Income and child labor: evidence from agricultural households in Ethiopia

By

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DECLARATION

I, Abidemi Toyosi ADISA, declare that the dissertation, which I hereby submit for MSc Agricultural Economics degree at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

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Signature ……………………………………..

Doctor B.O. Abidoye

Date ………………………………………….

DEDICATION

This dissertation is dedicated to the glory of the Lord Almighty and to the memory of my late grandfather, Pa Arinde Timothy who lived a life worthy of emulation. Live on in the bosom of your maker till we meet to part no more.

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ABSTRACT

Child labour is closely associated with poverty. However, the direction of causality is an empirical question. There is need to control for potential endogeneity in order to be able to adequately estimate the factors that determine child labour. This study proposed a model of an agricultural household to explain the factors that affect the household's decision to involve their children in child labour and the type of influence each factor has on the household. These factors include household resources, child characteristics, community characteristics, school availability, etc. The data was analysed using both Tobit and Logit models. The Tobit model was used to find the relationship between the factors and duration of child work while the Logit model was used for the participation of the child in farm work. The outcome of the analysis showed that among agricultural households in Ethiopia, child labour is a normal good increasing with income. However, the impact on the male child was different from that of the female child, suggesting that gender bias with respect to child labour might exist in Ethiopia. The male child is made to participate more in farm work than the female child, though the females responded more to household land holding (size). This can be attributed to the need for the household decision maker to substitute household chores performed by the female child for farm work. The substitution effect of increase in income on household decision on child farm work is higher than the income effect, irrespective of the gender of the child, although the effect was significant for the male child but not significant for the female child. Also, school availability is a very important factor for both the male and the female child. The impact of household size in this analysis suggests the presence of division of

labour, and the significance of the mother's education on the female child's response suggests that the effect of cultural belief system changes with the mother's education.

Key Words: Child labour; Income effect; Substitution effect; Endogeneity; Tobit.

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ACRONYMS

CSA	Central Statistics Agency
EA	Enumerator Areas
ECADF	Ethiopian Current Affairs Discussion Forum
ILO	International Labour Office
IPEC	International Programme on the Elimination of Child Labour
OPHI	Oxford Poverty and Human Development Initiative
LSMS-ISA	Living Standard Measurement Study- Integrated Survey of Agriculture
MPI	Multidimensional Poverty Index
UNICEF	United Nations Children's Emergency Fund
SNNP	Southern Nations Nationalities and Peoples' Region

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Poverty is one of the major challenges of this century and human capital formation is one of the key ways of overcoming it (Pervez, 2014). Poverty can influence the decision as to whether a child will attend school, work or combine the two. However, investment in education is a long-term process which may yield benefits in the future but conflicts with current household consumption. Trade-off between investing in education and consumption has implications for child development and poverty alleviation effort.

Child labour, according to the International Labour Office (n.d.), is defined as work that deprives children of their childhood; their potential and their dignity; and that is harmful to physical and mental development. The ILO further defined it as work undertaken by children below the appropriate legal minimum working age. This minimum age varies from country to country, with the lowest being fourteen years. According to Fafchamps and Wahba (2006), lack of education and child labour has potential long-term effects on human capital accumulation and development.

However, child labour is said to be one of the most pervasive problems of developing countries (Haile and Haile, 2012).Ersado (2005) concluded that child labour has a negative relationship with child schooling. Besides affecting the child physically, mentally and psychologically, it prevents human capital formation by leaving the child with little or no time and strength to focus on education, thereby perpetuating poverty into future generations (Ravallion and Wodon, 2000). Gunnarsson et al. (2006) in a study carried out on nine Latin America countries found that third and fourth graders that worked longer hours outside their homes performed poorly in school both in mathematics and language exams. Therefore, for the problem of low level of education to be tackled, child labour is of great relevance.

UNICEF (2014) estimated the population of child labourers at 150 million using a definition for only children from ages five to fourteen. They further concluded that around 13% of children aged five to fourteen in developing countries are involved in child labour and sub-Saharan Africa has the highest proportion with 25%. Child labour mostly occurs in sectors like agriculture with 58.6%, industries with 7.2%, domestic work with 6.9%, services that

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exclude domestic work with 25.4% and those that are non-defined with 1.9%, according to the ILO (n.d.). However, household domestic work or chores will be included in child labour when it deprives the child the opportunity for human capital formation.

Child labour is widespread but its causes could vary from one location to another (Ersado, 2005), which has contributed to the inconclusive evidence in the literature. Cultural and economic factors cannot be generalised upon because they are expected to influence child labour based on other factors which could be peculiar to the particular location. Basu and Van (1999) argued that the fact that parents send their children to work is not a result of their selfishness to enjoy leisure time but is a result of poverty. In Pakistan for example, child labour was found to be a result of poverty (Bhalotra, 2000). Poverty is taken as a primary cause although studies have shown that other factors can be significant in this decision making, such as access to credit, school quality, labour market opportunities and so on (Ersado, 2005). A high level of child labourers in low income generating countries according to Basu, (1999) is an indication of an inverse relationship between income and child labour. The opportunity cost of schooling increases as the market wage of child labour increases (Becker, 1964). Likewise, differences in the market conditions for boys and girls further affect the decision to go to school or not.

School attendance may be low even with the presence of good schools that are accessible, especially when the households give more weight to income generation from child labour and less to schooling as a result of poverty (Grootaert and Kanbur, 1995). Furthermore, when a poor household depends on the income from their children and does not invest in their education, they are risking perpetual poverty (Moser, 1996) and the vicious circle of poverty will continue. For poor households, school investment decisions are related to decisions like use of time and other resources. Child labour constitutes a serious and complex problem in developing countries and the type of child labour varies from country to country according to both country and family culture, the location of residency, socioeconomic conditions as well as level of development (Pinzon et al. 2003).

Child labour is considered primarily a rural phenomenon in Africa where children are engaged in farming and in contrast as an urban phenomenon in Asia and Latin America where children often work in small-scale industrial enterprises or in small trade and service businesses (Fafchamps & Wahba, 2006). Child labour is concentrated mainly in the agricultural sector with a large proportion carried out in family businesses either at home in

the form of chores done mainly to allow the adult responsible for those chores to carry out productive tasks, or on the family business (farm) without pay (Kim and Zepeda, 2004). Most times attention is drawn to children in the workforce that earn wages but little is said or done about the ones involved in family business or that are over laboured with household chores. This has led to laws and policies of countries that concentrate on children in the labour market but do not say much about the ones that are over laboured in their homes since household child work is difficult to measure and monitor unlike wage work.

1.1.1 Background on Ethiopia

The main source of livelihood and highest employer of labour in Ethiopia is subsistence farming and the informal urban sector as casual labourers, all of which are labour intensive and characterised by low income. Ethiopian household production will require a large labour size which will be drawn mainly from the household because of the labour market failure that exists in Ethiopia. The effect of this will directly impact on the children within these households. In Ethiopia, children enter the labour market very early in life; according to Assefa (2002), 75.8% of children below 8 years of age were already working. Children either work within the household business, help their parents to meet their contract terms as labourers, or work in the house in the form of chores that are mostly done by females and young ones so as to allow the adults responsible for those chores to have more time for productive activities, all of which can be categorised as child labour depending on the intensity and the impact on the child's human capital formation.

However, there are variations in the scope and nature of child labour between the rural and urban dwellers, between the male and female genders and among sectors. Children in the rural areas are mainly involved in farm work and household chores but the ones in urban areas are involved in other sectors. There is very little information about child labour in the urban areas because of the illegality of child labour, though it exists in the urban areas. The growing population of children within the ages of eight and ten found working in the formal sectors of urban centres shows that child labour exists in the formal sector, though most of them are not direct employees (Hailu et al., 2009). Most of these children are employed as casual workers and this exposes them to labour exploitation by their employers and denies them their basic rights according to labour laws and constitutions. A report by the ILO in 1995 showed that the type of child labour in the rural formal sector is such that children under the age of fifteen were working on big plantations, not as direct staff but to help their

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parents who have contracts as labourers with the plantation. Other sectors in which child labour is found include the construction sector, small-scale manufacturing industries and agro-industries. However, most of these children do not get paid because they largely work in order to assist their parents who have signed contracts with the employers.

In the informal sector, however, agriculture is the main employer of children because of the subsistence nature and pastoralism involved. Crude, labour intensive methods are used for production, so every member of the household may be involved regardless of their age or gender. However, the female child has the added responsibilities of household chores after completing the farm work (Zeleke and Tuji, 2008). Male children between four to seven years would have started helping their parents to herd cattle and other domestic animals. They also fetch water and fuel wood from far locations just like their female counterparts (Hailu et al., 2009). However, the rural Ethiopian communities do not consider child labour as hazardous but see it as a way of equipping the child with the necessary skills they require for the future (ILO, 1995).

The ILO (2015) showed that a key cause of the problem of child labour in Ethiopia is poverty and its associated consequences. A survey carried out in 2001 reported that about 90% of the children working in productive activities gave a positive response to either supplementing family income (23.8%) or to improving it (66.0%) as their reasons for working. Also, due to the cheap labour that children provide, they are preferred to adults by employers of labour. Another important factor is the cultural belief system, which sees children as an asset to generate income in times of poverty and therefore advises that parents should make their children or wards start work early in life. This will help them acquire skills for future use. Other factors that the ILO found important were educational problems like poor quality of education, distance from school, over-crowding, inability to support schooling, family disintegration as a result of divorce, orphan-hood by AIDS, various conflicts, civil strife and war, drought and resettlement, and rapid urbanisation.

1.1.2 History of child labour

The growing gap between the rich and the poor in the United States and the world at large in the 1800s pushed millions of children out of school to work. Industrialisation led to an increase in child labour such that by the 19th century, American children were working in mines, glass factories, agricultural and textile industries, etc. However, child labour began to drop as labour and reform movements enlarged and the labour standards also began to

improve. In a bid to put an end to child labour in the USA, compulsory education of children was introduced and it was in the year 1938 that a minimum age of employment and hours of child work was regulated by federal law for the first time in the United States (Clark-Bennett et al. 2011).

A recent survey by ILO (n.d.) showed that above 2.5 million children are economically active in developed countries, 2.4 million in transition countries, 127.3 million in Pacific and Asian countries, 17.4 million in Latin American and Caribbean countries, 48 million in sub-Saharan Africa, and 13.4 million in the Middle East and North Africa. Africa has the highest incidence of economically active children, with 41% (approximately 80 million under the age of 14) of her children working and an average of 30% of children between the ages of ten and fourteen involved in agricultural activities.

The high rate of child labour led to the ILO's establishment of the International Programme on the Elimination of Child Labour (IPEC) to reduce child labour. IPEC is the world's largest technical corporation on child labour. It began in 1992 and since then has being effective in reducing child labour, creating general awareness of the problems associated with it and building the capacity of institutions with child labour as a responsibility in 75 countries. The ILO also led a convention in 1973 titled "ILO's minimum age convention (No. 138)" which has been ratified by 116 countries with the aim of abolishing child labour among children under the age of completing compulsory education. There was also another convention in 1999 titled "ILO's Worst Forms of Child Labour Convention (No. 182)" which has also been ratified by 117 countries with a focus to abolish all worst forms of child labour for children under the age of eighteen. Another international standard was by the United Nations: The UN Convention on the Rights of the Child (CRC), which outlines the economic, cultural, civic and social rights of the child (ILO, n.d.).

1.1.3 Effects of child labour

Child labour may lead to physical injury or damage and/or also cause social and economic harm to the child, both now and in future. Child labour generates an unfavourable effect for the proper development of the child (Amar et al., 2008). Childhood is a very crucial stage in a person's life and it is very critical for their psychological development, and so activities carried out during this stage could affect a young person's self-esteem and self-concept. This stage is influenced by school, relationship with peers, and the family environment (Omokhodion et al., 2006). Child labour also affects their quality of life and their mental

health. Amar et al. (2008) found that it is not just the physical health of the child that is affected but child labour also leads to emotional wear and tear. Children are more vulnerable to the physical and psychological impact of labour than adults. This is as a result of their psychological immaturity and the process of growth that they pass through, although this is not proven by research according to O'Donnell et al., 2002.

Child labour also has social and economic consequences. The study of Emerson and Souza (2008) found that adults that never participated in child labour during their childhood earned more than those that did. Their study also found a link between generations and child labour and this link is attributed to continuity of poverty. Therefore, child labour does not just affect the child immediately or in the short term but also has a long-term effect throughout the whole life cycle. Early exposure to labour will reduce an individual's work opportunities during adulthood, prevent attainment of adequate educational levels and impede the formation of a stable family unit (Beegle et al., 2006; Seebens and Wobst, 2003). Children who work in hazardous industries can end up being disabled, traumatised, sexually abused, intimidated, or mentally incapacitated. Also, children involved in child labour are not given a fair opportunity to decide or choose a career for themselves, since they will most likely end up as farmers due to the subsistence nature of Ethiopia's agriculture and will not be able to break free from the vicious circle of poverty. Therefore, for Ethiopia to alleviate poverty, child labour should be discouraged while child education needs to be encouraged.

The most significant impact of child labour is found in the educational sector. Most of the studies conducted have related child labour to education outcome (Grootaert and Kanbur, 1995). Pedraza and Ribero (2006) reached the conclusion that child labour and schooling is an exchange decision, although there are cases of both activities carried out. It mostly makes the adequate inclusion of children into the educational system difficult (Dyer, 2007), because the time that should be allocated to study is either reduced or completely taken away and little attention is paid to academic activities due to fatigue from labour work (Sabia, 2009). Therefore, the number of hours that a child dedicates to work should be included in evaluating the well-being of a child. For instance, studies carried out on developing countries have found that most children combine both work and school together (Heady, 2000). But some cases found a negative relationship between the amount of time a child spends working and that of school attendance (Boozer and Suri, 2001).

Child labour is an act that violates at least one of the following, according to Clark-Bennett *et al*. (2011):

- The National minimum age law
- Children's physical, mental or emotional well-being
- Tolerance of abuse like slavery, illicit activities, etc.
- Right to be educated
- Labour standards.

1.2 PROBLEM STATEMENT

Child labour, according to Cigno et al. (2002), is a growing problem that has been fuelled by international trade. The critics of globalisation argued that market integration will lead to an increase in labour demand which will expand the earning opportunities of children and lead to child labour (Edmonds and Pavcnik, 2005). Actions are being taken to reduce child labour by discouraging the sales of products in which child labour was engaged. However, the success rate is low because the supply chain is very long and producers end up subcontracting the services, which makes it difficult to monitor compliance (Yacouba et al., 2013). But if child labour is a direct product of poverty, an increase in household earning should lead to a decrease in child labour, provided child labour is not a normal good (a normal good is a good that its consumption increases with increase in income).

Moreover, the decision as to whether a child will be enrolled in school or work lies with the parent and not the child because the child has not attained the age of responsibility. In most cases, the child works within the household either on household chores or in the family business/farm (Basu and Ray, 2002). But in extreme cases they are made to work for wages and in small enterprises (ILO, 2015). Therefore, researchers have being trying to examine the factors that influence the decision of parents to choose work, schooling or both for their children or wards.

