spirits up when I was to fail. Without his lifting me up when this thesis seemed interminable, I doubt it should ever have been completed.

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LIST OF ABBEREVATIONS

AERC=African Economic Research Consortium

CRC=Convention on the Rights of the Child

CSA=Central Statistical Agency

CSAE=Center for the Study of African Economies

ERHS=Ethiopian Rural Household Survey

GLS =Generalized Least Squares

IFPRI=International Food Policy Research Institute

ILO=International Labor Organization

LFP=Labor Force Participation

LM =lagragian Multiplier

MOLSA=Ministry of Labor and Social Affairs

LSDV=Least Squares Dummy Variables

OLS=Ordinary Least Squares

SIMPOC=Statistical Information and Monitoring Program on Child Labor

SNNP=Southern Nations, Nationalities and people Regional States

TGE=Transitional Government of Ethiopia

UN=United Nation

UNICEF=United Nations International Children's Emergency Fund

VIF=Variance Inflation Factor

ABSTRACT

Despite the detrimental effects of child labor have on the nation and the availabilities of several written rights of children in the constitution, child labor is still a wide spread and sever problem in rural Ethiopia. The objective of this research was to identify the socio-economic factors affecting child labor in rural Ethiopia.

Random effects model using Generalized Least Squares (GLS) estimator was used to estimate the determinants of child labor. The micro and balanced panel data from the Ethiopian Rural Household Survey of the Economics department of the Addis Ababa University was employed in the analysis.

The findings of the result supported the hypothesis that the child being farm worker and domestic worker, age of child, dependency ratio, the presence of infant in the house hold, household size, number of plots of land, consumption expenditure, distance from high schools were positively related to child labor. The region where the household resides also had an effect on child labor incidence. However, first work starting age, enrollment status of the child, age square of child and the number of male members have had significant but negative effect on child labor. In our study we found that there was gender and age bias in child labor incidence.

From policy perspective, enforcing the family planning policy, provision of productive but labor saving assets, investment in education infrastructure, enforcing the ILO convention of minimum age for employment and instituting saving and credit institutions like eqqub and bank should deserve essential place in mitigating child labor .However, we need all rounded but gender, age, type of activities and region specific policies rather than “one size fits all” policy.

CHAPTER ONE

INTRODUCTION

1.1 General Background

Child is a father of the man. It is the small kid that will control the whole nation in the near future. Children are the softest souls, they are flowers. The future and progress of any country depends on an educated youth and if a child is not properly socialized then he/she will not be able to grow as confident and literate citizen. Children are the most beautiful and purest creation of God. They are innocent both inwardly and outwardly. No doubt they are the beauty of this world. Early in the morning when the children put on different kind of cloths and began to go to school for the sake of knowledge; we feel special kind of joy through their innocence. But there are also children who cannot go to school due to financial problems, they only watch others to go to school and can merely wish to seek knowledge (ILO, 2010).

Needless to state, children are the most precious resource of a given nation as they are fellow citizens who will overtake the countries with their respective future. Simply nations highly depend on flower of today. What we do for them since their birth determines their outcomes and potential life indeed. However, in today's world, child labor exploitation becomes a widespread and growing phenomenon especially in developing countries (ILO, 2012). Its long term negative effect is observed in the physical, intellectual and social development of the working children. It is also critical human right problem because it denies the child's time to take part in activities that are useful for their normal growth of them like time to go to school, and to play. Child labor

has serious consequences that stay with the individual and with the society for far longer than the years of childhood.

Cognizant of the detrimental effects of child labor on the overall development of children on whom tomorrow depends, the international community has legislated against it. Child labor has confined being global and complicated phenomenon, which is one of the most grievous and pervasive development problems of poor countries (ILO, 2012). However, it has been very difficult to get the exact figure of children engaged in labor in many countries partly due to the hidden nature of the problem (Kebebew, 1998) and differences in definition of who is considered as child and what constitute labor. ILO defines all those under 18 as children. According to it, labor is defined as "economically active," when a person works on a regular basis for which he/she is remunerated or that results in output destined for market. But in Ethiopia context where labor market is missing, this definition is too restrictive. In our study labor is used alternatively with work which includes all work related activities which potentially affect the overall development of a child.

International Labor Organization Convention 138 and the UN convention on the rights of the child (CRC) are often used as a benchmark to provide a working definition of child labor. According to CRC, the main criterion for deciding whether a particular activity should be considered as "labor" is the nature of the work. The convention states that children should be protected from hazardous work which interferes with their education, is harmful to their health, physical, mental, spiritual, moral or social development. However, the idea that work should be considered as labor if it is harmful for a child still does not provide a definition of "child labor". Apart from the most egregious type of work which no doubt harm a child, there may be a wide

range of activities carried out by children, especially in rural areas, which may not harm their overall development. Therefore before labeling all types of work as child labor, it may be important to identify the potentially different effects of different kinds of work activities carried out by children (Assefa and Arjun, 2005).

Whereas, United Nations International Children's Emergency Fund (UNICEF) defines "child" as anyone below the age of 18, and "child labor" as some type of work performed by children below age 18 (UNICEF, 2008).

"Child labor refers to the employment of children in any work that deprives their childhood, interferes with their ability to attend regular school and that is mentally, physically, socially or morally dangerous and harmful" (ILO, 2012).

A variety of factors have brought child labor to the fore front of current international and national policy agendas. Among them, even though there are clear signs of progress at the right direction, there is dis-concentrating gaps in the global response. As things are today, the pace of progress is not fast enough to achieve the ILO's 2016 target of eliminating child labor. Many countries are on the right track, and they are experiencing success. Yet there needs to be a reawakened sense of urgency so that the elimination of child labor becomes a worldwide reality.

According to International Labor Organization (ILO), for example, 246,218,215 and 168 million children aged 4-15 were trapped in child labor in 2000, 2004, 2008 and 2012 respectively; of which the global total includes 160,126,115 and 85 million children under 18 respectively engaged in "hazardous work" which highly threaten their safety or health such as handling chemicals, carrying heavy loads, mining, quarrying or enduring long hours (ILO, 2012).

None of us want to live in the world where more than 150 million children are working at the expense of their and our future. A newly released ILO (2012), report stated that 168 million world children are still being forced to engage in child labor who works almost full time. They do not go to school and have little or no time to play. Many do not receive proper nutrition or care. They are denied the chance to be children. More than half of them around 85 million children are exposed to the worst forms of child labor such as work in hazardous environments, slavery, or others forms of forced labor, illicit activities including drug trafficking and prostitution as well as involvement in armed conflict.

Recent estimates by ILO have showed that there has been a declining trend in child labor. Thus, child labor reduced by 3%, 10% and 21% for the period 2000-2004, 2004-2008 and 2008-2012. Among 5-14 year olds, the number of children in child labor has declined by 21 percent and the number of children in hazardous work by 26 percent (ILO, 2012). Despite signs that the number of children in hazardous work is declining, it is evident that the overall rate of reduction has slowed. Concerning the trend across gender, there has been a 15% and 24% decrease in the number of girls in child labor and in hazardous work, respectively. However, trend is the opposite for boys with an increase both in incidence rate and absolute terms. In contrast to the declining in child labor incidence for the 5-14 age category, there has been an alarming 20 percent increase in child labor in the 15-17 years age group from 52 million to 62 million (ILO, 2010).

A new report by the ILO (2012) marking progress against child labor stated that the global number of child laborers has declined by one third since 2000, from 246 million to 168 million in 2012. Child labor among girls fell by 40% since 2000, compared to 25% for boys.

ILO (2012) report stated that the target of eliminating the most exploitative forms of child labor will not be met by 2016, even though the global number of child laborers was reduced by one third between 2000 and 2012 from 246 to 168 million. Thus, the study said that though the reduction of child labor is on the right direction, it is not going fast enough and more action is needed.

The observed level in labor economic activity of the 5-14 aged children is not evenly distributed even across the developing economies where the incidence of the child labor is higher. When the largest number of child labor is found in the Asia Pacific Region (almost 78 million), sub-Saharan Africa has the highest incidence of child labor in terms of the proportion of the population, with more than one in five children (59 million) engaged in the practice's (ILO, 2012).

The agriculture sector accounted for the highest number of child laborers (59 percent) followed by the service sector mostly in the informal sector.

Although there is no one single cause of child labor which adequately explains the complex phenomenon, the following were identified as significant factors. Slow economic growth, famine and disease, war and conflict, poor governance and the spread of HIV/AIDS in Africa are all likely to have contributed to keep the incidence of child labor high (Bhalotra, 2003). Children work for a multitude of reasons-economic and socio-cultural. Poverty is the main cause of the involvement of millions of children in work related activities which are deemed to detrimental for their normal, psychological and educational development. The high levels of engagement in labor activities among children have been attributed to high poverty level prevalent in most parts

of the country especially in rural areas where access to basic social services is severely limited. Poor parents send their children to work, not out of choice, but for economic reasons (Beliyou, 2003). In such scenarios, child labor is a matter of survival than of a choice. Many of the working children have neither access to education nor have adequate remuneration, satisfactory working and living conditions. They are not protected from the most harmful and exploitative practices.

Global political initiatives to combat child labor are undertaken by the International Labor Organization (ILO) which devised two key instruments of international law; the 1973 Minimum Age Conventions 138 and the 1999 Convention on the Elimination of the Worst Forms of Child Labors.

Thus according to the 1999 ILO convention, the darkest category of child labor relates to those children caught up in criminal activities such as prostitution, military enrollment, slavery (such as bonded labor), or trafficking (which involves the removal of a child from its home, often involving deception and payment, for wide range of exploitative purposes) these categories are beyond the reach of statistical surveys. Together with hazardous work, they are described as the worst forms of child labor.

Child labor is prevalent in Africa (Hazan and Berdugo, 2003), especially in both subsistence and commercial agriculture sector. For this, lack of education is the main reason because uneducated families have no enough income flow so children of these families will be forced to become laborers. It is true that child labor is not an isolated phenomena; it is an outcome of multitude of socio-economic factors and has roots in poverty, lack of opportunities, explosive rate of

population growth, growing unemployment, uneven distribution of wealth and resources and other outdated social customs and norms.

The problem of child labor in Ethiopia is significant nearly 60 percent of children in the nation work to supplement their family income, half of them at hazardous jobs. Children most often work as domestics, farm hands or miners, the latter category including bootleg prospecting for gold, a common practice in this part of the world. While Ethiopians regard child labor as normal; many fail to distinguish between moderate and excessive, or exploitative forms of work. The country has ratified the ILO Minimum Age for Admission to Employment Convention of 1973 and the ILO 1999 Convention against the Worst Forms of Child Labor. Besides international conventions, the country has instituted protection for children in its constitution which provides that the children under 18 have the right to be protected from work that is exploitative, hazardous or inappropriate for their age, detrimental to their schooling, social, physical, mental, spiritual or moral developments (TGE, 1993 as cited in Tseganesh, 2011).

1.2. Statements of the Problem

Similar to other African Countries, child labor is a problem in Ethiopia, particularly in its rural part. Children are engaged in the worst forms of child labor including dangerous activities in agriculture and domestic activities, not compatible with their age in both urban and rural areas. Ministry of Labor and Social Affairs (MOLSA) and partners (2001) child labor survey in Ethiopia put the number of children around 15.5 million or 85.5 percent of children and over whelming majority below 15 years are working. Whereas according to Central Statistical Agency (CSA) (2010) demographic and health survey, 27 percent of Ethiopian children age 5-14, which

is reduced from 40% in 2009, are engaged in child labor. Of all children engaged in economic activities outside the household and housework, about 88 percent resides in the rural areas.

The highest rates of child labor were to be found in South Nation, Nationalities and Peoples of Ethiopia (SNNP) at 88.8%, Oromia at 88%, Afar at 86%, Addis Ababa at 69.1%, Tigray 76.6% while Dire Dawa 78.6 percent. The prevalence rate in other regions range between 84.6 percent in Amhara to 81.0 percent in Harari. Overall activity rate for the population aged 10 and above is 69.3% with the higher male participation rate (75.1%) than female (63.4%).

From the total population aged 10 and above males participate more than females both in rural and urban Ethiopia. Comparable to that of adults' children in the age range of 10 and 14 have 49.4% participation rate in the economy. The incidence of child work participation is far larger in rural (53.9%) than urban (19.2%) parts for this age group. This fact leads the study to focus on rural part of the country. While 55.3% and 52.4% of rural boys and girls participate in work the corresponding figures are 20.1% and 18.4% for urban categories. 75.7% and 50.4% of boys and girls in the 7-10 age group engage in work while the corresponding figures being 82% and 35.6% for the 11.14 age group. Domestic and herding are the predominant forms of activities children are involved; girls and boys traditionally assume domestic work and herding, respectively. 30.6%, 18.5% and 50.8% of boys aged 7-10 engaged in domestic work, farm work, herding, respectively; whereas, the corresponding percentage for girls in the same age category was 66.9, 7.3 and 23.4 (Tseganesh, 2011). Based on this, the study will try to analyze the child labor by dividing the issue based on the sex, age and work type of activities.

Children often began to participate in work activities at their early age usually when they were 4 or 5 (Assefa, 2002, Assefa and Arjun, 2005; and Tseganesh, 2011) and on the average they contributed 29-30 hours of labor per week (Assefa and Arjun, 2005). Age at start working was lower for rural areas where 3.14% of children started participation in work activities when they were 4 and 2.01% in urban areas. 40 percent started work in rural areas before reaching 5 compared to 22% in urban areas while there was little difference between boys and girls (CSA, 2010).

Children are engaged in all forms of paid work, in factories, commercial as well as subsistence agriculture, service industries, shops, market places and in households' chores (Kifle et al, 2005). Engagement in economic activities at an early age and participation especially in hazardous and exploitative work could have a devastating effect on children's physical and mental development and might also cause irreversible damage leading to permanent disability (ILO, 1998).

Child work may be viewed as means of socialization and acquiring necessary skills for adult life but not a problem purse. In this case parents prefer keeping them at home and do along with them to sending to school (Beliyou, 2003). This temptation would be more the case in poor rural households.

It is a general consensus that human capital accumulation is the way out from poverty and hence to ensure economic growth and development in any nation. Education is believed to have a special place in such endeavor. The problem is that if children are compelled to start work at their early ages and toil for longer hours means that their ability to attend school is seriously impaired.

So far, some studies (Cockburn, 2000; Cockburn, 2001; Assefa, 2002; Beliyou, 2003; Assefa and Arjun, 2005; Arjun and Assefa, 2009; Tasew et al., 2005; Chaudhury et al., 2006; Getinet and Beliyou, 2007; Tseganesh, 2011) have been conducted to investigate the child labor in rural Ethiopia. Poverty, slow economic growth, famine and disease, war and conflict, poor governance, the spread of HIV/AIDS, high level of unemployment, power quality of education, parent's choice, cost and returns to schooling were among the major factory which play edimportant role in exacerbating the problem in general.

As far as my knowledge is concerned, all studies which have been conducted to investigate the child labor in Ethiopia So far did not capture the effect of early marriage, work starting age ,availability of public pipe water, and electricity which would have important implications to child labor. Hence the study aims to fill the gap by incorporating these variables and provide policy makers with invaluable information to devise appropriate policies to address the issue and inspire further academic work and broaden frontier of knowledge area.

Besides, almost these studies have used cross sectional data and categorical dependent outcome models. Thus, this study is going to use the panel data that gives more realistic result, and easily show trend analysis which could reduce the problem of identification and endogenity as compare to single cross sectional and time series data (Verbeek, 2004).The other advantage of using panel data model is that it could capture the effect of 'inherent' or time invariant individual characteristics of the children such as permanent health, cognitive abilities and psycho-social characteristics. More importantly, detailed analysis of the determinants of child labor drawing on up to date data is of a paramount importance for the future development prospect of children in particular and the country in general as children of today are growth engines of tomorrow.

The other addition in this project is regarding the definition of child, almost the previous studies used narrow definition of child (7-15), but this study will use broad definition (5-15) because in rural part of Ethiopia the number of children who involve in labor at age of 5 and 6 are not negligible.

Finally, since most studies which have been done so far assessed the effect of each factors separately, this study will bring and combine range of different determinants proposed in the literature into one empirical framework and examine both the relevance of each factor as a child labor determinant and its significance relative to the other factors i.e. provide comprehensive and amenable outcome.

1.3. Objective of the Study

1.3.1 .General Objective

The main purpose of this study with rural Ethiopia as a specific analysis is to examine the major socio-economic determinants of child labor and the reasons why children are involving at various exploitative jobs in rural part of Ethiopia and come up with relevant policy recommendations.

1.3.2. Specific Objectives

So as to achieve the main objective, the study has the following sub-objectives:

- To assess the incidence/extent of child labor in rural Ethiopia
- To examine the major socio-economic determinants of child labor especially the effects of work starting age, early marriage, and the availability of pipe water and electricity.
- To check the existence of gender and age bias related to child labor.
- To empirically assess whether factors which affect domestic, farm and market paid child labor differs or not by examining separately.
- To come up with possible and appropriate policy implications that could be used to reduce child labor exploitation in the rural part of the country.

1.4 .Significance of the Study

This study aimed to investigate the major factors determining child labor amongst children in the 5-15 age categories. It is essential to study about child labor problem because children play vital role in every aspect of the nation. Some studies have been conducted to find out the factors that determine the child labor in rural Ethiopia. They did not attempt to capture the effect of early marriage, availability of electricity and pipe water on child labor. This paper adds to the existing stock of knowledge and literature on child labor in Ethiopia by assessing the determinants of different types of child labor incidence by using panel data in general and time spent on work by child as a dependent in particular which has never been tried by others and gives more realistic result (Verbeek, 2004)

The study will be an impetus to the understanding that efforts to mitigate child labor. It may also serve as a reference for other studies which focus mainly on issues related with child labor and its effect. Hence this paper will be used as a spring board for further research in the area under review and it will also inspire further academic work and hence broaden the frontier of knowledge in the area.

The result of the study provides policy maker with invaluable information to devise appropriate polices and to make competent decisions to address the issues. It helps the policy maker to investigate and examine the source of the problem and the proposed solutions for future policy production and implementation.

1.5. Scope and Limitation of the Study

This study attempts to assess the major determinants of child labor which is only one aspect of child labor. It does not go forth to examine the effect of working on schooling, physical and health of children. The paper includes only rural areas of the country but nowadays child labor is becoming the common phenomenon in urban areas; however, since the survey focused only on rural part of the country, we will study using this available data.

The other limitation is the availability of sufficient and comprehensive data on the demand side (firms side) factors and other variable that are supposed to be a determinant factor that affects child labor, since the data collected was not directly on the purpose of analyzing child labor. In this regard some proxy variables are going to be employed where necessary.

The major limitation is that since the data set contains information on hours worked, they are generally prone to significant measurement bias. Furthermore, like unitary household model because the questionnaire was filled by head of the household, there may be under estimation of the number of hours that the child spent on work deliberately or unknowingly, thus, it is difficult to get exact hours of child labor to used as dependent variable of the panel data model, which are going to use for our analysis. These limitations in scope are mainly because due to time, budget and other constraints. In general, these all potentially limits the scope of the study.

1.6. Organization of the Study

The study is presented in six chapters. The first chapter gives a general background of the study, statement of the problem, objective and delimitation of the study. After reviewing related and pertinent theoretical and empirical works that can be used as a base for the research in chapter two, chapter three, outline the theoretical/analytical framework and the empirical methodology employed to identify factors that explain child labor. The fourth chapter presents the major descriptive statistics analysis results and in the fifth chapter econometric estimation results will be presented and the last chapter concludes and puts forward policy implication based on the results.

CHAPTER TWO

LITERATURE REVIEW

2.1. Review of Theoretical Literatures on Child Labor

Even though a wide range of and growing empirical studies prevailed on child labor theoretical justifications on the area are rare.

2.1.1 .Basic Concepts and Definitions

Child labor has become widespread and very common phenomenon in the world especially in less developed and developing countries including Ethiopia. Despite this fact, still it has been very difficult to get actual number of children who involved in labor activities in many countries particularly in developing countries. It is partly due to its hidden nature of the problem (Kebebew, 1998) and mainly because of disagreements on the definition of child and on what constitute labor and child labor.

Even if there is no universally agreed upon definition of child labor, we will try to give the most common definitions. ILO Convention 138 and the UN Convention on the Right of Child (CRC) are often used as benchmark to provide a working definition on child labor. And of course developing an international, statistical definition on child labor has been continued to be an agenda for ILO. Public discourse on child labor uses the phrase to refer to child time activities that are somehow harmful to the child. For example,UN-CRC emphasizes the importance of protecting child from: “work that is likely hazardous or to interfere with the child’s education or to be harmful to the child’s health or physical, mental, spiritual, moral or social development,”

(1989, Article 32). The public's general understanding of the concept of child labor applies to activities that violate this standard. According to CRC, the criteria to group work as labor is its nature. Whether the work is hazardous depends on the tasks performed in the work and work conditions and one can debate what hazardous means (UN-CRC, 1989) assumes that interference with education is harmful to the child's future welfare and therefore, the question of whether work is harmful encompasses the question of whether work interferes with education. Thus, the idea that interprets child labor as any activity which is hazardous to child does not provide agreed and clear definition of "child labor". It is because there are works that are done by rural children which may not be harmful to the child's normal development. So, it indicates that before classifying all activities as child labor, it is important to distinguish different effects of different activities performed by children. In general so as to get clear definition for child labor it is necessary to evaluate the thresh hold beyond which the numbers of hours spent on work activities by children begin to harm their overall development (Assefa and Arjun, 2005).

Child labor carries a negative connotation, and there is a clear indication which in the existing ILO conventions for the idea that any statistical definition of child labor must refer to activities that are child welfare reducing. For example, ILO convention No. 138 on the Minimum Age for Admission to Employment was passed in 1973 and ratifying countries agree to pursue a national policy to abolish "child labor" and to increase the minimum age of employment to "a level consistent with the fullest physical and mental development of young person's" (ILO Convention No. 138, Article 1). Although the ILO convention contains no express definitions of "child labor" nor "employment", the goal of abolishing "child labor" makes it clear that it must refer to activities in which child participation makes the child worse off in some sense. The reference by

ILO convention to "employment or work" suggests that the convention may encompass all forms of economic activity, including work outside of a conventional employment relationship, such as self employment. ILO Convention No. 182 on the worst forms of child labor, which provides that children under the age of 18 years can legitimately work, provided that they have attained the applicable minimum age, and the work concerned is not hazardous or another worst form of child labor.

Convention No. 138 explicitly introduces a distinction between child labor and light work:

National laws or regulations may permit the employment or work of persons 13 to 15 years old age on light work which is:

(a) Unlikely to be harmful to their health development; and

(b) Not such as to prejudice their attendance at school, their participation in vocational orientation or training programs approved by the competent authority or their capacity to benefit from the instruction received (Article 7, Section 1).

The current criteria for identifying child labor used by the ILO's Statistical Information and Monitoring Program on Child Labor (SIMPOC) for its global child labor estimates is:

- A child under 12 who is economically active for 1 or more hours per week.
- A child 14 and under who is economically active for at least 14 hours per week.
- A child 17 and under who is economically active for at least 43 hours per week.

- A child 17 and under who participates in activities that are "hazardous by nature or circumstance" for 1 or more hours per week.

A child 17 and under who participates in an "unconditional worst form of child labor" such as trafficked children, children in bondage or forced labor, armed conflict, prostitution, pornography, illicit activities.

The ILO (2006b) estimates that there were 217.7 million child laborers in the world in 2004 under this definition. Light work is used to characterize the market work of children aged 12-14 that is non-hazardous and for less than 14 hours per week. Child work is an aggregate that pools child laborers with children engaged in light work.

One of the most effective methods of ensuring that children do not start working too young is to set the age at which children can legally be employed or otherwise work. The main principles of the ILO's convention concerning the minimum age of admission to employment and work listed below.

(A) **Hazardous Work**: any work which is likely to jeopardize children's physical, mental, moral, health, safety should not be done by anyone under age of 18.

(B) **Basic Minimum Age**: the minimum age for work should not be below the age for finishing compulsory primary schooling, which is generally taken as 15.

In general, ILO defines all those under 18 as children. Accordingly, labor is defined as "economically active," when a person works on a regular basis for which he/she is remunerated or that results in output destined for market. But in Ethiopian Context where labor market is

missing, this definition is too restrictive. In our study labor is used alternatively with work which includes all work related activities which potentially affect the overall development of a child.

To sum up child labor may take different forms depending on the effects on normal child development. One of the form; “hazardous work” that jeopardize “the health, safety, or morals of young person’s”. This group is also called worst forms of child labor. And according to ILO convention No. of 182, Article 2, this group includes activities like handing chemicals, carrying heavy loads, mining, quarrying or enduring long hours.

The darkest category of child labor relates to those children caught up in criminal activities such as prostitution, production of pornography or pornographic performances, forced recruitment of children for military conflict, slavery (such as bonded labor), or trafficking (which involves the removal of a child from its home, often involving deception and payment, for a wide range of exploitative purposes). These categories are beyond the reach of statistical surveys.

The other categories are those children whose tasks are not hazardous but are more substantial than permitted light work (ILO, 2008).

The last form is light work which may be viewed as a means to socialization and acquiring necessary skills for adult life but not a problem purse. Thus, child labor has not always had a negative connotation. In this case, parents prefer keeping them at home and do along with them to sending them to school (Beliyou, 2003). This temptation would be more the case in poor rural households.

Cross country studies on child ages 10-14 of child labor universally define child labor as the economically active population. Ages 10-14 are studied, because economic activity rates for the 10-14 population were available from the ILO and UN statistical data bases. Examples of papers defining child labor as economically active population include: Becchettiand Trovato (2005), Dehejja and Gatti (2005) Edmonds and Pavenik (2005), Meumayer and Desoysa (2005) Cigno et al (2002), Shelburne (2001), Hussain and Maskus (2003).

Ethiopia has ratified the ILO Minimum Age for Admission to Employment Conventions 1973 and the ILO Convention against the Worst Forms of Child Labor. Besides to these international conventions, the country has instituted protection for children in its constitution which provides that children under 18 have a right to be protected from work that is exploitative, hazardous or otherwise inappropriate for their age, detrimental to their schooling, or detrimental to their social, physical, mental, spiritual or moral development. According to the Ethiopian labor law, the minimum age to start work is 14 (TGE, 1993). The term 'work' is not limited to work in so called economic activities (e.g. paid employment) but it includes chores or household activities in the child's household (such as collecting wood, and fuel), where such work is exploitative, hazardous, inappropriate for their age or detrimental to their development. Even if there is no clear agreement on hazardous work, all international conventions and nation as laws agreed on minimum age for any work involvement on average to be 15. Thus our study is going to use this definition.

2.1.2 .Historical Context of Child Labor

Child Labor has not always had a negative connotation. It has existed since time immemorial especially in the early ages of agricultural societies where children helped their parents on the farms. Children working was seen in some traditional societies as a way of training the child and giving him or her some sort of profession e.g., farming, carpentry, fishing, etc which took the form of informal education. In that era, a child working had a positive or neutral connotation. http://www.buzzle.com/articles/history-of-child-labor.html (Accessed on 8th October, 2013).

The negative connotation of Child Labor as a social problem rose in the era of rapid industrialization and capitalism , the industrial revolution which occurred within the period of the 18^{th} and 19^{th} century. During the late 1700s, and early 1800s, power driven machines replaced hand labor for the production of manufactured goods and services. This era saw the enormous proliferation of factories all over the world particularly in England, U.S, Germany, Canada, France etc. Interestingly, a new source of labor (Children) were discovered by factory owners to run this power driven machines which required little strength and less labor cost compared to adult labor. Hence, there was high demand for Child Labor by factory owners because of the enormous profit accumulated. The rate of Child Labor rose throughout the world especially in countries experiencing rapid industrialization and capitalism and thus became a major societal problem by the mid 1800(s). http://www.scholastic.coin/teachers/article/ history-child-labor (Accessed on 8th October, 2013).

Some children for example might work for 12 to 18 hours a day, six days a week to earn a dollar and some of these children worked even before the age of 7. Approximately about 2,000,000 school age children in the year 1810 were working for 50 to 70 hours in a week, tending machines in spinning mills, hauling heavy loads, working underground in coal mines etc, mostly under precarious conditions. According to some historians, boys under 12years for example were kept in a barbed wire fenced glass factory carrying hot glass throughout night ours for a wage of 40 cents to 1.10 dollars per night. http://www.buzzle.com/articles/history-of-child-labor.html (Accessed on 8th October, 2013).

Some societal associations and groups were alarmed by such cruelty which led to lots of reforms. The poor and demeaning condition of child labor was criticized by popular writers like Karl Marx and the English Writer, Charles Dickens who published the cruelty of Child Labor in his novel "Oliver Twist". Lots of countries began passing laws to regulate the problem of Child Labor with Britain being the first to pass such law. In U.S, about 28 states had passed child labor laws which emphasized education in 1899. By 1938, the U.S congress enacted the Fair Labor Standard Act which fixed the minimum ages of Children working to 16 during school hours, 14 for some kind of jobs after school, and 18 for hazardous jobs. http://www.buzzle.com/articles/history-of-child-labor.html (Accessed on 8th October, 2013).

Other developed countries like Canada, France, and Germany etc., also passed laws to regulate the problem of Child Labor which helped curb the situation in these countries. Even though still there exist some form of child labor in the developed countries especially among the Children of Migrants in the U.S with little legal protection, Child Labor is most prominent in the Third World Countries particularly in Asia and Africa and remains a serious problem which has

attracted the attention of International Organizations, and most Countries in the developed world to join force with the Third World in order to curb the problem. http://www.buzzle.com/articles/history-of-child-labor.html (Accessed on 8th October, 2013).