Despite the fact that child labour is not acceptable universally, there are still millions of child labourers. According to UNICEF (2014), child labour deprives children of the right to go to school, it exposes them to violence and further reinforces the cycle of poverty from generation to generation. The Convention of the Rights of the Child as far back as 1989 recognises every child's right "to be protected from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education",

or that is likely to harm the child's health or "physical, mental, spiritual, moral or social development". This notwithstanding, child labour is still a global problem, particularly in the developing world, although most countries have this Convention of the Rights of the Child in their laws. UNICEF therefore gave the following outlines as to what an effective child protection system must include:

An effective child protection system must include the following:

- A robust legal and policy framework which includes regulations and standards
- Effective regulation and oversight to ensure effective implementation of standards and promote accountability
- Services and service delivery mechanisms, comprising promotion, prevention and response at institutional and structural levels
- Collaboration and coordination between government and non-government actors, ministries, departments and different sectors
- Knowledge and data on child protection issues
- Human and financial resources and management infrastructures and capacities.

(Adapted from *Child Labour and UNICEF in Action: Children at the Centre. UNICEF*, 2014).

However, for the above to be effective and efficient, there is a need for a well conducted study such that the policies and laws that will be passed and enforced will be able to tackle the problem of child labour correctly. If the underlying factors that influence household decisions are not properly defined, then decision makers and stakeholders will end up with bigger problems than they started with. The effectiveness of intervention programmes and policies that are designed and implemented to deal with child labour will increase if they are based on adequate knowledge of the causes of child labour (Holgado et al., 2014).

Practically all the studies carried out on child labour found poverty as a major contributor to the incidence of child labour. Countries with the highest rate of child labour in the world are also categorised as some of the poorest in the world. Ethiopia, for instance, is rated the second poorest nation and has a very high rate of child labour with very low education. This is because child labour is sometimes seen as a good way of engaging children in productive activities, especially when schools are either not available or not up to the expected standard (Rosati and Rossi, 2007).

Consequently, this study using Living Standard Measurement Survey data employs the Tobit model to test the relationship between child labour and poverty in an attempt to respond to the following questions:

1. How does the variation in individual household characteristics in Ethiopia affect the duration of child labour among rural agricultural households?
2. Can school availability and quality of school be important factors in child time allocation?
3. Are the factors responsible for child involvement in farm work the same as the factors that influence the duration of farm work a child performs?

1.3 OBJECTIVE OF THE STUDY

The general objective is to investigate the relationship between household income and time spent on farm work among agricultural households.

The specific objectives are:

i. Describe the demographic and socio-economic characteristics of agricultural households in Ethiopia.

ii. Identify the significant factors that influence the allocation of child time to farm work or schooling.

iii. Identify the factors that significantly influence intensity of child labour in farm work.

The above stated objectives will be achieved by testing the following hypotheses.

1.4 HYPOTHESES

- H0: Demographic factors and socio-economic factors have no significant impact on child labour in Ethiopia.
- H0: Income is not a significant factor that affects child time allocation between work and school.
- H0: Factors that affect child labour do not significantly vary from those that affect the intensity of farm work.

1.5 JUSTIFICATION OF THE STUDY

This study is important in Ethiopia because of the high rate of poverty. With intensity of poverty (A) of 62.26% in 2011 (OPHI, 2013) which has impacted on the households and since a large percentage of children are working instead of schooling (22% of children aged five to fourteen, according to UNICEF 2013), the vicious circle of poverty will continue to expand. To break this vicious circle, human capital has to be developed so that children will have a better future than their parents. For this to happen, child labour has to be reduced to its barest minimum. To reduce child labour, factors that affect it have to be identified. Since the effect of income change is peculiar to individual countries, the result from other countries like Vietnam cannot be used to judge its effect on Ethiopia. Therefore, for Ethiopia to reduce child labour, the income variation impact on household should be known.

Edmonds and Pavcnik (2005) argued that there is room for further studies on the impact of income on child labour particularly in different countries and sectors given that the determinants of the impact of income depends on the relative strength of the income and substitution effect which will determine the effect of income change on child labour. This is in contrast to other factors that affect child labour like demographic factors, etc.

The perception of child labour is important for evaluating its relationship with income. In general, child labour is a "bad" (that is an inferior good whose consumption will decrease with increase in income) and should reduce with increase in income, but in Ethiopia most households culturally see it as a way of helping the child (ILO, 1995). Most studies that focused on the impact of income change on child labour could not generalise the possible outcome of their study for all countries but acknowledged the possibility of an income effect overshadowing the substitution effect or vice versa. The role of income will be attenuated if it is seen as normal phenomenon. It is expected that for a country like Ethiopia with strong cultural values that sees child labour as a "good" (normal good) and not a "bad", particularly in the rural communities, income may not have a significant effect on child labour decisions.

Another issue is endogeneity in the relationship between child labour and income – previous studies in this area did not control for endogeneity (Cockburn, 2000; Assefa, 2002) as a result of child income entering the household income. This will potentially lead to biased estimates of the impact. Furthermore, child income is not separable from the household income because the child is not paid wages for working on the family business. Therefore, the need arose to introduce instrumental variables into the model.

This study is also interested in looking at the impact of the gender of the child on the involvement of the child in farm work, just like the study of Bhalotra and Heady (2000) on Ghana and Pakistan, which showed that in Pakistan, income had a negative significant impact on male children while for females the result was also negative but not significant. In the case of Ghana, the result was different, with a positive impact on males and negative on females.

In summary, this study will be useful for policy makers when deciding on the best way to reduce child labour in Ethiopia. This is because if poverty is taken as the key factor and attention is not paid to how a change in income is likely to affect the decision of households that belong to different sectors, a general solution might be provided which may have the expected result on some households and have a worse effect on others. Therefore, a study that looks at households based on their sector and the gender of the child is necessary since the existing laws and policies have little or no impact on child labour.

1.6 PLAN OF THE STUDY

The remaining part of this study is divided into chapters and arranged in the following format. Chapter Two contains the theoretical and empirical framework of the study. Chapter Three is made up of the data and descriptive statistics. Chapter Four presents the models used and marginal effect results from the analysis and the interpretation of results. Chapter Five documents the summary, policy recommendations and conclusions. All the coefficient results are presented in tabular form in the appendices.

CHAPTER TWO

THEORETICAL AND EMPIRICAL FRAMEWORK

2.1 THEORETICAL FRAMEWORK

2.1.1 Introduction

Theory is the foundation on which economic studies are built. The theoretical framework of this study concentrates on the relationship between household decision model and child labour. The household decision model is based on utility maximisation. Theoretically, two households should make similar decisions under similar conditions provided their source of utility is the same. This section further considered the household decision model and

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imperfect capital and labour market and how it affects child time allocation. It then concludes with the relationship that exists between income and substitution effect and child labour.

According to Becker (1981) and Schultz (1997), the household decision model is based on utility maximisation. Household utility is a function of the number of children, leisure per child, education per child, a composite consumption of goods and leisure of parents. Among rural dwellers, households are involved in the production of the goods they consume. The goods are produced using inputs purchased in the market and household labour. In a perfectly competitive labour, good and capital market, the father allocates time to labour and leisure, mother allocates to labour, home production and child rearing and the child allocates time to school, labour, home production and leisure. But where capital, labour or good market fails, the impact on the child may lead to an increase in time allocated to labour, which will further reduce the time a child can allocate to other activities from which he/she derives utility.

In the case of capital market failure, child labour arises when there is family credit-constraint (Laitnerm 1997; Parsons and Goldin, 1989; Jacoby and Skoufias, 1997). Credit facility is a factor that is related to income and it is expected to affect child labour and child schooling. If the household expects a continuous increase in family income, it is optimal to borrow against the future to smoothen consumption across time (Brown et al., 2002). Also the availability of credit facilities will positively influence the demand for child schooling (income effect) provided it leads to increase in household income. Since child labour is sometimes seen as a means of coping with shocks, the availability of credit facilities can help to overcome the impact of the shock without having to pull out the child from school into the labour market (Casabonne, 2006). But where there is no access to credit facility, the household will have to use their internal assets. This could lead to child labour which implies that the parents are borrowing from the future by making the children work instead of investing in their human capital. This is an optimal but not efficient situation because the present discounted value of an added hour of schooling is greater than the returns to an additional hour of work. And child labour will therefore lead to disutility to the child.

Furthermore, in an imperfect market for land and labour, market failure may occur as a result of the difficulties with employing labour or leasing land (Skoufias, 1995). This could be as a result of high transaction cost in employing external labour, leading families to make use of their own man power as compared with employing external labour. This has a significant impact on child labour because in a perfect labour and land market, an increase in land

holding should lead to positive investment in child education as a result of the income effect. But in the face of an imperfect market, the reverse may be the case. However, there may be an interaction between capital and labour market failure. If land is used as a form of savings, it will be dispersed among a large number of families instead of it being concentrated in the hands of few large scale farmers and the optimal use of land will now require child labour if the transaction cost of hiring external labour is high.

Therefore, households may have to choose between having a large family size and having a smaller one depending on which one gives them maximum utility. For farming households there is a high probability that they will prefer a large family size to non-farming households. Households that derive utility from investing in the human capital of their children may prefer a smaller family size to those that do not. This leads to a trade-off between the quality of child and quantity of children (Schultz, 1997) such that the decision of the household to increase one (that is quality or quantity) will reduce the other. Furthermore, household poverty usually affects the choice a household makes between quality and quantity of children. Also, agricultural households see children as assets because of the high demand for labour that exist as a result of subsistence farming. Therefore, children will have to dedicate time to work and this will reduce the amount of time left for other activities because of time constraint.

Poverty is therefore an important factor in the decision making of a household on how to allocate their child's time. An increase in household income will lead to a decrease in household poverty. However, an increase in household income can either increase or decrease child labour. Child labour may persist in the presence of high household income if the degree of selflessness of the parent is very low (Rogers and Swinnerton, 2004). Therefore, the decision to send a child to work or school will not only depend on government incentives and household income but on factors such as returns from alternative use of child's time, capital market and credit constraints (Basu and Van, 1998; Baland and Robinson, 2000; Edmonds, 2005; Loury, 1981). Parental or household income will affect child labour through the income and substitution effect (Mayer, 1997; Ranjan, 2001; Edmonds and Pavcnik, 2005). Child labour will increase with increase in household income if the impact of the positive substitution effect of child labour is higher than the negative income effect. An increase in income will therefore lead to increase in demand for the child's time on the farm. This is the expectation for households that do not see child labour as a disutility but as a utility. When

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child labour is a "normal good", the household will increase its consumption with increased household income (substitution effect). But when it appears as a "bad" in household preference, its consumption will decrease with increase in income (income effect).

2.2 EMPIRICAL FRAMEWORK

As much as national level of poverty has a known path of influence on child labour, household level income cannot be generalised. This is as shown by all the studies carried out on the influence of household income on child labour (such as Cockburn (2000); Assefa (2002); Bhalotra and Heady (2000)); they all concluded that the effect of household income on child labour is determined by the income and substitution effect and the impact will be in line with the one that overshadows the other. If the income effect overshadows the substitution effect, then child labour will reduce with increasing household income. Which means child labour is a "bad" in household preference. However, if the substitution effect is greater, then child labour will be expected to increase with increasing income in which case child labour is seen as a normal good.

A study on India and some other developing countries by Swaminathan (1998) found that increased poverty was not correlated with increased incidence of child labour. Income does not matter in the presence of a complete credit market (Ranjan, 2001). Jacoby (1994) also found that in Peru, borrowing constraint had a negative impact on child schooling and therefore will increase child labour. Ersado (2005) carried out a study on three geographic regions: Africa, Asia and Latin America to show that poverty may not be the primary cause of child labour. He concluded that improving the access to credit has a great potential of reducing child labour and improving school attendance in the rural areas. He also found that attempts to improve adult education and wage of adults will help to curb the prevalence and intensity of child labour and also improve the likelihood of children to stay in school.

Furthermore, Edmond and Pavcnik's (2005) study on the effect of trade liberalisation on child labour using the relative change in price of rice as an indicator for trade liberalisation showed that an increase in the price of rice by 30% led to a 9% decrease in child labour in rural Vietnam among net producing households. This was as a result of a large income effect that led to a reduction in child labour despite an increase in the opportunity cost of child leisure due to increase in price of rice which translated to an increase in the value of labour. Other studies used various means to relate the effect of household income on child labour and

found that the impact is dependent on the income and substitution effect (Basu and Van, 1999; Baland and Robinson, 2000; Fafchamps and Wahba, 2006; Ersado, 2005). Child labour supply is an outcome of a household welfare maximising decision. Therefore, an increase in the price of an agricultural product should increase its demand and lead to higher wage if agriculture is child labour intensive and children will be expected to work more. But when child labour is a "bad" in parental preference, the price increase will lead to a decrease in child labour.

Land according to the agrarian society is the most important store of wealth but with a large percentage of households not owning land, it is not possible to conclude that child labour emerges from the poorest households (U.S Department of Labour, 2000; Basu and Van, 1999). Theory has emphasised on the credit market imperfection (Ranjan, 1999; Lahiri and Jaffrey, 1999) but paid little attention to the labour market imperfections. However, Basu and Van (1999) emphasised that labour market failure may explain the prevalence of children working on household farms and enterprises. Bhalotra and Heady (2000) in a study carried out on Ghana and Pakistan expected that asset ownership should increase child labour because the marginal product of the child increases with increase in the stock of productive asset which in their case was land. Although it is expected to keep increasing until the wealth effect of the household is large enough to dominate.

However, provided that production and consumption decisions can be separated, then labour usage on household farms will not be dependent on household composition (Benjamin, 1992). But in the presence of an imperfect labour market, separability will be violated and farm labour usage becomes a function of household composition. In the case of non-separability, Cockburn (2000) found that child labour in Ethiopia is a function of the stock of land and other assets. Bhalotra and Heady (2000) therefore modelled their own study on child farm labour as it depends on both farm size and consumption of the household, using consumption as a proxy for household income.

Bhalotra and Heady (2000) presented a different twist to the relationship between income and child labour by correcting for the flaws in previous studies. For instance, most of the studies used consumption, adult wage rate or household assets like land as poverty indicators but Bhalotra and Heady combined both consumption and land ownership in their analysis. This is because if asset ownership is used alone as was done by Assafe and Cockburn on Ethiopia, the household income in this case will lead to a positive substitution effect which could

entangle the expected negative income effect. Also the assets owned by households will not reflect the complete income of the households especially for households that have other sources of income like abroad transfers.

Cultural practices have a strong influence particularly on the female child. Poverty was found to influence the enrolment of the female child more than the male child in school (Colclough et al., 2000). This is due to the preferential treatment that a male child has gotten over the female child since time immemorial. However, for households where the mother is educated, it is expected that the female child should work less and be enrolled in school. In Ethiopia where child labour is not seen as a "bad" in the parental preference but as a way of equipping the child, children are introduced to labour work at a very tender age from four years of age (Assefa, 2002). Therefore, the cultural belief system will not just affect the female child as in most developing countries but also affect the male child. Although for Ethiopia, the cultural belief will affect the type of work that the different genders will be involved in and will likely increase the work load of the female child as compared to the male child since the female child is expected to be equipped with other forms of skills especially household chores.

Child labour and school enrolments are two decisions that the household has to make at the same time. The household head or decision maker will have to choose between sending their children to school, engaging them in work or involving the children in both at the same time. Therefore, any decisions that will affect a child's schooling will indirectly or directly affect child labour. For instance, poor quality of educational system (Ray, 2000; Mukherjee and Das, 2008), low salary and poor working conditions of education facilitators (Kim, 2009) were factors that encouraged households to send their children to work.

Only Edmonds and Pavcnik (2005) and Cockburn (2000) used a panel data in their analyses. This is due to the presence of a change in the price of rice and the availability of data on the pre- and post- changes. The use of panel data allowed a comparison of the pre- and post-effect of a new programme or technology on each household unlike cross sectional data. However, the other studies that were stated above used cross sectional data in their analysis. Ersado; Bhalotra and Heady; Fafchamps and Wahba used the Tobit to analyse the regressors. This is as a result of none participation by some households that own land but are not involved in agricultural practices according to Bhalotra and Heady (2000). They all included instrumental variables in their regressions since child income was found to be endogenous in

their regression. However, Edmond used a linear probability model while Assefa and Cockburn used multinomial Logit models

Most of the studies that were carried out on income and child labour failed to look into the endogeneity problem that exists as a result of child labour contributing to the household income. This will lead to an upward bias in the coefficient of income. Furthermore, there has always being an aggregation of child labour that is not separated into the different areas in which children work. This could lead to a loss of the actual impact on child labour if child labour is not distinguished according to the sector in which the child works or the location in which the child dwells or if the impact is carried out on both genders at once. It will be difficult to be able to interpret the result correctly and accurately. Bhalotra and Heady's result further buttresses the ambiguous nature of income impact on child labour and the nature of the result further confirms that aggregating child labour across jobs, rural and urban areas and even gender will lead to a misinterpretation of the impact of income on child labour.

Cockburn (2000) and Assefa (2002) in their study on Ethiopia both used assets as proxy for income but both did not put endogeneity into consideration. It is expected that child labour will contribute to household income which is used to purchase the assets within the household. Child income cannot be separated from the household income because children working on family business do not earn wages. Therefore, endogeneity will be present. However, in the case of land as asset, endogeneity will not constitute a problem for Ethiopia due to the main method of land acquisition which is free.

This study therefore concentrated on the response of child farm work to income proxied by consumption and land holding of households which is in line with the study of Bhalotra and Heady on Ghana and Pakistan. It also controlled for other factors that most studies on child labour found to significantly affect the household's decision on child labour like child characteristics, community characteristics etc. But just like Bhalotra and Heady (2000), it took care of endogeneity that exists between child labour and income by introducing instrumental variables. It also focused on agricultural child work and separated the response of the male child from the female child.

In summary, the decision of a household to include their child(ren) in labour work is influenced by external factors ranging from failure in the credit and labour market to cultural belief system. Child labour may not be affected by the household income especially for

households that consider it as a means of maximising utility and not as a disutility. Therefore, variation in household income does not have a known path of influence on child labour and should not be generalised until a proper research is carried out that will define the path. In addition to income, household decision about child time allocation is affected by other factors as was discovered by previous studies and these factors may not necessary follow a known path just like income.

CHAPTER THREE

DATA AND DESCRIPTION STATISTICS

3.1 INTRODUCTION

Measurement of child labour is always tricky given differences in perception of what it is and negative connotation related to it. Questions on child labour are best not asked in a direct form so as to avoid imperfect information. Also to be able to get information on income, there has to be a tactical way of presenting the question such that the respondents do not distort the information that they will provide. The data used for this study was collected by the World Bank in conjunction with the Central Statistics Agency of Ethiopia in year 2011/2012. It was a detailed agricultural household survey. The descriptive statistics presented below gives a picture of what was obtainable in Ethiopia providing prior knowledge of what the analysis in the next chapter entails.

3.2 ETHIOPIA AS A CASE STUDY

Ethiopia's present population is estimated at about 98 million people that is 1.35% of the world's total population of about 7 billion and therefore ranks the 13th most populous country in the world with a growth rate of 2.58% (Worldometer, 2015) and a relatively high fertility rate of 4.59 which showed a decline compared to previous years in which fertility rate was as high as 7.09 children per woman in 1995. Children are seen as a form of asset in Ethiopia and this is attributed to the high reliance on subsistence agriculture as a source of livelihood. The median age is 18.6 years which defines it as a country dominated by youths. It is densely populated, with 90 persons/km². However, the majority of the population dwell in the rural areas with 82% rural dwellers and 18% urban dwellers (Worldometer, 2015).

With this high population, Ethiopia is one of the poorest countries in the world. According to the ECADF, 2013, Ethiopia is ranked the second poorest nation in the world after Niger. This ranking used the Multidimensional Poverty Index (MPI). The MPI is an index that looks beyond just the income of an individual but complements a traditional focus on income to reflect the deprivations that a poor person faces simultaneously with respect to education, health and living standard. Ethiopia had a MPI of 0.523, multidimensional headcount ratio (H) of 84.07% and intensity of poverty (A) of 62.26% in year 2011. This high MPI is almost twice that of most countries in East Africa (OPHI, 2013) thereby indicating how much the poor in Ethiopia suffer as compared to their counterparts in the same continent. It also shows that for Ethiopians, the social services that are supposed to alleviate poverty are not available to them unlike other countries with lower MPIs.

A breakdown of the age structure in Ethiopia shows that child labour may be high in the country due to its very high dependency ratio that comes mainly from the youth. With almost half of the entire population less than fourteen years of age, it is expected that the activities of this large portion of the population may greatly affect the well-being of the total population. Therefore, children are part of the decision makers of the economy either directly or indirectly. Index Mundi, 2014 gave the following age structure and dependency ratios.

Table 3.1: Age structure in Ethiopia

Age in years	Female	Male	Total percentages
0–14	21,308,454	21,376,243	44.2
15–24	9,692,275	9,557,462	19.9
25–54	14,176,263	14,023,218	29.2
55–64	1,919,212	1,826,602	3.9
65 and above	1,511,558	1,242,171	2.8

Source: Index Mundi, 2014

Total dependency ratio**:** 83.5%

Youth dependency ratio**:**77.2%

Elderly dependency ratio**:**6.3%

Potential support ratio**:** 15.8% (2014 est.)

According to the statistics given by UNICEF in 2013 on Ethiopia's education and child labour, only 63% of young males between fifteen and twenty-four years are literate and just 47% of females of the same age group are literate. A decline in the percentage of children that enrolled for primary school and moved to lower secondary school and of those from

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lower secondary to higher secondary indicates a high level of dropouts from school. About 52% of the poor have primary education while 86.2% of the rich have primary education, but only 46.9% enrolled for lower secondary education and just 17.3% for upper secondary education between year 2008 and 2012. The total percentage of child workers as at 2012 was 27.4%, with 31.1% males and 23.5% females (UNICEF, 2013) with 22% of the country's children aged five to fourteen working, 54% schooling and 17% of children aged seven to fourteen were working and schooling according to the United States Department of Labour's Bureau of International Affairs (n.d.). Only 43.4% of the total population had completed their primary school education as at 2014.

3.3 DATA DESCRIPTION

The data used for this study is a secondary data from the Living Standard Measurement Study-Integrated Surveys of Agriculture (LSMS-ISA). It was collected in 2011/2012 by the Central Statistics Agency of Ethiopia (CSA) and the World Bank. The objective of the LSMS-ISA is to collect multi-topic panel household level data focusing specifically on improving agricultural statistics. This data was used because it focused on rural communities and small towns. Three types of questionnaires were used in the survey: the household, community and agriculture questionnaires, although agriculture was further divided into pre-planting, post-planting, post-harvesting and livestock. 333 communities were visited in this survey with 290 from rural areas and 43 from small towns. The communities were represented by enumerator areas (EAs). Twelve households were randomly selected from each EA, giving a total of 3,996 households but the total number of households was less than the expected 3,996 households. This was due to the method of selection used since households were not replaced in the random selection. The response rate was 99.3%.

The process of merging the household data with community and agricultural data led to the loss of 28 EAs. The study therefore had 305 EAs, 2,030 households and 4,046 children. The loss was due to factors like missing responses, lack of responses from household heads since characteristics of the household head and the absence of a child in the household were important. The sample was further divided into male and female children using a dummy to represent each category. About 56% of the sampled population were male and 44% were females. This study defined children as individuals between the ages of seven and fourteen. The lower boundary was set by the data set itself since labour information was collected on

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individuals from age seven; however, the upper boundary was chosen using the minimum age of employment according to the ILO (2012).

3.4 DESCRIPTIVE STATISTICS

Previous studies like Assefa (2002) and Cockburn (2000) on Ethiopia have shown that children, just like in many other developing countries, start working at a very early age and are exposed to very high levels of hazards. However, the LSMS data set used for this study did not include children below the age of seven in its labour section. So it is impossible to present the result for children below the age of seven.

Descriptive results presented in table 3.2 shows that over 40% of children aged seven years in Ethiopia participated in farm work; this buttresses the point that children in Ethiopia are introduced to labour work at an early stage. This percentage increased with the age of the child, which is in line with theoretical expectations. The highest population of child labourers was at thirteen years with about 58%. Domestic work, which is defined in this study as household chores like fetching water and firewood, is closest to that of farm work participation. About 33% of the child population participated in household chores and this also increased with age, with the highest rate at fourteen years (54.61%). However, wage work had the least participation with the highest being children aged seven years (5.68%) and lowest at fourteen years (2.63%). This is a deviation from the expectations since the age of a child is supposed to have a positive impact on the participation of the child in wage work. But with the nature of Ethiopia where agriculture is the main source of employment and subsistence farming the main method, the older children will work more on the family farms just as the statistics prove.

Table 3.2: Percentage of working children by age in Ethiopia

Age	Farm work participation (%)	Non-farm work participation (%)	Domestic work participation (%)	Casual labour work participation (%)	Wage work participation (%)	Apprentice work participation (%)
7	42.14	11.54	33.11	6.35	5.68	7.52
8	47.03	10.53	35.65	4.58	4.09	7.30
9	52.26	12.34	46.29	3.91	4.32	6.79
10	55.39	14.05	50.98	5.39	3.59	8.49
11	53.80	16.03	48.37	4.89	4.35	7.33
12	55.92	14.81	51.85	5.00	3.89	9.07
13	58.44	18.89	51.38	4.53	3.27	8.56
14	55.92	17.76	54.61	3.73	2.63	7.02

Total	4,046	4,046	4,046	4,046	4,046	4,046

Source: LSMS-ISA Ethiopia Rural socioeconomic survey, 2011/2012

The main activities performed by male and female children as presented in Table 3.3 is also in line with theoretical expectations and with the nature of Ethiopian agriculture, which includes cattle rearing and manual cultivation of land. It is expected that the male child will be more involved in agricultural work than the females. About 60% of the total population of males in the sample were involved in farm work while about 45% of females were involved in farm work. As farm work is to a male child, so is domestic work to the female child. The result showed that about 58% of the female were in domestic work and about 35% of their male counterparts were involved in domestic work. Other forms of work like wage work, non-farm work, casual work and apprentice work are presented in Table 3.3.

Table 3.3: Types of activities performed by children by sex (%)

Main activities	Female	Male
Farm work	44.57	60.00
Non-farm work	15.14	12.47
Domestic work	57.54	35.45
Casual work	4.46	5.23
Wage work	3.83	4.38
Apprentice	8.46	7.28
Total number of children	1,750	2,101

Source: LSMS-ISA Ethiopia Rural socioeconomic survey, 2011/2012

Results presented in table 3.4 shows the combination of farm work and other activities. Farm work is the most common activity that employs child labour in rural Ethiopia. Farming knowledge is like an asset to the Ethiopian child. Therefore, children are expected to participate in farming from a tender age so as to acquire knowledge for their future security. As expected, over one-fourth of the children combined farming with domestic work and the females combined more with close to 30%. This is because a female child is expected to still participate in household chores after carrying out other activities. About 8% of female children combined agricultural work with non-agricultural work and about 9% of the males did the same. Wage work and farm work has the least percentage of combination. This could be as a result of the time requirement for both.

Table 3.4: Combination of farm work and other activities by children (%)

Activities	Female	Male

Farm work and non-farm work	7.66	9.42
Farm work and casual work	4.06	4.90
Farm work and domestic work	29.31	24.70
Farm work and wage work	3.71	3.99
Farm work and apprentice	6.11	6.37
Total number of children	1,750	2,101

Source: LSMS-ISA Ethiopia Rural Socioeconomic Survey, 2011/2012

Over 90% of the children were enrolled in school from Table 3.5, the population of female children was greater than that of male children enrolled in school. This lower enrolment of male children in school could be explained from Table 3.6 which shows a relatively large percentage of male children between the age of twelve to fourteen that work without schooling (11.50%) and (3.08%) that were neither working nor schooling. This further buttresses the increasing tendencies of children especially male children to drop out from school as they advance in age. The proportion of male dropouts is expected to be higher than that of the female.

Table 3.5: Percentage of children schooling according to age

Age	Female	Male
7	95.69	92.97
8	98.79	96.17
9	95.07	95.93
10	94.28	93.83
11	93.43	90.91
12	91.52	89.96
13	93.29	78.36
14	90.96	85.79
Total number of children	1,252	1,474

Source: LSMS-ISA Ethiopia Rural Socioeconomic Survey, 2011/2012

A comparison of the activities a child is involved in such as schooling only, working only, neither working nor schooling or both was recorded in table 3.6. Work in this section was categorised by a child's participation in at least one of farm work, domestic work, non-farm work, casual work, wage work or apprentice work. The statistics show that a higher percentage of male children attended school only although the population reduced with increase in age. Also a larger percentage of male children were found to be involved in work only as compared with their female counterparts and in this case it increased with increase in age. The reduction in the population of children in school with age is an indication of the possibility of dropouts from school. For children that combined both school and work,

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females had a higher population which increased with age and in the case of the male child the increase was less than 1%. Very few of the sample population were found to be idle, less than 5%. This is unlike the previous study on Ethiopia, which in the case of Haile and Haile (2007) was close to 20% among children between ages eight to fifteen. This study will therefore concentrate on the factors that affect the amount of time a child puts into farm work and not on the participation of the child in farm work.