2.1.3. Theoretical Determinants of Child Labor

The Use of Theories:

A theory according to (Salkind 2006:8) is "a set of statements that predict things that will occur in the future or explain things that occurred in the past". He argued further that by the very nature of theories "they can be modified according to the result of the research based on the same assumptions on which the theory is drawn".

Unitary Versus Collective House Hold Models:

The decision-making process within the household is modeled either as the domain of one individual or as a bargaining process between members of the household. In both sets of models, households maximize total welfare through the allocation of resources among the members of the household according to the weight assigned to each household member. In unitary models, formalized originally by Becker (1964), the weights are assigned by one person. In collective models formalized by, for instance, browning et al (1994), the weights are determined by the bargaining power of the individuals which may vary depending on factors such as how much money the individual brings in and what his/her fall back options are.

Households' models also differ in the assumptions made regarding the preferences of the decision maker(s). If the decision makers are altruistic, the child's utility enters into their utility

function, resulting in a negative weight on child labor (Bhalotra, 2004). In this framework child labor is a manifestation of constrained household resources and is a consequence of poverty. Basu and Van (1998), for instance, develop model in which parents are assumed to be altruistic. Here, child labor occurs only when market wages for adult labor are too low for the household to sustain a subsistence level of consumption. If, however, parents are not altruistic towards their children, child labor occurs as the result of the welfare maximizing process in which it is treated entirely as a consumption good (Becker and Lewis, 1973).

There are also studies on the effects of within household distribution of bargaining power. Collective models of household decision making were developed as a response to evidence that household consumption patterns vary with distribution of earning within the household Dercon et al. (2000), for instance, find that household resources are not pooled to help women cope with illness shocks in Southern Ethiopia an area where options for maimed women are worse than in other parts of the country. If the balance of power within the household affects resource allocation then it can be modeled as a determinant of child labor. Moehning (1995), for instance, finds evidence that working children receive a larger share of household resources, using American data from the early 20^{th} century. Even without assuming that children have some independence and say in household decisions, Basu and Ray (2002) construct a collective household model in which the balance of power between husband and wife affects how much their children work. In this model, the more balanced the bargaining power of husband and wife is, the less the children in the household have to work. This assumes that both parents are altruistic and so do not like sending their children to work, and that the two parents have different preferences over the goods consumed by the household.The outcome of their model is a

u-shaped relationship between the balance of bargaining power between husband, wife and child work.

Where child participate in market labor, theory indicates that their market wage rate is the principal exogenous individual characteristic that influences time use decisions. The predicted impact of wage rates on child labor participation is ambiguous given a contrasting positive substitution effect (increase in price of leisure) and negative income effect. Generally it is assumed that the substitution effect will dominate initially as wages increase but that at higher wage rates the income effect will dominate thus generating a backward-bending labor supply curve, wage rates may vary among children for variety of reasons such as their age, sex, experience and location. However, individual wage rates are rarely used for measurement error reasons given the thin participation of children in the labor market. Instead, community level child wage rates are applied. Evidence suggests that the substitution effect predominant as could be expected where child wages are a small share of total household income. (Ray, 2002)

Where children do not participate in wage work, their shadow wage (marginal productivity in household production and/or domestic work) plays the same role. However, the shadow wage is indigenous and is not directly observable. Its role is taken into account in the structure of the theoretical model and, in particular, through the inclusion of the household and home production functions. Arguments of these functions indirectly determine children's marginal productivity and primarily include household characteristics (productive asset, participation of other household members, etc.)

In general, economic theory suggests that as income increases, child labor supply should fall as long as leisure is normal good. However, child labor is a direct or indirect source of a household income and thus income is indigenous will respect to child labor supply.

In principle, the model should be estimated using (exogenous) wage rates, household producer prices and non-earnings income as separate regressors. The coefficients on non-earnings income should then measure the pure income effect.

Despite their differences in initial assumptions the existing few theoretical explanations have the central idea that child work school decisions are made by parents on behalf of children and that child labor should be reduced for it is socially undesirable.

The Basic/Static Model (Poverty and Substitution Axioms):

According to Jane Humphries (2010), there are two assumptions that are crucial and also founded in the basic static model of labor market with child labor. These are the Luxury Axiom and the Substitution Axiom (Humphries 2010:26 citing Basu and Tzannatos 2003). The Substitution Axiom according to Jane Humphries (2010) argues that "adults and child workers are substitutes subject to some adult equivalency correction". This Axiom argues that it is always possible to replace adult labor with Children and since adult labor cost more; some employers aiming to maximize profit would switch to children.

The Poverty model (Luxury Axiom) argues that parent or household send their children to work because of poverty and that children's "non work, school attendance or leisure" is a luxury commodity household cannot afford. Families or household with low income cannot afford to

disengage their children from working in order to survive. This is because children work in this case brings in surplus income that helps to sustain the family together with adult income. Children, according to this assumption are only kept out of productive activity when adult income rises above the subsistence level. Hence, there lies implicitly altruistic view of parents and guardians who have negative disposition towards their children working but have to consent to the act because of poverty and the household's survival (Humphries 2010:26).

In the view of Basu (1999), Karl Marx's writing coincides with the period when child labor was at its peak during the industrial revolution. In his work called "Capital", he developed a model explaining the causes of child labor.

According to Marx, the rise of a new technology which he specifically referred to it as "machinery" led to the practice of employing persons "whose bodily development is incomplete, but whose limbs are all more supple" (Marx 1867:372 cited in Basu 1999:1094).

In the view of Marx, Ideally the existence of machinery should have resulted in more time for leisure but since machinery is owned by one agent(capitalists) and labor by the proletariat (including adults and children of the working class), "a diminished need for labor would lead to decline of wages to a higher extent, therefore it would be beneficial for the capitalist to freely utilize labor on one hand, and also equally important to have workers and their entire household (family) work to satisfy their subsistence consumption (Marx 1867:373 cited in Basu 1999 :1094).

In this way, machinery tends to depreciate the labor power of men because in order for families to satisfy their subsistence consumption, there is the supply of not only labor but surplus labor

for the capitalists. In other words, all members of the family has to engage in some sort of economic activity that brings income, in order to secure their subsistence consumption. This happens because of the declined in adult wages stemming from the strong competition occurring in the labor market during the era of the British Industrial Revolution (Humphries 2010:25). Marx also noted the long term consequences of child labor.

In Humphries (2010) view, "poverty is the main cause of child labor even though it may have some other non economic causes and could also be affected by the changing conception of childhood and the value of children (Zelzer 1985 cited in Humphries 2010:28). He argued that during the industrial revolution which saw a boom in child labor, only children belonging to the elite class did not work and Humphries(2010) citing Nardinelli (1990), Cunningham (2000) and Heywood (2001) further stated that "the incidence of child labor tended to fall as countries became richer and their economies advanced" (Humphries 2010:31).

Citing examples, he asserted that "by the last quarter of the 19th century, very young children between the ages of 5-9 years old were no more found working in the British economy and older child workers between 10-14 years old in the labor market were brought to the barest minimum.

Similarly, Alfred Marshall also noted some effect of child labor. In Marshall's view, "the moral and physical misery and disease caused by excessive work under bad conditions reached their highest period in the first quarter of the 19^{l} century... and that the most valuable of all capital is that invested in human beings (Basu 1999: 1094).

According to Marshall, if faculties of children are not developed well, they would not be able to realize the importance of developing the faculties of their own children, hence, limiting their

ability or power to do so. Therefore any change ascribed to the workers of one generation with regards to satisfactory wages and good opportunities that help to develop their human potentials would go a long way to increase the material and moral advantages with which they are likely to help their children (Marshall 1920: 468, cited in Basu 1999:1094).

It must be noted that there have been several scholars who have argued for a ban on child labor as a policy prescription to solving this problem. For example, Basu and Arthur have argued that the consequences of such ban could cause less privileged households to live below their subsistence consumption level and as such argued that such a ban should incorporate the provision of social welfare to such section of the population by the government. (Basu 1999:1094).

In the view of Basu (1999), a child's non schooling implies the denial of benefits not only for the child but the society to a larger extent. Basu (1999) quoting Marshall (1920:470), noted that "Whoever may incur the expense of investing capital in developing the abilities of the workman, those abilities will be the property of the workman himself: and thus, the virtue of those who have aided him must remain for the greater part of its own reward".

Similarly, John Stuart Mills also argued for the positive externalities that come with education. In his opinion, it is a breach of duty against both the child and community for a parent or a guardian denying his child education. According to him, in the long run, both the child and the community will bear the consequence of ignorance and lack of education. Therefore children must be protected from overworking themselves which is tantamount to child exploitation (Mill 1848:319&323, cited in Basu 1999:1095), hence the essence of externalities.

Thus, Grootaert and Kanbur (1995) in their work noted the essence of government intervention to direct children's involvement in child labor to schooling which is the ideal policy for solving the problem of child labor.

The basic model has certain significance. It has been employed by development economists to assist policy prescriptions and to specifically discover the circumstances or conditions under which protective labor laws would constitute a "benign intervention" (Humphries 2010:28). In other words, after its previous impact, it may become dormant and could be abolished without reversal.

The Cultural (Norm) Model:

Albert Hirschman, according to Basu (1999) argued that the decision of whether or not to send one's child to work has, to some extent, something to do with social norms. A parent's decision to send a child to work makes that parent incur a social stigma cost. If the society or area of residence has lots of child labor, the stigma cost is smaller and it may even be advantageous to each parent to send their child to work. On the other hand, if a particular society frowns upon or consider it socially unacceptable for parents sending out their children to work, then most parents would find it embarrassing sending their child to work since the social stigma cost is high in that particular society (Basu 1999:1103-1104).

In Conclusion, the application of the three analytical frameworks discussed above which are the unitary vs. collective, Poverty model, and Cultural model are not mutually exclusive theoretical, that is they are distinct in theory but in reality, there is a combination of these three models explaining the complex issue of child labor.

2.2. Empirical Literature Review

There exist a myriad of reasons as to why parents do or do not allow or force their children to involve in different work activities such as domestic work, farm agricultural production and paid off farm activities. Although the findings of various studies differ depending on the peculiar country specific situations but poverty, gender bias, parents' educational level, distance to available primary education, income shocks and return to researcher reviews the various literatures with their empirical findings

children contribute to household labor supply when reserves of labor are essential at critical periods of the production process, supervision of labor is costly, and household production by children frees other household members to pursue remunerative market activities without children's work, poor households lose one of the few mechanisms they have to increase incomes or smooth consumptions in the face economic constraints.

2.2.1 Empirical determinants of child labor in the Rests of the world

A. Poverty and Household income level:

Household income is the most studied of all determinants of child labor supply as much of the policy debate concerns the necessity and the appropriateness of using income-oriented policies. Some researchers (e.g Deiray, 1983) use adult income, even though this is simultaneously determined with child labor participation in their theoretical household model.

Many argue that poverty is the main driving force behind the engagement of millions of children at their early age in work in a way that endangers their overall development and hence hinders

their access to schooling. In line with this argument (2004) in India found that the higher average income of the household's head whose children are working in substantially lower than that of household's head with lower income whose children are working.

Based on Ray's (2000) study on child labor in Peru and Pakistan, found a positive and very significant correlation between child labor and poverty in Pakistan but this association is insignificant in Peru. Similar to this result Patrinos and Psacharopolous (1997) found that there is no significant correlation between child labor and poverty in Peru.

Surprisingly and in contrast to the Luxury axiom, the household's monthly income does not have a significant relationship with the working hours of children (Rubkwan, 2004). This result corresponds with the study of Peru child labor by Ray (2000) that failed to find a positive relation between poverty and child labor.

Spindle (19850 surveyed Brazilian adolescents in the labor force and support the view that poverty plays a major role in the child employment decisions in low-income households. For the poorest children in the samples 54 percent cited economic motivation as the primary reason for working while for working children in the higher income brackets, only 35 percent worked primarily for financial (Spindel, 1985).

Dessy and Ven cafachelium (2001) by using cross-country data for 83 rich and poor countries, find a negative correlation of child labor and the log of GDP per capita (at a purchasing power parity). The study result revealed a negative relation of economic development and the incidence of child labor. They also found a positive relation of child labor incidence and Log of the Gini

index of inequality. However, the relation of household income and child labor in micro-data tends to tends to be non-linear and in many cases is weak (Bhalotra and Tzannatos (2002).

Of course, the effects of poverty on child labor are somewhat age specific. According children aged 10 to 14 comprise the group for which the labor force participation (LFP) rate is almost sensitive to economic conditions (Drusilla, 2001and Kruti Kova (2009) had empirically analyzed the determinants of child labor and school enrollment in rural Andlira Pradesh, India, through estimating a village fixed-effects Logit model for each child and found that richer households are less likely to force their children in work activities and more likely to send their children to school.

Kumar, (2013) analyze the nature and magnitude of the problem and determinants of child labor and their participation in the work force of a nearly age in Odisha, India by using primary data and the regression result revealed that family income has significant negative impact on the working hours of the child labor.

By employing three analytical frame works which were the poverty model, norm or cultural model and the institutional mode using winter's integrated model of policy implementation study has been done in the Ga east district, Ghana, by using the mixed method research design by the use of case study, interview and the design of questionnaire found that poverty, low socio economic status of parents had contributed to the influx of child labor positively. (Ampomah, 2012)

Child labor in Tanzania viewed as primarily as a consequence of poverty. (Beegle, 2003)

In Cambodia, similar result was founded to the above who reveals that increasing household's income does increase the human capital formation of the child through reducing worst forms of child labor which has devastating effect on child's education. (Phoumin, 2006)

Jayachandran (2002) in India conducted a panel data analysis on exploring the socio-economic determinant of child labor by using random effects model with emphasis on girls and found that poverty has positive relation to child labor.

By using household consumption expenditure as proxy for permanent income in Pakistan by using panel data turns out to be insignificant in affecting child labor. (Bilquees and Saqib, 2004). Another study by Chishti etal (2009) in Pakistan, however, showed that the financial constraints of the households found to be a significant factor. Thus, in general the effect of poverty is mixed.

B. Child characteristics:

It is often argued that earlier born children may have more intra-household resources directed to them as a result of which they tend to have better education and earning at a later stage. However, in the presence of child labor, the effects of birth order can be confounded by the fact that earlier born children are able to command higher wages than younger siblings.

According to Ray's (2000) study on child labor in Peru and Pakistan result showed the linear relationship between children's labor hours and age in both countries. Children typically work more when they receive higher wages and children living in rural areas tend to work more than those in urban areas (Ray, 2000)

Rubkwan (2004) in Thailand has found that age of child has effects only on boys in that the older the boys are the more hours per week they work, it has no significant effect on girls. The coefficient of age square boys was significant, which indicated non-linear relationship between age and the supply of child labor.

However, Bholotra et al (2001) found birth order to have an insignificant impact on child farm hours in Ghana.

C. Parents Choice:

One of the most significant factors which affect child labor is that of the parent's preference of working to schooling i.e. parents thought that schooling was not appropriate for the child. This type of parental perception highly depend on their background, the situation in the community, the relevance of education for household and farm work, employment prospects in the labor market and socio-cultural-environment. From these factors, human capital level of the community would have significant influence on the investment decision on child schooling and labor.

Children in better opportunity to attend school, the lesser child labor will be. (Burney, 1995)

Regarding parent's preference in India, Ejrneas et al (2004) propose a set up in which parents decide how many children to have based on their budget constraints, the genetic endowments of the existing children and their expectations about the genetic endowments of future children. Parents then reinforce, compensate or are neutral to the distribution of genetic endowments

across their children depending on their preferences concerning in equality i.e. parental response is contingent up on genetic endowments of their offspring.)

According to some reports in developing countries particularly in agriculture based economy Africa, child labor is understood to be a form of education which initiates the child into a communal life and is valued by many societies. (Bonnet, 2003)

By using primary data collected from Cuttack city of Odisha, India, in which relevant information is elicited from 50 child laborers, their parents and employers with the help of structured questionnaire designed for the purpose have found a very significant effect of parent's attitude towards child labor. Thus, children's desire to work has a positive and significant influence on employment of working children. As a result he recommended awareness creation on the attitude of parents, communities towards child labor. (Kuari, 2013)

D. Parent's Education Level:

Krutikova (2009) conducted study on child labor determinant in India specifically at case of Andhra Pradesh and has obtained the result that stated the education of adult women relative to men in the household, which plausibly reflected bargaining power of women, appears to have no impact in the main specification on aggregates child labor or on its individual components economic activities and chores. However, splitting the sample by areas of residence and gender showed that this is because the effects appear to move in the opposite directions depending on the area of residence. The result showed that in urban areas, the more educated the women in the household are relative to the men, the less children work. While the effect is negative for both boys and girls, it is larger in magnitude and statistically significant only for boys. In contrast, in

rural areas, relative education of women and appears to have no impact on how much children work. This result holds for boys and girls. Strikingly, however, children living in poorer households work significantly more if women in the household are more educated then the men. (Krutikova, 2009)

In Africa by using survey data, a negative association is found between parental education and hours of work (Phoumin and Fukui, 2006).

To the extent higher education enhances earning potential, children of educated parents may not be as resource constrained as their counter parts from illiterate parents.

Ray (2000) found that the higher the level of parental education, the less children will work in Peru. This inverse relationship between parent education and child labor was found in many studies. (e.g Brown, Deadorff and Stern, 2001)

Similar to other studies in Thailand, for working children, both head of household and spouse have lower level of education than children who are not working. In other words, the education level of both head of household and spouse strongly reduce the number of hours that children work. The coefficients are larger for boys in both head of the households, and spouse's education but the difference in magnitude between boys and girls decrease to work when the head of their household is a farmer, fisherman or other occupation related to agriculture. (Rubkwan, 2004)

A four country (Cote d'Ivoire, Colombia, Bolivia and the Philippines) comparative study of child labor by Groofaert and patrinos (2002) by World Bank, using sequential probit model as they believed that the household decision about how a child's time will be allocated is seen as a

sequential decision making process whereby the household first weighs the decision on whether the child will attend school only against all other options. If the household does not select the preferred option, then a series of further decisions are needed to choose between a work-school combination or work only option and then to select the type of work. The results confirm that the importance of parents characteristics, especially the level of education and whether the parents had themselves been child laborers in these countries

Phoumin and Fukui (2006) in Cambodia studied the determinant of hours supplied of child labor using simultaneous tobit and probit model by the maximum likelihood estimator they found that only after completing primary education, thus, parent's education has impact on the probability of child's schooling and reduce hours worked of the child.

Like all above studies, kumara (2013) who studied on determinants of child labor in India using primary data found that parent's education can reduce incidences child labor in India. (Kumara, 2013)

In general, all research results agreed that parental education had significant effect on child labor in such a way that as education level increase, the incidence of child labor reduces.

E. Household Head Characteristics:

Unemployed parents and parents involved in economic activities that do not generate enough resources are more likely to let their children engage in various activities within and outside the household to make ends meet. In Thailand the head of household's gender and head's marital status are not significantly different with 0.79 for working children and 0.78 for not working

children, as that culture tends to recognize the male as a household's leader. But, the head of household's age is negatively significant for boys (Rubkwan, 2004).

Phoumin and Fukui (2006) in Cambodia found an inverse association between child work participation and head's education level. It is interesting to note that compared with children from households with a farmer head, children from households with an unemployed head are less likely to participate in market activities. This is to be expected since unemployed heads are less likely to own land and hence their children are less likely to be involved in farm activities (Phoumin and Fukui, 2006).

F. Cost of schooling:

If the cost (direct as well as indirect) of sending children to school is high, then poor households will be forced not to send their children to school or to take their children out of school which in turn creates a fertile ground for the use of child labor.

To the extent that is true, policy reforms targeted at affecting the cost (direct and indirect) of schooling will affect the allocation of children's time.

Ruvallion and Wdon (2000) in rural Bangladish, Shoufia, and Parker (2001), and Edmonds (2005) are some of the studies that used policy reforms targeted at affecting the cost of school attendance to establish the tradeoff between schooling and child labor. Free basic facilities and education to exterm poor can reduce incidence of child labor in India. (Kumari, 2013)

Whether households for whom it is more costly to send children to school (using distance from the nearest school as a proxy for this cost) are more likely to use child labor. The demand for

schooling responds to lower costs, both in school expenses (fees, clothing, books, and the like) and the opportunity costs of travelling over poor roads to distance locations and not having children to do productive work. These costs to families can be lowered. The recent elimination of school fees for primary education in Kenya and Uganda induced major increases in school enrollment.

Although child labor in Thialand has decreased significantly, many children are still out of school. Tzannatos (2003) has conducted an empirical analysis about why children do not attend school and reported that younger children (below 14) were hindered by direct education costs while the opportunity costs explains why older children choose to enter the labor force rather than go to school.

In developing countries, one of the determinants that affect household decision about sending children to school the opportunity cost of revenue generated from their labor. The more the time they have for education. Psacharopoulou (1997) compared the educational attainments of children who work with those who do not in Bolivia and Venezuela. They conclude that child labor leads to two years less schooling on average. Ravallion and Modon (1999) found that the reduction of child labor in bangladish accounts for about one quarter to one eighth of the increase in school attainment rate.

G. Quality of Education:

By employing the method of output based school quality technique with maximum likelihood technique and with the student's own ability and achievement held constant, a student is much less likely to remain in school if attending a low quality (Hanushek et al, 2006).

They further argue that with the individual's own ability and achievement held constant, a student attending a higher quality school will tend to stay in school and a student attending a lower quality school is more likely to dropout and completes fewer grades. Students appear to recognize quality differences and act on them.

Despite progress over decade in increasing access to schooling in developing world education levels measured by years of schooling are still dismal in many countries. (WB, 2008). Low attainment in rural areas is often attributed to farm work; in those areas, children miss school or drop out to help with farm or household work. But studies of child labor show that of the 5 to 14 years old children not in school, 37 percent do not work and an additional32 percent do only domestic work. Other reasons for dropping out include the inability to meet costs of attendance, distance to school, a curriculum or language incompatible with local condition, beliefs that education is not necessary and poor school quality. Neither improving basic education in Africa nor secondary in Latin America is essential to energize the process of rural development. (WB, 2008).

An interesting finding from Huisman and Smits (2009) shows that children have a higher likelihood to stay in school if the teacher child ratio or the percentage of female teacher is higher and these effects are stronger for girls than boys though it will lose its significance in multivariate estimation. The study by El Daw and Safaa (2002) found the link between quality and school attendance/drop out reveals that quality matters and that quality of education in private schools is much better than in public and religious schools. Access to private lessons significantly reduces the likelihood of failure and repetition then child labor.

The poor quality of education and the deficiencies in school resources reduce the benefit of education and thus, adversely affect the household decision to enroll children in schools and then they opt child work. (Dreze and Kingdom, 2000; Ray, 2000)

H. Returns to Schooling:

Edmonds (2006) in India found that the amount of schooling and work each child is involved in depends on the return to each activity for him/her relative to the other children in the households. For instance, if returns to schooling are higher for boys and those with more experience are better at households with younger boys will work more than those living in the households with younger girls.

Behavioral theory argues that parents use their own experience (i.e., returns to education) in the labor market to decide to send their children to work. Though rates of returns to education may be increasing as a country develops, parents may still use their own experience in making schooling decisions for their children (Beegle et al, 2004).

Reducing child labor will require parents to be farsighted (i.e. to recognize the future returns to schooling) and to be able to engage in costly long-horizon investments (either through internal funding or borrowing).

I. Domestic work and market work:

Muller (1984) by using rural survey finds that boys specialize in household production and girls in domestic work when the number of cattle increases. Other studies which confirm this result is obtained by Canagarajah et al (1997), unlike the findings for market work, where male children

are more likely to participate the probability is higher for female children in domestic chore activities.

J. Family Asset:

Assets such as livestock and land have mixed effects on child labor and schooling, depending on the shock and asset type. However, household durables are substitutes for increased child labor when households face health shocks (Andrew 2007).

Nevertheless, it may not be possible to determine priori in which direction the family assets alter child labor rates. For example, in order for a mother with small children to engage in market work, she may require her older female children to engage in child-care rather than school. It is generally the case that gender plays a key role in whether a child is engaged in home or market work. In addition, as a consequence of the rigidities of market work, children may have time to attend school but are required to work while school is in session (Drusilla, 2001)

In his study of a Bangladesh, Cain (1977) finds that "children of owners of production assets, therefore, can begin work at a considerably earlier age in a larger number of directly productive activities requiring assets" (Cain, 1977).

Beegle et al (2004) also show that child labor is prevalent among households likely to have higher borrowing costs, that are farther from schools, and whose adult members experienced negative returns to their own education suggesting that reducing child labor will require facilitating access to credit and will also require households to be forward looking (Beegle et al, 2003).

In the absence of access to formal markets, the household may still be able to tap internal assets. The presence of father in the household, the presence of older siblings in the household (particularly brother), the capacity of the mother to engage in market work or property associated with a family enterprise can all be thought of as assets that can be drawn up on even if the family has no access to formal capital markets. For this reason the presence of such household assets might be expected to lower child labor.

In contrast, ownership of productive assets like land can increase child labor. Bhalotra and Heady (2000) illustrate this argument with a theoretical model, and present evidence from rural Ghana and Pakistan (Bhalotra and Heady, 2000). Land ownership may have detrimental effect to child schooling while increasing child labor. Studies try to stipulate the effect of land owning on child labor and schooling decisions, with the view that land owning household could have a greater demand for child labor (Beegle et al, 2004).

To sum up, the effects of productive asset on child labor is inconclusive.

K. Shocks:

Krutikova's (2009) study on effect of shocks on child labor reflect that the effect of shocks are different by area of residence and gender and it shows that in rural areas, shocks have differing effects depending on the type of shock. While a crop shock or natural disaster increases the amount children work by approximately two hours per week, death and illness of household member reduces the amount children work by a similar amount of time. In urban areas the shock, natural disaster have no effect on urban child labor, since these households tend to be engaged in non-agricultural activities. Surprisingly, death and illness of household members

also has no significant effect, despite its strong impact on rural areas. Finally, livestock theft, which does not affect child labor in rural areas, results in a substantial increase in children's work load. (Krutikova, 2009)

Income variability may be the child labor supply determinant of its own right. Income variability may lead households to diversify their income sources and this may be accomplished in part through increased child labor participation. Related to this issue of income variability, using panel data Jacoby and Skoufias (1997) have found that rural Indian household, adapt to negative income shocks by reducing school attendance and increasing labor participation among their children as a form of self insurance. Of course it depends on the household's accumulated wealth and access to credit.

Beegle et al (2003) studies on the link between transitory income shocks, access to credit and child labor in Tanzania by using panel data. The result showed that child labor increases significantly in response to crop losses due to calamities such as fire, insects, rodents, etc. Moreover, it showed that the availability of collateral assets offsets the effect of income shocks on child labor, even when controlling for other sources of wealth in the family and for household level unobservable. In other words the study concluded that households respond to transitory shocks by increasing child labor, but that the extent to which child labor is used as a buffer is lower when households have access to credit (Beegle, 2003).

L. Capital Market Imperfection:

Baland and Robinson (2000) emphasize the importance of capital market failure as a contributing factor to inefficient child labor. They take as a point of departure the fact that child labor is a device for transferring income from the future into the present. A child who works today at the expense of acquiring an education will contribute to family income today at the expense of future productivity (Baland and Robinson, 2000).

Rainjan (2001) argued that credit constraints facing households result in excessive child labor and hinder children's human capital development. Rammohan, (2001) also consider the role of credit constraints.

With capital market imperfection, poor families cannot afford to send their earlier born children to school, but may be able to send their later born children due to the income earned by their old siblings (Emerson and Souza, 2002). The ability of households to cope with shocks is linked to the permanent income hypothesis and consumption smoothing literature (e.g. Townsend, 1994). Within this framework, household optimal resource, to transitory shocks is to borrow or use up buffer stocks. In the presence of credit constraints, however, less efficient and less effective mechanisms have to be used. These may include child labor. Assuming that there is a trade-off-between child labor and human capital ccumulation, this may be an inefficient strategy (Baland et al., 2000).

Access to credit helps to reduce child labor if it is serving as risk diversification and insurance mechanism (Shoufias, 1997).

Using household wealth (log per capita durable assets and household expenditure) as a proxy for a household's ability to borrow, Beegle et al (2003) assert that household who face a lower discount rate are less likely to resort to child labor (Beegle et al., 2003). In another year, Beegle explore the transitory income shocks as a determinant of child labor empirically, using data from rural Tanzania. They find that child labor increases in response to income shocks, but that this increase is mitigated by household asset holdings. This is consistent with better off households being more able to cope with transitory shocks due to better access to credit (Beegle et al., 2003).

A government loan that is tied to the child's educational performance and becomes the liability of the child, rather than the parent, allows the child to access the capital markets to meet required contributions to the family. Such a loan is efficient provided there is some reason to believe that the child would have voluntarily undertaken the loan if he/she had the cognitive ability to analyze the choice like an adult (Drusilla, 2001).

Even if parents treat their child's future as a contributing factor to their own sense of well-being, they may be willing to borrow against their own assets or future income in order to finance their child's education. In this case, a lack of collateral will prevent parents from accessing the capital markets, thus again giving rise to an efficiently low level of education.

M. Labor Market Imperfection:

Labor market imperfections may make it difficult for land cultivating, parents the hire extra labor, for example during peaks of agricultural activity, leading children to work though their household's resources may be above subsistence level (Leclercq, 2001).