Table 3.6: Children' activities including schooling for males and females across age categories (%)

Activities	Female (7–11)	Female (12–14)	Male (7–11)	Male (12–14)
School attendance only	25.81	11.01	27.31	18.31
Work only	2.85	6.24	4.78	11.50
Schooling and working	65.64	80.87	66.74	67.10
Neither working nor schooling	1.69	1.87	1.17	3.08
Total number of children	771	481	857	617

Source: LSMS-ISA Ethiopia Rural Socioeconomic Survey, 2011/2012

The amount of time a child spends working will affect the amount of time left for the child to perform other forms of activities like schooling and leisure. This is because of the constraint imposed by time. Therefore, the amount of time a child spends on farm work should impact negatively on the child's schooling. However, from table 3.7, it is observed that this was very true for the male child but not well defined for the female child. A further comparison of the response of the female and male child to the reasons for not attending school as given in table 3.8 showed that lack of money affected the female child more than the male child and domestic obligations of the female child is more influential than that of the male. This, however, is high in both cases with about 22% of female children not in school citing domestic obligations as an excuse and about 16% of the male citing domestic obligations as an excuse. About 31% of male children gave lack of interest and time as their excuse for not being in school, while about 19% had other reasons for not attending school.

Table 3.7: Impact of hours of farm work on school attendance (%)

Categories of hours of farm work per week	Female not attending school	Male not attending school
0 hours	5.50	7.47
1–28 hours	6.50	8.92
29–56 hours	5.37	14.21
57–84 hours	0.00	38.89
Total number of children	1,215	1,450

Source: LSMS-ISA Ethiopia Rural Socioeconomic Survey, 2011/2012

Table 3.8: Reasons for not attending school (%)

Reasons	Female	Male
Had enough schooling	5.19	0.71
Awaiting admission	5.19	0.71
No school/no teacher	1.30	2.14
No time/no interest	22.08	31.43
Lack of money	20.78	10.71
Sickness	3.90	11.43
Separation of parents	2.60	0.71
Death of parents	7.79	6.43
Domestic obligations	22.08	16.43
Other	9.09	19.29
Total number of children	77	140

Source: LSMS-ISA Ethiopia Rural Socioeconomic Survey, 2011/2012

In summary, a large percentage of Ethiopia's children start working at a very tender age. This large population of child workers is prominent among rural agricultural households. This is attributed to the subsistence nature of agriculture that is practiced in Ethiopia. Therefore, farming is the highest employer of child labour in rural Ethiopia especially for male children, and domestic work for the females. A larger percentage of female children combined farm work with domestic work as compared to their male counterparts. This is due to the added responsibilities a female child has to perform in the home after performing their daily activities which could include farm work or schooling. Furthermore, the high proportion of male dropouts from school with increasing age is an indication of the importance that is given to farm work as compared to education. A high percentage of male children work only, while a large percentage of females combined both work and school. Finally, the reasons given by the children that were not in school showed that poverty and domestic obligations affected

the female child's education more than the male child. Though, a large percentage of male children showed no interest in school.

CHAPTER FOUR

MODEL SPECIFICATION AND RESULTS

4.1 MODEL SPECIFICATION

Parental decisions on how to allocate the child's time are expected to be influenced by more than one factor. This necessitates the simultaneous use of various factors that could influence the decision.

4.1.1 Household model

An agricultural household model that is similar to that of Bhalotra and Heady (2000) was used which consists of parents and children. The household production (Y) is a function of land, parent labour and possibly child labour as inputs. Children may combine school with work or they may not. Household income is given as

$$Y = F(A, L_p, L_c) \tag{1}$$

Where Y represents the household production, A represents area of land, L_p represents parent labour and L_p represents child labour

The utility function of the household (U) is expressed as;

$$U = U(X, L_p, L_c, S) \tag{2}$$

Where *X* represents consumption and *S* represents child schooling. However, the wealth of the household is not only determined by the present production year but includes previous years and inheritance. Therefore, the financial wealth of the household is expressed as;

$$W = K + F(A, L_p, L_c) - X - C(S) \qquad (3)$$

Where *K* represents previously acquired wealth, *C*(S) represents cost of schooling.

Maximising the utility equation subject to the wealth equation will give the following first order conditions.

$$U = U(X, L_P, L_C, S) - \Lambda(W - K - F(A, L_P, L_C) + X + C(S)) \qquad (4)$$

First order

$$\frac{\partial U}{\partial X} - \Lambda = 0 \qquad (5)$$

$$\frac{\partial U}{\partial L_C} + \frac{\partial F}{\partial L_C} \cdot \Lambda \leq 0 \qquad (6)$$

$$\frac{\partial U}{\partial S} - \frac{\partial C}{\partial S} \cdot \Lambda \leq 0 \qquad (7)$$

Provided child labour is a "bad" in household choices and schooling is a normal good in household choices.

The estimation equation can therefore be expressed as;

$$L_C = G(A, X, Z, e) \qquad (8)$$

Where *Z* represents all other observable factors that affect the objectives and constraints of the optimisation problem such as household characteristics, access to credit, school availability, cost and so on. *e* represents the unobservable characteristics and optimisation errors.

4.1.2 Empirical model

Hours of child farm work was regressed on the dependent variables. The Tobit model was selected over the ordinary least square method because OLS will produce biased and inconsistent estimates due to censoring a large population of children that have zero hours of

farm work but not necessarily zero. Some of the zeros represent a corner solution for children that will never participate in farm work; the others represent the ones that do not participate due to lack of opportunity (households that are not using their lands for agricultural purposes).

The Tobit model estimates a data with observable variable y_i which is equal to a latent variable y_i^* when the latent variable is above zero.

$$y_i = \begin{cases} y_i^* \; if \; y_i^* > 0 \\ 0 \; if \; y_i^* \leq 0 \end{cases} \tag{1}$$

$$y^* = x\beta + u, \; u \mid x \; \sim Normal \; (0, \sigma^2) \tag{2}$$

But what is observed is $y = max \; (0, y^*)$

The effect of the independent variable, x on the latent dependent variable, y^* is what is explained by β and not of y.

Therefore,

$$Pr \; (y_i = 0 \mid x_i) = Pr(x_i + u_i \leq 0 \mid x_i) \tag{3}$$

$$= Pr \; (u_i \leq -\frac{x_i\beta}{\sigma} \mid x_i) = \phi(-\frac{x_i\beta}{\sigma}) \tag{4}$$

$$Pr \; (y_i > 0 \mid x_i) = 1 - \phi \; (-\frac{x_i\beta}{\sigma}) \tag{5}$$

Where, $y_i \; is$ child duration of farm work; x_i is the vector of independent variables including child characteristics, household resources, school variables, household variables; β is vector of unknown coefficients; u_i error term which is assumed to be normal with zero mean and constant variance, σ^2; and ɸ is the cumulative normal distribution function.

One major issue with understanding the relationship between income and child labour is endogeneity. The direction of causality between child labour and household income is typically unknown. Child labour affects income and income can also increase child labour intensity. Instrumental variable technique is applied to control for the endogeneity problem. Community variables gave some good instruments (cost of transport to urban areas, cost of transport to towns and type of road). The Sargan test was performed to confirm the validity of

the instruments that were used. Therefore, instrumental variables Tobit was used to run the regression[1]. The model is therefore given as

$$y_{1i}^* = y_{2i}\beta + x_{1i}\gamma + u_i \qquad (6)$$

$$y_{2i} = x_{1i}\,\Pi_1 + x_{2i}\Pi_2 + v_i \qquad (7)$$

Where $y_{1i}^* =$ unobserved child duration of farm work, $i = 1\ldots\ldots\ldots N$, $y_{2i} =$ vector of endogenous variables, $x_{1i} =$ vector of exogenous variables, $x_{2i} =$ vector of additional instruments. The second equation that is y_{2i} is written in the reduced form. $(u_i, v_i) \sim$ N(0), β and γ are vectors of structural parameters, Π_1 and Π_2 are matrices of the reduced form parameters. A condition for the identification of structural parameter is that the vectors of additional instruments must be greater than or equal to the vectors of endogenous variables.

$$y_{1i}^* = z_i\delta + u_i \qquad (8)$$

$$y_{2i} = x_i\Pi + v_i \qquad (9)$$

Where $z_i = (y_{2i}, x_i)$, $x_i = (x_{1i}, x_{2i})$, $\delta = (\beta, \gamma)$, and $\Pi = (\Pi_1, \Pi_2)$, y_{1i}^* is not observed, what is observed is $y_{1i} = \begin{cases} a & y_{1i}^* < a \\ y_{1i}^* & a \le y_{1i}^* \le b \\ b & y_{1i}^* > b \end{cases}$ $\qquad (10)$

(u_i, v_i) is distributed multivariate normal with zero mean and covariance matrix.

$$\sum = \begin{bmatrix} \sigma_u^2 & \sum_{21}' \\ \sum_{21} & \sum_{22} \end{bmatrix} \qquad (11)$$

With the properties of the multivariate normal distribution

$$, u_i = v_i'\alpha + \epsilon_i \qquad (12)$$

$$\alpha = \sum_{22}^{-1}\sum_{21}; \epsilon_i \sim N(0, \sigma_{u|v}\sigma_{u|v}^2) \qquad (13)$$

where $\sigma_{u|v}^2 = \sigma_u^2 - \sum_{21}'\sum_{22}^{-1}\sum_{21}$; and ϵ_i is independent of v_i, z_i and x_i.

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[1] The double hurdle model is not applied in this model case because we can reasonably assume that participation and intensity of child work is not a two stage process that can lead to the bias of the Tobit model. Conditional on the size of the farm and other characteristics the two processes are independent.

The likelihood function is straightforward to derive because the joint density $f(y_{1i}, y_{2i} \mid x_i)$ can be expressed as $f(y_{1i} \mid y_{2i}, x_i)$. In the case of one endogenous regressor:

$$\ln f(y_{2i} \mid x_i) = -\frac{1}{2}\{\ln 2\pi + \ln \sigma_v^2 + \frac{(y_{2i} - x_i\Pi)^2}{\sigma_v^2}\} \tag{14}$$

$$\ln f(y_{1i} \mid y_{2i}, x_i) = \begin{cases} \ln\{1 - \phi\left(\frac{m_i - a}{\sigma_{u|v}}\right)\} & y_{1i} = a \\ -\frac{1}{2}\{\ln 2\pi + \ln\sigma_{u|v} + \frac{(y_{1i} - m_i)^2}{\sigma_{u|v}^2}\} & a < y_{1i} < b \\ \ln\phi\left(\frac{m_i - b}{\sigma_{u|v}}\right) & y_{1i} = b \end{cases} \tag{15}$$

Where a = zero, b = eighty-four $m_i = z_i\delta + \alpha(y_{2i} - x_i\Pi)$ and $\phi(.)$ is the normal distribution function so that the log likelihood for observation i is

$$\ln L_i = \omega_i\{\ln f(y_{1i} \mid y_{2i}, x_i) + \ln f(y_{2i} \mid x_i)\} \tag{16}$$

where ω_i is the weight for observation i it becomes one if no weight is specified. However, instead of estimating $\sigma_{u|v}$ and σ_v directly, we estimate $\ln\sigma_{u|v}$ and $\ln\sigma_v$.

The logit model is used in this study as a robust test. It is assumed that participation in child labour follows a latent variable representation such that:

$$y_i = \begin{cases} 1 \ if \ y_i^* = x_i\beta > 0 \\ 0 \ if \ y_i^* = x_i\beta = 0 \end{cases} \tag{17}$$

Where y_i is child labour and x_i are factors that explain y_i^* (the latent variable).

4.1.3 The dependent variables

The first estimation equation dependent variable was hours of child work on the farm. The farm is either owned or operated by the household. However, not all households that own land operate the land in agricultural practices. For instance, about 37% of the rural population of Ethiopia owned land by inheritance but only 23% of this population operated it during the year of the survey. Therefore, many children may not participate in farm work for that particular year. This does not imply that the household would not have involved them in farm work if the household was operating their land in agricultural practices. This justifies the use of Tobit estimators for the hours of child work on the farm since about 50% of the sampled population did not participate in farm work.

The second estimation equation dependent variable was child participation in farm work. This was estimated by a Logit model. This second equation is necessary to confirm if the independent variables that are responsible for child participation are also responsible for the duration of participation. All the reported standard errors are the robust ones that corrected for correlations of observations within clusters (White, 1980; Deaton, 1997).

4.2 RESULTS AND DISCUSSION OF HOURS OF CHILD FARM WORK

The parsimonious equation result as presented above showed positive effects of income on both the male and female child but the impact was significant for the female child whereas for the male child it was not. This positive impact of income on child duration of farm work is similar to that presented by Bhalotra and Heady (2000) on Ghana, although for Pakistan, the impact was negative. Household size has a negative impact on child labour although the impact on the male child is higher than that on the female child due to division of labour among family members. The area of land holding by the household increased child labour significantly for both male and female children with higher impact on the female child than on the male child just as it did on Ghana and Pakistan in Bhalotra and Heady (2000).

Table 4.1: Marginal effects of left censored hours of child farm work parsimonious equation

VARIABLES	ALL SAMPLE	FEMALE	MALE
Log of household food expenses	2.114*	2.928**	2.8915
	(1.2089)	(1.361)	(1.833)
Household size	−0.8037***	−0.6443***	−0.8792***
	(0.1545)	(0.2136)	(0.2242)
Area of land in hectares	2.546***	5.140***	2.889***
	(0.6557)	(1.0857)	(0.8125)
Observations	3,428	1,467	1,802

*Robust standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

This study compared three models. In the first model, Z excluded the presence of irrigation in the community and also excluded interaction terms. The second model includes the irrigation facility variable but does not have interaction terms. The last model contains both irrigation and two interaction terms between income and household size and income and household landholding. Irrigation availability is included in model two and three because of the importance of water to agriculture and the fact that Ethiopia is a country with a high drought level. Therefore, availability of irrigation is expected to increase agricultural activities.

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4.2.1 Child characteristics

Child characteristic variables such as age and a dummy for the relationship between the child and the household head were included in the models. The age factor is important because age is expected to be positively related with the duration of child work. However, age was included in its quadratic form since its relationship with the dependent variable is not linear. However, the inclusion of a dummy to signify if the child is a child of the household head is a factor that previous studies such as Bhalotra and Heady (2000) have found significant in determining how the household will allocate the child's time to work, school and leisure. Children that are not direct children of the household heads are expected to work more than those that are the direct children.

The age of the child significantly increased child labour across all the three models for both the male child and the female child. This positive impact is in line with expectations as supported by Bhalotra and Heady (2000) result on both Pakistan and Ghana. However, the impact on the male child was higher than on the female child. This is because male children are expected to perform agricultural activities as their main occupation but the female child will have other responsibilities which will also increase with increasing age such as caring for the young, cooking etc. Furthermore, the relationship between the child and the household head was found to be significant in reducing the duration of farm work that the child performs across all the models but was insignificant on individual gender. It is expected that children of the household head will work lesser hours compared to others. Although in Bhalotra and Heady (2000), a contrasting result was presented, while for Ghana the impact of being the child of the head of the household led to a reduction in the duration of child farm work, the result presented by Pakistan was opposite that of Ghana.

4.2.2 Household resources

Household income is a very important variable because of the importance of income to child labour based on literature. However, this study used household food expenditure per week as a proxy for household income. This food expenditure also included an approximated value of the cost of household produced consumption. Food expenditure is a smoother measurement of household income than the actual income itself (Altonji, 1983). This is because of information imperfection that is mostly linked to direct questions on income. The respondents will likely underestimate their income if they feel the survey may be linked to tax payment or if they think it could lead to additional funds for them.

Across all the models, the duration of farm work performed by children increased with increasing income. The highest impact was in model three that included two interaction terms, income and household size and income and land size. This is an indication of the existence of an interaction between income and household size and income and household land holding. This is similar to the result presented in the parsimonious model above. However, from model 3, for child farm work hours to be equal to zero, log of food expenses has to be -0.597 as presented in Appendix 3. The impact is not significant in affecting the female child unlike the male child across the three models. When we compare this result with that of Bhalotra and Heady (2000) on Ghana, it was the male child's duration of farm work that became insignificant while the impact on the female child became negative as expected by theory. Therefore, an increase in income will lead to the male child sacrificing part of his leisure or school time to work more.

Area of land is used as a proxy for measuring household assets since land size can denote the wealth of a household. However, land is an important factor in agricultural production and so its impact would most likely be a substitution effect given the subsistence nature of agriculture practiced in Ethiopia. But since a large percentage of the land holding is by inheritance, and very little is by rent while the rest is operated for free, land may not be a good measure of wealth in Ethiopia. Therefore, it is expected to have little or no income effect but a high substitution effect. This therefore gives further support to separating the household income from the asset holding so that the household income measures the income effect while the asset holding measures the substitution effect.

 Land holding capacity has a similar impact on the number of hours a child will work on the farm as income had but it is higher for the female child than the male child. The impact is also very high in the third model with interaction term as compared with the ones without interaction term. This can be associated with the female child having to drop part of her other responsibilities to be able to increase assistance with farm work on a larger farm. The positive relationship between child farm work and income shows that there is a substitution effect of income on child labour. This is because child farm work in Ethiopia is not a "bad" in household preference and increased wealth will increase the responsibilities that the child has to perform. However, the proportion of the impact of income on male child farm work is an indication that the males in Ethiopia are more inclined to farm work while the females have other responsibilities. This is further supported by the ratio of female children in domestic

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work to those into farm work (57.54%:44.57%) and the percentage of male children in farm work (60%), as presented in Table 3.2.

4.2.3 School variables

Community distance to government schools and the quality of primary schools were included to assess the impact of education availability on child labour. The quality of primary school was proxied by the availability of electricity in the school. This variable is expected to have a negative impact on child labour as stated previously. The farther away a government primary school was from the community, the higher the rate of child labour for both male and female child with a higher impact on the male than the female child. This is due to the effect of inaccessibility of school and since parents will not want their children to be idle, they will rather involve them in a productive activity than leave them idle. However, the distance to a government secondary school did not follow expectations for the female child and was not significant in the case of the male child. The quality of primary school also did not significantly affect the number of hours a child worked for both male and female child.

4.2.4 Household variables

Household composition characteristics have been previously identified as having a significant impact on child labour. The marginal effect of the size of the household has shown varying results from positive to negative. This can both be justified by theory. The negative impact could be linked to the impact of division of labour among the large family while the positive impact could be linked to the need for more income to support the large family. But for agricultural households, a negative relationship between household size and child labour is expected. The gender of the household head was also a factor that previous studies have found significant in child participation in the labour work. Other variables included are the age of the household head and the gender of the household head. Other household characteristics like the position of the child by birth, the number of siblings and the age dependency of the child were important variables in some studies but were not included in this study as a result of data constraints.

The household size had the same impact as observed from the parsimonious equation which further buttresses the effect of division of labour with a higher impact on the male child than the female child. With the highest negative impact on the model that included interaction term between income and household size. This is backed up by literature on the large size of

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Ethiopian household although there has being a decline in the fertility rate of the country. However, the older the household head, the higher the duration of farm work performed by the female child (as the household head gets older his/her duration of effective farm work will reduce and will need to be substituted) but the age of the household head was insignificant for the male child's duration of farm work. Furthermore, the gender of the head of the household was not significant in explaining the amount of time the child worked on the farm for both the male and female child.

4.2.5 Parental education

Parental educational level was included as dummy variables. The education dummy was presented as secondary school and above as one while below secondary school was represented by zero. This is significant because it will affect the exposure of the parents and their willingness to trade child labour for child schooling. The fathers' education had no significant effect on the amount of farm work the child performed for all the models and both genders. But with the mothers' education, the duration of farm work a female child performed reduced significantly by about 2% for the three models with educated mothers as compared with those without education. Although, in Bhalotra and Heady (2000)'s study, the impact of mother's education was significant in reducing the duration of only the male child's farm work in Ghana. The impact of the education of the mother on the female child in Ethiopia is an indication of how education affects cultural belief. Male child's education is given higher preference to the female child's education (Colclough et al, 2000) therefore; it is easier for an educated mother to enrol her daughter in school because she has already overcome the bias belief system than for an uneducated mother.

4.2.6 Farm structure

The method of acquiring land is also included in the equation. This is divided into free land, rented land and allocations by government. This is to further buttress the impact of land on the dependent variable. Also, the number of fields a household has was included because some of the households have fields at different locations. The method of farm land acquisition was found to significantly reduce the duration of farm work by the male child but had no relevance in the case of the female child. Also, the number of fields that a household has had a significant impact in increasing the duration of farm work of a male child but no significant impact on the female child. This further supports the fact that male children work

more on farms than the females and factors that affect the inputs of production will also affect the input of labour.

4.2.7 Community variables

While the presence of irrigation facilities will make water available for farming, since Ethiopia is known to suffer from drought. An increase in water supply should encourage agricultural activities. The presence of irrigation facilities also shows the level of technology available for agricultural production. However, the availability of irrigation facilities had no significant impact on child duration of farm work for both the male and female child just as it was presented by Bhalotra and Heady (2000) on Ghana. A dummy for the presence of a microfinance bank in the community is expected to make credit available to households. This was found to significantly reduce female farm work duration but was irrelevant for the male child. This is due to the fact that the female child suffers more from the impact of poverty than the male child as presented in table 3.8. In addition, community access to telephone services will increase their access to information and indicate the level of civilization. Community access to phone services was found to be relevant in reducing child labour jointly for male and female children but was irrelevant for individual gender.

4.2.8 Regions

Finally, the inclusion of different regions will show the effect of the variation in ethnicity and cultural and religious belief systems that exist among the rural dwellers in the country. Ethiopia consists of 11 regions with the capital in Addis Ababa. The regions include: Addis Ababa, Afar, Amhara, Benishangul-Gumuz, Dire Dawa, Gambella, Harari, Oromia, Somali, Tigray and Southern Nations, Nationalities and People's Region. This study excluded Adis Ababa because it is focused on rural communities and Adis Ababa is the capital of the country.

Regions were included as dummies with Tigray as the base region. Afar region and Oromiya region were not significantly different from Tigray region in the duration of farm work the children performed. However, Amhara and Somali have a higher rate of female farm work than Tigray. Furthermore, SNNP and Harari experienced a lower duration of male farm work than Tigray but for the female child it is not different. For Dire Dawa, child duration of farm work is significantly higher than that of Tigray. Finally, Tigray experienced higher levels of child farm work than Benshangul-Gumuz and Gambela for both genders.

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Table 4.2: Marginal effect of left censored hours of child farm work participation for males and females

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	1.619***	1.622***	1.621***
	(1.221)	(1.229)	(1.229)
Child of head(dummy)	−1.946*	−1.928*	−1.928*
	(0.996)	(1.003)	(1.003)
Household resources			
Log of household food expenses	3.069**	2.947**	5.685**
	(1.259)	(1.315)	(2.5237)
Area of land in hectares	1.499*	1.656**	9.469**
	(0.614)	(0.579)	(0.579)
School variables			
Comm. dist to govt primary sch.	0.188***	0.204***	0.204***
	(0.0549)	(0.0547)	(0.0547)
Comm. dist to govt secondary sch.	0.0117	0.0182	0.0182
	(0.0233)	(0.0246)	(0.0246)
Quality of primary sch. (dummy)	0.526	0.668	0.668
	(0.724)	(0.728)	(0.728)
Household variables			
Household size	−0.713***	−0.715***	−6.228***
	(0.172)	(0.174)	(0.174)
Age of household head	0.00625	0.00319	0.00319
	(0.0241)	(0.0242)	(0.0242)
Female head (dummy)	−0.998	−0.983	−0.983
	(0.809)	(0.814)	(0.814)
Parental education			
Father education (dummy)	−1.014*	−0.998	−0.998
	(0.601)	(0.608)	(0.608)
Mother education (dummy)	−0.622	−0.680	−0.680
	(0.728)	(0.733)	(0.733)
Farm structure			
Free land (dummy)	−8.436**	−8.120**	−8.120**
	(3.297)	(3.331)	(3.331)
Rented land (dummy)	−6.946**	−6.735**	−6.735**
	(3.385)	(3.420)	(3.420)
Local commland (dummy)	−7.658**	−7.365**	−7.365**
	(3.308)	(3.347)	(3.347)
No of field	0.188***	0.181***	0.181***
	(0.0565)	(0.0569)	(0.0569)
Community variables			
Presence of irrigation facility in comm.		−0.380	−0.380
		(0.674)	(0.674)

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Presence of microfinance bank (dummy)	−1.616**	−1.662**	−1.662**
	(0.690)	(0.690)	(0.690)
Comm. access to phone	−1.137*	−1.121*	−1.121*
	(0.674)	(0.679)	(0.679)
Region Effect	Yes	Yes	Yes
Observations	3,427	3,398	3,398

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4.3: Marginal effect of left censored hours of child farm work participation for females

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	1.348**	1.296**	1.297**
	(1.595)	(1.602)	(1.622)
Child of head (dummy)	0.645	0.692	0.816
	(1.377)	(1.379)	(1.391)
Household resources			
Log of household food expenses	2.355	2.420	2.9797
	(1.505)	(1.527)	(3.786)
Area of land in hectares	2.814**	2.957**	26.393**
	(1.129)	(1.143)	(1.131)
School variables			
Comm. dist to govt primary sch.	0.187***	0.185***	0.166***
	(0.0524)	(0.0527)	(0.0548)
Comm. dist to govt secondary sch.	−0.0658**	−0.0571*	−0.0568*
	(0.0290)	(0.0299)	(0.0302)
Quality of primary sch. (dummy)	−1.115	−1.100	−0.946
	(0.920)	(0.921)	(0.926)
Household variables			
Household size	−0.536**	−0.565**	−15.419**
	(0.236)	(0.238)	(0.234)
Age of household head	0.122***	0.127***	0.132***
	(0.0312)	(0.0313)	(0.0317)
Female head (dummy)	0.329	0.293	0.375
	(0.995)	(0.996)	(1.006)
Parental education			
Father education (dummy)	−0.509	−0.444	−0.405
	(0.811)	(0.819)	(0.820)
Mother education (dummy)	−2.017**	−1.985**	−2.106**
	(0.939)	(0.944)	(0.951)
Farm structure			
Free land (dummy)	3.615	3.587	4.271
	(4.623)	(4.662)	(4.823)
Rented land (dummy)	4.414	4.368	5.036
	(4.715)	(4.752)	(4.913)
Local comm land (dummy)	3.060	3.023	3.671
	(4.616)	(4.660)	(4.818)
No of field	−0.0322	−0.0359	−0.0460
	(0.0756)	(0.0757)	(0.0761)
Community variables			
Presence of irrigation facility in comm.		0.280	0.153
		(0.900)	(0.903)
Presence of microfinance bank (dummy)	−3.257***	−3.188***	−3.253***

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	(0.885)	(0.894)	(0.889)
Comm. access to phone	0.522	0.574	0.589
	(0.902)	(0.918)	(0.913)
<u>Regional Effect</u>	Yes	Yes	Yes
Observations	1,464	1,452	1,452

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Table 4.4: Marginal effect of left censored hours of child farm work participation for males

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	1.496***	1.535***	1.525***
	(1.841)	(1.850)	(1.850)
Child of head(dummy)	−2.097	−2.122	−2.091
	(1.469)	(1.470)	(1.473)
Household resources			
Log of household food expenses	4.268**	4.514**	6.8649**
	(1.915)	(1.945)	(3.2888)
Area of land in hectares	1.525*	1.922*	11.859**
	(0.795)	(0.801)	(0.790)
School variables			
Comm. dist to govt primary sch.	0.381***	0.383***	0.380***
	(0.0967)	(0.0967)	(0.0972)
Comm. dist to govt secondary sch.	0.0348	0.0345	0.0376
	(0.0374)	(0.0380)	(0.0381)
Quality of primary sch. (dummy)	1.196	1.302	1.332
	(1.054)	(1.060)	(1.062)
Household variables			
Household size	−0.782***	−0.782***	−4.116***
	(0.248)	(0.251)	(0.251)
Age of household head	−0.00841	−0.0128	−0.0142
	(0.0362)	(0.0362)	(0.0362)
Female head (dummy)	−0.444	−0.525	−0.467
	(1.249)	(1.252)	(1.253)
Parental education			
Father education (dummy)	−1.460	−1.446	−1.500
	(0.913)	(0.918)	(0.919)
Mother education (dummy)	0.171	0.181	0.150
	(1.096)	(1.100)	(1.101)
Farm structure			
Free land (dummy)	−15.53***	−15.86***	−15.59***
	(4.101)	(4.129)	(4.148)
Rented land (dummy)	−12.05***	−12.42***	−12.22***
	(4.242)	(4.279)	(4.291)
Local comm. land (dummy)	−14.17***	−14.51***	−14.23***
	(4.126)	(4.162)	(4.182)
No of field	0.224***	0.222***	0.215**
	(0.0840)	(0.0844)	(0.0842)
Community variables			
Presence of irrigation facility in comm.		−0.923	−0.953
		(1.004)	(1.007)
Presence of microfinance bank (dummy)	−1.473	−1.477	−1.407

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	(1.015)	(1.020)	(1.020)
Comm. access to phone	−1.573	−1.441	−1.540
	(1.005)	(1.011)	(1.012)
<u>Regional Effect</u>	Yes	Yes	Yes
Observations	1,802	1,790	1,790

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

4.3 RESULTS AND DISCUSSION OF CHILD PARTICIPATION IN FARM WORK

For the parsimonious equation above, the participation of a child in farm work was not affected by income for both male and female children. Household size was however significant in whether a child will work on the farm or not for both male and female children. Also, the size of farm did not affect the participation of a male child in agricultural activities but affected the female child's participation in agricultural work although the impact of all the variables is very low. Therefore, from the two parsimonious equations, it is observed that the factors that affect participation of a child in farm work may not be significant in affecting the length of hours the child spends working.