Similar to this, Benjamin (1992), for example argued that if labor markets are imperfect, then farm labor usage will be a function of household composition. In the absence of perfect labor market, higher parental education that increases outside employment opportunities may increase the intensity of work participation by child, especially within household.

Two papers by Bhalotra and Heady (2000) and Cockburn (2000) argue that agricultural households who do not need their children's income to survive May still use child farm labor if labor market imperfections prevent them from hiring extra adult labor, notably during seasonal peaks of activity.

N. Demand for Child Labor:

The demand aspect in the labor market can have a share in determining the incidence of child labor. In this respect, Kaijace and Kanyala (1998) argued that the demand for cheap labor by most employers was another reason for children to be involved in child labor. They further continue to argue that employers in Tanzania prefer children below the age of 15 because they are cheaper, easier to access and less demanding compared to adult employees who have the relative advantage of bargaining the terms of employment in the labor market. They conclude that the prevalence of child labor in Tanzania is a result of "push-pullover" effect.

O. Household composition:

It is often argued that the larger the number of young children and the elderly if For example, the higher the demand for care taking will become, which is usually undertaken by older children. Also the number and the composition of adult household members affect the intensity

of child labor depending on the relationship between adult and child labor. (Cherienhous ky, 1985)

With regard to the gender dimension of household composition, Krutikova (2009) examines whether the older sibling effect is gender specific or not and the result shows that the positive effect of having older girls. One possible explanation for the seeming independence of child labor and the presence of children of the opposite sex is lack of substitutability between tasks done by girls and boys. In consistence with this, the data suggest that boys and girls are engaged in different types of child labor.

The reduction in family size in Thailand has decreased the ability of households to diversify their members' economic activities and financially insure them. As result, household demand for a child work can remain high for a significant time after the household moves out of poverty until a threshold level of income security is achieved. (Tzannatos, 2003)

In Thailand, the number of children in the family has more influence on boys than girls. Children who live in households with more members typically have longer working hours. (Rubkawan, 2004)

A number of studies have found some significant associations between the total number and the age gender composition of children in the household and child labor (Ponczek et a, 2007, Grooraert 1998)

In India, Sofya (2009) has got the finding in case of Andhra Pradesh that the number of older boys and girls in the household is insignificant in affecting child labor despite a range of

findings to the contrary in the literature. (For instance Edmonds, 2006). One of the explanations made by Sofya (2009) for this contrary result is that of the specification, being too crude, rather than actual independence of child labor from household composition.

A four country (Cote d'Ivoire, Colombia, Bolivia and the Philipines) comparative study of child labor by using sequential probit model identified household size and composition are the most notable, factors which affect child labor, (Grootaert and Patrinos, 2002)

The very recent study on determinants of child labor in Odisha, India found that majority of child laborerss are from larger families who are forced to join labor force to supplement the family income and thus, family size is an economic factors which affect the working hours of child labor significantly. (Kumari, 2013)

P. Agricultural Technologies:

The fact that child labor is mainly agricultural phenomenon in developing countries implies that agricuktural technologies would have important implications for child labor on the one hand, farmers who adopt new and improved agricultural practices are more likely to enjoy a substanitial income increase that should lead to an increased demand for education (Basu and Van, 1998; Edmonds, 2005, Basu and Tzannatos, 2000; Kazianga, 2007). On the other hand, it might be the case that the productivity of child labor is relatively high when used along with improved practices (Collins and Margo, 2006; 1996) which reduces family's willingness to send their children to school. Self and Grahbowski, 2007) assumed that adult labor and child labor are substitutable when agricultural technology is labor intensive, but not when technology is

more advanced which not only reduces/eliminates the need for child labors, but also makes the agriculture sector more productive.)

According to Hayami and Ruttan (1985), agriculture technology is generally divided into two types or varieties: biochemical and mechanical. The former involves the use of high yield seeds, fertilizer, and irrigation that allows for a more intensive cultivation of the land while the later utilize machinery to substitute for labor. Even though the impact of these different types of technology on child labor is not so straight forward, the application of mechanical technologies would likely reduce the employment of children while biochemical technologies might increase opportunities for child labor (Self and Grabowski, 2007). However, the successful application of biochemical technologies requires careful and precise application of water and fertilizer at appropriate times (Nkamleu, 2009). Thus, the skilled labor required in parents deciding to send their children to school.

2.2 .2 .The case in Ethiopia

A. Poverty:

A study on Ethiopia revealed that both poverty constraints and income opportunities played important roles in the decision to send children to school or to work. It is also found that work and school conflict substantially but not entirely (Cockburn, 2001).

Ethiopia as one of the poorest countries in the world suffers from socio-economic and political problems that primarily embedded in the extreme poverty in which it has been trapped in its long history. As is the case in many aspects of life in the country poverty plays a major role for

the ever growing involvement of children in the labor market that is characterized by exploitation and denial of basic rights of the working children.

In both rural and urban areas child labor is in one way or another attributable to poverty at local and national level. The national child labor survey conducted by the central statistics agency (CSA) provides data on the distribution of child work between rural and urban areas and among regions in the country due to the pressure created by poverty. About 52% of the children were reported to be engaged in productive activities. Girls were mainly engaged in domestic activities (e.g collecting firewood and water, food preparation, washing clothes) while boys were involved in productive activities (eg cattle herding, weeding, harvesting, ploughing, petty trading, wage work). The participation rate in productive activities was 62% for boys and 42% for girls. For domestic activities, this figure was 222% for boys and 44% for girls. In rural areas, children were more frequently engaged in productive activities than in domestic activities, where as in urban areas the opposite was true.

In rural parts of the country household poverty is caused by large family size increasing fragmentation of farm land that ultimately leads to low family income. The situation in urban areas is also so severe that, lacks of employment opportunities that lead to low family income deprive parents to send their children to school. Instead they tend to encourage and even some times force their children to enter into the labor market in their early age so as to enhance the household income to sustain the families. Considering the extreme poverty in both rural and urban conditions, the use of child labor in on farm and off farm activities and in other sectors of the economy has become not a matter of choice (Tassew, et al, 2005)

B. Costs of Schooling:

Child schooling is not determined by demand side factors alone, rather there are hosts of supply side factors which have a very pronounced effect. Among these supply side factors, influence of cost of schooling is very significant. Even though parents are not volunteer to involve their children in child work activities, in situation where the expenditure on schooling is very high they obliged not enroll their children because they do not afford the fee. In rural Ethiopia context where the available school is a government schools there are no tuition fees. However, parents are expected to pay for registration, learning materials and uniforms. He average expenditure per enrolled child is significant in the work equation for girls with 0.09% reduction in the probability of engaging in work only. (Tseganesh, 2011)

The issue of child labor is motivated by its detrimental impact on the normal development of laboring children in general and on their education performance in particular (Bhalotra, 2003). Using micro level data, a number of studies have investigated the cause and consequences of child labor, with a particular emphasis on the link between child labor and schooling. Among these, Beliyou (2003) investigates the determinants of child domestic and market work participation and school attendance as well as the trade off, if any among the three activities.

C. Returns to schooling:

A better understanding of the nature and trade-off between child labor and schooling in Ethiopia is essential to be able to inform policy aimed at curbing the high incidence of child labor (Beliyou, 2003). Ethiopia is the country of the young will children under 15 years accounting for 44% of the population. According to the country's recent survey on the child labor that 85%

of child in Ethiopia were found to be engaged in some kind of labor activity during school (CSA, 2001). It is also found that more than 33% combined work and schooling.

D. Parents education level:

The most important characteristic of the parents is his/her education level (years of schooling). As expected, it is negatively related to the likelihood of children particularly boy and older children, working as his/her main activity. The likelihood of a child working falls by 1.7% with each additional years of schooling of the parents. (Cockburn, 1999)

Better education background of parents is likely to favor child schooling as the decision makers become main aware of the benefits of investing in human capital and better educated parents will be well informed about the detrimental impacts of child labor on the overall development of children. (Dessy, 2000)

Heads with female schooling fallow child schooling and reduce child work as compared to others (Assefa and Arjun, 2003; Tassew et al, 2005)

Children in household with formal schooling level of up to grade six are more likely to enroll to school only and less likely to specialize in work by 7% each, whereas, those in household having formal school of above grade seven has greater probability of being in school only (12%) and reduced the probability of specializing work only (7%) (Tseganesh, 2011)

E. Domestic work and Market work:

Based on the study on rural Ethiopia by using bivariate probit model, of Beliyou (2003) children are more likely to engage in market activities. Other studies which confirm this result is

obtained by Jensen etal (1997), Canagarajah etal (1997), and Cockburn (1995). Unlike the findings for market work where male children are more likely to participation, the probability of domestic work participation is higher for female children.

Muller (1984) finds that boys specialize in household production any girls in domestic work when the number of cattle increases.

F. Household head's characteristics:

Gender as well as age of the head had an insignificant impact on child labor participation in rural Ethiopia (Cockburn, 1999); Beliyou (2003), on the other hand, children from household headed by a person with at least primary education are less likely to involve in work activities (Beliyou, 2003).

To the extent of female headship signifies aspect of ill being or insecurity, for example, children in female headed households may tend to have greater work burden to generate resources to generate resources to sustain the family. There may be opposite effect. Canagarajah et al (1977), for example, reported a negative association between female headship and work participation, with stronger effect for girls.

Very young children (age 4-7), particularly boys, are more likely to work in male-headed households. The age of the household head does not appear to a have much importance on children's time use. (Cockbun, 1999)

Female headed households in highlands are likely to be discriminated against provision of assets mainly land which is the most important asset for survival restricting their earning potential (Assefa, 2002)

Even though the age of the head had no such pronounced effect on child time allocation decision, children in male headed households were more likely to engage in work only ,would have more significant effect on boys. (Tseganesh, 2011)

G. Imperfect capital market:

Credit market in rural Ethiopia is almost non-existent. Although the fact that in the reach of the rural society, people in those areas have established informal group saving and borrowing arrangement like "eqqub" to smooth consumption. The recent study by Tseganesh (2011) reveal that children in household where the head or over family member is same a member of at least are eqqub have 10.7% greater chance of attending school only relative to being inactive. The effect is somehow larger for girls (9.4%) as compared to boys (8.3%). Female children are more advantageous in the sense that household equbb membership reduces their probability of specializing in work only by 8.5% (Tseganesh, 2001)

H. Child's characteristics:

It is interesting to note that compared with children age 7-9, children age 9.1-12 and 12.1-15 are more likely to participate in domestic work activities including water/firewood fetching, care taking, and other activities. Being a biological child, a direct offspring of household head, is also found to increases the likelihood of participation in domestic work activities.

According to Beliyou's study in 2003 by using Ethiopian rural household survey of 1995 and bivariate probit model on Ethiopia the coefficient of birth order is negative implies that late born children are less likely to participate in domestic work activities (Beliyou, 2003).

As Cockburn's et al (1999) study's result on child labor supply detrimental on rural Ethiopia revealed the strong positive and significant effect of age on the probability of a child working and boys are 4.8% less likely than girls to have work as main activity. These sex differences increase with age.

I. Family Asset:

In non-monetized rural economies, household assets became the potential indicators of household wealth without going into detail, as the variables value which indicates wealth increase, the probability of being child laborer decrease. Thus, as land size, number of plots of land owned numbers of livestock in standard unit, and constructions increase, the level child labor decrease (Tseganesh, 2011).

An inverse association is reported between land ownership and the likelihood of school attendance and the direct relationship between land ownership the direct relationship between land ownership and the likelihood of child labor participation (Jense et al. 1997; Cockburn 1999, Assefa 2002). On the other hand, other studies haves found an insignificant impact on child time allocation of land size (Bhalotra, et al. 2001 and Beliyou, 2003) of the two wealth indicators, land and livestock size has a significant impact with children from households that own large livestock population being more likely to participate in market activities that include farm work and herding. This finding does not support the argument that wealthier household are less likely

to involve their children in work activities. The relationship between wealth and child labor may depend on a family's position on the weak ladder and it may very well be the case that at a very low level, as is the case in Ethiopia, increase in wealth may trigger a higher demand for adult labor in general and that of the children in particular. In the case of Ethiopia, animal rearing is highly labor intensive where children are required to spend, on average, 31 hours per a week looking after animals. In such situation, an increase in wealth which increases livestock ownership is likely to increase demand for child herders (Beliyou, 2003).

In the rural Ethiopia probably the country with the highest incidence of child work in the world today, but does not control for income, so that this estimates mix up the contribution of assets to household income and their impact in terms of substitution between child and adult labor. Child labor increasing (decreasing) assets are characterized by a dominant wage (income) effect (Cockburn, 2001). Using a multi-nominal Logit analysis of data from rural Ethiopia found that small livestock and land ownership are child labor increasing, where as ownership of oxen proximity to a source of water are child decreasing (Cockburn, 2001).The larger land size encourage combination of schooling with work but highly discourage specialization of in either activity. In other words, the larger land size demands more labor including children but it also increase schooling as it enables to general more income that use to pay for schooling fees. Household ownership of one more plot of land diminishes the likelihood of a child being only at school by 1%. It increases the probability that a child combine school with work by the same percentage point. (Tseganesh, 2011)

It is likely that more livestock demand more children to herd ,on the other hand, ownership of a more livestock capacitates the household to pay for school in addition to reducing the need for

children to engage in income generating activities which may hinder their schooling potential .According to the study of Tseganesh (2011) and Getinet and Beliyou (2007), for a unit increase in the number of livestock that the household owns, probability of a male child to attend school falls by 1.4 % and a limit increase a boy's likelihood of combining school with work and work only by about 1% and 0.4% respectively.

Construction materials for house are also other good indicators for the wealth of a household. According to Tseganesh (2011) the effect of such type of assets on child labor is insignificant.

J. Household composition:

Among the household composition variables, only the number of infants and the number of boys appear to influence child time use. The presence of infants significantly and strongly increases the likelihood of a child working (roughly 6.2% for each additional infant), probably due to increased household demand for domestic work or in order to substitute for the mother's over activities. This effect is particularly strong for girls and younger children. (Cockburn, 1999)

Beliyou's (2003) study result imply that an inverse relationship between the number of dependents and children's market work participation. While having a large number of young children increase the demand for care taking, large number of school aged children makes the competition over resources Stiffer, making school attendance less of an option for at least some of the children. (Beliyou, 2003)

The presence of adult males and females in the household is thought to liberate younger children from specializing in work only thereby increasing their potential to attend schools. The presence

of one more adult male or female is found to reduce the chance of a girls to be in school only by 7.1% alike while increasing the chance for a boy by 3% even worse the addition gone more male adult hightes the probability for girls to specialize only on work by 5.4%. (Tsganesh, 2011)

The presences of infant and higher dependency ratio are likely to discourage child schooling as they are required to care for infants and the elderly. An addition to the number of infants is found to increase the likelihood of children to involve in work any by 5.5% and a point increase in the dependency ratio is found to raise the probability for agirls to be any at school by 39.4% while decreasing her probability to specialize in work only by (43%0 (ibid)

(Nelson and Dubey, 2002 and Tseganesh (2011) study's result reveal that the larger households have sufficient labor input so that children may be likely to enroll in school.

K. Agricultural practices:

Based on Tseganesh (2011) studies on the determinants of child labor and schooling in rural Ethiopia by using rural household survey and multinomial logit model As agriculture is labor intensive especially in ox-plow farming system which is predominant in rural Ethiopia, the application of productivity improving inputs like improved seed, modern machinery has significant impact on reducing child labor demand and thereby liberating children to often school.

Accordingly, the evidence from this result reveals that the application of compost and use of improved machinery do not significantly affect the likelihood of a child to be a child laborer. However, the use of improved seed has pronounced effect on child labor; it significantly

decreases the probability of child labor and increase the probability of schooling by 4.9%. Evidence from disaggregated data reveals that the use of improved seeds reduces the probability f female children in specializing in work while having the opposite effect on boys. Similar results have been reported by Kazaing (2007) from cotton producing households in Burkinafaso. (Tseganesh, 2011)

The country's heavily reliance on subsistence agriculture means that child work on family farms and within household are abundantly prevalence (Basu 1999; Bigesten et al. 2003, Beliyou 2003) Cockburn and Dostie 2007; Dercon 2004; Edomdndos and Pavenik 2005; UNDP 2005; CSA 2001). Thus, accordingly the introduction of new technologies affect directly or indirectly child labor supply.

L. Regional Differences:

Since each region in Ethiopia has different level of infrastructural development, socio-cultural and environmental setting, a child who has similar child specific, parental, household and community characteristic may have different likelihood working depending on where a child resides. Thus, the result shows regional disparities have very significant effect on child labor. When we compare Tigray region with Amhara, SNNPS and Oromia , Amhara region has higher probability of engaging in both schooling and work at a particular time than those in Tigray region. Children in oromia and SNNP regions have greater probability of engaging in work only with the greater influence for the latter (28%) than the former (18.5%). the work- school combination outcomes for girls is similar to the pooled model where as for boys being from Amhara region has not significant effect on the probability of this outcomes relative to those in

Tigray region. Boys in Tigray region are less likely to specialize in work only than those in the rest region. (Tseganesh, 2011)

According to Cockburn et al (1999) study on determinant of child labor supply in rural Ethiopia has stated that regional difference show up very strong and significant effects on child labor supply. Thus, the likelihood of a child working appears to be smallest in the Tigray region and greatest in the Amhara region. Likelihood of attending school also appears to be smaller in the Tigray region and greatest in the Amhara and, to a lesser extent, the oromia regions.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1. Analytical and Theoretical Framework

For the model on the determinants of child labor in rural Ethiopia: children have three alternative time uses: labor, schooling and leisure. Furthermore, labor can be disaggregated into various categories-essentially; market paid work, household production in agricultural activities and domestic work that likely have quite different determinants. Consequently child time allocation decisions can be much more complex than those of adult males and females. In the case of rural Ethiopia, there are a particularly wide variety of child activities: domestic work (fetching wood and water, cooking and cleaning, minding children that are non-marketable), work in household production (farm work and tending livestock), off farm (paid or shared labor) ,schooling and leisure.

To capture all these activities, we use an agricultural household model in which households produce both marketable and non-marketable “home” goods where the latter involves domestic work.

The most notable micro-economic model that is commonly used as a spring board in works related to time allocation and labor is the model developed by Becker (1964, 1965 and 1973). We considered a household composed of (one adult male superscript, (M), one adult female (F) and one child (C)).

Household is assumed to maximize a twice differentiable utility function subject to its production functions, budget and time constraints. In extension to Becker's model which more or less similar in content with the previous model and Mincer (1958), altruistic parents maximize household utility for which quantity and quality of children, leisure, and market goods are major arguments. Hanushek et al. (2006) affirmed that in developing countries, regarding the time allocation young children, parents are expected to have a large say. They are expected to make a comparison between current and future costs and benefits, and give weight. Accordingly, the arguments in utility function which is a unitary household welfare are consumption of a composite market purchased consumer goods (CM), composite of household produced marketable (CH) and non-marketable (CN) consumer goods, the number of children (N), the quality of children, which is represented by child schooling (S), leisure (CL):

$U = U (N, CM, CH, CN, C_L^F, C_L^M, C_L^C, S; Xh)$

Where U is utility and Xh is a vector of household characteristics in which some of these may be unobservable.

Households tried to maximize this utility function subject to household production function constraint, full income (budget) constraint and time constraints discuss as follows:

Household production of marketable (QH) and non-marketable goods (QN) is a function of household labor (L_H, L_N) and hired in labor (LH_I, LN_I) and a vector of associated fixed factors (K_H, K_N, skills, capital, land, technology, etc):

$QH \leq h (LH^M, LH_I^M, LH^F, LH_I^F, LH^C, LH_I^C, KH)$

$QN \leq h\ (LN^{M}, LN_{I}^{M}, LN^{F}, LN_{I}^{F}, LN^{C}, LN_{I}^{C}, KN)$

And for simplicity let's leave land, skills, technology and other intermediate inputs. Let assume that all household production of the non-marketable good is consumed so that $Q_N = C_N$

Thus, the total budget constraint that limits the choices of households which take the following form given by:

$PsS + WCL + P_M C_M + P_H C_H = V + P_H Q_H + W (LO - LI)$

Thus PsS+WCL+PMCM=V+PH(QH-CH)+W(LO-LI)

P_M = price index for composite market purchased consumer goods

P_H = price index for the composite household produced consumer good s

P_S = price of index for schooling which represent educational inputs like books, materials and fees and that of implicit cost or opportunity cost

V = is household non-labor income

CL=leisure time

Q_H = household production of composite marketable good

W = wage rate

$L_O - L_I$ = net hired labor which is labor hired out for paid work in off farm less the labor hired in the household production in exchange for wage payment.

Schooling involves material/fee costs (CS) and implicit child schooling time (ts^c): S = S (cs, tsc)

In the budget constraint equation the right side represents full income which includes V, the non labor income of households, $P_{H(}Q_{H\text{-}CH)}$ the net income from selling produced goods and W ($L_O - L_I$) is net income from paid of farm work and the left hand side represents the total expenditure of households.

Finally, each household member faces a time constraint:

$$L_H^M + L_N^M + C_L^M + LH_O^M + LN_O^M \leq T^M$$

$$L_H^F + L_N^F + C_L^F + LH_O^F + LN_O^F \leq T^F$$

$$L_H^C + L_N^M + t_S^C + C_L^C + LN_O^C + Lh_O^C \leq T^C$$

Note that the leisure variables can alternatively be determined from the time constraints once the over time uses are resolved.

$$CL^M = T^M - L_H^M - L_N^M - LH_O^M - LN_O^M$$

$$CL^F = T^F - LHF - LN^F - LHO^F - LNO^F$$

$$CL^C = T^C - LH^C - LN^C - t_S^C - LH_O^C - LN_O^C$$

Where T is total time available and

O indicated hired out in of farm activities or as a servant.

By using lagrangian function we can solve the utility maximization problem given the above three constraints. From the first order conditions of the optimization we derive reduced form equations for each of the endogenous variables:

C_M, C_H, C_N, S, Q, C_S, L_H^M, L_H^F, L_H^C, LN^M, LN^F, LN^C, LN_I^M, LN_I^F, LN_I^C, LNO^M, LNO^F, LNO^C, t_S^C C_L^M, C_L^F, C_L^C.

These equations all have the same set of exogenous variables and are of the form:

$X = X (P_M, P_H, P_S, V, K_H, K_N, W)$

Solving the household's optimization problem gives a set of demand functions for child quality, number of children, leisure, consumption goods, domestic labor, market paid labor and farm work labor. In this framework, the reduced form functions for the i^{th} child; i

The demand for non-marketable, domestic work labor is given by:

$$L_H^C = f (X_i, X_C, X_h, X_s , w, P_S, P_M, P_H, K_H, K_N)$$

$$L_N^C = f (X_i, X_C, X_h, X_s , W, P_S, P_M, P_H, K_H, K_N)$$

Thus: Child labor = $L_N^C + L_H^C + LN_O^C + LH_O^C$

$$= f (X_i, X_C, X_h, X_s , W, P_S, P_M, P_H, K_H, K_N)$$

Where Xi= are a vector of child individual characteristics such as age and gender of a child; Xh is a vector of household level characteristics such as education level, sex, age of household head;

Xc is a vector of community level characteristics such as access to electricity, public pipe water and Xs is school related factors like distance to the closest school kilometrs and number of schools in the association..

These above first four above equations will be estimated so as to compare the factors which affect farm work child labor, domestic child labor and paid market child labor. And finally the aggregate all these which is child labor equation will be empirically estimated by using two rounds 2004 and 2009 Ethiopian rural household survey panel data in order to identify the factors which affects child labor in the rural part of the country.

In general, with the underlying assumptions that child labor is a logical response to household utility maximization problem subject to production, time and cash constraints (Assefa, 2002). This study attempts to model the choice regarding child time allocation activities as a function of child specific, parental, household, community characteristics.

Following Assefa (2002), the study assumed that the time allocation decision for children are made either through a complete agreements among family members regarding the choices or by an altruistic adult (Assefa, 2002).

3.2 .Study Areas, Population, Data Type and Sources

The data set which is going to be used for empirical investigation of this study was drawn mainly from Ethiopian Rural Household Survey (ERHS) conducted by Addis Ababa University, Department of Economics in Collaboration with the Center for the Study of African Economies (CSAE), University of Oxford and International Food Policy Research Institute (IFPRI),

Washington DC. These surveys were so far conducted in seven rounds during the years 1994a, 1994b, 1995, 1997, 1999, 2004 and 2009. The first four rounds of ERHS covered a sample of 1,477 households in eighteen peasant association (villages) spanning 15 woredas (districts) in four largest regional states of the country i.e. Amhara, Oromia, Tigray and Southern Nations, Nationalities and people Regional States (SNNP).

The fifteen woredas are: Haresaw, Geblen, Dinki, Debre Birhan, Yetmen, Shumsha, Sirbana Godeti, Adele Keke, Koro Degaga, Turfe Kechemane, Imdibir, Aze Deboa, Addado, Gara Godo and Doma. Additional three villages were included in the fifth (1999) and six (2004) rounds, increasing the number of villages to 18 and households to 1681.

The sampling design was such that regions were selected to represent the main agro-ecological zones in the country and to represent the major socio-economic and demographic characteristics of the rural population. Together, the fifteen district sites provide a mix of cultivation categories and standard of living strata and reflect most of the important agro-economic variations found in rural Ethiopia; though it cannot be said as national representative data (Stefan D. et al. 2005 and 2007). The survey included information on household demographics, income, consumption, employment, education, facilities, and other household socio-economic variables. According to Darcon et al (2005) the selection of districts as well as households within each district was based on stratified sampling. (For those readers who are interested to see the questionnaire of the ERHS, you can access it from the website.)

For the consumption of this study, as to reduce computational difficulty of various variables in the model that is going to be employed, panel data of the latest two rounds, the sixth (2004) and the seventh (2009) will be used.

The main logics behind using these two rounds are because these waves are child focused, are recent, and are the only round which give data on hours spent by children on different activities (time allocation on domestic, market, farm) which showed the extent of child labor. The other reason was that due to nature of the problem in the study, child, as panel time period is extended, the attrition rate of course natural attrition rate due to age bound will be high.

For empirical investigation data on children in the age range of 5 years and 15 years has been considered in this study. Since we used panel data, we needed to identify the number of children whose age is between 5 and 15 in both sixth (2004) and seventh (2009) rounds and 526 total number children are in this range and in both rounds in which the total number observations (N) is 526 and n in each round 263 and in two years (2004) and (209), thus the panel data is short, micro and balanced.

Generally, we run the empirical model for a total of 526 children out of which 276(52.47%) and 250(47.53%) are females and males respectively, on whom we had complete information over the variables included in the model.

3.3 .Panel Data and its Nature

A panel data set contains repeated observations over the same units (individual, households, firms), collected over a number of periods.

Although panel data are typically collected at the micro-economic level, it has become more and more practice to pool individual time series of a number of countries or industries and analyze them simultaneously (Verbeek, 2004).

Panel data or longitudinal data are repeated measurements at different point in time on the same individual unit, such as person, firm, state, or country. Regressions can then capture both variation over units, similar to regression on cross-section data and variation overtime like regression on time series data.

Some of basic considerations: according to Verbeek (2004), the following are basic points to be considered in panel data.

First, panel data are usually observed at a regular time intervals, as is the case for most time series data. A common exception is growth curve analysis where, for example, children are observed at several irregularly spaced intervals in time, and a measure such as height or IQ is regressed on a polynomial in age.

Second, panel data can be balanced, meaning all individual units are observed in all time period (T_i=T for all i), or unbalanced ($T_i \neq T$ for some i). Most X_t commands can be applied to both balanced and unbalanced data. In either case, however, estimator consistency requires that the sample-selection process does not lead to errors being correlated with regressors loosely

speaking; the missingness is for random reasons rather than systematic reasons. For our study the data is balanced panel data in which for all observation in two years (T=2).

Third, the data set may be a short panel (few time periods and many individuals), long panel (many time periods and few individuals), or both (many time periods and many individuals). This distinction has consequences for both estimation and inference. This study uses short panel data that for many individuals but only for two years.

Forth, model errors are very likely correlated. Micro-econometrics methods emphasize correlation (or clustering) over time for a given individual, with independence over individual units. For some panel data sets, such as country panels, there additionally may be correlation across individuals.

Regardless of the assumptions made, some correction to default Ordinary Least Squares (OLS) standard errors is usually necessary and efficiency gains using Generalized Least Squares (GLS) may be possible.

Fifth, regression coefficient identification for some estimators can depend on regressor type. Some regressors, such as gender, may be time invariant with $X_{it}=X_i$ for all t. Some regressors, such as an overall time trend, may be individual invariant with $X_{it}=X_t$ for all i and some may vary over both time and individuals.

Sixth, some or all model coefficients may vary across individuals or overtime.

Seventh, the micro econometric literature emphasizes the fixed effects model. This model permits regressors to be endogenous provided that they are correlated only with a time invariant

component of the error. Most other branches of applied statistics instead emphasize the random effects model that assumes that regressors are completely exogenous.

Finally, panel data permit estimation of dynamic models where lagged dependent variable may be a regressor most panel data analysis use models without this implication.

To sum up, in this study we apply short, micro and balanced panel data by using the linear or panel method of estimation.(Verbeek,2004)

3.4. Advantages and Disadvantages of Using Panel Data

3.4.1. Advantages of Panel Data

The following are the fundamental advantages of panel data which is one reason to prefer panel data sets to other data sets.

Efficiency of Parametric Estimators:

Because panel data sets are typically larger then cross-sectional and time series data sets, and explanatory variables vary over two dimensions (individuals and time periods) than one, estimators based on panel data are quite often more accurate than single cross-sectional and time serious data sets. Even with identical sample sizes, the use of a panel data set will result in the more efficient estimates than a series of independent cross-sections. (Verbeek, 2004)

Identification of Parameters:

A second advantage of the availability of panel data is that it reduces identification problems. Although this advantage may come under different headings in many cases it involves

identification in the presence of endogenous regressors or measurement error robustness to omitted variables and the identification of individual dynamics. The availability of panel data will case the problem of distinguishing between true and spurious state dependence, because individual histories are observed and can be included in the model (Heckman, 1978). The true state dependence refers that the fact that he is more likely to experience that event in the future. Whereas the spurious state dependence says that individual may differ in unobserved characteristics which influence the probability of experiencing the event.

Reducing Observable and Unobservable Omitted variable bias:

Omitted variable bias arises if a variable that is correlated with the included variable is excluded from the model. The availability of panel data capture the effect of omitted variable bias which vary from individual to individual by introducing a firm specific effect can be included in the model to capture the effect of all (observed and unobserved) variable that do not vary over the individual units. This illustrates the proposition that panel data can reduce the effects of omitted variable bias or in other words estimators from a panel data set may be more robust to an incomplete model specification (Verbeek, 2004).

Reducing Problem of Endogenity:

In many cases panel data will provide internal instrument for regressors that are endogenous or subject to measurement errors. That is transformation of the original variables can often be argued to be uncorrelated with the models error term and correlated with the explanatory variables themselves and no external instruments are needed (Wooldrige, 2002).

Thus using panel data in empirical estimation could have the following core advantages:

- Increase precision of regression estimates. The more observations we have, the better the estimation will be.

- It makes it possible to control for factors that vary across cross section units (municipalities) but do not vary over time i.e. we can control for individual fixed effects.

  Variables that vary across cross section units but do not vary over time (e.g., location variables) are excluded from fixed effects panel data models. There are two implications of this exclusion, namely:

  (i) We can control for factors that cause omitted variable bias, if they are omitted.

  (ii) We can control for factors which are unobserved or unmeasured - and therefore cannot be included in the regression using multiple regression.

The key idea behind panel data estimation is that if an omitted variable does not change over time, any changes in the dependent variable over time cannot be caused by the omitted variable, aggregation bias, and simultaneity. (Baltige,2001)

In general, the availability of repeated observations on the same units allows economists to specify and estimate more complicated and more realistic models than a single cross-section or single time series would do. An important advantage of panel data compared to time series or cross sectional data sets is that it allows identification of certain parameters or questions, without a need to make restrictive assumptions. That is, panel data are not only suitable to model or explain why individual units behave differently but also to model why a given unit

behaves differently at different time periods.

3.4.2. Disadvantages of Panel Data

- Attrition: Because we follow the same subjects over time, non-response or attrition typically increases through time.

- Non-randomness of the sample: Non-randomness bias occurs when a rule other than simple random sampling is used to select cross section units. For example, the choice of municipalities may be dictated by the availability of data on all variables rather than by random sampling. Non-random samples could be a consequence of attrition. Units that drop out (or refuse to participate later) may be similar in some systematic way.

- Measurement errors: The greater the number of observations, the greater is the possibility of measurement errors.

- Most panel data are unbalanced which require slight modifications of the techniques.

- Most estimation techniques are for panel data with short time horizon (i.e. the number of cross section units exceeds the number of time periods.

- The choice of appropriate model depends inter alia on the degree of homogeneity of the intercept and slope coefficients and the extent to which any individual cross section effects are correlated with the independent variables.

- In general, the disadvantages are more of a practical nature because we repeatedly observe the same units, it is usually no longer appropriate to assume that different

observations are independent. This may complicate the analysis, particularly in non-linear and dynamic models. Furthermore, panel data sets very often suffer from missing observations. Even if these observations are missing in a random way the standard analysis has to be adjusted (Verbeek, 2004)

3.5. Description and Measurement of Dependant and Independent Variables in the Model

3.5.1. Dependant variable

The dependent variable used in this study to capture the child labor incidence is number of hours spent on work activities per week by a child aged 5-15 years. To explain it more, other previous studies did not use quantitative data to show child labor instead they used qualitative dummy variable which indicates, only child participation in their econometric regression though they used for the purpose of the descriptive analysis.

The following two are basic index which indicate the extent of child labor. One factor that determines the impact of child labor on the normal development of laboring children is the working age. The younger the child is, ceteris paribus, the riskier work participation will be. Around 79% on children aged 5-15 in our sample have already started work activities before celebrating their 8^{th} birthday and as the official school starting age (refer Appendix 7). A part from its impact on human capital formation, the fact that more than three-fourth of children start participating in work activities of such an early age increase vulnerability to physical and psychological health hazard (Beliyou, 2005). Children often begin to participate in work activities at their early age usually when they are 4 or 5 (Assefa, 2002; Assefa and Arjun,

2005 and Tseganesh, 2011) and on average contribute 29-30 hours of labor per week (Assefa and Arjun, 2005). Most previous studies considered only children aged 7-15 because of age 7 years being the official (though not compulsory) school starting age in Ethiopia but child labor not only affect education but the overall normal development of child. Thus, this study prefers to include all children whose age ranges from 5 to 15 due to above reasons.

Another indicator of the intensity of child labor is the length of time spent on work activities. The longer the work hours, ceteris paribus, the shorter time available for other activities and the serious the effect on child's normal development will be. In our data there are children who have spent up to maximum of 90 hours per week in work activities. (Refer at Appendix 3)

These are the reasons why the study use quantitative data that is number of hours spent to indicate the extent of child labor than qualitative variables which shows only participation unlike other studies.

On the other hand undertaking light work activities may not significantly interfere with schooling and may improve the acquisition of important skills for the child. This may particularly be the case in traditional communities with insufficient schooling and/or post school labor market opportunities where children may have to depend on skills passed on from their parents.

In short, child participation in work activities is not a serious problem rather the work starting age and the length of time spent affect child normal development.

3.5.2 Explanatory Variables

After reviewing some related literatures the following factors which are given in the following table are taken as explanatory variable and the variables are grouped into sub groups.

Table 3.1 Description of Variables

Variable	Description
Dependant variables	
Child labor	The total hours spent for all activities (domestic worker, farm worker and off farm paid activities)
Paid child labor	The total hours spent on off farm paid work activities
Farm child labor	The total hours spent on farm activities
Domestic child labor	The total hours spent on domestic work activities
Child characteristics	
Early marriage	1 if the child is single (un married)
First work starting at farm	The age in which the child starts work
Farm work	1 if the child is farm worker
Domestic worker	1 if the child is domestic worker
Student	1 if the child is student
Sex_ child	1 if child is male
Age_ child	Age in years of the child
Age 2 _child	Age squared

Bio child	1 if the child is son/daughter of the head
Household head characteristics	
Head age	Age of the household's head
Male head	1 if the head is male
Head divorced	1 If the head is divorced
Illiteracy of head	1 if the head is illiterate
Informal education of head	1 if the head has informal education only
Ped 18 of head	1 if the head has primary (1-8 grade)
Sed 9-12 of head	1 if the has secondary (9-12 grade)
Higherinstitution of head	1 if the has higher education.
Household composition	
Male number	The total number male members in the household
Female number	The total number female mumbers in the household
Depratio hhsize	Dependency ratio i.e. ratio of dependents to household the household size
Young mf	Total young members aged 15 to 65
Newbirth	1 if there is no infant below age of five in the houshold
Household assets	
Ozerlsk	The number of other livestock
Oxen	The number of oxen
Doxen	1 if the household has at least one ox

Nplot	Number of plots land
Land size	Size of land in hectares
Consumption mz	The consumption expenditure per month
Cementalwal	1 if wall of the house is made of cement
Galvanized roof	1 if roof the house is made of "korkoro"
Other assets	
Labour sharing	1 if households involve in labor sharing arrangement
Toilet	1 if the household do not have any form of toilet in the compound
Pipewater	1 if the household has access to pipe water in the compound
Garbage disposal	1 if the wastage is disposed at the households willingness
Loan take	1 if the household takes loan
Lank accownership eqqub membership	1 if he household own bank account
Income generactivity 12mzs	1 if the household have been member of the eqqub.
Hhoffarm yr	1 if household involve engage in income activities
Remittance	1 if the household receives remittance.
Agricultural practices	
Extention agents	1 if the household have greater contact with the extension agents
Water harvest	1 if the household apply water havesting technology

Fertilizer credit	1 if the household use fertilizer which is purchased by borrowed money.
Soil conservation manure	1 if households apply manure as soil conservation.
School related community variables	
Number of primary schools pa 1	The number of primary school in the peasant association.
Distance to primary school km pas	The average distance to primary school of the peasant association kilo meters.
Distance to high school km pas	The average distance to high school of the community in kilo meters.
Other community variables	
Yesacccess to pipewater pa 1	1 if peasant association access to pipe water
Yesaccess to electricity pa 1	1 if there is access to electricity of peasant association
Region	
Oromia	1 if region is oromia
Tigray	1 if region is Tigray
Amhara	1 if region is Amhara
SNNP	1 if region is SNNP

3.6. Empirical Econometric Model Specification and Estimation Strategy

Panel data methods are more complicated than cross-sectional data methods**.** It is because the standard errors of panel data estimators need to be adjusted because each additional time period of data is not independent of previous periods. Panel data requires the use of much richer models and estimation methods. Also different areas of applied statistics use different methods for essentially the same data. The stata Xt command where Xt is an acronym for cross-section time serious covers many of these methods. There are many types of panel data and goals of panel data analysis, leading to different models and estimators for panel data. (Verbeek, 2004)

In our econometric estimation the dependent variable is the incidence of child labor which is captured by the numbers of hours spent by child on work activities. In such economic contexts where the dependent variable is continuous, classical linear panel models are appropriate. (Wooldrige, 2002)

Given that the dependent variable of the study is the number of hours that the child spent on work and that the nature of the panel data that we are going to use is balanced two years (2004 and 2009) which is short panel that implies small number of time (T=2) and large number of observations (N=526), the fixed effects and random effects linear models are the possible models for the study. Since it is impossible to predetermine which model is appropriate before empirically test these models by employing the data, we are going to assess both of them separately.

Both these models are called error components model:

$Yit = \alpha i + \beta\ xit + \varepsilon it$, $i = 1, 2, 3, \ldots N$ and

$t = 1, 2, 3 \ldots T$ (i.e. N = number of cross section units and T = number of time periods)

where

εit represents idiosyncratic usual error term

αi indicates unobserved individual heterogeneity. Thus,

The unobserved heterogeneity part of error term measures factors that are specific to an individual cross section unit but do not vary over time (example location, ability, etc…) whereas the idiosyncratic error component is the usual error term which varies among the cross section as well as overtime.

3.6.1 .Fixed Effects Model

This model is the extension but the improvement result of pooled OLS model; pooled models have the disadvantage of assuming that the intercept and slope parameters are the same for all the cross section units. To circumvent this problem, econometricians often specify fixed effects models. It is specified as:

$$Y_{it} = \alpha i + \beta X_{it} + \varepsilon_{it}$$

Where it is usually assumed that X_{it} are independent of ε_{it}. Cov (X_{it}, ε_{it}) = 0 but it allows some degree of relationship between Xit and αi, Cov (Xit,αi) $\neq 0$; a curse which means we should eliminate αi. Thus, in fixed effects model, the αi are permitted to be correlated with the regressors, Xit.

It implied that the fixed effects model is simply a linear regression model in which the intercept terms vary over the individual units. i.e. αi is fixed for each cross section unit over time but it differs from individual to individual.

$\alpha i \neq \alpha s$, for its as we already stated fixed effect model differs from other panel models with respect to the treatment of unobserved heterogeneity (αi) (i.e., variables which vary among the cross section units but not vary over time). In fixed effects μi and the intercepts are presumed to be fixed. Fixed effects models have the additional complication that regressors may be correlated with the individual unobserved level effects so that consistent estimation of regression parameters requires eliminating or controlling for the fixed effects.

Fixed effects model has five different versions depends on the interest of the study: (Baltagi, 2001).

Individual Fixed Effects Model:

This fixed effects model in which slope is same across all cross section unit and overtime and intercepts differ across section units but are constants overtime for each cross section unit. We can specify this model as:

$Yit = \alpha i + \beta Xit + \varepsilon it;\ i=1, 2, \ldots N$

$t= 1, 2, \ldots, T$

In the equation αi consist of variables that vary across section units but do not vary over time, it is the constant (fixed) effect of belonging to that cross section unit. In this model we have excluded the variable that vary overtime but do not vary cross section units at any given time.

Hence the model we have constructed is a one way fixed effects model. There are two attractive features of the above one way fixed effects model.

First, it allows the intercepts to vary across cross section units, a more realistic outcome, but the intercepts do not vary over time.

Second, another important characteristic of the above model is that it allows the slope to be the same across cross section units and overtime. Usually, it is the slope parameters that are primary interest in panel regressions. The intercepts are of secondary importance and are often called nuisance parameters (Baltagi, 2001).

Time Fixed Effects Model:

It is fixed effects model in which the slopes are the same across all cross section units and overtime and the intercepts differ according to time but are the same for all cross section units at any given time.

This time fixed effects model is specified as:

$Yit = \alpha t + Xit\beta + \varepsilon it,$

$i = 1, 2, \ldots N \quad ,t = 1, 2 \ldots T$

αt in the formulation consists of observable or non-observable variables that do not vary across cross section units at any given time but vary overtime. The error term εit are iid, zero mean random variables. There are two attractive features of the above model:

a) Incorporating αt or at allows the intercept to vary overtime.

b) The second attractive feature of the time fixed effects model is that the slope coefficients, β, is the same across cross section units and overtime. This model is logical if the variables are homogenous across cross section units like national policy(Baltagi,2001)

Two Way Fixed Effects Model:

A natural question that arises is: how can we allow the intercepts to vary across cross section units at any given time as well as vary overtime for any cross section unit?

The answer is to specify a two way fixed effects model, which is a hybrid of the individual fixed effects model and the time effects model. In fact the standard extension of the individual effects is a two-way effects model that allows the intercept to vary over individuals and overtime. This model is specified as:

$$Yit = \alpha i + \alpha t + Xit\beta + \varepsilon it$$

$$i = 1, 2 \ldots N \text{ and } t = 1, 2 \ldots T$$

Where αi consist of variables that vary across cross section units but not over time and αt or at consists of all variables that do not vary across cross section units but vary overtime. For short panels, it is common to let the time effects αt or at be fixed effects. It implies that in short panel the two way fixed effect is the same as time fixed effect. Thus the above specified model is reduced as:

$$Yit = \alpha t + Xit\beta + \varepsilon it \text{ (Baltagi, 2001)}$$

Fixed Effect Models With Intercepts and Slopes that Vary Across Cross Sectional Units but not overtime:

For these models, we include cross section dummies as well as their interaction with relevant independent variables. This model is more appropriate for long and macro panels, and the model is specified as:

$$Yit = \alpha i + \beta Xit + D\alpha i + \beta(D\alpha i \bullet Xit) + \varepsilon it$$

$$i= 1, 2, \ldots N \text{ and } t = 1, 2 \ldots T$$

Where D – Dummy and

(αi, xit) shows the interaction of dummies created for cross sectional units and explanatory variables (Baltagi 2001 and WooldRige, 2002).

Mixed Linear Models:

These are fixed effects models with intercepts and slopes that vary across cross sectional units as well as overtime. The mixed linear model is a hierarchical linear model that is quite flexible. It is appropriate for long panel.

And the model is specified as

$$Yit = Xit\beta + D\alpha i + (Xit \bullet D\alpha i)\beta + D\alpha t \ (Xit \bullet D\alpha t)\ \beta + \varepsilon it$$

$$T= 1, 2 \ldots T \text{ and } i = 1, 2 \ldots\ldots N$$

Where D = Dummy and

(Dαi • Xit) indicates the interaction of Dummy of cross sectional units and independent variables and (Dαt •xit) shows interaction of time fixed effects to the relevance explanatory variables (Verbeek, 2004).

Estimation methods of fixed effects model:

In general, fixed effect models and estimators try to demonstrate more of within dimension (the difference with in individuals) but not individual to individuals.

More than this, fixed effect models and estimators cannot estimate the effect of any time invariant variable such as gender, race or religion. These variables are wiped out by the within transformation. This of course, the major disadvantage if the effect of these variables on the study is of interest. However as the major advantage, fixed effects models allow certain endogeneity i.e. correlation between Xit and αi is allowed. (Wooldrige,2002)

There are four different types of fixed effects estimators, these are: the first difference, between, the entity demand and the least squares dummy variables.(if you are interested to know detail of them, refer Baltigi(2001),Wooldrige(2002) and Verbeek(2004))

3.6.2. Random Effects Model

In Random Effects (RE) model; it is assumed that αi is purely random, a stronger assumption implying that αi is strictly uncorrelated with the regressors. Thus

$$Yit = \alpha i + Xit\beta + \varepsilon it,\ \varepsilon it \sim IID\ (0,\ \delta \varepsilon_t^2);$$

$$\alpha i \sim IID\ (0,\ \delta \alpha_t^2)\ \text{and}$$

$$Corr\ (Xit, \alpha i) = 0$$

The estimator to estimate random effects model is random effects estimator or Generalized Least Squares (GLS) which gives optimal and efficient combination of fixed effect (within) and the between dimension unlike OLS which is inefficient.

The major advantage of random effects model is that it yields estimates of all coefficients and hence marginal effects, even those of time invariant regressors, and that E (Yit/Xit) can be estimated.

The big disadvantage is that these estimators are inconsistent if the fixed effects model is appropriate, in other words it highly affected by endogeneity problem. RE combines the information from the between and the within dimensions in an efficient way. It is consistent for T ----∞ and N -----∞ under the combined conditions of between and within estimators. It can be determined as a weighted average the between and within estimators (Verbeek, 2004).

3.7. Model Selection: Theoretical Justification

Although, it is inadequate and inconclusive to choose the model without testing empirically, it is necessary and possible to choose among the above alternative models by justifying theoretically. Between fixed effects and random effects mode, we have chosen the random effects model

because of the following main advantages and of course the study's main interest over the other models.

First, random effects model enable us to show the effects of time and individual fixed effects which are individual or time invariant variables. In our study, sex and region are few of the examples which are time invariant and the objectives of the study. However, if we use pooled average model for this aim, it treats all intercepts as same i.e. does not show the effects of these variables more than random effects model do and if we employ fixed effects model, these variables in all fixed effects estimators will be totally eliminated.

Second, random effects model also enable us to see effects all explanatory variables of on both within the group and between the group in very efficient and optimal combination. However, fixed effects model mainly focused on the within dimension. Thus in our study we try to show the effects of the explanatory variables on different individual within the same household and on different children between the two household (children from two different households and communities). For this objective random effects model is rationally the better model.

Lastly, the random effects model could estimate efficiently by using its estimator called Generalized Least Squares (GLS) than the other estimators. Thus with regard to efficiency which is major issue, this model is preferable. In general having these fundament advantages, theoretical we have chosen random affects model.

Therefore unless there is an empirical justification which disfavors random effects model like Hausman test, we will employ random effects model for our study. In chapter five we will employ Hausman test to choose between the models by using the panel data and then after we

may approve or disprove the model which we chose by giving theoretical justification above i.e. random effects model.

In general, even if we prefered one to the other model by using only theoretical advantages, it is not predetermined before empirically testing these models.

3.8.Econometric Diagnostic Tests

Since panel data is an amalgam of cross sectional and time series data, we will apply necessary tests which are common in both data sets. However, given the nature of panel data is short and balanced panel data of year 2004 and 2009 of ERHS, we expect to employ the following essential tests.

3.8.1 Data Property Test (Pre-Estimation Test

Data Distribution (Normality) Test:

As our result is determined by the nature of the data, it is essential to check normality of the data by using the possible ways, and if the data set is non-normal in distribution we will transform it into logarithmic form to get relative distributions that minimize the effect of extremes (outliners) value on the estimation result.

In our study, we are going to check the distribution by employing the Skewness and kurtosis and according to this test if kurtosis is equal to three and the skweness is equal to zero, the distribution is normal(Gujaraati,1995)

Thus, before running the model variables will be assessed by employing the gladder test in STATA to come up with the appropriate transformation of count variables. And if these three measures of distribution of data, skewness, kurtosis and gladder test do not give us symmetric distribution result, some transformation and modification of Data will be made (Gujarati, 1995).

Multicolinearity Test:

Multicolinearity is the correlation of explanatory variables each other. The two basic approaches of testing multicolinearity are Variance Inflation Factor (VIF) and pair wise correlation coefficient.

So, efforts will be made to detect whether the data set suffers from the problem of multico linearity. The VIF test is going to be employed to check for the presence of severe multico linearity problem among the explanatory variables included in the empirical model.

According to this test, to say that there is no severe multicollinearly, the overall VIF should be at least less than 10. In addition, careful observation of the pair wise correlation coefficients will be provided and if this coefficient is below 0.8 suggesting that our data set does not suffer from severe multi co linearity problem (Gujarati, 1995).

3.8.2 .Model Selection Tests

To check whether the model we selected, random effects model, by providing theoretical justification, empirically approved or disproved, we will employ different model selection tests between the two linear panel data models. Thus, if the empirical tests confirm, the model

theoretically chosen, we will use it; however, if we empirically violate what we select theoretically, we will follow the empirically chosen model.

Testing for Individual Fixed Effects:

Testing for individual fixed effects proceed in exactly the same manner as testing for pooling. It is, in fact, a test for pooling. For this regression, the unrestricted regression includes the dummy variables for fixed effects; the restricted regression excludes the dummy variables. The F-statistic is therefore calculated as:

$$F_{FE} = \frac{(SSR_{POOLED} - SSR_{FE})/(N-1)}{SSR_{POOLED}}$$

Where T is the number of time periods; N is the number of cross section units; k is the number of independent variables with double subscript "it". R^2_{FE} *is* R-squared value for the fixed effects model, and R^2_{POOLED} is the corresponding value for the pooled model. The critical value F^{α} *, N-1, NT-(N+k),* where α is the level of significance, is read directly from the F-distribution tables. A value of the F-statistic which is greater than the critical value indicates significant group effects (Woodrige, 2002).

Testing for Time Fixed Effects:

Testing for time fixed effects is also similar to testing for individual fixed effects. For this regression, the unrestricted regression includes the dummy variables for time effects; the restricted regression excludes the time dummy variables. Construction of the F-test in terms of

the sum of squared residuals or the R-squared values is straightforward. The critical values are also easy to define.

The set-up of both tests above is based on the assumption that the panels are balanced. In the case of unbalanced panels, some adjustments for the degrees of freedom have to be made. An unbalanced panel with N cross section units and T time periods will have fewer than NT observations in total. In this case, it is necessary to write the total number of observations as $\sum_{i=1}^{N} T_i$, where T_i is the number of observations in the i-th cross section unit, instead of NT. Similar adjustments could be made in terms of the F-tests and variances (Woodrige, 2002).

Fixed Effects vs. Random Effects Model

(Hausman Test):

Even though there are several different linear models for panel data, the fundamental distinction is that between fixed effects and random effects models.Whether to treat the individual effects αi as a fixed or random is not an easy to answer. It can make a surprising amount of difference in the estimate of parameters in case where T is small and N is large (Verbeek, 2004): To undertake hausman test:

Null hypothesis (Random effects model)

Alternative hypothesis: (Fixed effects model)

The implications of these two hypotheses with respect to fixed effects (i.e., within) or random effects estimators are summarized in the table below:

Hypothesis	Fixed effects (within) estimator	Random effects estimator
Null hypothesis	Consistent but inefficient	Consistent and efficient
Alternative hypothesis	Consistent and efficient	Inconsistent

Note: under the null hypothesis, both random effects and fixed effects estimators are consistent implying that one could use either random effects or fixed effects under the null hypothesis.

Under the alternative hypothesis: the random effects estimator is inconsistent implying that the fixed effects estimator is better.

In summary, failure to reject the null hypothesis means that either random effects or fixed effects estimator should be used but at this time random effects model is efficient; rejection of the null hypothesis implies that the fixed effects estimator should be used.

3.8.3. Post Estimation Test (Heteroskedasticity Test)

Most of the tests that can be used for heteroskedasticity in the random effects model are computationally burdensome. For the fixed effects model, which is essentially estimated by OLS, things are relatively less complex. Fortunately, as the fixed effects estimator can be applied even if we make the random effects assumption that αi is i.i.d and independent of the explanatory variables, the tests for the fixed effects model can also be used in the random effects case.

To test for heteroskedasticity in life, we can again use the fixed effects residuals μi the auxiliary regression of the test regresses the squared within residuals upon a constant and the variables if that we think may affect heteroskedasticaity. This is a variant of the Breusch-Pagan test for heteroskedasticity alternative hypothesis is that where is an unknown continuously different function with, so that the null hypothesis that is tested is given by under the null hypothesis, the test static computed as times of the auxiliary regression, will have an asymptotic chi-squared distribution, with J degrees of freedom. An alternative test can be composed from the residuals of the between regression, and is based upon N times the of an auxiliary regression of the between residuals upon or more generally upon under the null hypothesis of homskedastic errors, the test the number of variables included in the auxiliary regression (excluding the intercept) the alternative hypothesis of the latter test is less well defined.

CHAPTER FOUR

DISCUSSION OF DESCRIPTIVE STATISTICS RESULTS

This chapter present descriptive statistics result on the extent of child labor in rural Ethiopia. As discussed in the previous chapter, the data source of this study was the two recent rounds, sixth (2004) and seventh (2009) of the ERHS using these as panel data. Accordingly, the primary aim of this paper was to examine the determinants of child labor for a sample of children in rural Ethiopia. Relevant variables that determine child labor were selected based on the theoretical framework, their availability in the data set.

For the purpose of this paper, the sample was restricted to individuals aged 5-15, children in this paper defined as those in the specified age group. Thus the data included those children whose age lies in the range of 5 to 15. We started from age 5 because in rural Ethiopia, it is the work starting age (Assefa, 2002; Assefa and Arjun, 2005 and Tseganesh 2011). The study considered children whose age is below 15 as in rural Ethiopia, according to Ethiopian labor law, the minimum age to start work is above 15 (TGE,1993).

The data in this age group as the panel data included a total of 526 children and 263 in each year which is balanced panel.

4.1. General Description of the Data

According to Table 4.1, out of 526 total number of children in the sample, 276 were female (52.47%) and 250 were male (47.53%). It meant boys were less than girls. The age distribution of the data showed that 315 (59.89%) were between the age of 5 and 10 and 211 (40.11%)

between the age of 11 and 15 years (see Table 4.2 below). Based on Table 4.1, 95% of the children in this case biological children are defined as a child who is either the son or the daughter of the spouses. Hence, the rest 5% of children have other relationship to the head, but lives in the household and belongs to the specific age group.

Table4.1. Number of Children by Sex of child and Biological Relationship to Head

Sex of the Child	*Frequency*	*Percentage (%)*
Female	*276*	*52.47*
Male	*250*	*47.53*
Total	*526*	*100*

Relationship to the Head	*Frequency*	*Percentage (%)*
Direct Offspring	*500*	*95*
Non-Biological Relationship	*26*	*5*
Total	*526*	*100*

Source: Author's Calculation from ERHS

Table 4.2.Numbers of Children by Age of child

Age in Years	*Frequency*	*Percentage*
5-10	*315*	*59.89*
11-15	*221*	*40.11*
Total	*526*	*100*

Source: Author's Calculation from ERHS

Regional distributions revealed that the highest number of children came from the SNNP region i.e. 226 children (42.9%) followed by Oromia and Amhara 136(25.8%) and 110 (20.9%) children respectively. The lowest number of children came from Tigray which accounted 54 children (10.26%). One can see from Table 4.4 that the minimum and the maximum age of the head were 18 and 86 years with the standard deviation of 11.30 where as the minimum and the maximum age of the children included in this study were 5 and 15 years respectively.

Table 4.3.Number of Children by Region

Region	***Frequency***	***Percentage (%)***
Tigray	***54***	***10.6***
Amhara	***110***	***20.9***
Oromia	***136***	***25.9***
SNNP	***226***	***42.9***
Total	***526***	***100***

Source: Own Calculation from ERHS

Table 4.4.Summary Statistics of Age of Child and the Head

Variables	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Age of the child	*9.90*	*2.89*	*5.00*	*15.00*
Age of the house hold head	*46.14*	*11.30*	*18.00*	*86.00*

Source: Author's Calculation from ERHS

According to Table 4.5, the overall average household size was around 7.43 members in which the minimum and the maximum size were registered to be 2 and 10 respectively.

In line with this the overall average number of dependents in the household, individuals whose age is below 5 years and greater than 65 years was 2.17 with the minimum and maximum of 0 and 16 respectively. In this regard, the average dependency ratio which is the ratio of the number of dependents to the household size was 0.27 with the minimum and the maximum of 0 and 0.63. In the sample the overall average of total number of female members, male members and young members (age of 15 and 65) were 4, 4 and 3. The lowest number of female, male and young members (age 15-65) 0, 0 and 1 respectively and the highest were 15, 16 and 8 respectively.