Table 4.5: Marginal effects of child participation in farm work, parsimonious equation

VARIABLES	Combine	Female	Male
Log of household food expenses	0.0584*	0.0627	0.0522
	(0.0343)	(0.0495)	(0.0463)
Household size	−0.0238***	−0.0199***	−0.0229***
	(0.0045)	(0.0069)	(0.0059)
Area of land in hectares	0.098	0.177**	0.114
	(0.0269)	(0.0378)	(0.02275)
Observations	3,546	1,528	1,860

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

4.3.1 Child characteristics

Age of child has a statistically significant positive impact on child participation in farm work just as it has on the duration of farm work performed by the child for both genders. The relationship of the child with the head of the household was not relevant in the decision as to whether a child will participate in farm work or not. Since child labour is a form of skill acquisition, the relationship with the head of the household will not have an impact on the involvement of the child in labour work but may reduce the duration of farm work.

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4.3.2 Household resources

The impact of household income on child participation in farm work is similar to that on child farm work duration. It is significant for the male child and not significant for the female child. This further buttresses the fact that a male child has more flexibility of time than a female child in rural Ethiopia. An increase in income will lead to about 10% participation rate of a male child in farm work for all the models. However, area of household land holding does not have a relevant impact on child participation in farm work as opposed to its impact on duration of farm work especially for the female child.

4.3.3 School variables

The impact of the distance to government primary schools gave a similar result to that given for the duration of farm work. It is expected that the distance should be positively related to child labour for both gender. However, the dummy for quality of school also did not follow expectations because quality schools should encourage parents to enrol their children in school and reduce or prevent child labour, not increase it as observed in the case of male child participation.

4.3.4 Household variables

Household size had a negative impact, while age of household head had a positive impact and gender of the household head was not significant in the decision of child participation in farm work just as in the decision of duration of child farm work.

4.3.5 Parental education

As observed in the duration of farm work, the educational level of the father was insignificant in child participation but the mother's education was significant in the female child's participation in farm work. This further supports the argument on the cultural belief system changing with educational achievements for the woman since an educated mother will be inclined to send her daughters to school than involve them in child labour.

4.3.6 Farm structure

The method of acquisition of land was not relevant in the participation of the child in farm work for the female child, but for the male child, land acquired for free and allocated by the community significantly reduced child labour. Land acquired by rent was insignificant. This is a bit different from its impact on duration of farm work which was significant for all three

although they both moved in the same direction. The number of fields also has the same impact on child participation as it had on duration.

4.3.7 Community variables

The presence of irrigation facilities was statistically insignificant in the two models for both males and females just as in the case of child duration of farm work. Furthermore, the presence of microfinance banks also has a negative statistically significant impact on the female child's participation in farm work just as it does on her duration of farm work. The community's access to phone services, however, reduced the male child's participation in agricultural activities significantly.

4.3.8 Regions

Afar and Amhara regions experienced higher female child participation in farm work as compared to Tigray. Somali and SNNP experienced a lower male child participation rate in farm work as opposed to Tigray. Also, Benshangul-Gumuz and Gambela have significantly lower rates of child participation in farm work as compared to Tigray. Finally, Oromiya, Harari and Dire Dawa are not significantly different from Tigray.

Table 4.6*:* Marginal effect of child participation in farm work, males and females

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	0.103***	0.104***	0.103***

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	(0.0367)	(0.0368)	(0.0368)
Child of head(dummy)	−0.0213	−0.0210	−0.0200
	(0.0295)	(0.0296)	(0.0296)
Household resources			
Log of household food expenses	0.0911**	0.101***	0.3621**
	(0.0358)	(0.0365)	(0.1643)
Area of land in hectares	0.069	0.0633	0.816
	(0.0222)	(0.0223)	(0.0180)
School variables			
Comm. dist to govt primary sch.	0.00724***	0.00824***	0.00797***
	(0.00260)	(0.00266)	(0.00265)
Comm. dist to govt secondary sch.	6.79e−05	3.91e−05	0.000160
	(0.000682)	(0.000737)	(0.000745)
Quality of primary sch. (dummy)	0.0358	0.0382*	0.0398*
	(0.0223)	(0.0223)	(0.0223)
Household variables			
Household size	−0.0215***	−0.0214***	−0.424***
	(0.00490)	(0.00494)	(0.00492)
Age of household head	−0.000305	−0.000392	−0.000427
	(0.000731)	(0.000734)	(0.000735)
Female head (dummy)	−0.0285	−0.0304	−0.0284
	(0.0236)	(0.0237)	(0.0237)
Parental education			
Father education (dummy)	−0.0285	−0.0285	−0.0295
	(0.0181)	(0.0183)	(0.0183)
Mother education (dummy)	−0.0322	−0.0315	−0.0339
	(0.0219)	(0.0220)	(0.0220)
Farm structure			
Free land (dummy)	−0.242**	−0.242**	−0.229**
	(0.113)	(0.112)	(0.112)
Rented land (dummy)	−0.200*	−0.202*	−0.190*
	(0.116)	(0.115)	(0.115)
Local comm. land (dummy)	−0.228**	−0.229**	−0.216*
	(0.113)	(0.113)	(0.112)
No of field	0.00724***	0.00723***	0.00693***
	(0.00189)	(0.00189)	(0.00190)
Community variables			
Presence of irrigation facility in comm.		−0.00952	−0.0113
		(0.0204)	(0.0204)
Presence of microfinance bank (dummy)	−0.0179	−0.0202	−0.0190
	(0.0216)	(0.0216)	(0.0216)
Comm. access to phone	−0.0650***	−0.0626***	−0.0646***
	(0.0203)	(0.0205)	(0.0204)

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Regional Effect	Yes	Yes	Yes
Observations	3,545	3,513	3,513

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Table 4.7: Marginal effect of child participation in farm work, females

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	0.064**	0.060**	0.058**
	(0.0579)	(0.0583)	(0.0585)
Child of head(dummy)	0.0361	0.0369	0.0394
	(0.0466)	(0.0466)	(0.0466)
Household resources			
Log of household food expenses	0.0509	0.0574	0.2164
	(0.0563)	(0.0572)	(0.2780)
Area of land in hectares	0.091	0.094	0.963
	(0.0420)	(0.0427)	(0.0414)
School variables			
Comm. dist to govt primary sch.	0.00874***	0.00870***	0.00827***
	(0.00301)	(0.00302)	(0.00307)
Comm. dist to govt secondary sch.	−0.00251**	−0.00236**	−0.00240**
	(0.00106)	(0.00110)	(0.00111)
Quality of primary sch. (dummy)	0.00166	0.000830	0.00431
	(0.0326)	(0.0327)	(0.0327)
Household variables			
Household size	−0.0125	−0.0127*	−0.701
	(0.00768)	(0.00774)	(0.00771)
Age of household head	0.00295***	0.00302***	0.00314***
	(0.00110)	(0.00111)	(0.00111)
Female head (dummy)	0.0315	0.0304	0.0340
	(0.0364)	(0.0365)	(0.0364)
Parental education			
Father education (dummy)	−0.0279	−0.0285	−0.0293
	(0.0283)	(0.0286)	(0.0286)
Mother education (dummy)	−0.0794**	−0.0785**	−0.0819**
	(0.0333)	(0.0335)	(0.0335)
Farm structure			
Free land (dummy)	0.102	0.107	0.129
	(0.142)	(0.143)	(0.146)
Rented land (dummy)	0.146	0.148	0.171
	(0.146)	(0.147)	(0.150)
Local comm. land (dummy)	0.0674	0.0698	0.0908
	(0.142)	(0.143)	(0.146)
No of field	0.000694	0.000531	6.80e−05
	(0.00285)	(0.00284)	(0.00282)
Community variables			
Presence of irrigation facility in comm.		0.00929	0.00682
		(0.0309)	(0.0307)
Presence of microfinance bank (dummy)	−0.0764**	−0.0756**	−0.0752**

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	(0.0324)	(0.0327)	(0.0325)
Comm. access to phone	−0.0360	−0.0348	−0.0338
	(0.0320)	(0.0322)	(0.0320)
<u>Regional Effect</u>	Yes	Yes	Yes
Observations	1,525	1,512	1,512

Robust standard errors in parentheses*** p < 0.01, ** p < 0.05, * p < 0.1

Table 4.8: Marginal effect of child participation in farm work, males

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	0.127***	0.128***	0.132***
	(0.0484)	(0.0484)	(0.0484)
Child of head (dummy)	−0.0195	−0.0209	−0.0204
	(0.0381)	(0.0382)	(0.0383)
Household resources			
Log of household food expenses	0.104**	0.112**	0.4521*
	(0.0474)	(0.0478)	(0.2352)
Area of land in hectares	0.123	0.126	0.883**
	(0.0211)	(0.0212)	(0.0212)
School variables			
Comm. dist to govt primary sch.	0.0171***	0.0170***	0.0167***
	(0.00605)	(0.00601)	(0.00598)
Comm. dist to govt secondary sch.	0.000664	0.000612	0.000748
	(0.000928)	(0.000989)	(0.00100)
Quality of primary sch. (dummy)	0.0561*	0.0581**	0.0585**
	(0.0296)	(0.0296)	(0.0296)
Household variables			
Household size	−0.0205***	−0.0214***	−0.243***
	(0.00624)	(0.00629)	(0.00632)
Age of household head	−0.00100	−0.00116	−0.00118
	(0.000971)	(0.000975)	(0.000976)
Female head (dummy)	−0.0216	−0.0274	−0.0244
	(0.0317)	(0.0318)	(0.0319)
Parental education			
Father education (dummy)	−0.0322	−0.0318	−0.0334
	(0.0243)	(0.0244)	(0.0244)
Mother education (dummy)	−0.00864	−0.00670	−0.00834
	(0.0294)	(0.0296)	(0.0296)
Farm structure			
Free land (dummy)	−0.447**	−0.452**	−0.447**
	(0.226)	(0.225)	(0.224)
Rented land (dummy)	−0.354	−0.360	−0.356
	(0.229)	(0.229)	(0.228)
Local comm. land (dummy)	−0.422*	−0.427*	−0.422*
	(0.227)	(0.226)	(0.225)
No of field	0.00800***	0.00798***	0.00767***
	(0.00247)	(0.00248)	(0.00248)
Community variables			
Presence of irrigation facility in comm. (dummy)		−0.0235	−0.0233
		(0.0272)	(0.0272)

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Presence of microfinance bank (dummy)	0.00728	0.00982	0.0127
	(0.0287)	(0.0289)	(0.0289)
Comm. access to phone (dummy)	−0.0757***	−0.0710***	−0.0738***
	(0.0265)	(0.0268)	(0.0267)
<u>Regional Effect</u>	Yes	Yes	Yes
Observations	1,860	1,846	1,846

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

In summary, household income and household land size has a positive relationship with child participation in farm work and duration of farm work. The age of the child also influenced child's participation and duration of farm work positively. However, a child of a household head will participate in farm work but will spend lesser time than the ward. Distance to government primary school has a positive relationship with child's participation and duration of farm work. The household size has a negative relationship with child participation and duration of farm work. The female child's duration of farm work is increased by increase in the age of the household head but reduced by mother's education. Finally, the presence of microfinance banks has a negative impact on the female child's participation and duration of farm work.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLEMENTATIONS

5.1 INTRODUCTION

This chapter provides policy recommendations that are relevant in proffering solutions to the problem of child labour. The policy recommendations fall into different categories, such as those related to education, income and land size, demographic factors and the availability of credit facilities. Furthermore, the concluding part of this chapter presents a summary of the findings of this study as it relates to the objectives previously stated.

5.2 SUMMARY AND CONCLUSION

The cause of child labour cannot be generalised for all nations, as was observed in previous studies, and the results presented in this study further buttresses that fact. In Ethiopia, increase in household income does not lead to reduction in child labour among farming households, although it is a product of poverty. Child labour will increase with increase in income due to a high positive substitution effect that requires a child from a wealthy agricultural household to work more than one from a poor household. The hypothesis that income is not a significant factor that affects child time allocation between work and schooling can therefore be rejected. This is no doubt a problem of labour market failure which makes households prefer internal labour to external labour. Also child labour is used in most households in Ethiopia because it does not appear as a "bad" in household preferences since it is a means of acquiring skills that will be used in the future.

Although land size also has a substitution effect on child farm work, its impact is greater for the female child than the male child due to the level of flexibility that exists in the duties performed by the female child over the male child. The main duty of the male child in Ethiopia is agricultural work while the female child has other additional duties such as household chores, therefore, female children will have to increase their hours of farm work when land size increases.

While some factors affect the male child's participation and duration of farm work (farm structure), some affect the participation and duration of the female child (age of household head, mother's education and presence of microfinance banks) and others affect both the male and female child. Therefore, child labour should not be generalised for both male and

female children but should be separated as different factors affect each gender differently. Also, the participation of children in farm work and duration of child farm work were influenced by different factors which further indicate the need for separating child labour into different sectors. The hypothesis that factors that affect child labour do not significantly vary from those that affect the intensity of farm work can be rejected because the factors that affected child participation were not exactly the same as those that affected child duration of farm work.

Finally, income and land size were not the only factors that influenced the household decision on child labour. The age of the child was also a very significant factor. School variable, distance to school is also an important factor that affected the decision. The age of the head of the household affected the female child more than the male. The education of the mother in the household also had a significant impact on the female child but not the male child. The presence of a microfinance bank was significant in reducing child farm work among female children. The region in which the household was located also has different impacts on child farm work. Therefore, though income and land size are very important factors, they are not the only factors that influence the household decision on child labour. Therefore, the hypothesis that demographic and socio-economic factors have no significant impact on child labour in Ethiopia can also be rejected.

5.3 POLICY RECOMMENDATIONS

The establishment of government schools in the rural communities will lead to a decrease in child labour as observed in the results reported in the previous chapter. The farther away the school is to the child the lower the motivation to attend school and since households will prefer to engage their children in work than leave them idle, the lack of schools will encourage child labour. In addition to establishment of schools, the cost of schooling should be reduced or basic education should be free so as to make education accessible and affordable for poor households.

The effect of income and land holding as presented in the previous chapter indicates that child's involvement in farm work is not a "bad" in household preference and increased wealth will increase the responsibilities that the child has to perform. Therefore, any policy that will increase farm productivity will possibly increase child labour given the subsistence nature of farming in Ethiopia. Any policy to reduce poverty should therefore be more

inclined to cash transfer than to increasing productivity of agriculture especially in areas that will require higher labour.

The impact of the education of the mother on the female child as presented in the previous chapter shows the need for the female child to be encouraged to attend school. Therefore, for future child labour to reduce, female child should be enrolled in school. This will affect their tendencies to choose schooling in place of working for their female children. Policies that focus on female education can help reduce female child labour. Also, policies that will support old people will be helpful in reducing child labour especially among female children.

The presence of microfinance banks will affect the female child more than the male child because household poverty will have a higher impact on the female child than the male child. The wide gap between the percentage of male and female children that gave money as an excuse for not attending school in this study and the study conducted by Colclough et al. (2000) further buttresses the gender bias towards education. Therefore, more accessible microfinance banks or borrowing facilities will help reduce the involvement of the child in labour particularly the female child as observed earlier, since child labour was found by previous studies (such as Jacoby, 1994; Ranjan, 2001) to reduce in the presence of complete credit market even among poor households. Therefore, if parents can borrow against the future of the child they will readily do that and not involve their children and/or wards in child labour.