Table 4.5.Summary Statistics of House hold Composition

Variables	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Male number in the household	*4.21*	*2.09*	*0.00*	*16.00*
Number of female members	*4.14*	*2.22*	*0.00*	*15.00*
Number of young(15-64)	*3.20*	*1.27*	*1.00*	*8.00*
Dependency ratio	*0.27*	*0.34*	*0.00*	*0.63*
Household size	*7.43*	*2.09*	*2*	*16*
Number of dependants(<5 &>64)	*2.17*	*2.97*	*0.00*	*10*

Source: Own Calculation from ERHS

As we saw from Table 4.6 below about 81% of the households in the sample were male headed while the rest were female headed household implying the fact that it is important to separate male headship and female headship and study the impact it has on child labor. From the total observation 80% of the household head in the sample are married while the rest, 20% were either single or divorced.

Table 4.6.Summary Statistics of Sex and Martial Status of the Head

Variables	*Percentages*
Married household head	*80.04*
Male headed households	*80.99*

Source: Own Calculation from ERHS

Rather than using income directly as a determinant, use of alternative measures has become increasingly documented (EL Daw and Safaa, 2002). Filmer and Pritchett (1998), in their work argued that an index constructed from the questions about household assets and household characteristics (eg. drinking water and toilet facilities) work arguably better than income as a proxy for household long-run wealth. Hence the paper used land size, number of plots of land, number of oxen, total other livestock and value of the asset as a proxy for the household wealth index and the use of toilet, garbage disposal mechanism, availability of pipe water as a proxy of standard of living. Accordingly as shown in the following Table 4.7., the households had average of 5340.39 values of the total assets in birr where the maximum being 65280 and the minimum only 0 birr. The mean plot size in hectare was 1.38 in which 0.000125 was the minimum hectare owned by the household and 42.5 was the maximum. The lowest number of oxen, number of plots and other livestock owned were 0, 0 and 0 respectively in which the highest were 11, 5 and 46 respectively of the mean size 1.14, 2.13and 4.24 respectively. Accordingly, 39.54% the household in the sample did not have any oxen at all.Table 4.7.Summary Statistics of the Assets Owned by the House hold

Variables	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Value of live stock in birr	*5340.39*	*7722.90*	*0.00*	*65280.00*
Number of plots of land	*2.13*	*1.02*	*0.00*	*5.00*
Land size in hectare	*1.39*	*3.30*	*0.00*	*42.50*
Number of other livestocks	*4.24*	*4.99*	*0.00*	*46.62*
Number of oxen	*1.14*	*1.48*	*0.00*	*11.00*

Variables	*Percentages*
Households who have at least one ox	*60.49*
Households who do not have any ox at all	*39.54*

Source: Author's Calculation from ERHS

According to Table 4.8, 65.4 % of the household in the sample did not have any kind of toilet, while the household who had pipe water were only 13.88% for the rest 86.12% their source of

drinking water was either from pond, river, spring, well, bore hole, rain water or other, 15% of the household disposed their wastage at their willing, the rest 85% employed other for this activity.

Table 4.8.Summary Statistics of Variables Indicates Standard of Living of the House hold

Variables	*Percentages*
Households who dispose the wastage at their willing	*15.02*
Households who have any kind of toilet	*34.60*
households who have pipe source of drinking water	*13.88*

Source: Author's Calculation from ERHS

Additional variables at the household level were included in the analysis of child labor determinants and descriptive statistics of this information will help to create the general awareness about the variable. Thus, according to the data in table 4.9. 40.87% take out loan in kind or in cash for different reason in which one of the reasons to take out the loan was to engage in different agricultural activities. In addition, about 48.5% of the household have been working off farm during 12 months before the survey was conducted. Similarly, 40.5% of the households have received remittance or any gift for the last 12 months. Moreover, only 8.75% of the household in the sample owned a bank account where as 10.46% of household participated in at

least one eqqub; 33.27% of the household head or any members of the household under analysis have engaged in some kind of income generating activities.

Regarding the community level variable, out of 15 peasant associations considered, 40% of them were said to have access to electricity, while 37% had access to communal pipe water source. The number of primary schools in the community ranges from 0 to 3 with the average of 1.35 and, the lowest and the highest distance of primary school and highest school from the peasant association were 0.5 and 1 and 13 and 67, respectively. The average distance was 6.3 and 14 for primary and high school respectively.

Table 4.9.Summary Statistics of variables Related to finance and Credit

Variables	*Percentages*
Households who received any form remittance	*40.49*
Households who have engaged in other income generating activities over the last 12 months	*33.27*
Households who have involved in off farm activities	*48.48*
Households who have been the member of at least on Eqqub	*10.46*
Households who have bank account	*8.75*
Households who have taken loan	*40.87*

Source: Own Calculation from ERHS

Table 4.10.Descriptive Statistics of Community Variables

Variables	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Number of primary schools	*1.35*	*0.71*	*0.00*	*3.00*
Distance from primary school in kms	*6.33*	*3.70*	*0.50*	*13.00*
Distance from high schools in kms	*14.72*	*14.15*	*1.00*	*67.00*

Variables	*Percentages*
Communities who have pipe water access	*36.88*
Communities who have electricity access	*40.11*

Source: Own Calculation from ERHS

4.2 Child Work Participation Incidence and Work Starting Age

Cognizant of the detrimental effects of the child labor on the overall development of children on whom tomorrow depends, the international community has legislated against it. Being the primary responsible body in this arena the ILO has devised two major conventions which obligated signatory countries to act in accordance with the convention. Many of signatories have tried to incorporate the legislation into their domestic laws.

Yet, child labor has continued being global and complicated phenomenon, the situation would have been improving in countries who had signed for those conventions. Despite the fact that Ethiopia has ratified both conventions, there is no specialized body with the primary responsibility of mitigating child labor. Even the existing legal provisions about child rights were far from implementation in the rural parts of the country where the vast majority of the children reside and where child labor is pervasive.

To allow better understanding of the seriousness of the issue, we presented information on the incidence of child labor in rural Ethiopia using data from sixth (2004) and last (2009) rounds of rural household survey as panel data.

As can be seen from Appendix 7, children engaged in work activities in various forms even when they were too young (3 &4) years old. Our data in Appendix 7 showed that 25% of children started participation in work (paid, domestic, farm) activities for the first time when they were seven. At the age of 8, 79% of children were already participating in work. As far as the child participation rate is concerned Table 4.11. Showed that 88% of children in the 5-15 age categories participated in work.

Besides to the aggregate information, it is essential to see what happened to work participation for the differing age groups and across gender. Accordingly, Table 4.12 showed that 77% and 82% of boys and girls in the 5-10 age group engageed in work while the corresponding figures being 95% and 98% for the 11-15 age group.

Table 4.11. Child Work Participation Rate

Type	*Percentage*
Work Participant	*88*
Non Participant at Work	*12*
Total	*100*

Source: own Computation from ERHS

Table 4.12.Main Activity of Children across Different Age Groups and Sex (%)

Main Activity	*All Boys and Girls*				*Both Sexes*	
	5-10		*11-15*			
	Number	*%*	*Number*	*%*	*Number*	*%*
School Only	*5*	*1.5*	*0*	*0*	*5*	*0.7*
School&work	*122*	*39*	*169*	*80*	*291*	*55*
*Work Only**	*132*	*41*	*36*	*17*	*168*	*31*
Inactive	*56*	*18*	*5*	*2*	*63*	*11*
Total (%)		*100*		*100*		*100*
Number of Children	*315*		*211*		*52*	

Main Activity	*Boys*				*Girls*			
	5-10		*11-15*		*5-10*		*11-15*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
School ONLY	*2*	*1*	*0*	*0*	*2*	*1*	*0*	*0*
Work and School	*58*	*37*	*77*	*80*	*64*	*39*	*92*	*80*
Work only	*63*	*40*	*15*	*15*	*69*	*43*	*21*	*18*
Inactive	*31*	*20*	*4*	*5*	*25*	*15*	*1*	*2*
Total	*100*		*100*		*100*		*100*	
Number of Children	*154*		*96*		*161*		*155*	

Source: own Computation from ERHS

For both sexes combined, about 55.7% of children in the age range of 5-15 attended school. School attendance was better for the upper primary school age category (80%) than the preceding primary school age category (40.5%). Girls had a relative advantage in school attendance as compared to their counter parts in each age category. It was observed that 40% and

38% of girls and boys age 5-10 years attended school, respectively. Enrollment in school gets better in the upper primary school age category for both boys (80%) and girls (80%).

In rural societies where the means of living demand intensive use of labor it is logical to expect that the possibility of combining school with work would be of considerable size. As can be inferred from Table 4.12, 55% of primary school age children combine school with work while 0.7% attends school only.

The proportion of children engaged in work only was lower for the 11-15 age categories than the 5-10 age category indicating enrollment in rural Ethiopia. As age increase the probability of attending school only decrease from 1.5% to zero percent where as the probability of combining school to work increases from 39% to 80% of 11-15.

School attendance here showed children's enrollment in school whether they attend school only or combine it with work in the relevant age groups.

4.3 .Types of Work Activities Children Perform

While some children contributed income directly to household through formal wage labor, more often children perform a combination of market activities and /or domestic activities especially in Africa. These market activities include unpaid agricultural production on the family farm and formal or informal family business. Domestic activities include households' public goods such as food preparation, household cleaning, and provision of child care for other siblings. Assessment of the primary and secondary occupation of children in our data showed that children involved in a multitude of work activities; domestic activities such as cooking, fetching water and wood,

child care, etc, herding animals, working on the farm and off farm paid activities and a number of informal activities.

Table 4.13.Type of Work Activities Performed by Children by Age and sex (%)

Main Activity	*Age 5-10*				*Age 11-15*			
	Male		*Female*		*Male*		*Female*	
	Number	*%*	*Number*	*%*	*Number*	*%*	*Number*	*%*
Domestic Worker	*12*	*7*	*109*	*66.7*	*8*	*3.45*	*96*	*83.47*
Farm Work	*31*	*21*	*13*	*8*	*73*	*73.7*	*4*	*3.4*
Herding	*103*	*66.8*	*37*	*22*	*13*	*19.6*	*0*	*0*
Others	*8*	*5*	*2*	*1*	*2*	*1.8*	*15*	*13*
Total (%)	*100*		*100*		*100*		*100*	
Number of Children	*154*		*161*		*96*		*115*	

Source: own Computation from ERHS

Of those children for whom it was reported that they engaged in some form of work activity being their occupation, the activities have been grouped into domestic work, farm work, herding, and others categories like informal activities such as selling food, trading, manual work, etc. and

presented in Table 4.13. To allow clear understanding of the phenomenon, the information has further been disaggregated by sex and age group. It is observed from the table that 7%, 22% and 66.8% of boys aged 5-10 engaged in domestic work, farm work and herding respectively; whereas, the corresponding percentages for girls in the same age category of 5-10 was 66.8%, 8%and22%. Male children participate more in herding and farm work but less in domestic work; however, disproportionately large percentages of their female counter parts engaged in domestic work.

Thus, domestic work and herding were the predominant forms of activities children were involved. Overall, there was evidence that there exist gender based specialization in work type: girls, boys (10-15 age) and boys 5-10 age) traditionally assumed domestic tasks, farm work and herding, respectively.

4.4. Description of Child Labor Participation by Child Characteristics

Table 4.14 indicated the profile of child labor by sex of the child and it showed 53.8 percent children who participated in child labor were female while the figure was 46.2 percent for male children. Table 4.14. Profile of Child Labor Participation by Sex of the Child

Child Labor (%)	
Male	*Female*
46.2	*53.8*

Source: own Computation from ERHS

When one looked at the regional distribution of child labor in Table 4.15, the SNNP region took the largest figure i.e. 44.9 percent followed by Oromia and Amhara which were 25.5 percent and 18.9 percent respectively. The lowest percentage of child labor was found in Tigray i.e. 10.6 percent.

Table 4.15. Profile of Child Labor Participation by Region

REGION	***CHILD LABOR***	
	NUMBER	***%***
TIGRAY	***49***	***10.6***
AMHARA	***87***	***18.9***
OROMIA	***118***	***25.5***
SNNP	*207*	*44.9*
Total	*461*	*88*

Source: own Computation from ERHS

From Table 4.16, in SNNP, which the largest percentage of children participated in child labor, the percentage of female children was 54.11 percent while the figure was lower for male children, which was 45.89 percent. As can be seen from Table 4.16, in SNNP and Oromia regions the percentage of male child laborers was less than that of female chidren. On the other hand, in the rest of the regions (i.e. Amhara and Tigray), the percentage of female child labor

was less than that of male child labor. Table 4.16.Regional Profile of Child Labor Participation by Sex of Child

Region	*Child Labour(%)*	
	Male	*Female*
Tigray	*71.43*	*28.57*
Oromia	*33.9*	*66.1*
Amhara	*50.91*	*49.09*
SNNP	*45.89*	*54.11*

Source: own Computation from ERHS

The percentage of child labor by age of the child was displayed in Table 4.17 and one can saw that those children between the ages of 5-10 years had higher percentage of child labor i.e. 55 percent. Table4.17.Profile of Child Labor Participation by Age of Child

Age of Child	*Child Labor(%)*
5-10	*55.31*
11-15	*44.69*

Source: own Computation from ERHS

4.5 Description of Child Labor Participation by Household Head Characteristics

Table 4.18 showed the distribution of child labor participation by the sex of the household head; Child labor participation was lower for female headed household while it was higher for male headed households.

Table4.18. Profile OF Child Labor Participation by Region and the Sex of House Hold Head

Region	*Child Labor*	
	Male Headed(%)	*Female Headed(%)*
Tigray	*75.51*	*14.49*
Amhara	*90.8*	*9.2*
Oromia	*65.25*	*24.75*
SNNP	*85*	*15*

Source: own Computation from ERHS

This result held for all regions which implied that there was no regional difference regarding the effect of sex of the head on child labor.Table 4.19 showed child labor participation by marital status of the head of the household. As the table showed 80.04 percent of the child labor lived in married household. It implied that child labor was higher in married households than those single or divorced.

Table 4.19.Profile of Child Labor Participation by Martial Status of Head.

Marital Status	*Child Labor*
Married	*80.04*
Unmarried	*19.94*

Source: own Computation from ERHS

CHAPTER FIVE

Empirical RESULTS AND DISSCUSSIONS

In order to substantiate the descriptive results presented in the previous chapter, more detailed and rigorous econometric analysis has been undertaken. The result of econometric analysis is presented in this chapter.

5.1. Diagnostic Tests Results

Given the nature of data was short, balanced and static panel data; it is expected to undertake the following pre and post estimation tests. Before estimation is done, data exploration is an important step. To start with, we employed skewness and kurtosis distribution test to check the normality of the data i.e. to control the effect of outliers and to come up with the appropriate transformation of count variables .We found that the data was free from this problem i.e. it is normally distributed .In other words, all count variables found to have symmetric distribution at their level. Hence, they are used as they were. (For detail refer Appendix 8)

In order to test whether multicolinearity problem present or not, a simple pair wise correlation coefficient matrix and Variance Inflation Factor (VIF) were conveyed. Gujaraati (1995) established a rule of thumb, which said multicolinearity is a serious problem when the pair wise correlation coefficient is 0.8, or above and the VIF is on average 10 or above (Gujarati, 1995) Appendix 9and10 indicated multicolinearity is not serious problem in our data since all reported pair wise correlation coefficients are less than 0.8. According to VIF test of multicolinearity, except for age and its squared value, the VIF test result showed that multicolinearity is not of a

serious problem in our data set (see Appendix 10). The VIF value for the age variable was found to be as required by the test when age squared variable is excluded. However, because there are supporting evidences that age would not have a linear effect in the Ethiopian context (Beliyou, 2003 and Assefa, 2002) and due to the significant impact of this variable in the child labor equation, the researcher found it important to keep the variable despite the higher VIF values. And this is an indication that each variable in the model capture a distinct feature of child labor.

Regarding the model selection in fact which is our critical concern in panel data, the Hausman test was employed to choose between fixed effects and random effects model. The test result conformed to the null hypothesis that both fixed effects and random effects estimates are same in which fixed effects estimates are consistent but inefficient and random effects estimates are both efficient and consistent. It is because we had the calculated Chi^2 values are less than the corresponding tabulated values at the relevant degrees of freedom with a strong P-value of 0.3800. Hence, we found that random effects model is appropriate which confirms our theoretical model selection justification in chapter three (for detail refer Appendix 11).

As indicated in (Appendix 12) the Brush pagan test of heteroskedasticity showed that the probability of rejecting the null hypothesis of homoskedsticity while it is true is hundred percent implying the fact that hetroskedasticity was a problem in our data. Consequently, even if it is not the ultimate solution, STATA command to come up with the Huber Robust estimation was conveyed when each of the analysis was made.

Evidence from the descriptive statistics had shown that children perform a multitude of activities which have implications for the child labor. The extent to which the child being child labor tend

to be a response of various child parental, household, school related and community variables. The section that follows is devoted to the discussion of the econometric analysis of the impact of those variables on the child labor.

There will be four equations to be estimated by using random effects model and Robust Generalized Ordinary Least Squares (GLS) estimators: the determinants of child labor, domestic child labor, paid child labor, and farm child labor. In each case the sample includes the children in the relevant and defined age group, with the other characteristics of the explanatory variable for all equations being the same.

5.2 Determinants of Child Labor in Rural Ethiopia

Following the theoretical and empirical model selection result which preferred random effects model to the other models using the Generalized Least Squares (GLS) estimator, the study reported the resulting estimates for different groups in the tables.

The overall adequacy of the model which can be seen from the Wald chi^2-test showed that all the slope coefficients jointly are different from zero at one percent level of significance for each of the models.

R^2 is not appropriate measure of model fitness in panel data as different models have their own goal such as between estimator maximizes the between R^2, with in (fixed) estimator maximizes the within R^2. However, in our model, random effects and the GLS estimator is the optimal combination of the between and the within estimator, thus, this estimator maximize the overall

R^2 in each model. As we refer from each regression result about thirty eight percent of the variation in the respective child labor is explained by the given explanatory variables.

A. The Impact of Child Characteristics:

Several literatures identified that child (individual) specific characteristics could have important implications for child time allocating decision. Among these attributes primary occupation of the child such as whether the child is student, farm worker or domestic worker, marital status of the child mainly the issue of early marriage, age, age square, sex and the biological relationship of the child with the household head have been expected to have pronounced effects on the decision of child labor. However, the direction of their effect is highly determined by socio-cultural factors. It is fundamental to assess the effect of the primary occupation of the child supposed to engage in ; as the child mainly assigned for farm domestic or paid off farm activities, less time will remain for schooling by this child labor increase. On the other hand if the main occupation of the child is schooling then the time allocated for other work activities will be very small and insignificant, by this child labor could be minimized.

The other vital attribute of the child is marital status of the child .If the child was married, then definitely he/she involved in different activities. Similar to this if the child start working at farm activities in the very early age, there is high probability to remain in the activities and even by larger extent as their age increase.

The GLS estimates of Random effects model (Robust) of all children for total child labor is presented here in Table 5..

Table 5.1 Robust GLS Estimates of the Random and Fixed Effects Model of Child Labor for all Children who's Age is between 5-15

Child labor	*Random effects model coefficients*	*Fixed effects model coefficients*
Early marriage	*2.31*	*5.27*
First work starting age at farm	*-1.30**	*-1.11*
Farm work	*23.90**	*12.10*
Domestic worker	*5.69****	*4.19*
Student	*-5.63***	*-7.19*
Sex of child	*4.04***	_
Age of child	*11.64**	*8.96*
Age2 of child	*-0.47**	*-0.47*
Biochild	*-2.25*	_
Head_age	*-0.01*	*-0.10*
Head_divorced	*-0.12*	*-1.18*

Male head	*-4.06***	*-3.56*
Illiteracyofhead	*6.45*	*5.80*
Informaleduofhead	*6.42****	*4.16*
Ped18ofhead	*7.70****	*11.80*
Sed912ofhead	*6.87*	*-0.41*
Hhsize	*1.26*	*1.79*
Newbirth	*-4.96**	*-9.38*
Malenumber	*-1.45****	*-2.81*
Femalenumber	*-0.95*	*-2.64*
Depratio	*11.14****	*22.57*
Youngmf	*-0.11*	*0.63*
Nplot	*2.82**	*3.47*
Landsize	*0.06*	*-0.51*
Ozerlsk	*0.16*	*0.13*
Oxen	*-0.95*	*2.01*

Doxen	*0.87*	*-6.82*
Consumption_mz	*0.01***	*0.02*
Cementwal	*1.18*	*3.51*
Galvanizedroof	*-1.22*	*-4.62*
Labour sharing	*-2.49*	*-9.14*
Garbagedisposal	*-0.31*	*0.72*
Loantake	*3.27****	*11.03*
Bankaccownership	*-4.36*	*-6.66*
Eqqubmembership	*-2.80*	*3.87*
Incomegeneactvty_12mzs	*2.60*	*-0.01*
hhofffarm_yr	*0.59*	*0.21*
Remittance	*0.45*	*2.27*
Fertilizercredit	*2.84*	*-0.50*
Waterharvest	*-1.08*	*-2.37*
Soilconservationmanure	*-0.22*	*4.06*

Extentionagents	*0.21*	*0.05*
numberofprimaryschoolpa1	*1.20*	*5.99*
distancetoprimaryschoolkmpa1	*-1.92**	*-1.37*
distancetohighschoolkmpa1	*0.34**	*0.22*
Yesaccesstoelectricitypa1	*-0.10*	*-0.38*
Yesaccesstopipewaterpa1	*2.69*	*0.81*
Oromia	*-7.92***	_
SNNP	*-15.11**	_
Amhara	*-1.89*	_
Contant	*-32.05*	_

N.B.*,**and *** indicates variables significant at 1%,5% and10% level of significant, respectively

Source: own calculation from ERHS

The role of gender of the child in the children's time allocation is also very important because subsistent households may be forced to choose which children go to school, and which involve in work activities; male or female. It is traditionally expected that male children have got advantage over counterpart female to go to school and less to work activities .However the role of gender

differs from activity to activity. It means male child highly supposed to involve in farm work (on or off farm) and herding while female child assigned to do domestic chore activities (caring elder and younger siblings, fetching wood and water, cooking food)

The allocation of child time will also be determined by his/her age. In poor households older children may be participating in paid employment restricting their access to school as compared to younger siblings in the household owing to their relative working capacity. Whereas in rural economies, where paid employment is almost non-existent and when the work definition encompasses household chores, unpaid family business and farm work apart from wage employment, older children may be allowed at least to combine work and school since younger siblings may overtake the herding and home chore activities. The relationship between child outcome and age may not be linear. Hence, the square of child age has been incorporated to capture the non-linear effect.

Another possible factor which affects children time allocation is their biological relationship to the household head. It is expected that children who are the direct off-springs of the head would be more likely to attend school than the other children in the household. The head might be inclined towards the human capital development of his/her own child while those who are not his/her direct off-springs may be discriminated in favor of work jeopardizing their potential to attend school.

Our result showed that age of the child had significant effect on child labor incidence (Simila to Tassew et al, 2005). However, unlike Tseganesh (2011) who supported that age of the child decrease the probability of specializing in work only, the study found that as age of the child

increase, the extent of child labor increase; it may be due to the fact that the productivity of the child improved as age increase, Specifically as the age of child increase by one year,on average child labor increases by 10.7 hours, ceteris paribus.

Like age, the square of age had significant but the opposite impact on the extent of child labor which implied that as age increases, child labor increases but at decreasing rate (unlike Tseganesh, 2011). The significant effect of age and its square of child on child labor indicate that there is age bias of child labor.

The dummy variable for sex of the child was found to be significant in child labor equation. Contrary to the finding by Getinet and Beliyou (2007) and Chaudhury et al (2006) for Ethiopia and Nielson and Dubey (2002) for rural India, but similar to Tseganesh (2011) for rural Ethiopia, the extent of child labor was found to be higher for boys' than girls' it is mainly due to current policies which give priority for girls such as in education. The other possible reason is that because girls are highly involved in domestic activities which is not reported correctly,this undermine the female incidence of child labor. It implies that there is gender bias in child labor.

According to Table 5.1, the first work starting age was found to be highly significant factor which determines child labor incidence. As the result identified, the child starts working at work activities early, the extent of child labor increased by 1.29 hours.

In addition to the above factors, the occupation in which the child engaged in primarily (student, farm worker, and domestic worker) played vital role towards incidence of child labor. In contrary to being student, farm worker and domestic worker increased the incidence of child labor. Based

on this result, we have tried to distinguish the factor which affects farm, domestic and off farm (paid) child labor separately in table 5.2.

In contrast to Tseganesh (2011) who found that being the direct off-spring of the household head was found to increase the children chance to combine school with work and decrease the problem to specialize in work related activities, we have got that biological relationship to the head was insignificant. Similarly, early marriage was not important in determining the incidence of child labor.

B. The Contribution of Household Head Characteristics to Child Labor:

Attributes specific to the head would have important implications for the child time allocation decision. The variables included are sex, age, education level and marital status of the head.

Age of the household head may be essential determinant of child labor as head gets older children may be more likely at least to combine school with work if not specialize in work only owing to greater demand for labor to complement and/or substitute head's labor. On the other perspective, older head might learn the importance of investing on education for the employment opportunity of the child and hence preferred schooling even if child is needed for work.

Regarding the effect of gender of the head, female headed households in highlands are likely to be discriminated against in the provision of assets mainly land which is the most important asset for survival restricting their earning potential (Assefa, 2002). This has an implication that since children have less to do on farm they may have sufficient time for school. On the contrary, in the female headed households who are economically poor, male children may be assumed to take all

the responsibilities that male undertake mainly at farm agricultural activities. Thus, female headship may increase child labor on the other way it is assumed that female heads are highly inclined towards male child and will give priority to male children to send school. In such households older female children would be more likely to assume domestic responsibilities and be out of school.

Marital status of the head is another influential variable that affects child labor. It is expected that if the head married, since the spouse share work load, then children could get free from specializing at work activities on the other hand if the head divorced, child labor increase for same reason.

Apart from sex, age and marital status, education level of the head is expected to have an important implication for child time allocation in line with the parental education hypothesis of Dessy (2000). Better educational background of parents is likely to favor child schooling as they awarded the benefits of investing in human capital. Furthermore it is logical to think in such a way that head who has good educational background may be well informed about the detrimental impacts of child labor on the overall development of children. However, it should be taken into consideration that uneducated head tend to enroll their children as they understood that they are poor because they were illiterate. Hence, they do not want the fate of their children be as themselves. Thus, it is hypothesized that head education decrease child labor.

Education has entered in the model in the categorical form rather than by years of schooling. This was to overcome with the problem how to rate informal education levels. Thus, to capture this possible impact four dummy variables have been introduced to the empirical analyses:

dummy for whether the head is literate, dummy for head having formal primary schooling up to grade eight, dummy for head has in formal education and dummy for head has high school education from grade 9 up to 12. The reference category for analyzing the result higher institution education.

Our result in contrast to Tseganesh (2011) showed that children in female headed households were forced to spend more hours at work than those children in male headed households. It was because those households who have been in female headed may be economically insecure so that children were needed to supplement family income as female headed household in highland are likely to be discriminated against the provision of asset for survival restricting their earning potential (Assefa, 2002). Thus, male children in those households were responsible to undertake farming which was traditionally the role assumed to males.

We had evidence that the age of the head in line with Tseganesh (2011) and head's marital status had no as such pronounced effect on child time allocation decision.

With regard to the effect of education level of the head, children in households with primary education level and informal education like adult literacy and religious church education spent 7.69 and 6.42 more hours, respectively than those children of whose head had higher institutions education (College and University) level. This may be due to the fact that better educational background of parents is likely to favor child schooling as the decision maker become more aware of the benefits of investing in human capital and well informed about the detrimental impact of child labor on the overall developments of children.

This finding confirmed to the result founded by Assefa and Arjun (2003) and Tassew et al 2005) who stated that heads with formal schooling favor child schooling and reduce child work as compared to others.

Meanwhile, having secondary education level had no pronounced effect on incidence of child labor when we compared to children from head's with higher institution education level.

C. Household Composition and Child Labor:

In our model we included the number of dependents (the sum of infant below 5 years old and elderly whose age is beyond 65), the total number of members (household size), the dependency ratio which is defined as the ratio of dependents to household size, total young members whose age lies between 15 and 65, the total male number, total female number to capture the effects of household composition on child labor. The presence of adult male and female in the household is thought to liberate younger children from specializing in work only thereby increasing their potential to attend school. The presence of infants and higher dependency ratio are likely to encourage child labor as they required to care for infants and the elderly. The other vital variable is household size. Larger households may have sufficient labor input so that children may be likely to enroll in school. Household grow in number adding on children implying that the number of younger children may be disproportionally higher. Larger household may have little income in per capita terms which limits their ability to afford for children's schooling.

We have evidence that showed larger household size aggravated the incidence of child labor. From the random effects model, one more household size leads to increase the incidence of child labor on average, by 1.26 hours, the possible explanation for this result is that as households

grow in number adding on children implying that the number of younger children may be disproportionally higher and which require additional income for the consumption that force households to force children to engaged in work activities.

Dependency ratio found to be very significant in affecting child labor; as dependency ratio increase, the incidence of child labor increase. Similarly, housholds who have at least newly born infant, child labor incidence increases.

The additional one more male member in the household, on average, results in the incidence of child labor to decrease by 1.45 hours.

The number of total female members was among the factors from the household composition in which was insignificant in determining child labor.

D. Factors Related to Physical Household Assets:

The variable which thought to measure the household's asset position like number of plots of land, land size, the number of oxen and any other livestock in standard units, and the roof and wall construction materials of the house were included.

As pointed out in the analytical frame work, because child time allocation is a rational utility maximization response of the household subject to the full resource constraints the role of household assets is very indispensable in this decision.

Over all, the greater land size the household owns, the more child labor is required as it demand more labor including children while at same time it increases the earning potential which improves the household school fee and other expenditures paying capacities and thus, increase

child schooling. This direction of relationship is gender specific in which it holds for male child while is opposite for female children. In addition to the size of the land, the number of plots of land also plays important role in child time allocation decision since more plots of land need more labor for proper cultivation on one hand and it increase the earning potential on the other hand so the effect is mixed.

The number of livestock in standard unit in general and the number of oxen in particular in oxen plow rural agricultural system is another important factor determining the child labor. The effect is much inconclusive in the way that more number of livestock and oxen demands more labor for herding and at same time owning more livestock improves the income of the households.

Construction materials of wall and roof of the house used by the household also be a good indicators of the wealth,rich households construct their wall by durable materials like brick, stone, cement and their roof by korkoro (galvanized) whereas poor households used non-durable construction materials like mood, dung, wood, shebeko and sar (thach). In our model, we include two dummy variables which show whether the household uses iron for roof and cement for wall and our expectation is that if the house of the household is made of these materials, the extent of child labor will be lesser.

Among the house hold's asset variables which we have included in our model to examine incidence of child labor, number of land plots the household own was found to be significant. Thus, household ownership of one more plot of land increases the incidence of child labor by 2.81 hours on average. It is because more plots of land demand more labor including children.

However, the number of oxen, the existence of at least one (dummy oxen), size of land in hectare and the number of other livestock other than oxen were found to be insignificant. This result contradicted with result found by Getnet and Beliyou (2007) and Tseganesh (2011). The reason might be that the income and substitution effects of these variables offset each other.

E. The Role of Other Assets on Child Labor:

Bank account ownership, membership to eqqub, access to credit, receipt of remittance engagement in off farm and other income generating activities and involvement in labor sharing arrangement were the non-physical assets that were included in our analysis as we thought to have important implications for child time allocations their effects is not absolute but it is mixed.

We expect that engagement in off farm and other income generating activities could relax the income constraint, by this it reduce child labor. At same time these activities may require the children to carry domestic and on farm careers as adults go for other income generating activities and /or likely these activities may demand the children themselves to involve in these activities, in which it increase child labor.

Although in the rural societies, formal financial institutions are not available, informal groups of saving and borrowing arrangement like "eqqub" to smooth consumption were established. However, the formal financial institution like bank rarely appeared. Our prior expectation was that as the household owns bank account or had access to loan, the child labor decreased as it smoothes to income constraint. On the other hand, if there is access to credit, households may try to invest in agricultural activities which demand more labor including children.

Receipt of supplementary income like remittance could have significant effect on child labor. The researcher expects that receiving remittance income reduce child labor as they used this transitory income for educational expense which liberates child from work activities.

Even though credit market is almost malfunctioning in rural Ethiopia, those households who have access to credit are expected to educate their children and less likely to participate at work activities under the assumption that child labor is a borrowing a cross generations.

In rural agriculture communities where there is no labor market and malfunctioning if it exist, household prefer pooling labor i.e. involve in labor sharing arrangement. This decision might have contrasting effect on child labor. It could reduce child labor as the demand of labor is satisfied through the labor sharing arrangements. On the other hand we expect increased child labor in the way that children might be demanded to discharge this responsibility at peak agricultural season.

The construction materials of house could be made (wall and roof construction material), wastage disposal mechanisms, bank account ownership and eqqub membership status of the household were among the asset which failed to be significant in determining incidence of child labor. It was because the fact that rural households had no pronounced difference regarding the above wealth and standard of living measures. Thus, in our random effects model outcome, they were insignificant to explain the within and /or between households incidence of child labor difference.

Similar to these factors but for different reason, the remittance reception, household engagement in labor sharing arrangements were insignificant not because they were negligent rather because their negative effects canceled the positive effects.

Access to credit which was measured by the loan take status of household in our model was found to be important in affecting the incidence of child labor. On average, those children who came from households who had access to credit were more vulnerable to the incidence of child labor by 3.27 hours. This was attributed to the offsetting power the substitution effect over the income effect in which households might use the loan to engage in activities that required labor which likely increased work burden on children.

F. Agricultural Practices and Child Labor:

Application of water harvest technologies, modern seed and fertilizer and the existence of extension agents who give advice on application of these technologies and the application of manure (compost) to improve and /or preserve soil fertility were included in our model to capture the effects of improved agriculture technologies on child labor. The application of these practices was expected to improve the agricultural productivities, hence increase earnings,increase school fee paying ability by this it reduce child labor. On the other perspective, increased labor productivity may induce households to allow/ force their child to engage in agricultural activities .We expect the income effect (the former) offset the substitution effect (the latter). Thus, we would expect that the application of improved agricultural inputs and methods could reduce the incidence of child labor and thereby liberating children to attend school.

However, unlike Tseganesh (2011) in rural Ethiopia and Cazing (2007) in Burkinafaso, we have found that all of them were insignificant in determinig child time allocation decisions. This might be because the balancedness of their positive and negative effects they had on child labor requirement and as a result concealed each other.

G. School Related Community Factors:

Child schooling is not only a demand side phenomenon which is exclusively determined by the choice and ability of parents to send their children to school. Rather a host of supply side factors played a role in determining children's chance of going to school. We included distance to the closest governmental primary school and high school in kilometer as well as the number of primary schools in the peasant associations as a measure of supply side school factors.

Distance to school was expected to hinder child schooling and promoting child labor in rural Ethiopia where other means of transport other than foot were rare. The other reason is that as school is too far, the available time for agricultural activities is less so households decide to force their children to engage in work only. As the number of schools are fewer, household opt their child to engaged in work activities as they believed that as schools are fewer, the quality reduced and the return will be inadequate.

However, the effect of distance from primary and high school would not be same since as a policy having primary education is mandatory where secondary education is choice.

In our study, we have found that the number of primary schools in the community was insignificant. However, the distance to primary and secondary (high) school in kilometer were

fundamental factors but with opposite direction. As the peasant association far from the nearest government primary school by one kilometer, on average, the incidence of child labor decreased by 1.81 hours. Whereas, the one kilometer distance of the community from high school, on average increased the child labor by 0.33 hours. This difference was because of the fact that today having primary education and attending it regardless of its quality was considered as a duty and tradition without considering how far the school is. As a result attending primary education reduced the child labor. However, once the child completed the mandatory education level, since the opportunity cost is higher after then, the children might be obliged to drop out from school and to specialize totally at work activities. Thus, child labor increased.

H. The Effects of Other Community Variables:

In addition to above community attributes, we considered the effect of availability of public pipe water and electricity in the peasant association on child labor. And we expected that communities who have access to public pipe water and electricity could reduce the extent of child labor as these variables indicates standard of living of the households in that community.

In our model, we have included the accessibility of the community to electricity and public pipe water, but both of them failed to be significant in explaining the issue under consideration. We guessed that it was because most of the rural communities were the same regarding the accessibility of the water and electricity, in which they were far from such facilities.

I. Regional Distribution Effects:

Three regional dummies which indicated where the child resides have been included in our model to see effects of difference in region and Tigray region used as a references group. As each region has different infrastructures, socio cultural settings and environmental characteristics, we expected that the child from same individual, parental, community attributes may have different extent of child labor owing to only they reside in different regions.

In contrary to Tseganesh (2011), those children who were from SNNP and Oromiya were less in extent of child labor by 13 and 7 hours when we compared to those children from Tigray region. However, relative to those children from Tigray region, Amhara region was found to insignificant in the incidence of child labor.

Once we have seen the factors which affect child labor in aggregate level, in the following sections, we will try to identify the determinants which determine child labor by disaggregating based on occupation (paid, farm work and domestic) of the child.

Table 5.2 Robust GLS Estimates of the Random Effects Model of Farm, Domestic and Paid Off farm Child Labor for all Children who's Age is between 5-15

Explanatory variables	*Farm child labor*	*Domestic child labor*	*Paid off farm child labor*
Early marriage	*2.23*	*0.23*	*0.44*
First work starting age at farm	*-1.25**	*-0.21*	*0.19*
Farm work	*21.70**	*1.73*	*0.62*
Domestic worker	*-3.07*	*7.42**	*0.78****
Student	*-10.02**	*2.93****	*0.82****
Sex of child	*10.42**	*-6.42**	*-0.02*
Age of child	*9.21**	*3.36***	*-0.94*
Age2 of child	*-0.40**	*-0.11*	*0.05*
Biochild	*-1.39*	*-0.63*	*-0.17*
Head_age	*-0.05*	*0.08*	*-0.04****

Head_divorced	*-5.00*	*5.05*	*0.26*
Male head	*-1.11*	*-3.25***	*0.22*
Illiteracyofhead	*5.21*	*1.31*	*-0.61*
Informaleduofhead	*3.53*	*1.61*	*1.24*
Ped18ofhead	*5.00*	*2.68*	*-0.36*
Sed912ofhead	*5.05*	*1.83*	*-0.14*
Hhsize	*0.04*	*1.45***	*-0.09*
Newbirth	*-2.90***	*-2.01****	*-0.07*
Malenumber	*-0.91*	*-0.69*	*0.08*
Femalenumber	*-0.47*	*-0.73*	*0.03*
Depratio	*7.05*	*6.41****	*-0.06*
Youngmf	*0.58*	*-1.00***	*0.32*
Nplot	*1.74***	*1.22***	*0.03*
Landsize	*0.07*	*0.05*	*-0.02*
Ozerlsk	*0.48***	*-0.32*	*-0.01*

Oxen	*-1.37*	*0.24*	*0.01*
Doxen	*1.37*	*-0.95*	*0.39*
Consumption_mz	*0.01***	*0.01***	*-0.01*
Cementwal	*1.13*	*-0.40*	*0.49*
Galvanizedroof	*-1.40*	*-0.41*	*0.35*
Labourshare	*0.13*	*-2.34***	*-0.60*
Garbagedisposal	*-2.63*	*2.69****	*-0.40*
Loantake	*1.71*	*1.06*	*0.47*
Bankaccownership	*2.06*	*-5.60**	*-0.93*
Eqqubmembership	*-0.97*	*-0.14*	*-0.67*
Incomegeneactvty_12mzs	*1.58*	*0.08*	*0.62*
hhofffarm_yr	*-2.00*	*2.32***	*0.50*
Remittance	*1.47*	*-0.95*	*0.15*
Fertilizercredit	*1.95*	*-0.19*	*0.86*
Waterharvest	*0.46*	*-0.49*	*-0.90*

Soilconservationmanure	*1.46*	*-0.14*	*-0.88*
Extentionagents	*0.28*	*0.02*	*-0.08*
numberofprimaryschoolpa1	*0.09*	*0.96*	*0.05*
distancetoprimaryschoolkmpa1	*-1.33**	*-0.40****	*-0.03*
distancetohighschoolkmpa1	*0.16***	*0.15**	*0.01*
Yesaccesstoelectricitypa1	*0.11*	*-0.27*	*0.08*
Yesaccesstopipewaterpa1	*-2.15*	*4.50**	*0.55*
Oromia	*-12.90**	*5.54***	*-0.23*
SNNP	*-17.79**	*3.92*	*-0.19*
Amhara	*-5.73****	*2.96*	*0.86*
Contant	*-16.08*	*-20.82*	*3.45*

N.B.*, **and *** indicates variables significant at 1%,5% and10% level of significant, respectively.

Source: own calculation from ERHS

5.3 Determinants of Farm Child Labor of Age 5-15: Work starting age at farm, occupation of the child (farm worker, student), sex, age and its square, the presence of infant in the household, number of plots of land, consumption expenditure, garbage disposal mechanism, distance of the community to both primary and high school, the place where child lives (Amhara, SNNPRs, Oromiya) and other livestock ownership were significant factors which affected farm child labor. However other variables were found to be insignificant (for detail refer Table 5.2)

5.4. Determinants of Domestic Child Labor of Age 5-15: According to Table 5.2 of the Robust GLS Random effects model result showed that the occupation of the child (Domestic worker and students), sex, and age of the child, dependency ratio, number of plots of land, household size, consumption expenditure, sex of the household's head, distance to primary and high school, the region Oromia, involvement in labor sharing arrangement, the total female members, the mechanisms of wastage disposal, the ownership of bank account, households engagement in off farm activities, the total young members and access to pipe water were found to be significant factors which fundamentally differed the child in extent of child labor.

As the wastage is disposed by the household at willing, domestic child labor increases because those children are involving in disposing the wastage, and of course which harms the child's health. If the community far from high school, the domestic child labor will increase as the opportunity cost is higher.

5.5. Determinants of Paid off farm Child Labor of Age 5-15: In rural agricultural society**,** it is not very common to engage in paid agricultural activities; however, it does not mean that it is totally negligent from the study: Only the child education enrollment status and his/her being

domestic worker and the age of the household head found to be significant factors that determined the difference in paid off farm child labor among and within the households. However, other variable found to be insignificant.

CHAPTER SIX

CONCLUSIONS AND POLICY IMPLICATIONS

6.1. Conclusions

Even though countries in the world particularly in sub-Saharan Africa, have ratified the two ILO conventions: the Minimum Age for Admission of Employment at Convention of 1973 and the Convention against the Worst Forms of Child Labor in 1999, the incidence of child labor was still high, in which 168 million children were subjected to child labor and out of this 85 million were in hazardous child labor (ILO, 2012).

Furthermore, Ethiopia, in addition to the ratification of these ILO conventions, has instituted protection for children in its constitution. Notwithstanding the availability of these legal provisions for the protection of children, many children were victims of the child labor in the nation. This implied that the recommended policies and strategies by previous researchers were not able to reduce the child labor incidence hence demanding a need to conduct this study.

Unlike previous studies, we have tried to include the effects of early marriage, the availabilities of public pipe water and electricity and work starting age on child labor. As child work viewed as a means to socialization and acquiring necessary skills for adult life, it is not a problem per se;in other words child work participation is not a serious problem rather the work starting age and the length of the time spent on work activities matters most. Thus unlike the other studies, we tried to see the factors which affects the incidence of child labor rather than determinants of the child participation at work activities.

By drawing on data from Ethiopia rural household survey of the year 2004 and 2009 as panel data which gives more realistic result (Verbeek, 2004) and by adopting broader definition of a

child labor that indicates the total time spent on all work related activities by children of age ranges 5-15 engaged in. Descriptive analysis has been employed to see how much the included variables minimum and maximum value differs and to see how child labor varies according to different child, household head and regional characteristics. The descriptive analysis of the data set showed that 88 percent of the children were found to be in child labor in rural Ethiopia. It also found that SNNP region had the highest level of child labor incidence.

To achieve the major objective of this study that was to understand the socio economic determinants of child labor in rural Ethiopia, we employed the Generalized Least Squares (GLS) estimator and the Random effects model. However, as we aimed to assess the difference in factors for different types of child labor (paid, farm, domestic), the dependent variable vary accordingly in our regression. After reviewing the possible theoretical and empirical literatures and by considering the availability of data, the major socio- economic determinants, which were expected to have an effect on child labor were, age, sex of child, education level of head, the distance from primary school and regional difference.

As we found from the study, there was sex and age based child labor difference. The difference also held for different work activities like domestic, farm and paid off farm child labor. The major conclusions which emanated from the analysis of the aggregate child labor were the following:

The sex, age and its square, primary occupation of the child were found to be among influential factors of the individual specific factors. Household size, the number of male members, the presence of at least one infant and dependency ratio were among the important factors of child labor from the included household composition variables.

The major socio-economic determinates of child labor in increasing order of significance level were found to be the child engagement in farm work activities, the region of child to be SNNP, age of the child, distance of the community from primary school, age square of the child, distance from the high school, the number of plots of land the household owns, sex of head of the household, the work starting age of the child, the consumption expenditure of the household, the child status in enrollment in school, sex of the child, the total number of male members, dependency ratio, Oromia region, access to credit, household size, primary and informal education level of head.

Except sex of the child, the region where the child resides and distance from primary school, the direction of the variables found to affect child labor as expected.

However, the child's biological relationship to the head, the material in which the house was made of, land size, female members size, the number of livestock's including oxen, marital status and age of the head, access to electricity and pipe water, early marriage were not found to have significant effect on child labor. Even though these factors were not able to explain total child labor, they were found to be significant in determining disaggregated child labor based on type of activities as we saw in previous chapter.

Thus the study showed that child, household and community characteristics played significant roles in determining child labor.

- Lack of access to school especially high school in a reasonable distance increased the opportunity cost of education and thus child labor would be high.

- From physical assets, the numbers of plots of land the household possess trigger the incidence of child labor whereas the livestock and other wealth indicators in the rural society were not important in explaining child labor.
- If the household head is educated, the child labor incidence decreases as they aware the importance of human capital investment and the detrimental effect of child labor. It implied that education reinforce itself.
- We have found regional, sex, age disparities of incidence of child labor.

6.2. Policy Implications

This piece of research demonstrated the direct need for program and policy attention to mitigate the incidence of child labor. Thus, the main long term objective of the country needs to meet the international as well as national target of avoiding the hazardous form of child labor in particular and any form of child labor in general.

Owing to the fact that achieving a sustainable economic development of the country is required reducing child labor and promoting child education which is the base for the future and an all rounded effective policy measure to tackle the problem of child labor is a significant value. Though this study only focused on some regions of rural households of Ethiopia, the implications of the variables that were found to affect child labor decisions of the household can be further extended to the rural areas as a whole and to the semi-urban areas as well.

On the basis of the major findings of the study, the following policy implications have been forwarded.

- As being a student reduces child labor, it is recommended to encourage children for constantly attending school and families for enrolling their children. Thus, to strengthen the law enforcement mechanism towards educating a child i.e. to reduce child labor, incentive mechanisms could be planned for families who educate their children. For instance Mexico introduced an incentive scheme that made transfer to poor households in rural areas if their children enroll in school (Schultz, 2007)

- From dependency ratio, the presence of infant and household size effect on child labor, we can forward the following implication. It has been clearly observed from the result that large household size, the presence of infant and higher dependency ratio induced exclusive engagement in work. Thus, family planning efforts should be made with continuous monitoring about program performance.

- Credit loan accessibility affected the child labor positively. Thus, organizing saving and credit associations within the reach of the rural poor by itself is not enough rather give advice on how to allocate the loan and enhancing saving habit and overcome the problem of capital market absence. Furthermore like what the government operates, scaling up the formal financial institution through opening several branches till the kebele levels is advisable.

- The school related community attributes suggested that building more schools mainly secondary schools within a reasonable distance to ensure easy access by rural children backed by adult education can have undisputable positive role in reducing child labor.

- Construction of infrastructural facilities with regard to increasing the service provided by the education sector should also be another policy objective to improve child schooling and reducing child labor especially in rural areas. Building schools nearby roads and providing school facilities will decrease the distance to school and increase the opportunity to go to school facilities and reduce child labor.

- Regarding the education level of the head provision of education service to households formal or informal should be given due importance especially in rural parts of the country. Adult training through formal and informal means can be a potential area to focus on to mitigate child labor.

- Promoting informal and formal primary education of the household head would give a desirable result. Therefore, projects should be aimed to create opportunities for parents to have primary education level.

- Policies and strategies with the aim to tackle child labor should have gender, age, occupation dimension. Such mechanisms should also take into consideration regional circumstances since the economic and socio-cultural environment in each region demands means particular to the existing scenario. In other words, rather than employing a “one size fits all” policy direction, regions and culture focused policies could be more effective in delivering the required target.

In general, integrated and fully fledged policies must be incorporated together in comprehensive and coherent manner in order to tackle the problem related to child labor.

The findings from the study indicated that child labor was not only influenced by single factor but inter twined socio-economic variables. Thus policies which aimed at reducing child labor should be all rounded rather than be sector specific and it should be the long term project of the country as the nation's future position is determined by those children.

Over all, the long lasting solution to curb the problem of child labor and promote human capital accumulation is to get rid of poverty.

As the study indicated in the scope and limitation of the research, it is impossible to include all variables which affect child labor as data is not available in our data source, ERHS. Thus, there is room for further studies by including new variable and particularly using primary data.

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APPENDICES

Appendix 1: Description panel data and Variables Used In both Descriptive and Econometric Analysis

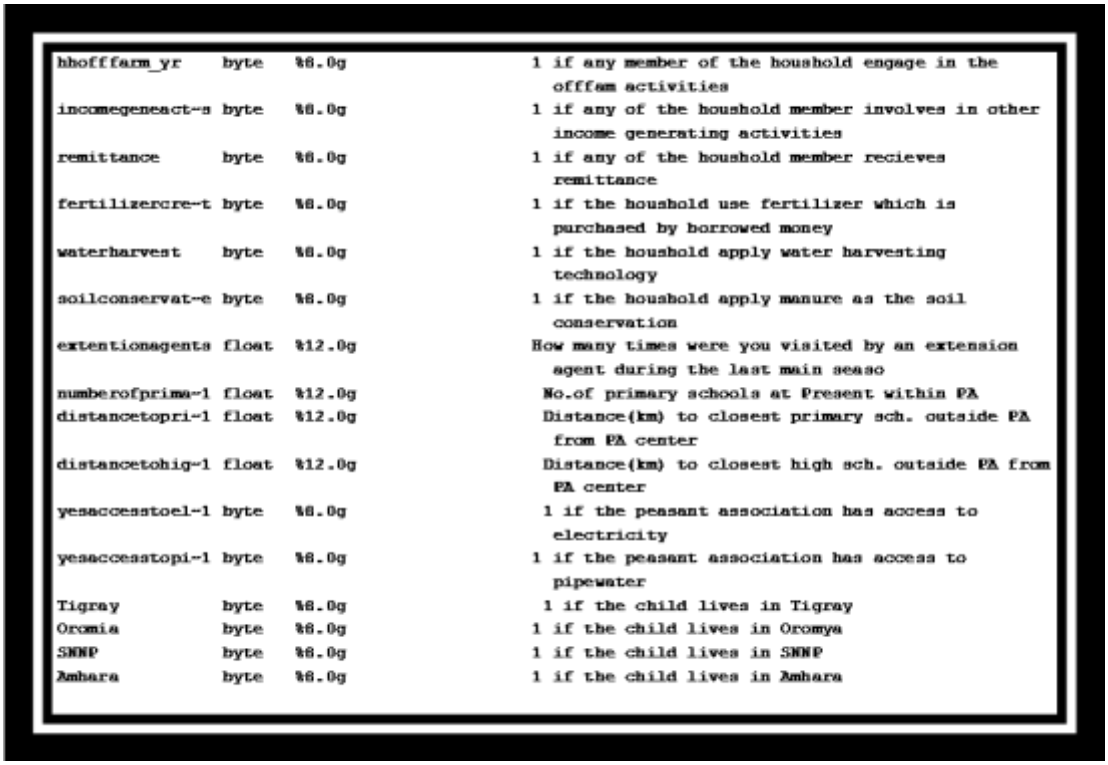
```
. xtdes

      ID:  1.101e+10, 3.305e+10, ..., 7.715e+15              n =        263
    time:  2004, 2009, ..., 2009                             T =          2
           Delta(time) = 1 unit
           Span(time)  = 6 periods
           (ID*time uniquely identifies each observation)

Distribution of T_i:   min      5%     25%       50%       75%     95%      max
                         2       2       2         2         2       2        2

     Freq.  Percent    Cum.  |  Pattern*
 ------------------------------------------
       263   100.00  100.00  |  11
 ------------------------------------------
       263   100.00          |  XX
 ------------------------------------------
 *Each column represents 5 periods.
```

variable name	storage type	display format	value label	variable label
childlabour	float	%9.0g		the total number of hours that child spent in different activities per week
farmchildlabour	float	%12.0g		Hours/week on work on family farm, cattle herding, oth. family business
domesticchild~r	float	%12.0g		Hours/week on domestic tasks-fetching water, firewood,cleaning,cooking, childcar
paidchildlabour	float	%12.0g		Hours/week working for pay outside of hh
Earlymarriage	float	%9.0g		1 if the child is single(unmarried),0 otherwise
Firstworkstar~m	float	%12.0g		Age participated in farm/hh activities for 1st time (for ages 0-15)
Farmwork	byte	%8.0g		1 if occupation==Farmer /family farm worker
Domesticworker	byte	%8.0g		1 if occupation==Domestic work(inc. housewife)
Student	byte	%8.0g		1 if occupation==Student
Sex_child	float	%9.0g		1 IF child is MALE
Age_child	float	%12.0g		Age of the child in years
Age2_child	float	%9.0g		square of age of the child
Biochild	float	%9.0g		1 if child is direct offspring of the head
Head_age	float	%12.0g		Age of the head
marriedhead	byte	%8.0g		1 if the head is Married
Head_divorced	float	%9.0g		1 if divorced 0 otherwise
malehead	float	%9.0g		1 if the head is male
Schoolingleve~d	float	%42.0g	edc	Grades of schooling completed(for Ages>15) of the head
Illiteracyofh~d	float	%9.0g		1 if no education atall
Informaleduof~d	float	%9.0g		1 if the head has taken only informal education
Ped18ofhead	float	%9.0g		1 if the head attend grade 1-8
Sed912ofhead	float	%9.0g		1 if the head has attend 9-12
Hiegherinstit~d	float	%9.0g		1 if the head attend college and university education
hhsize	double	%7.0f		hous hold size
Newbirth	float	%9.0g		1 if non of the member give new birth
dependant565	float	%9.0g		the sum of infants(<5)and elders(>65)
youngmale1565	float	%9.0g		the total numbers of young males age (15-65)
youngfemale1565	float	%9.0g		the total young female members age of(15-65)
malenumber	float	%9.0g		the total numbers of male in the houshold
femalenumber	float	%9.0g		the total numbers of female in the houshold
depratio	float	%9.0g		dependency ratio which is ratio of numbers of infantsand elders to houshold size
youngmf	float	%9.0g		the number of independent members between15-65 in the houshold
nplot	float	%9.0g		the numbers of plots of land the houshold owns
landsize	double	%9.0g		plot area in hectare
ozerlsk	double	%9.0g		other tropical livestock units other than oxen
valueoflivest~k	double	%9.0g		nominal livestock value in birr
oxen	double	%9.0g		total number of oxen owned
doxen	double	%9.0g		1 if any oxen owned by the houshold
consumption_mz	double	%8.2f		total consumption per month in birr
cementwal	byte	%8.0g		1 if the wall of house is made of Stone/Brick/Concrete/Cement
galvanizedroof	byte	%8.0g		1 if the roof of the house is made of galvanized/korkoro
labboursharing	byte	%8.0g		1 if the any of the houshold member involve in labour sharing arrangement
garbagedisposal	byte	%8.0g		1 if the Household dumps at will
toilet	byte	%8.0g		1 if the houshold has no any form of toilet
pipewater	byte	%8.0g		1 if the houshold has access to Piped water (not in house)
loantake	byte	%8.0g		1 if the houshold has access to credit service(if takeloan)
bankaccowners~p	byte	%8.0g		1 if the houshold has bank account
eqqubmembership	byte	%8.0g		1 if the houshold is a member of any of the eqqub in the association



hhoffarm_yr	byte	%8.0g	1 if any member of the houshold engage in the offfam activities
incomegeneact~s	byte	%8.0g	1 if any of the houshold member involves in other income generating activities
remittance	byte	%8.0g	1 if any of the houshold member recieves remittance
fertilizercre~t	byte	%8.0g	1 if the houshold use fertilizer which is purchased by borrowed money
waterharvest	byte	%8.0g	1 if the houshold apply water harvesting technology
soilconservat~e	byte	%8.0g	1 if the houshold apply manure as the soil conservation
extentionagents	float	%12.0g	How many times were you visited by an extension agent during the last main seaso
numberofprima~1	float	%12.0g	No.of primary schools at Present within PA
distancetopri~1	float	%12.0g	Distance(km) to closest primary sch. outside PA from PA center
distancetohig~1	float	%12.0g	Distance(km) to closest high sch. outside PA from PA center
yesaccesstoel~1	byte	%8.0g	1 if the peasant association has access to electricity
yesaccesstopi~1	byte	%8.0g	1 if the peasant association has access to pipewater
Tigray	byte	%8.0g	1 if the child lives in Tigray
Oromia	byte	%8.0g	1 if the child lives in Oromya
SNNP	byte	%8.0g	1 if the child lives in SNNP
Amhara	byte	%8.0g	1 if the child lives in Amhara