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Appendix

Appendix 1: Sargan test

These steps were followed in carrying out the Sargan test.

Step 1: Regressed the endogenous variables on the instruments

Appendix 1.1

Variable	Coefficient
Community road dummy	0.0788*** (0.0299)
Cost of transport to urban	0.00231*** (0.00085)
Cost of transport to town	-0.0101*** (0.00149)
Constant	5.876*** (0.0689)
Total	3428

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

Step 2: Predicted the fitted values for instrumented variables.

Step 3: Regressed the dependent variable duration of child work on the predicted value from 2.

Appendix 1.2

Variables	Coefficients
Instrumented food expense	2.139* (1.2114)
Constant	−0.3369 (7.1823)
Total	3428

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

Step 4: Predict residual

Step 5: Regress residual on the instrumental variables

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Appendix 1.3

Variables	Coefficient
Community road dummy	0.1018 (0.2607)
Cost of transport to urban	0.00153 (0.0128)
Cost of transport to town	0.00052 (0.0075)
Constant	−0.2019 (0.6017)
Total	3428

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Step 6: To validate the instruments. The instruments will be valid if the test statistics value is less than critical value. The test statistics is NR-Square. That is Number of observations $\times$ R-square.

The R-Square is 0.0001

Number of observations is 3428

Test statistics = 0.0001*3428=0.3428

The critical value is obtained from chi-square distribution table with 2 degrees of freedom. At 5% significance level it is 5.991. This therefore confirms that the instruments used are valid ones.

Appendix 1.4: Histogram for child duration of farm work
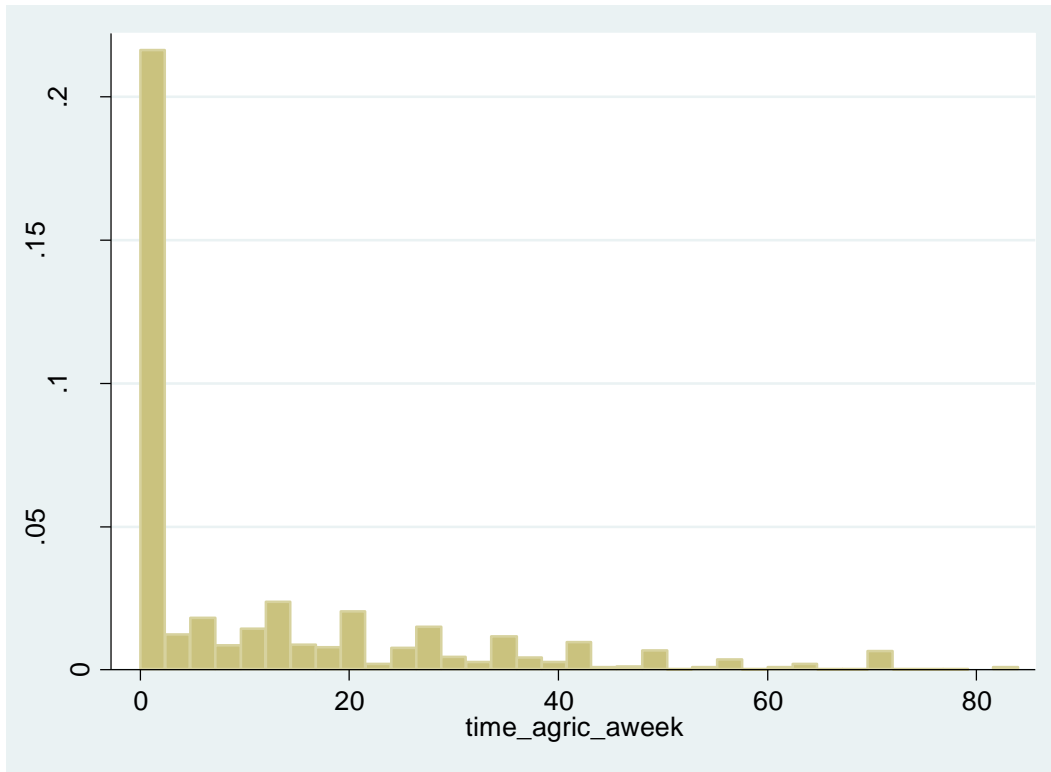
Appendix 2

Appendix 2.1: Coefficients for hours of child farm work, parsimonious equation

VARIABLES	Combined	Female	Male
Log of household food expenses	4.081*	6.959**	4.822
	(2.334)	(3.177)	(3.057)
Household size	−1.551***	−1.506***	−1.466***
	(0.3)	(0.502)	(0.375)
Area of land in hectares	3.379***	8.680***	3.580***
	(1.279)	(2.582)	(1.363)
Area of land in ha square	−0.522**	−2.320***	−0.431**
	(0.248)	(0.66)	(0.216)
Constant	−13.88	−38.85**	−13.8
	(14.01)	(19.59)	(18.5)
Observations	3,428	1,467	1,802

*Robust standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

For model 3 which includes the interacting terms, to calculate the marginal effect of income we will have to divide the marginal effect presented in chapter four by the mean value of income so as to get the actual effect since the income in used is in the log-form.

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Appendix 2.2: Coefficients for hours of child farm work for males and females

VARIABLE	MODEL 1	MODEL 2	MODEL 3
Child Characteristics			
Age of child	10.92***	10.82***	10.84***
	(2.355)	(2.362)	(2.362)
Age of child square	−0.452***	−0.447	−0.448***
	(0.112)	(0.112)	(0.112)
Child of head(dummy)	−3.747*	−1.200	−3.700*
	(1.913)	(1.405)	(1.921)
Household resources			
Log of household food expenses	5.909**	6.341**	−5.610
	(2.425)	(2.469)	(8.906)
Interaction btw income and household size			2.079
			(1.337)
Interaction btw income and land (ha)		2.035*	−3.367
		(1.195)	(3.240)
Area of land in hectares	2.164*	2.305*	22.21
	(1.189)	(1.195)	(19.28)
Area of land in hectares square	−0.417**	−0.407	−0.431**
	(0.209)	(0.209)	(0.182)
School variables			
Comm. dist to govt. pry. sch.	0.362***	1.200	0.392***
	(0.106)	(1.395)	(0.105)
Comm. dist to govt. secondary sch.	0.0224	−3.759*	0.0349
	(0.0448)	(1.919)	(0.0472)
Quality of primary sch. (dummy)	1.013	−1.886	1.281
	(1.393)	(1.167)	(1.396)
Household variables			
Household size	−1.374***	10.82***	−13.69*
	(0.334)	(2.362)	(7.935)
Age of household head	0.0120	−0.407*	0.00611
	(0.0463)	(0.209)	(0.0464)
Female head (dummy)	−1.922	0.359***	−1.885
	(1.558)	(0.109)	(1.563)
Parental education			
Father education (dummy)	−1.952*	−16.41***	−1.915
	(1.157)	(6.355)	(1.167)
Mother education (dummy)	−1.197	−13.67**	−1.304
	(1.401)	(6.532)	(1.406)
Farm structure			
Free land (dummy)	−16.24**	−14.98**	−15.58**
	(6.348)	(6.388)	(6.392)
Rented land (dummy)	−13.37**	−0.447***	−12.92**
	(6.518)	(0.112)	(6.563)
Local comm.. land (dummy)	−14.75**	0.00894	−14.13**
	(6.370)	(0.0464)	(6.424)
No of field	0.361***	−2.026	0.348***
	(0.109)	(1.308)	(0.109)

Community variables			
Presence of microfinance bank (dummy)	−3.112**	−0.605	−3.189**
	(1.325)	(1.292)	(1.322)
Comm. access to phone	−2.189*	1.908	−2.150*
	(1.299)	(4.031)	(1.303)
Presence of irrigation facility in comm..		2.624	−0.729
		(1.895)	(1.294)
Regions			
Afar	0.577	0.208	1.895
	(3.928)	(2.134)	(4.043)
Amhara	2.742	−0.449	2.763
	(1.892)	(3.224)	(1.896)
Oromiya	0.624	−29.06***	0.264
	(2.031)	(4.322)	(2.134)
Somali	0.0992	−10.23***	−0.512
	(3.090)	(2.251)	(3.229)
Benshangul-Gumuz	−28.92***	−25.32***	−28.76***
	(4.309)	(3.409)	(4.332)
SNNP	−9.934***	−10.24***	−10.04***
	(2.050)	(3.706)	(2.254)
Gambela	−24.61***	6.797*	−25.16***
	(3.291)	(3.920)	(3.404)
Harari	−10.21***	−66.55***	−10.35***
	(3.710)	(20.60)	(3.702)
Dire Dewa	6.933*		6.869*
	(3.916)	3,398	(3.919)
Constant	−65.22***	v2	3.379
	(20.49)		
Observations	3,427		

Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1

Appendix 2.3: Coefficient of child farm work duration participation in farm work, females

VARIABLE	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	9.175**	8.341**	8.609**

	(3.790)	(3.801)	(3.822)
Age of child square	−0.380**	−0.342*	−0.355*
	(0.180)	(0.180)	(0.181)
Child of head(dummy)	1.520	1.629	1.909
	(3.244)	(3.247)	(3.253)
Household resources			
Log of household food expenses	5.550	5.698	−29.35**
	(3.550)	(3.597)	(13.64)
Interaction btw income and household size			5.926***
			(1.943)
Interaction btw income and land (ha)			−9.879*
			(5.842)
Area of land in hectares	5.678**	5.901**	64.35*
	(2.700)	(2.733)	(35.26)
Area of land in hectares square	−1.877***	−1.929***	−1.757**
	(0.711)	(0.724)	(0.698)
School variables			
Comm. dist to govt. primary sch.	0.439***	0.435***	0.388***
	(0.124)	(0.125)	(0.129)
Comm. dist to govt secondary sch.	−0.155**	−0.134*	−0.133*
	(0.0681)	(0.0702)	(0.0704)
Quality of primary sch. (dummy)	−2.627	−2.589	−2.213
	(2.164)	(2.164)	(2.163)
Household variables			
Household size	−1.263**	−1.330**	−36.58***
	(0.558)	(0.563)	(11.51)
Age of household head	0.288***	0.298***	0.308***
	(0.0734)	(0.0735)	(0.0738)
Female head (dummy)	0.776	0.691	0.878
	(2.345)	(2.346)	(2.353)
Parental education			
Father education (dummy)	−1.200	−1.046	−0.947
	(1.912)	(1.928)	(1.917)
Mother education (dummy)	−4.753**	−4.674**	−4.926**
	(2.206)	(2.216)	(2.216)
Farm structure			
Free land (dummy)	8.518	8.444	9.989
	(10.90)	(10.98)	(11.28)
Rented land (dummy)	10.40	10.28	11.78
	(11.11)	(11.19)	(11.49)
Local comm.. land (dummy)	7.210	7.118	8.584
	(10.88)	(10.97)	(11.27)
No of field	−0.0758	−0.0845	−0.108
	(0.178)	(0.178)	(0.178)
Community variables			
Presence of microfinance bank (dummy)	−7.676***	−7.505***	−7.607***
	(2.078)	(2.097)	(2.072)
Comm. access to phone	1.230	1.351	1.377
	(2.124)	(2.160)	(2.134)
Presence of irrigation facility in		0.660	0.358

comm.			
		(2.118)	(2.112)
<u>Regions</u>			
Afar	3.754	5.424	5.488
	(5.820)	(5.851)	(5.840)
Amhara	8.124**	7.973**	8.778***
	(3.187)	(3.182)	(3.236)
Oromiya	4.106	4.340	4.752
	(3.459)	(3.581)	(3.613)
Somali	8.874*	9.260*	9.675*
	(5.041)	(5.168)	(5.143)
Benshangul-Gumuz	−30.76***	−30.79***	−30.15***
	(8.735)	(8.728)	(8.675)
SNNP	−0.0826	0.271	0.743
	(3.504)	(3.770)	(3.808)
Gambela	−24.59***	−24.10***	−22.88***
	(5.442)	(5.598)	(5.688)
Harari	−7.671	−7.702	−7.585
	(5.728)	(5.721)	(5.702)
Dire Dewa	4.997	5.120	5.425
	(5.944)	(5.944)	(5.954)
Constant	−101.6***	−99.20***	105.7
	(31.89)	(31.97)	
Observation	1,464	1,452	

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

Appendix 2.4: Coefficient of child duration in farm work, males

VARIABLE	MODEL 1	MODEL 2	MODEL 3
<u>Child Characteristics</u>			
Age of child	13.02***	13.10***	13.07***

	(3.058)	(3.068)	(3.068)
Age of child square	−0.558***	−0.560***	−0.559***
	(0.145)	(0.145)	(0.145)
Child of head (dummy)	−3.473	−3.509	−3.456
	(2.428)	(2.426)	(2.429)
Household resources			
Log of household food expenses	7.067**	7.463**	1.871
	(3.174)	(3.219)	(12.25)
Interaction btw income and household size			1.197
			(1.807)
Interaction btw income and land (ha)			−3.857
			(3.660)
Area of land in hectares	2.525*	2.477*	25.87
	(1.323)	(1.330)	(22.21)
Area of land in hectares square	−0.350*	−0.346*	−0.394**
	(0.186)	(0.187)	(0.162)
School variables			
Comm. dist to govt primary sch.	0.631***	0.634***	0.627***
	(0.161)	(0.160)	(0.161)
Comm. dist to govt secondary sch.	0.0576	0.0570	0.0621
	(0.0619)	(0.0627)	(0.0629)
Quality of primary sch. (dummy)	1.980	2.153	2.201
	(1.746)	(1.754)	(1.755)
Household variables			
Household size	−1.294***	−1.292***	−8.453
	(0.413)	(0.416)	(10.83)
Age of household head	−0.0139	−0.0212	−0.0234
	(0.0599)	(0.0599)	(0.0599)
Female head (dummy)	−0.736	−0.869	−0.772
	(2.069)	(2.071)	(2.071)
Parental education			
Father education (dummy)	−2.417	−2.390	−2.478
	(1.512)	(1.517)	(1.518)
Mother education (dummy)	0.284	0.299	0.248
	(1.814)	(1.818)	(1.819)
Farm structure			
Free land (dummy)	−25.72***	−26.22***	−25.76***
	(6.790)	(6.828)	(6.856)
Rented land (dummy)	−19.95***	−20.53***	−20.19***
	(7.026)	(7.077)	(7.094)
Local comm. land (dummy)	−23.47***	−23.99***	−23.51***
	(6.835)	(6.885)	(6.914)
No of field	0.371***	0.367***	0.355**
	(0.139)	(0.140)	(0.139)
Community variables			
Presence of microfinance bank (dummy)	−2.438	−2.443	−2.324
	(1.677)	(1.682)	(1.682)
Comm. access to phone	−2.604	−2.382	−2.545
	(1.667)	(1.673)	(1.674)
Presence of irrigation facility in		−1.526	−1.574