Appendix 2: Summary Statistics of Continuous Variables used in the Analysis

Variable		Mean	Std. Dev.	Min	Max	Observations
childl~r	overall	24.19962	18.28145	0	90	N = 526
	between		13.18254	0	67.5	n = 263
	within		12.67923	-11.80038	60.19962	T = 2
Firstw~m	overall	6.754753	1.719282	2	19	N = 526
	between		1.306628	3.5	13	n = 263
	within		1.118885	.7547529	12.75475	T = 2
Age_ch~d	overall	9.908745	2.896836	5	15	N = 526
	between		1.834581	6	13	n = 263
	within		2.243297	5.408745	14.40875	T = 2
Head_age	overall	46.14068	11.30626	18	86	N = 526
	between		10.54802	20	75	n = 263
	within		4.096689	30.14068	62.14068	T = 2
hhsize	overall	7.431559	2.09718	2	16	N = 526
	between		1.925391	3	15	n = 263
	within		.8355209	4.931559	9.931559	T = 2
malenu~r	overall	4.214829	2.087023	0	16	N = 526
	between		1.620023	1	10	n = 263
	within		1.317646	-2.285171	10.71483	T = 2
female~r	overall	4.140684	2.220935	0	15	N = 526
	between		1.674682	1	10	n = 263
	within		1.460593	-1.359316	9.640684	T = 2
depratio	overall	.2743572	.3443436	0	1	N = 526
	between		.1511464	0	.5	n = 263
	within		.3094686	-.2256428	.7743572	T = 2
youngmf	overall	3.203422	1.274836	1	8	N = 526
	between		1.116098	1	7	n = 263
	within		.6179844	1.203422	5.203422	T = 2
nplot	overall	2.127376	1.022104	0	5	N = 526
	between		.7691149	.5	4	n = 263
	within		.6740072	.1273764	4.127376	T = 2
landsize	overall	1.38539	3.300822	.000125	42.5	N = 526
	between		2.343159	.0847	21.28	n = 263
	within		2.32712	-19.83461	22.60539	T = 2
ozerlsk	overall	4.266836	5.003026	0	46.62	N = 523
	between		4.235882	0	28.285	n = 263
	within		2.668869	-14.06816	22.60184	T-bar = 1.98859
oxen	overall	1.136882	1.481405	0	11	N = 526
	between		1.349402	0	7.5	n = 263
	within		.6141196	-2.363118	4.636882	T = 2
consum~z	overall	932.5917	875.0633	59.384	6383.34	N = 526
	between		653.83	185.5488	3690.118	n = 263
	within		582.2854	-1760.63	3625.814	T = 2
number~1	overall	1.353612	.7147802	0	3	N = 526
	between		.5098798	.5	2	n = 263
	within		.5014265	.3536122	2.353612	T = 2

childla~r	Overall Freq.	Overall Percent	Between Freq.	Between Percent	Within Percent
0	65	12.36	63	23.95	51.59
2	4	0.76	4	1.52	50.00
3	5	0.95	5	1.90	50.00
3.3	1	0.19	1	0.38	50.00
4	3	0.57	3	1.14	50.00
5	2	0.38	2	0.76	50.00
6	3	0.57	3	1.14	50.00
6.6	1	0.19	1	0.38	50.00
7	23	4.37	23	8.75	50.00
8	2	0.38	2	0.76	50.00
9	4	0.76	4	1.52	50.00
10	15	2.85	15	5.70	50.00
11	7	1.33	7	2.66	50.00
12	6	1.14	6	2.28	50.00
14	46	8.75	41	15.59	56.10
15	4	0.76	4	1.52	50.00
16	5	0.95	5	1.90	50.00
17	2	0.38	2	0.76	50.00
17.3	1	0.19	1	0.38	50.00
18	9	1.71	9	3.42	50.00
19	3	0.57	3	1.14	50.00
20	12	2.28	12	4.56	50.00
21	66	12.55	63	23.95	52.38
22	3	0.57	3	1.14	50.00
24	10	1.90	10	3.80	50.00
25	5	0.95	5	1.90	50.00
26	3	0.57	3	1.14	50.00
27	1	0.19	1	0.38	50.00
27.5	1	0.19	1	0.38	50.00
28	58	11.03	56	21.29	51.79
29	1	0.19	1	0.38	50.00
30	11	2.09	11	4.18	50.00
31	3	0.57	3	1.14	50.00
32	4	0.76	4	1.52	50.00
33	1	0.19	1	0.38	50.00
34	5	0.95	5	1.90	50.00
35	24	4.56	23	8.75	52.17
36	9	1.71	9	3.42	50.00
37	1	0.19	1	0.38	50.00
38	1	0.19	1	0.38	50.00
39	2	0.38	2	0.76	50.00
40	2	0.38	2	0.76	50.00
42	19	3.61	19	7.22	50.00
44	1	0.19	1	0.38	50.00
45	3	0.57	3	1.14	50.00
46	1	0.19	1	0.38	50.00
47	2	0.38	2	0.76	50.00
48	6	1.14	5	1.90	60.00
49	7	1.33	7	2.66	50.00
51	1	0.19	1	0.38	50.00
52	2	0.38	2	0.76	50.00
54	2	0.38	2	0.76	50.00
55	1	0.19	1	0.38	50.00
56	16	3.04	16	6.08	50.00
57	1	0.19	1	0.38	50.00
58	1	0.19	1	0.38	50.00
60	1	0.19	1	0.38	50.00
62	1	0.19	1	0.38	50.00
63	5	0.95	4	1.52	62.50
64	2	0.38	2	0.76	50.00
66	3	0.57	3	1.14	50.00
70	8	1.52	8	3.04	50.00
72	3	0.57	3	1.14	50.00
73	1	0.19	1	0.38	50.00
73.3	1	0.19	1	0.38	50.00
74	1	0.19	1	0.38	50.00
84	1	0.19	1	0.38	50.00
86	1	0.19	1	0.38	50.00
90	1	0.19	1	0.38	50.00
Total	526	100.00	511 (n = 263)	194.30	51.47

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Appendix 4: Child Domestic Work Participation Rate and Incidence for Children Aged 5-15 by the Numbers of Hours Spent at Domestic Work Activities per Week

	Overall		Between		Within
domesti~r	Freq.	Percent	Freq.	Percent	Percent
0	150	28.52	122	46.39	61.48
2	7	1.33	7	2.66	50.00
3	6	1.14	6	2.28	50.00
3.3	3	0.57	3	1.14	50.00
4	10	1.90	10	3.80	50.00
5	6	1.14	6	2.28	50.00
5.5	1	0.19	1	0.38	50.00
6	4	0.76	4	1.52	50.00
7	58	11.03	56	21.29	51.79
8	7	1.33	7	2.66	50.00
9	4	0.76	4	1.52	50.00
10	24	4.56	24	9.13	50.00
11	2	0.38	2	0.76	50.00
12	7	1.33	7	2.66	50.00
14	76	14.45	70	26.62	54.29
15	8	1.52	8	3.04	50.00
16	7	1.33	7	2.66	50.00
18	3	0.57	3	1.14	50.00
20	13	2.47	13	4.94	50.00
21	53	10.08	49	18.63	54.08
22	1	0.19	1	0.38	50.00
24	5	0.95	5	1.90	50.00
25	1	0.19	1	0.38	50.00
26	2	0.38	2	0.76	50.00
28	34	6.46	32	12.17	53.13
29	1	0.19	1	0.38	50.00
30	4	0.76	4	1.52	50.00
31	1	0.19	1	0.38	50.00
32	4	0.76	4	1.52	50.00
35	10	1.90	10	3.80	50.00
36	1	0.19	1	0.38	50.00
40	1	0.19	1	0.38	50.00
42	5	0.95	5	1.90	50.00
43	1	0.19	1	0.38	50.00
49	2	0.38	2	0.76	50.00
51	1	0.19	1	0.38	50.00
56	1	0.19	1	0.38	50.00
60	1	0.19	1	0.38	50.00
70	1	0.19	1	0.38	50.00
Total	526	100.00	484	184.03	54.34
			(n = 263)		

Source Author's own calculation from ERHS

Appendix 5: Child Farm Child Labor Participation Rate and Incidence for Children Aged 5-15 by the Numbers of Hours Spent at Farm Work Activities per Week

	Overall		Between		Within
farmchi~r	Freq.	Percent	Freq.	Percent	Percent
0	238	45.25	176	66.92	67.61
1	1	0.19	1	0.38	50.00
2	3	0.57	3	1.14	50.00
3	7	1.33	6	2.28	58.33
4	3	0.57	3	1.14	50.00
5	11	2.09	11	4.18	50.00
6	3	0.57	3	1.14	50.00
7	29	5.51	28	10.65	51.79
8	4	0.76	4	1.52	50.00
9	3	0.57	3	1.14	50.00
10	14	2.66	14	5.32	50.00
10.3	1	0.19	1	0.38	50.00
12	3	0.57	3	1.14	50.00
14	46	8.75	44	16.73	52.27
15	2	0.38	2	0.76	50.00
16	4	0.76	4	1.52	50.00
17	1	0.19	1	0.38	50.00
18	7	1.33	7	2.66	50.00
20	11	2.09	11	4.18	50.00
21	31	5.89	30	11.41	51.67
22	2	0.38	2	0.76	50.00
24	2	0.38	2	0.76	50.00
25	1	0.19	1	0.38	50.00
26	3	0.57	3	1.14	50.00
27	1	0.19	1	0.38	50.00
28	31	5.89	31	11.79	50.00
30	6	1.14	6	2.28	50.00
32	4	0.76	4	1.52	50.00
35	7	1.33	7	2.66	50.00
36	5	0.95	5	1.90	50.00
40	1	0.19	1	0.38	50.00
41	1	0.19	1	0.38	50.00
42	9	1.71	9	3.42	50.00
48	4	0.76	4	1.52	50.00
49	1	0.19	1	0.38	50.00
50	1	0.19	1	0.38	50.00
52	2	0.38	2	0.76	50.00
54	1	0.19	1	0.38	50.00
56	15	2.85	15	5.70	50.00
63	1	0.19	1	0.38	50.00
70	5	0.95	5	1.90	50.00
72	1	0.19	1	0.38	50.00
Total	526	100.00	459 (n = 263)	174.52	57.30

Source Author's own calculation from ERHS

Appendix 6: Paid Off farm Labor Participation Rate and Incidence for Children Aged 5-15 by the Number of Hours Spent at off farm Paid Activities per Week

	Overall		Between		Within
paidchi~r	Freq.	Percent	Freq.	Percent	Percent
0	515	97.91	263	100.00	97.91
2	1	0.19	1	0.38	50.00
3.3	1	0.19	1	0.38	50.00
8	1	0.19	1	0.38	50.00
10	1	0.19	1	0.38	50.00
14	3	0.57	3	1.14	50.00
20	1	0.19	1	0.38	50.00
24	1	0.19	1	0.38	50.00
35	1	0.19	1	0.38	50.00
70	1	0.19	1	0.38	50.00
Total	526	100.00	274	104.18	95.99
			(n = 263)		

Source

Author's own calculation from ERHS

Appendix 7: Work Starting Age for Children of in Rural Ethiopia

	Overall		Between		Within
Firstwo~m	Freq.	Percent	Freq.	Percent	Percent
2	1	0.19	1	0.38	50.00
3	7	1.33	7	2.66	50.00
4	24	4.56	24	9.13	50.00
5	87	16.54	74	28.14	58.78
6	122	23.19	112	42.59	54.46
7	130	24.71	117	44.49	55.56
8	42	7.98	40	15.21	52.50
8.5	78	14.83	78	29.66	50.00
9	14	2.66	14	5.32	50.00
10	15	2.85	14	5.32	53.57
11	4	0.76	4	1.52	50.00
19	2	0.38	2	0.76	50.00
Total	526	100.00	487	185.17	54.00
			(n = 263)		

Source Author's own calculation from ERHS

Appendix 8: Normality (Distribution) Test by Skweness and Kurtosis of Variables used in the Model

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
childlabour	526	0.0000	0.0346	44.03	0.0000
Firstworks~m	526	0.0000	0.0000	.	0.0000
Age_child	526	0.1356	0.0000	69.58	0.0000
Head_age	526	0.0000	0.1881	19.38	0.0001
hhsize	526	0.0002	0.0391	15.95	0.0003
malenumber	526	0.0000	0.0000	.	0.0000
femalenumber	526	0.0000	0.0000	.	0.0000
depratio	526	0.0000	0.0029	54.23	0.0000
youngmf	526	0.0000	0.0588	39.17	0.0000
nplot	526	0.0002	0.0047	18.75	0.0001
landsize	526	0.0000	0.0000	.	0.0000
ozerlsk	523	0.0000	0.0000	.	0.0000
oxen	526	0.0000	0.0000	.	0.0000
consumptio~z	526	0.0000	0.0000	.	0.0000
numberofpr~1	526	0.0000	0.1106	38.97	0.0000
dista~okmpa1	526	0.6757	.	.	.
distanceto..	526	0.0000	0.0000	.	0.0000
paidchildl~r	526	0.0000	0.0000	.	0.0000
farmchildl~r	526	0.0000	0.0000	.	0.0000
domesticch~r	526	0.0000	0.0000	.	0.0000
hoursefors~g	526	0.0000	0.0000	.	0.0000
waterdista~s	526	0.0000	0.0000	.	0.0000
feuldistan~s	526	0.0000	0.0000	.	0.0000
dependant565	526	0.0000	0.0000	.	0.0000
youngma~1565	526	0.0000	0.0106	49.13	0.0000
youngfe~1565	526	0.0000	0.0024	50.60	0.0000
valueofliv~k	523	0.0000	0.0000	.	0.0000
Schoolingl~d	526	0.0000	0.0000	39.43	0.0000
extentiona~s	526	0.0000	0.0000	.	0.0000

Appendix 9: Multi –co linearity Test Using Pair Wise Correlation Coefficients for Variables Used in the Model

	Earlym~e	Firstw~m	Farmwork	Domest~r	Student	Sex_ch~d	Age_ch~d
Earlymarri~e	1.0000						
Firstworks~m	-0.0611	1.0000					
Farmwork	0.0550	-0.0295	1.0000				
Domesticwo~r	-0.0221	-0.0708	-0.0747	1.0000			
Student	0.3866	-0.0912	-0.2468	-0.4661	1.0000		
Sex_child	-0.0314	0.0395	0.0895	-0.2070	-0.0282	1.0000	
Age_child	0.5377	-0.1003	0.0818	-0.0940	0.4533	-0.0213	1.0000
Age2_child	0.4718	-0.0898	0.0801	-0.0976	0.4127	-0.0182	0.9904
Biochild	0.0969	-0.0758	0.0462	0.0088	0.0419	-0.0029	0.0254
Head_age	0.1212	0.0396	0.0556	-0.0144	0.0614	0.1159	0.2202
Head_divor~d	-0.0356	0.0630	0.0565	0.0005	-0.0589	0.0373	-0.0176
malehead	-0.0249	0.0140	0.0203	-0.0536	-0.0134	0.0342	-0.1241
Informaled~d	0.0107	0.0926	-0.0836	-0.0447	0.0119	-0.0698	0.0224
Ped18ofhead	-0.0765	-0.0681	-0.0574	0.0138	-0.0522	-0.0413	-0.1638
Sed912ofhead	0.0007	-0.0176	0.0441	-0.1064	0.1004	0.0222	-0.0351
Illiteracy~d	0.0269	0.0577	0.0539	0.0813	-0.1012	0.0611	0.0520
hhsize	0.0272	-0.0797	0.0207	0.0798	0.0062	-0.0271	-0.0092
Newbirth	-0.0640	-0.0478	0.0844	0.0654	-0.1077	-0.0837	-0.1331
malenumber	-0.1905	0.0487	0.0177	0.0361	-0.1820	0.2616	-0.2800
femalenumber	-0.1881	0.0475	-0.0798	0.1142	-0.1506	-0.2130	-0.3778
depratio	-0.3353	0.1054	-0.0557	0.0884	-0.2869	0.0120	-0.5613
youngmf	0.1002	0.0145	-0.0083	-0.0101	0.0920	0.0094	0.1732
nplot	-0.0632	0.2048	-0.0832	-0.1260	0.0471	-0.0255	-0.0990
landsize	-0.0609	0.1539	-0.0139	0.1194	-0.0591	-0.0935	-0.0683
ozerlsk	0.0878	0.0405	0.1145	-0.1006	0.0476	0.0432	0.1542
oxen	0.0458	0.0846	0.0958	-0.0425	-0.0254	0.0046	0.0677
doxen	-0.0202	0.1947	-0.0628	-0.0980	0.0489	-0.0790	0.0054
consumptio~z	0.1212	0.0518	0.0122	-0.1382	0.2334	-0.0447	0.2151
cementwal	-0.0489	0.0249	-0.0555	-0.0825	-0.0157	0.0726	-0.1206
galvanized~f	-0.0071	0.0915	-0.0297	-0.1093	0.0542	-0.0724	-0.0384
labourshar~g	0.0417	0.1940	-0.0838	-0.0105	0.0175	-0.1147	-0.0210
garbagedis~l	0.0556	0.0631	0.0834	-0.0123	0.0663	0.0048	0.1217
loantake	0.1728	-0.1537	0.0167	-0.0889	0.2186	-0.0789	0.3843
bankaccown~p	0.0345	0.0462	-0.0264	-0.0549	0.0565	-0.0116	-0.0065
eqqubmembe~p	0.0202	0.0072	-0.0355	-0.0339	0.0591	-0.1137	-0.0407
hhofffarm_yr	0.0301	0.0366	-0.0934	-0.0406	0.0183	0.0442	-0.0194
incomegene~s	0.0903	-0.1846	-0.0349	0.0782	0.0072	-0.1226	0.0543
remittance	0.0500	-0.1517	0.0385	-0.0273	0.0541	-0.0018	0.0742
fertilizer~t	-0.0373	-0.0298	-0.0754	-0.0447	0.0921	-0.0775	0.0680
waterharvest	-0.0455	0.0219	-0.0870	0.0092	-0.0569	-0.0443	-0.0986
soilconser~e	0.0412	0.1732	-0.0589	-0.1430	0.1020	-0.0040	0.1457
extentiona~s	-0.0021	-0.0411	0.0309	-0.0535	0.0641	-0.0010	0.0651
numberofpr~l	0.0793	0.1691	-0.0010	-0.0970	0.1428	-0.0128	0.2106
dista~okmpal	0.1166	0.1989	-0.0449	-0.1214	0.1845	0.0569	0.2458
distanceto..	0.0754	0.0722	-0.0285	0.0138	-0.0142	0.0314	0.0892
yesacce~ypal	0.2214	0.1349	0.0604	-0.0598	0.1353	0.0366	0.2510
yesacce~rpal	-0.0137	0.1780	-0.0078	-0.0117	-0.1021	0.0063	-0.2033
Oromia	-0.1201	0.0426	-0.0720	-0.0370	0.0668	-0.1360	-0.0294
SNNP	0.0704	-0.3669	0.1086	0.1526	-0.0476	-0.0032	-0.0058
Amhara	0.0567	0.3837	-0.0045	-0.0794	-0.0355	0.0348	0.0130

	Age2_c~d	Biochild	Head_age	Head_d~d	malehead	Inform~d	Ped18o~d
Age2_child	1.0000						
Biochild	0.0270	1.0000					
Head_age	0.2192	-0.0619	1.0000				
Head_divor~d	-0.0077	0.0289	0.0040	1.0000			
malehead	-0.1280	0.1727	0.1429	-0.0981	1.0000		
Informaled~d	0.0232	0.0496	0.0984	-0.0522	0.0681	1.0000	
Ped18ofhead	-0.1586	0.0198	-0.0783	0.0430	0.1502	0.1398	1.0000
Sed912ofhead	-0.0437	0.0350	-0.2649	-0.0557	0.1133	-0.1884	-0.3192
Illiteracy~d	0.0565	-0.0482	0.2012	0.0211	-0.2788	-0.3551	-0.6015
hhsize	-0.0191	-0.0878	0.1415	-0.0553	0.0998	-0.0485	0.0319
Newbirth	-0.1422	0.0169	-0.3026	-0.1179	0.0998	-0.0943	0.0274
malenumber	-0.2797	-0.0215	0.0334	-0.0128	0.1498	-0.0790	0.0424
femalenumber	-0.3752	-0.1639	0.0379	-0.0429	0.0198	-0.0578	0.0745
depratio	-0.5563	-0.0683	-0.1831	-0.0590	0.0550	-0.0971	0.0317
youngmf	0.1755	-0.0778	0.3733	-0.0077	0.0051	0.1042	0.0031
nplot	-0.0948	-0.0554	-0.0190	-0.0916	0.1316	0.1560	-0.0455
landsize	-0.0730	-0.0061	-0.0920	-0.0328	0.0576	0.0122	0.1146
ozerlsk	0.1532	0.0024	0.0202	0.0212	0.1324	0.0250	-0.0771
oxen	0.0675	0.0273	-0.0511	-0.0535	0.1037	0.0474	-0.0767
doxen	0.0106	-0.0295	-0.0591	-0.0266	0.0442	0.1441	-0.0247
consumptio~z	0.2094	-0.0332	-0.0176	0.0309	0.0954	0.0043	-0.1678
cementwal	-0.1236	0.0649	0.1057	0.2053	0.0791	-0.0145	0.0033
galvanized~f	-0.0493	-0.0486	-0.0687	0.0119	-0.0463	0.0173	-0.1317
labourshar~g	-0.0238	-0.0100	-0.1790	-0.1147	-0.0388	0.0817	0.0046
garbagedis~l	0.1159	0.0254	0.1460	0.0347	0.0681	0.0765	-0.0516
loantake	0.3841	-0.0169	-0.0223	-0.0401	-0.0899	-0.0356	-0.1502
bankaccown~p	-0.0111	0.0415	-0.0944	0.1815	0.0471	0.0206	-0.0353
eqqubmembe~p	-0.0460	0.0232	-0.0769	-0.0425	0.1339	-0.0219	0.0065
hhofffarm_yr	-0.0197	-0.0329	0.0088	-0.0895	-0.0535	0.0820	-0.0146
incomegene~s	0.0492	0.0728	0.0451	-0.0877	0.0336	-0.0371	0.0351
remittance	0.0750	-0.0363	0.0288	-0.0076	-0.1333	-0.0324	-0.0711
fertilizer~t	0.0684	-0.0343	0.0206	-0.0752	0.0307	0.0820	-0.0131
waterharvest	-0.0960	-0.1144	0.0050	0.0042	0.0066	0.0047	0.0026
soilconser~e	0.1524	0.0077	0.0845	0.1247	-0.0987	0.1666	-0.0416
extentiona~s	0.0647	0.0815	-0.1192	-0.0695	-0.0079	-0.0149	0.0074
numberofpr~1	0.2073	-0.0537	-0.0498	0.0690	-0.0722	0.0675	-0.1216
dista~okmpa1	0.2432	0.0118	0.1044	-0.0113	-0.0142	0.2002	-0.1922
distanceto..	0.0852	0.0607	0.1044	0.0409	-0.0104	0.0781	-0.0923
yesacce~ypa1	0.2397	0.0322	0.1045	-0.0066	0.0011	0.1988	-0.0493
yesacce~rpa1	-0.2069	0.0528	-0.1016	0.0338	0.0792	0.1860	0.0227
Oromia	-0.0305	-0.1971	-0.2534	-0.0734	-0.2118	0.0191	-0.0805
SNNP	-0.0123	0.0801	0.0551	-0.1079	0.1171	-0.3004	0.0890
Amhara	0.0170	0.0561	0.1211	0.0507	0.1181	0.3596	0.0196

	hhofff~r	income~s	remitt~e	fertil~t	waterh~t	soilco~e	extent~s
hhofffarm_yr	1.0000						
incomegene~s	0.0094	1.0000					
remittance	0.0522	0.1491	1.0000				
fertilizer~t	0.1515	0.1010	0.0079	1.0000			
waterharvest	0.1424	0.0166	0.0072	0.2403	1.0000		
soilconser~e	0.1977	-0.2434	0.0535	-0.0020	0.0200	1.0000	
extentiona~s	0.0829	0.0013	-0.0607	0.0781	-0.0090	0.0679	1.0000
numberofpr~1	-0.1341	-0.1575	-0.1590	-0.1554	0.0950	0.1510	0.0365
dista~okmpa1	0.0105	-0.1409	0.0306	0.0198	-0.1767	0.2851	-0.0807
distanceto..	-0.0239	-0.0276	0.0222	-0.0938	-0.0499	0.1327	-0.1025
yesacce~ypa1	-0.0721	-0.0675	0.1387	-0.2063	-0.2352	0.1389	-0.1251
yesacce~rpa1	-0.0319	-0.0882	-0.0928	-0.1157	-0.0161	0.0029	-0.0955
Oromia	-0.0168	-0.0299	-0.0449	0.3190	0.0301	0.0891	0.0895
SNNP	-0.1350	0.2919	0.0272	-0.1438	-0.1020	-0.5267	0.0289
Amhara	0.0905	-0.1547	-0.0718	-0.2057	-0.0323	0.3011	-0.0643

	youngmf	nplot	landsize	ozerlsk	oxen	doxen	consum~z
youngmf	1.0000						
nplot	0.0736	1.0000					
landsize	-0.0529	0.1035	1.0000				
ozerlsk	0.2281	0.0702	0.0495	1.0000			
oxen	0.1678	0.0979	0.0709	0.8608	1.0000		
doxen	0.1628	0.1885	0.0225	0.4158	0.6213	1.0000	
consumptio~z	0.0668	0.2248	-0.0040	0.3059	0.2669	0.2165	1.0000
cementwal	-0.0100	-0.0851	-0.0310	0.0180	0.0089	0.1806	0.0382
galvanized~f	0.0271	0.1180	-0.0023	0.0749	0.1190	0.1324	0.2593
labourshar~g	0.0442	0.2285	0.1264	0.0292	0.0358	0.1459	0.0241
garbagedis~l	0.0916	0.0049	-0.0174	0.1663	0.1337	0.0679	0.0646
loantake	0.0160	-0.1605	-0.1032	0.0321	0.0328	0.0318	0.1102
bankaccown~p	0.0298	0.1130	-0.0067	0.1458	0.1169	0.1953	0.3578
eqqubmembe~p	0.0430	0.1521	-0.0310	0.0644	0.0524	0.0349	0.1470
hhofffarm_yr	0.0571	0.1435	-0.0278	0.0429	0.0439	0.1777	-0.0631
incomegene~s	0.0298	-0.0051	0.0807	-0.1565	-0.1716	-0.1551	0.0272
remittance	-0.0101	-0.1446	-0.1062	-0.2006	-0.1967	-0.1170	-0.0204
fertilizer~t	0.0314	0.1389	0.0359	-0.0606	-0.0792	-0.0109	0.1778
waterharvest	-0.0219	-0.0254	0.0039	0.0550	0.1181	0.2110	-0.0050
soilconser~e	0.0738	0.1401	-0.0404	0.1647	0.1365	0.2847	0.1522
extentiona~s	0.0696	0.1124	0.0301	0.3144	0.2716	0.1145	0.0924
numberofpr~l	-0.0164	0.0269	-0.0459	0.1677	0.1503	0.1446	0.2833
dista~okmpal	0.0173	0.2452	-0.0441	0.0280	0.0216	0.1820	0.2173
distanceto..	-0.1230	0.1509	0.0662	-0.0489	-0.1198	-0.0397	-0.1291
yesacce~ypa1	0.0124	0.0347	-0.1090	-0.0029	-0.0364	-0.0124	0.2557
yesacce~rpa1	-0.0231	-0.0336	-0.0424	0.0952	0.1556	0.1992	0.1457
Oromia	-0.0636	0.1730	0.0772	0.0027	0.0158	0.0957	0.2321
SNNP	0.0634	-0.2963	-0.0286	-0.0531	-0.1010	-0.3898	-0.2237
Amhara	0.0170	0.3067	0.0051	0.0740	0.1293	0.2438	0.1069

	cement~l	galvan~f	labour~g	garbag~l	loantake	bankac~p	eqqubm~p
cementwal	1.0000						
galvanized~f	0.0177	1.0000					
labourshar~g	-0.1250	0.1209	1.0000				
garbagedis~l	0.1705	0.0565	0.0390	1.0000			
loantake	-0.1275	-0.0035	0.0550	0.0077	1.0000		
bankaccown~p	0.2256	0.2687	0.0383	0.0394	-0.0110	1.0000	
eqqubmembe~p	0.0246	0.1278	0.1707	0.1172	0.0824	0.1141	1.0000
hhofffarm_yr	0.0967	-0.1847	0.0968	-0.0884	-0.0405	-0.0175	-0.0704
incomegene~s	-0.1503	-0.0290	0.0120	-0.1613	0.0777	-0.0186	0.0884
remittance	0.0241	0.0005	-0.0233	0.0651	0.0625	-0.0223	-0.0161
fertilizer~t	-0.0197	0.0026	-0.0764	-0.0862	0.0469	0.0406	0.0317
waterharvest	0.0180	0.0311	-0.0454	-0.0580	0.0120	0.0183	-0.0141
soilconser~e	0.1920	0.0346	0.0722	0.1134	0.0302	0.0954	-0.1168
extentiona~s	-0.0428	0.1490	0.0649	0.1012	0.0864	-0.0263	0.0379
numberofpr~l	-0.0868	0.1223	0.1732	0.0825	0.2056	0.2142	0.1005
dista~okmpal	-0.0392	0.0498	0.0752	0.0746	0.2115	0.0609	0.0377
distanceto..	0.0168	-0.0549	0.0232	0.0540	0.0446	-0.0621	-0.0839
yesacce~ypa1	-0.1085	0.0425	0.1551	0.1337	0.1243	0.1448	0.0372
yesacce~rpa1	0.1824	0.1261	0.1403	0.0095	-0.1867	0.2515	0.0092
Oromia	-0.0977	0.1841	0.1431	-0.1267	0.0743	0.1246	-0.0315
SNNP	-0.2422	-0.1289	-0.2002	-0.0531	0.0517	-0.2279	0.0548
Amhara	-0.0532	0.0548	0.2663	0.1240	-0.1328	0.0725	0.0534

	Sed912~d	Illite~d	hhsize	Newbirth	malenu~r	female~r	depratio
Sed912ofhead	1.0000						
Illiteracy~d	-0.3786	1.0000					
hhsize	0.1727	-0.1703	1.0000				
Newbirth	0.0929	-0.0352	0.2672	1.0000			
malenumber	0.1517	-0.0722	0.4510	0.0486	1.0000		
femalenumber	0.0427	-0.0501	0.4572	0.0684	0.2832	1.0000	
depratio	0.0578	0.0536	-0.0705	0.0950	0.5521	0.5614	1.0000
youngmf	-0.0436	-0.0471	0.5221	-0.1800	0.2162	0.2274	-0.2233
nplot	0.0838	-0.0940	0.0134	0.0015	0.0505	0.1717	0.1230
landsize	-0.0226	-0.0902	-0.0222	0.0555	-0.0078	0.0351	0.0455
ozerlsk	0.1785	-0.1219	0.2937	0.0652	0.2422	-0.0688	-0.1090
oxen	0.1409	-0.0833	0.2483	0.0952	0.2880	-0.0105	0.0233
doxen	0.0500	-0.0978	0.1239	0.0552	0.0945	0.0706	0.0340
consumptio~z	0.2630	-0.1476	0.1940	-0.0480	-0.0482	-0.0721	-0.2627
cementwal	-0.0661	0.0771	0.0056	0.0976	-0.0147	0.0220	0.0344
galvanized~f	0.2800	-0.0965	0.2159	0.0793	0.1165	0.1982	0.0978
labourshar~g	-0.0254	-0.0059	-0.0044	-0.0084	-0.0713	0.0377	0.0103
garbagedis~l	-0.0601	0.0228	0.0074	0.0573	-0.0842	-0.1130	-0.1654
loantake	0.0832	0.0195	-0.0125	-0.0324	-0.2155	-0.2148	-0.3713
bankaccown~p	0.2038	-0.1522	0.1450	-0.0575	0.0875	-0.0075	-0.0432
eqqubmembe~p	0.1631	-0.1500	-0.0289	-0.0318	-0.0710	0.0035	-0.0539
hhofffarm_yr	-0.0679	0.0681	-0.0237	0.0482	-0.0379	-0.0306	0.0012
incomegene~s	0.0402	-0.0234	-0.0318	-0.1106	-0.1211	0.0625	-0.0521
remittance	-0.0688	0.1046	-0.0923	-0.0389	-0.1500	-0.0802	-0.1239
fertilizer~t	-0.0183	0.0026	-0.0058	-0.0643	-0.0232	-0.0306	-0.0512
waterharvest	-0.0929	0.0670	0.0075	-0.0211	0.0974	0.1586	0.1606
soilconser~e	-0.1817	0.1073	-0.0836	-0.0534	-0.1501	-0.1626	-0.1759
extentiona~s	0.2361	-0.1677	0.0787	0.0693	0.0535	-0.0777	-0.0601
numberofpr~1	0.0277	-0.0132	-0.1007	-0.1461	-0.0510	-0.2138	-0.1646
dista~okmpa1	0.0651	-0.0064	-0.1452	-0.1212	-0.1909	-0.2720	-0.3191
distanceto..	-0.1110	0.0834	-0.1840	0.0065	-0.1992	-0.1332	-0.1611
yesacce~ypa1	-0.0239	-0.0539	-0.0834	-0.1085	-0.2592	-0.3019	-0.4013
yesacce~rpa1	-0.0154	-0.0541	-0.0314	0.0184	0.0365	0.0208	0.1148
Oromia	0.1774	-0.0495	0.0048	-0.0478	0.0433	0.0330	0.0934
SNNP	0.0843	-0.0397	0.1787	0.0811	0.0358	0.1509	0.0006
Amhara	-0.1804	-0.0455	-0.1572	-0.0669	-0.0776	-0.1274	-0.0604

	number~1	d~okmpa1	distan..	yes~ypa1	yes~rpa1	Oromia	SNNP
numberofpr~1	1.0000						
dista~okmpa1	0.2668	1.0000					
distanceto..	-0.0432	0.5067	1.0000				
yesacce~ypa1	0.4095	0.5427	0.2023	1.0000			
yesacce~rpa1	0.2229	-0.0785	-0.1922	0.3471	1.0000		
Oromia	0.2548	0.1374	-0.1551	-0.0846	-0.0464	1.0000	
SNNP	-0.3814	-0.5369	-0.1005	-0.2716	-0.2177	-0.5125	1.0000
Amhara	0.2756	0.4680	0.2566	0.5711	0.3045	-0.3037	-0.4463

	Amhara
Amhara	1.0000

Appendix 10:Multi-collinearity Test Using Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Age_child	101.79	0.009824
Age2_child	88.76	0.011267
SNNP	10.69	0.093506
Illiteracy~d	10.08	0.099164
depratio	9.62	0.103980
oxen	7.86	0.127175
Ped18ofhead	7.55	0.132517
hhsize	6.83	0.146436
Amhara	6.49	0.154000
Oromia	6.37	0.156991
Sed912ofhead	6.32	0.158271
ozerlsk	6.01	0.166455
femalenumber	5.75	0.173805
malenumber	5.70	0.175494
dista~okmpa1	4.46	0.224218
yesacce~ypa1	3.83	0.261239
doxen	2.85	0.350871
Informaled~d	2.80	0.357404
Student	2.61	0.382856
youngmf	2.29	0.437299
Earlymarri~e	2.26	0.443280
cementwal	2.19	0.457493
numberofpr~1	2.15	0.465068
yesacce~rpa1	2.15	0.465171
distanceto..	2.12	0.472422
consumptio~z	2.07	0.484207
soilconser~e	1.97	0.508699
Head_age	1.96	0.510169
Newbirth	1.86	0.538434
Domesticwo~r	1.84	0.544449
nplot	1.78	0.560343
fertilizer~t	1.68	0.596358
loantake	1.60	0.625603
waterharvest	1.60	0.625794
bankaccown~p	1.54	0.651172
labourshar~g	1.52	0.659413
galvanized~f	1.51	0.662302
malehead	1.50	0.666317
Firstworks~m	1.46	0.683535
Sex_child	1.43	0.698279
incomegene~s	1.41	0.708445
extentiona~s	1.41	0.711203
Farmwork	1.39	0.719930
remittance	1.38	0.725047
hhofffarm_yr	1.36	0.735662
eqqubmembe~p	1.31	0.760921
Head_divor~d	1.28	0.781822
garbagedis~l	1.26	0.793291
Biochild	1.23	0.810732
landsize	1.20	0.830726
Mean VIF	6.96	

.

Appendix 11: Model Selection Test: between Random Effects and Fixed Effects Model (Hausman Test)

fixed effects model is consistent under Ho and Ha; obtained from xtreg

random effects model is inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(50) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 0.450

Prob>chi2 = 0.3800

Appendix 12: Test of Heteroskedasticity-(Breusch Pagan ,Cook Weisberg Test)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of childlabour

         chi2(1)      =    47.07
         Prob > chi2  =   0.0000
```

Appendix 13: summary statistics of dummy variables and the regression results

```
. xttab marriedhead
```

	Overall		Between		Within
married~d	Freq.	Percent	Freq.	Percent	Percent
0	105	19.96	74	28.14	70.95
1	421	80.04	232	88.21	90.73
Total	526	100.00	306	116.35	85.95
			(n = 263)		

```
. xttab malehead
```

	Overall		Between		Within
malehead	Freq.	Percent	Freq.	Percent	Percent
0	100	19.01	69	26.24	72.46
1	426	80.99	232	88.21	91.81
Total	526	100.00	301	114.45	87.38
			(n = 263)		

```
. xttab remittance

                Overall             Between             Within
remitta~e |     Freq.  Percent      Freq.  Percent        Percent
----------+-----------------------------------------------------
        0 |      313    59.51        217    82.51          72.12
        1 |      213    40.49        167    63.50          63.77
----------+-----------------------------------------------------
    Total |      526   100.00        384   146.01          68.49
                                (n = 263)

. xttab incomegeneactvty_12mzs

                Overall             Between             Within
incomeg~s |     Freq.  Percent      Freq.  Percent        Percent
----------+-----------------------------------------------------
        0 |      351    66.73        218    82.89          80.50
        1 |      175    33.27        130    49.43          67.31
----------+-----------------------------------------------------
    Total |      526   100.00        348   132.32          75.57
                                (n = 263)

. xttab hhofffarm_yr

                Overall             Between             Within
hhofffa~r |     Freq.  Percent      Freq.  Percent        Percent
----------+-----------------------------------------------------
        0 |      271    51.52        183    69.58          74.04
        1 |      255    48.48        175    66.54          72.86
----------+-----------------------------------------------------
    Total |      526   100.00        358   136.12          73.46
                                (n = 263)

. xttab eqqubmembership

                Overall             Between             Within
eqqubme~p |     Freq.  Percent      Freq.  Percent        Percent
----------+-----------------------------------------------------
        0 |      471    89.54        251    95.44          93.82
        1 |       55    10.46         43    16.35          63.95
----------+-----------------------------------------------------
    Total |      526   100.00        294   111.79          89.46
                                (n = 263)

. xttab bankaccownership

                Overall             Between             Within
bankacc~p |     Freq.  Percent      Freq.  Percent        Percent
----------+-----------------------------------------------------
        0 |      480    91.25        260    98.86          92.31
        1 |       46     8.75         43    16.35          53.49
----------+-----------------------------------------------------
    Total |      526   100.00        303   115.21          86.80
                                (n = 263)

. xttab loantake

                Overall             Between             Within
 loantake |     Freq.  Percent      Freq.  Percent        Percent
----------+-----------------------------------------------------
        0 |      311    59.13        238    90.49          65.34
        1 |      215    40.87        190    72.24          56.58
----------+-----------------------------------------------------
    Total |      526   100.00        428   162.74          61.45
                                (n = 263)
```

Random-effects GLS regression — Number of obs = 526
Group variable: ID — Number of groups = 263

R-sq: within = 0.3264 — Obs per group: min = 2
between = 0.4388 — avg = 2.0
overall = 0.3846 — max = 2

Wald chi2(50) = 495.93
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

(Std. Err. adjusted for 263 clusters in ID)

childlabour	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Earlymarriage	2.309957	2.85672	0.81	0.419	-3.289112	7.909025
Firstworkstartageatfarm	-1.295844	.463733	-2.79	0.005	-2.204744	-.3869445
Farmwork	23.90785	5.233413	4.57	0.000	13.65055	34.16515
Domesticworker	5.697547	3.2233	1.77	0.077	-.6200055	12.0151
Student	-5.631186	2.766126	-2.04	0.042	-11.05269	-.2096791
Sex_child	4.038228	1.644339	2.46	0.014	.8153828	7.261073
Age_child	11.63722	2.42814	4.79	0.000	6.878149	16.39628
Age2_child	-.4724483	.1098386	-4.30	0.000	-.687728	-.2571686
Biochild	-2.25331	2.821139	-0.80	0.424	-7.78264	3.276021
Head_age	-.0134838	.0793788	-0.17	0.865	-.1690635	.1420958
Head_divorced	-.1184194	8.046945	-0.01	0.988	-15.89014	15.6533
malehead	-4.062633	1.823775	-2.23	0.026	-7.637167	-.4880991
Illiteracyofhead	6.453119	4.616027	1.40	0.162	-2.594129	15.50037
Informaleduofhead	6.423318	3.445138	1.86	0.062	-.3290289	13.17566
Ped18ofhead	7.695899	4.326599	1.78	0.075	-.7840798	16.17588
Sed912ofhead	6.872375	4.676572	1.47	0.142	-2.293538	16.03829
hhsize	1.258704	.805961	1.56	0.118	-.3209502	2.838359
Newbirth	-4.958244	1.896251	-2.61	0.009	-8.674828	-1.24166
malenumber	-1.451621	.7665892	-1.89	0.058	-2.954108	.0508665
femalenumber	-.9484936	.6911765	-1.37	0.170	-2.303175	.4061874
depratio	11.13853	6.415756	1.74	0.083	-1.436118	23.71318
youngmf	-.114793	.8392987	-0.14	0.891	-1.759788	1.530202
nplot	2.818871	.8208434	3.43	0.001	1.210047	4.427694
landsize	.0599934	.2586836	0.23	0.817	-.4470172	.567004
ozerlsk	.1577609	.2852318	0.55	0.580	-.4012832	.716805
oxen	-.9454629	1.172353	-0.81	0.420	-3.243232	1.352307
doxen	.8682781	2.342934	0.37	0.711	-3.723788	5.460344
consumption_mz	.0030547	.0013124	2.33	0.020	.0004825	.0056268
cementwal	1.180863	3.810938	0.31	0.757	-6.288439	8.650165
galvanizedroof	-1.22044	1.862978	-0.66	0.512	-4.871811	2.430931
laboursharing	-2.488346	1.621074	-1.53	0.125	-5.665594	.6889008
garbagedisposal	-.3076118	1.975868	-0.16	0.876	-4.180242	3.565018
loantake	3.273106	1.68244	1.95	0.052	-.0244165	6.570629
bankaccownership	-4.358473	2.968948	-1.47	0.142	-10.1775	1.460558
eqqubmembership	-2.800713	2.044064	-1.37	0.171	-6.807006	1.205579
incomegeneactvty_12mzs	2.60376	1.603756	1.62	0.104	-.5395439	5.747065
hhofffarm_yr	.5862652	1.51946	0.39	0.700	-2.391821	3.564351
remittance	.4497667	1.672536	0.27	0.788	-2.828343	3.727876
fertilizercredit	2.839293	1.883484	1.51	0.132	-.8522678	6.530854
waterharvest	-1.079512	1.916574	-0.56	0.573	-4.835928	2.676904
soilconservationmanure	-.2205849	1.872291	-0.12	0.906	-3.890208	3.449038
extentionagents	.2168384	.2266856	0.96	0.339	-.2274573	.6611341
numberofprimaryschoolspa1	1.197978	1.268559	0.94	0.345	-1.288353	3.684308
distancetoprimaryschookmpa1	-1.815936	.3739101	-4.86	0.000	-2.548787	-1.083086
distancetohighschoolkmpa1	.3363304	.0727704	4.62	0.000	.193703	.4789579
yesaccesstoelectricitypa1	-.097014	2.540757	-0.04	0.970	-5.076805	4.882777
yesaccesstopipewaterpa1	2.684825	1.98439	1.35	0.176	-1.204508	6.574158
Oromia	-7.920174	3.767045	-2.10	0.036	-15.30345	-.5369022
SNNP	-15.109	4.106238	-3.68	0.000	-23.15707	-7.060917
Amhara	-1.889678	3.955795	-0.48	0.633	-9.642893	5.863537
_cons	-32.05243	14.83014	-2.16	0.031	-61.11897	-2.985879
sigma_u	0					
sigma_e	14.329116					
rho	0	(fraction of variance due to u_i)				

a

Random-effects GLS regression — Number of obs = 526
Group variable: ID — Number of groups = 263

R-sq: within = 0.3109 — Obs per group: min = 2
between = 0.5792 — avg = 2.0
overall = 0.4689 — max = 2

Wald chi2(50) = 582.26
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

(Std. Err. adjusted for 263 clusters in ID)

farmchildlabour	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Earlymarriage	2.230995	1.947674	1.15	0.252	-1.586376	6.048365
Firstworkstartageatfarm	-1.249386	.3490619	-3.58	0.000	-1.933535	-.5652374
Farmwork	21.6955	4.032432	5.38	0.000	13.79208	29.59892
Domesticworker	-3.073195	2.512269	-1.22	0.221	-7.997152	1.850761
Student	-10.02226	2.406297	-4.17	0.000	-14.73852	-5.306004
Sex_child	10.42005	1.24381	8.38	0.000	7.982227	12.85787
Age_child	9.211751	1.953001	4.72	0.000	5.38394	13.03956
Age2_child	-.4036097	.0894781	-4.51	0.000	-.5789835	-.2282358
Biochild	-1.39237	2.232952	-0.62	0.533	-5.768875	2.984134
Head_age	-.0534894	.0600099	-0.89	0.373	-.1711066	.0641277
Head_divorced	-5.005889	7.431165	-0.67	0.501	-19.57071	9.558927
malehead	-1.111625	1.571682	-0.71	0.479	-4.192065	1.968815
Illiteracyofhead	5.219685	3.589401	1.45	0.146	-1.815413	12.25478
Informaleduofhead	3.528286	2.755843	1.28	0.200	-1.873068	8.92964
Ped18ofhead	4.995199	3.237664	1.54	0.123	-1.350506	11.3409
Sed912ofhead	5.05382	3.498246	1.44	0.149	-1.802617	11.91026
hhsize	.0397255	.6584242	0.06	0.952	-1.250762	1.330213
Newbirth	-2.901019	1.435788	-2.02	0.043	-5.715113	-.0869258
malenumber	-.9131044	.6580537	-1.39	0.165	-2.202866	.3766571
femalenumber	-.4656785	.5701189	-0.82	0.414	-1.583091	.651734
depratio	7.059098	5.267885	1.34	0.180	-3.265768	17.38396
youngmf	.581859	.57197	1.02	0.309	-.5391817	1.7029
nplot	1.735665	.7387426	2.35	0.019	.2877564	3.183574
landsize	.0737744	.1394139	0.53	0.597	-.1994718	.3470206
ozerlsk	.4817917	.2275526	2.12	0.034	.0357968	.9277866
oxen	-1.370466	.9148252	-1.50	0.134	-3.163491	.4225582
doxen	1.365071	1.909512	0.71	0.475	-2.377504	5.107647
consumption_mz	.0016733	.000826	2.03	0.043	.0000544	.0032922
cementwal	1.134397	2.819716	0.40	0.687	-4.392145	6.660938
galvanizedroof	-1.39773	1.606861	-0.87	0.384	-4.547119	1.751659
laboursharing	.1344298	1.169625	0.11	0.908	-2.157992	2.426852
garbagedisposal	-2.629608	1.540688	-1.71	0.088	-5.649302	.3900851
loantake	1.715834	1.329978	1.29	0.197	-.8908757	4.322544
bankaccownership	2.057925	2.78405	0.74	0.460	-3.398712	7.514562
eqqubmembership	-.9673313	1.756781	-0.55	0.582	-4.410559	2.475896
incomegeneactvty_12mzs	1.583807	1.304321	1.21	0.225	-.9726153	4.14023
hhofffarm_yr	-1.998383	1.279769	-1.56	0.118	-4.506684	.5099181
remittance	1.472747	1.368514	1.08	0.282	-1.20949	4.154985
fertilizercredit	1.948753	1.375731	1.42	0.157	-.7476307	4.645137
waterharvest	.4623631	1.756306	0.26	0.792	-2.979933	3.904659
soilconservationmanure	1.461714	1.334545	1.10	0.273	-1.153946	4.077375
extentionagents	.2845935	.2053245	1.39	0.166	-.1178352	.6870222
numberofprimaryschoolspa1	.0879722	1.209153	0.07	0.942	-2.281923	2.457868
distancetoprimaryschookmpa1	-1.326307	.3141411	-4.22	0.000	-1.942012	-.7106013
distancetohighschoolkmpa1	.1629772	.0644269	2.53	0.011	.0367027	.2892517
yesaccesstoelectricitypa1	.113783	2.042999	0.06	0.956	-3.890421	4.117987
yesaccesstopipewaterpa1	-2.154671	1.685612	-1.28	0.201	-5.458409	1.149067
Oromia	-12.90213	2.781511	-4.64	0.000	-18.3538	-7.450473
SNNP	-17.79152	3.153069	-5.64	0.000	-23.97142	-11.61162
Amhara	-5.733042	3.282411	-1.75	0.081	-12.16645	.7003658
_cons	-16.08785	12.12993	-1.33	0.185	-39.86208	7.686371
sigma_u	0					
sigma_e	12.315476					
rho	0	(fraction of variance due to u_i)				

Random-effects GLS regression — Number of obs = 526
Group variable: ID — Number of groups = 263

R-sq: within = 0.2823 — Obs per group: min = 2
between = 0.4719 — avg = 2.0
overall = 0.3785 — max = 2

Wald chi2(50) = 418.11
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

(Std. Err. adjusted for 263 clusters in ID)

domesticchildlabour	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Earlymarriage	.2295038	2.084697	0.11	0.912	-3.856427	4.315434
Firstworkstartageatfarm	-.2134054	.2681094	-0.80	0.426	-.7388903	.3120794
Farmwork	1.726167	2.529095	0.68	0.495	-3.230769	6.683103
Domesticworker	7.424218	2.045744	3.63	0.000	3.414634	11.4338
Student	2.929478	1.536637	1.91	0.057	-.0822751	5.941232
Sex_child	-6.415987	.9420706	-6.81	0.000	-8.262411	-4.569562
Age_child	3.362151	1.653837	2.03	0.042	.1206895	6.603613
Age2_child	-.114757	.0742677	-1.55	0.122	-.2603191	.0308051
Biochild	-.6292123	1.865642	-0.34	0.736	-4.285803	3.027379
Head_age	.0751729	.0468506	1.60	0.109	-.0166526	.1669983
Head_divorced	5.046306	3.114467	1.62	0.105	-1.057938	11.15055
malehead	-3.252679	1.311619	-2.48	0.013	-5.823405	-.6819524
Illiteracyofhead	1.313465	2.763081	0.48	0.635	-4.102074	6.729005
Informaleduofhead	1.612205	1.865414	0.86	0.387	-2.043938	5.268348
Ped18ofhead	2.682484	2.666493	1.01	0.314	-2.543747	7.908715
Sed912ofhead	1.830199	2.925722	0.63	0.532	-3.904111	7.564509
hhsize	1.451248	.5774546	2.51	0.012	.3194574	2.583038
Newbirth	-2.011819	1.156695	-1.74	0.082	-4.278899	.2552605
malenumber	-.6936883	.4317783	-1.61	0.108	-1.539958	.1525817
femalenumber	-.7341718	.4592653	-1.60	0.110	-1.634315	.1659716
depratio	6.410135	3.573784	1.79	0.073	-.594352	13.41462
youngmf	-1.002057	.4765802	-2.10	0.036	-1.936137	-.067977
nplot	1.2247	.5238772	2.34	0.019	.1979195	2.25148
landsize	.0504831	.1702965	0.30	0.767	-.2832919	.384258
ozerlsk	-.3193862	.1968739	-1.62	0.105	-.705252	.0664796
oxen	.2415095	.7753728	0.31	0.755	-1.278193	1.761212
doxen	-.9538043	1.444784	-0.66	0.509	-3.78553	1.877921
consumption_mz	.001698	.0007456	2.28	0.023	.0002366	.0031593
cementwal	-.4019907	2.914564	-0.14	0.890	-6.11443	5.310449
galvanizedroof	-.4123944	1.046868	-0.39	0.694	-2.464218	1.639429
laboursharing	-2.343374	1.060527	-2.21	0.027	-4.421969	-.2647789
garbagedisposal	2.693425	1.423348	1.89	0.058	-.0962862	5.483136
loantake	1.060593	1.055409	1.00	0.315	-1.00797	3.129156
bankaccownership	-5.60652	1.665602	-3.37	0.001	-8.871039	-2.342001
eqqubmembership	-.1384629	1.518051	-0.09	0.927	-3.113787	2.836862
incomegeneactvty_12mzs	.0815673	.9076804	0.09	0.928	-1.697453	1.860588
hhofffarm_yr	2.322028	.9738939	2.38	0.017	.4132315	4.230825
remittance	-.9489082	1.02077	-0.93	0.353	-2.949581	1.051765
fertilizercredit	-.1915619	1.176221	-0.16	0.871	-2.496914	2.11379
waterharvest	-.4929186	1.111961	-0.44	0.658	-2.672322	1.686485
soilconservationmanure	-.1440185	1.091763	-0.13	0.895	-2.283834	1.995797
extentionagents	.018267	.1665876	0.11	0.913	-.3082387	.3447727
numberofprimaryschoolspa1	.9643707	.8904523	1.08	0.279	-.7808838	2.709625
distancetoprimaryschookmpa1	-.3976252	.2355679	-1.69	0.091	-.8593298	.0640794
distancetohighschoolkmpa1	.1493366	.0398372	3.75	0.000	.071257	.2274161
yesaccesstoelectricitypa1	-.2692988	1.483917	-0.18	0.856	-3.177723	2.639126
yesaccesstopipewaterpa1	4.51722	1.260752	3.58	0.000	2.046191	6.988248
Oromia	5.539703	2.288817	2.42	0.016	1.053704	10.0257
SNNP	3.915219	2.455119	1.59	0.111	-.8967267	8.727164
Amhara	2.896359	2.375317	1.22	0.223	-1.759178	7.551895
_cons	-20.82958	9.329129	-2.23	0.026	-39.11434	-2.544826
sigma_u	0					
sigma_e	9.6158037					
rho	0	(fraction of variance due to u_i)				

Random-effects GLS regression — Number of obs = 526
Group variable: ID — Number of groups = 263

R-sq: within = 0.1325 — Obs per group: min = 2
between = 0.1154 — avg = 2.0
overall = 0.1205 — max = 2

Wald chi2(50) = 15.24
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 1.0000

(Std. Err. adjusted for 263 clusters in ID)

paidchildlabour	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Earlymarriage	.4427518	.4299651	1.03	0.303	-.3999642	1.285468
Firstworkstartageatfarm	.1927577	.2303153	0.84	0.403	-.2586521	.6441675
Farmwork	.6225252	.4616911	1.35	0.178	-.2823727	1.527423
Domesticworker	.7818954	.4367322	1.79	0.073	-.0740839	1.637875
Student	.8188857	.4760814	1.72	0.085	-.1142166	1.751988
Sex_child	-.0227969	.4219445	-0.05	0.957	-.8497929	.8041991
Age_child	-.941781	.7534706	-1.25	0.211	-2.418556	.5349943
Age2_child	.048864	.0374943	1.30	0.192	-.0246236	.1223515
Biochild	-.1672871	.3999435	-0.42	0.676	-.9511619	.6165877
Head_age	-.0406745	.0228511	-1.78	0.075	-.0854618	.0041128
Head_divorced	.262973	.4443124	0.59	0.554	-.6078632	1.133809
malehead	.2180194	.3301511	0.66	0.509	-.4290649	.8651037
Illiteracyofhead	-.6092138	2.048959	-0.30	0.766	-4.625099	3.406671
Informaleduofhead	1.24354	1.082799	1.15	0.251	-.878708	3.365788
Ped18ofhead	-.3660056	1.835762	-0.20	0.842	-3.964034	3.232022
Sed912ofhead	-.1404498	1.755141	-0.08	0.936	-3.580462	3.299562
hhsize	-.0891093	.1168353	-0.76	0.446	-.3181023	.1398837
Newbirth	-.0707046	.2589592	-0.27	0.785	-.5782553	.4368461
malenumber	.0803429	.0968629	0.83	0.407	-.1095049	.2701907
femalenumber	.0271219	.1610262	0.17	0.866	-.2884836	.3427273
depratio	-.0617522	1.207126	-0.05	0.959	-2.427676	2.304171
youngmf	.3247724	.4459134	0.73	0.466	-.5492017	1.198747
nplot	.0277779	.1583337	0.18	0.861	-.2825504	.3381062
landsize	-.0228545	.0194808	-1.17	0.241	-.0610361	.0153272
ozerlsk	-.0006646	.0787299	-0.01	0.993	-.1549724	.1536432
oxen	.0031266	.3116917	0.01	0.992	-.607778	.6140311
doxen	.3874637	.4158069	0.93	0.351	-.4275029	1.20243
consumption_mz	-.0003323	.0002278	-1.46	0.145	-.0007787	.0001142
cementwal	.4862681	.530196	0.92	0.359	-.552897	1.525433
galvanizedroof	.3535687	.4047234	0.87	0.382	-.4396745	1.146812
labourshar ing	-.6060035	.7235737	-0.84	0.402	-2.024182	.8121748
garbagedisposal	-.4013822	.2930024	-1.37	0.171	-.9756563	.172892
loantake	.4722562	.5344583	0.88	0.377	-.575263	1.519775
bankaccownership	-.9259913	.5849105	-1.58	0.113	-2.072395	.2204122
eqqubmembership	-.6737067	.4890227	-1.38	0.168	-1.632174	.2847603
hhofffarm_yr	.5060989	.388834	1.30	0.193	-.2560018	1.2682
incomegeneactvty_12mzs	.6211846	.5275051	1.18	0.239	-.4127064	1.655076
remittance	.1513072	.5431413	0.28	0.781	-.9132302	1.215845
fertilizercredit	.8585708	.7195123	1.19	0.233	-.5516473	2.268789
waterharvest	-.9008024	.6064225	-1.49	0.137	-2.089369	.2877638
soilconservationmanure	-.8800265	.7399409	-1.19	0.234	-2.330284	.5702311
extentionagents	-.0790052	.0492828	-1.60	0.109	-.1755977	.0175873
numberofprimaryschoolspa1	.0508547	.3431749	0.15	0.882	-.6217558	.7234651
distancetoprimaryschookmpa1	-.0296275	.0831921	-0.36	0.722	-.192681	.133426
distancetohighschoolkmpa1	.0138074	.0140721	0.98	0.326	-.0137734	.0413881
yesaccesstoelectricitypa1	.0806115	.3196217	0.25	0.801	-.5458355	.7070585
yesaccesstopipewaterpa1	.5463528	.3563183	1.53	0.125	-.1520182	1.244724
Oromia	-.2343305	.5599641	-0.42	0.676	-1.33184	.8631791
SNNP	-.1924099	.7413615	-0.26	0.795	-1.645452	1.260632
Amhara	.8602457	.6611943	1.30	0.193	-.4356713	2.156163
_cons	3.456912	4.330837	0.80	0.425	-5.031372	11.9452
sigma_u	.3922135					
sigma_e	3.6540723					
rho	.01138979	(fraction of variance due to u_i)				

DECLARATION

I the undersigned, declared that this thesis is my original work, has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

The examiners' comments have been duly incorporated.

Declared by

Name: Bisrat Abebe

Signature: _____

Date: June 20, 2014

Confirmed by advisor

Name: _Tassew Woldehanna (PHD)

Signature: _____

Date: June 20, 2014

Place and date of submission

Addis Ababa university