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comm.			
		(1.661)	(1.665)
Regions			
Afar	2.223	2.642	2.520
	(5.172)	(5.260)	(5.265)
Amhara	2.210	2.021	2.037
	(2.381)	(2.381)	(2.379)
Oromiya	0.801	−0.0155	−0.0687
	(2.522)	(2.664)	(2.663)
Somali	−1.039	−2.012	−2.110
	(3.992)	(4.126)	(4.136)
Benshangul-Gumuz	−38.18***	−38.43***	−38.22***
	(6.165)	(6.206)	(6.208)
SNNP	−9.709***	−10.71***	−10.58***
	(2.560)	(2.821)	(2.818)
Gambela	−28.47***	−29.57***	−29.52***
	(4.077)	(4.277)	(4.283)
Harari	−8.129*	−8.158*	−8.300*
	(4.505)	(4.504)	(4.503)
Dire Dewa	11.97**	11.67**	11.63**
	(4.889)	(4.893)	(4.892)
Constant	−69.10**	−69.76**	−36.73
	(27.05)	(27.21)	
Observations	1,802	1,790	

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

Appendix 2 5: Coefficient of child participation in farm work, parsimonious equation

VARIABLES	Combine	Female	Male
Log of household food expenses	0.238*	0.257	0.223
	(0.14)	(0.203)	(0.198)
Household size	−0.0970***	−0.0815***	−0.0979***
	(0.0186)	(0.0286)	(0.0256)
Area of land in hectares	0.144	0.339**	0.14
	(0.11)	(0.156)	(0.0974)
Area of land in ha square	−0.0289	−0.106**	−0.0162
	(0.0247)	(0.0416)	(0.016)
Constant	−0.667	−1.255	−0.274
	(0.84)	(1.24)	(1.194)
Observations	3,546	1,528	1,860

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

Appendix 2.6: Coefficient for child participation in farm work, males and females

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child characteristics			
Age of child	0.667***	0.672***	0.673***
	(0.160)	(0.160)	(0.161)
Age of child square	−0.0274***	−0.0276***	−0.0277***
	(0.00762)	(0.00766)	(0.00767)
Child of head(dummy)	−0.0916	−0.0908	−0.0866
	(0.127)	(0.128)	(0.128)
Household resources			
Log of household food expenses	0.393**	0.434***	−0.309
	(0.155)	(0.158)	(0.600)
Interaction btw income and household size			0.142
			(0.0881)
Interaction btw income and land (ha)			−0.355*
			(0.213)
Area of land in hectares	0.106	0.0989	2.219*
	(0.0959)	(0.0962)	(1.270)
Area of land in hectares square	−0.0230	−0.0223	−0.0223
	(0.0193)	(0.0193)	(0.0136)
School variables			
Comm. dist to govt. primary sch.	0.0312***	0.0356***	0.0344***
	(0.0112)	(0.0115)	(0.0115)
Comm. dist to govt. secondary sch.	0.000292	0.000169	0.000689
	(0.00294)	(0.00318)	(0.00322)
Quality of primary sch. (dummy)	0.154	0.165*	0.172*
	(0.0962)	(0.0962)	(0.0965)
Household variables			
Household size	−0.0925***	−0.0925***	−0.934*
	(0.0213)	(0.0215)	(0.524)
Age of household head	−0.00131	−0.00169	−0.00184
	(0.00315)	(0.00317)	(0.00318)
Female head (dummy)	−0.123	−0.131	−0.123
	(0.102)	(0.102)	(0.103)
Parental education			

Father education (dummy)	−0.123	−0.123	−0.127
	(0.0783)	(0.0790)	(0.0790)
Mother education (dummy)	−0.139	−0.136	−0.147
	(0.0943)	(0.0949)	(0.0950)
Farm structure			
Free land (dummy)	−1.044**	−1.044**	−0.990**
	(0.486)	(0.486)	(0.484)
Rented land (dummy)	−0.861*	−0.870*	−0.822*
	(0.499)	(0.498)	(0.496)
Local comm. land (dummy)	−0.983**	−0.989**	−0.934*
	(0.488)	(0.487)	(0.485)
No of field	0.0312***	0.0312***	0.0299***
	(0.00821)	(0.00824)	(0.00828)
Community variables			
Presence of microfinance bank (dummy)	−0.0770	−0.0870	−0.0822
	(0.0932)	(0.0934)	(0.0932)
Comm. access to phone	−0.280***	−0.270***	−0.279***
	(0.0881)	(0.0891)	(0.0888)
Presence of irrigation facility in comm.		−0.0411	−0.0489
		(0.0881)	(0.0882)
Regions			
Afar	0.272	0.370	0.362
	(0.235)	(0.244)	(0.245)
Amhara	0.204	0.197	0.211
	(0.138)	(0.139)	(0.138)
Oromiya	0.0160	−0.0116	−0.00532
	(0.142)	(0.150)	(0.149)
Somali	−0.337*	−0.397**	−0.396**
	(0.186)	(0.197)	(0.197)
Benshangul-Gumuz	−1.729***	−1.746***	−1.723***
	(0.304)	(0.306)	(0.307)
SNNP	−0.450***	−0.474***	−0.454***
	(0.144)	(0.156)	(0.156)
Gambela	−1.162***	−1.219***	−1.195***
	(0.234)	(0.242)	(0.241)
Harari	−0.366	−0.374	−0.380
	(0.241)	(0.241)	(0.241)
Dire Dewa	−0.160	−0.171	−0.164
	(0.247)	(0.247)	(0.247)
Constant	−4.070***	−4.284***	0.0561
Observations	3545	3513	3513

*Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

Appendix 2.7*:* Coefficient for child participation in farm work, females

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child Characteristics			
Age of child	0.633**	0.581**	0.606**
	(0.256)	(0.258)	(0.260)
Age of child square	−0.0276**	−0.0253**	−0.0266**
	(0.0122)	(0.0123)	(0.0124)
Child of head(dummy)	0.158	0.162	0.174
	(0.205)	(0.205)	(0.206)
Household resources			
Log of household food expenses	0.223	0.252	−1.240
	(0.247)	(0.251)	(0.972)
Interaction btw income and household size			0.272**
			(0.126)
Interaction btw income and land (ha)			−0.713**
			(0.329)
Area of land in hectares	0.243	0.250	4.471**
	(0.185)	(0.188)	(1.979)
Area of land in hectares square	−0.0997*	−0.102*	−0.0911*
	(0.0528)	(0.0540)	(0.0514)
School variables			
Comm. dist to govt. primary sch.	0.0383***	0.0382***	0.0364***
	(0.0134)	(0.0134)	(0.0136)
Comm. dist to govt. secondary sch.	−0.0110**	−0.0104**	−0.0106**
	(0.00466)	(0.00487)	(0.00491)
Quality of primary sch. (dummy)	0.00730	0.00364	0.0190
	(0.143)	(0.143)	(0.144)
Household variables			
Household size	−0.0551	−0.0559	−1.672**
	(0.0338)	(0.0341)	(0.750)
Age of household head	0.0129***	0.0132***	0.0138***
	(0.00489)	(0.00490)	(0.00494)
Female head (dummy)	0.138	0.134	0.150
	(0.160)	(0.160)	(0.161)
Parental education			
Father education (dummy)	−0.122	−0.125	−0.129
	(0.124)	(0.126)	(0.126)
Mother education (dummy)	−0.348**	−0.345**	−0.361**
	(0.147)	(0.148)	(0.149)
Farm structure			
Free land (dummy)	0.449	0.469	0.566
	(0.623)	(0.627)	(0.644)
Rented land (dummy)	0.641	0.650	0.754
	(0.642)	(0.645)	(0.663)
Local comm.. land (dummy)	0.296	0.306	0.400
	(0.623)	(0.626)	(0.643)
No of field	0.00305	0.00233	0.000299
	(0.0125)	(0.0125)	(0.0124)

Community variables			
Presence of microfinance bank (dummy)	−0.335**	−0.332**	−0.332**
	(0.143)	(0.144)	(0.144)
Comm. access to phone	−0.158	−0.153	−0.149
	(0.141)	(0.142)	(0.141)
Presence of irrigation facility in comm.		0.0408	0.0300
		(0.135)	(0.135)
Region			
Afar	1.093***	1.233***	1.253***
	(0.397)	(0.420)	(0.423)
Amhara	0.779***	0.771***	0.825***
	(0.219)	(0.219)	(0.223)
Oromiya	0.263	0.274	0.308
	(0.226)	(0.233)	(0.236)
Somali	0.428	0.414	0.450
	(0.303)	(0.314)	(0.315)
Benshangul-Gumuz	−1.759**	−1.760**	−1.703**
	(0.683)	(0.684)	(0.683)
SNNP	0.194	0.219	0.269
	(0.231)	(0.243)	(0.247)
Gambela	−0.864**	−0.846**	−0.788**
	(0.364)	(0.374)	(0.379)
Harari	−0.448	−0.464	−0.444
	(0.351)	(0.351)	(0.352)
Dire Dewa	−0.180	−0.186	−0.159
	(0.348)	(0.348)	(0.350)
Constant	−5.680***	−5.631***	2.957
	(2.145)	(2.157)	(5.895)
Observations	1,525	1,512	1,512

*Robust standard errors in parentheses*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

Appendix 2.8: Coefficient for child participation in farm work, males

VARIABLES	MODEL 1	MODEL 2	MODEL 3
Child Characteristics			
Age of child	0.891***	0.930***	0.929***
	(0.231)	(0.232)	(0.232)
Age of child square	−0.0370***	−0.0388***	−0.0386***
	(0.0110)	(0.0111)	(0.0111)
Child of head(dummy)	−0.0917	−0.0986	−0.0965
	(0.179)	(0.181)	(0.181)
Household resources			
Log of household food expenses	0.487**	0.529**	0.394
	(0.224)	(0.227)	(0.917)
Interaction btw income and household size			0.0604
			(0.137)
Interaction btw income and land (ha)			−0.439
			(0.273)
Area of land in hectares	0.150	0.153	2.817*
	(0.0994)	(0.100)	(1.669)
Area of land in hectares square	−0.0166	−0.0169	−0.0219*
	(0.0143)	(0.0144)	(0.0117)
School variables			
Comm. dist to govt. primary sch.	0.0803***	0.0801***	0.0792***
	(0.0288)	(0.0287)	(0.0287)
Comm. dist to govt. secondary sch.	0.00312	0.00289	0.00354
	(0.00437)	(0.00467)	(0.00475)
Quality of primary sch. (dummy)	0.264*	0.274*	0.276**
	(0.140)	(0.140)	(0.141)
Household variables			
Household size	−0.0966***	−0.101***	−0.462
	(0.0296)	(0.0300)	(0.821)
Age of household head	−0.00472	−0.00546	−0.00558
	(0.00457)	(0.00461)	(0.00462)
Female head (dummy)	−0.102	−0.129	−0.115
	(0.149)	(0.150)	(0.151)
Parental education			
Father education (dummy)	−0.151	−0.150	−0.158
	(0.115)	(0.116)	(0.116)
Mother education (dummy)	−0.0407	−0.0316	−0.0394
	(0.138)	(0.140)	(0.140)
Farm structure			
Free land (dummy)	−2.102**	−2.135**	−2.112**
	(1.066)	(1.066)	(1.064)
Rented land (dummy)	−1.664	−1.697	−1.685
	(1.081)	(1.080)	(1.078)
Local comm. land (dummy)	−1.986*	−2.015*	−1.993*
	(1.069)	(1.068)	(1.066)
No of field	0.0376***	0.0377***	0.0363***
	(0.0117)	(0.0118)	(0.0118)

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Community variables			
Presence of microfinance bank (dummy)	0.0342	0.0464	0.0599
	(0.135)	(0.136)	(0.137)
Comm. access to phone	−0.356***	−0.335***	−0.349***
	(0.126)	(0.127)	(0.128)
Presence of irrigation facility in comm.		−0.111	−0.110
		(0.128)	(0.129)
Regions			
Afar	0.188	0.226	0.209
	(0.335)	(0.340)	(0.342)
Amhara	0.0260	0.00678	0.00481
	(0.199)	(0.200)	(0.200)
Oromiya	−0.0324	−0.0858	−0.0936
	(0.205)	(0.215)	(0.216)
Somali	−0.696***	−0.775***	−0.780***
	(0.265)	(0.280)	(0.281)
Benshangul-Gumuz	−2.766***	−2.797***	−2.775***
	(0.456)	(0.462)	(0.460)
SNNP	−0.582***	−0.666***	−0.650***
	(0.206)	(0.223)	(0.223)
Gambela	−1.814***	−1.894***	−1.875***
	(0.365)	(0.373)	(0.376)
Harari	−0.331	−0.329	−0.345
	(0.357)	(0.359)	(0.359)
Dire Dewa	0.0480	0.0328	0.0287
	(0.365)	(0.364)	(0.364)
Constant	−4.391**	−4.659**	−3.887
	(2.178)	(2.189)	(5.756)
Observations	1,860	1,846	1,846

*Robust standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1*

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Appendix 2.9:Mean values of variables

Variable	Combined	Female	Male
Household food expenses	3883.28	3721.80	4199.45
Age of child	10.289	10.2989	10.326
Comm. dist to govt. primary sch.	0.984	1.2204	0.8749
Comm. dist to govt. secondary sch.	14.349	14.503	14.232
Quality of primary sch. (dummy)	0.19688	0.2134	0.1994
Household size	6.711	6.713	6.717
Child of head (dummy)	0.8955	0.913	0.8849
Father education (dummy)	0.4679	0.470	0.4687
Mother education(dummy)	0.2122	0.2265	0.2089
Area of land in hectares	0.7975	0.763	0.8016
Free land (dummy)	0.5050	0.5213	0.5033
Rented land (dummy)	0.10476	0.094	0.1067
Local comm. land (dummy)	0.3837	0.3767	0.383
Age of child in square	111.12	111.193	111.859
Age of household head	46.031	45.65	46.123
Female head (dummy)	0.1707	0.1707	0.1631
Area of land in hectares square	2.4172	1.801	2.3375
No of field	3.6889	3.771	3.689
Presence of irrigation facility in comm. (dummy)	0.4967	0.4855	0.4938
Presence of microfinance bank (dummy)	0.2216	0.2162	0.223
Comm. access to phone (dummy)	0.2522	0.2424	0.2486
Tigray	0.1133	0.1067	0.1173
Afar	0.0238	0.0179	0.0257
Amhara	0,1922	0.188	0.189
Oromiya	0.2248	0.2314	0.2212
Somali	0.0632	0.05441	0.0663
Benshangul-Gumuz	0.022	0.0172	0.0240
SNNP	0.273	0.2762	0.2692
Gambela	0.0309	0.0296	0.03296
Harari	0.0274	0.0420	0.0262
Dire Dawa	0.0293	0.0365	0.0285

Appendix 3

Appendix 3.1: Income versus child duration of farm work

Hours of child farm work	Log of Income	Income
0	−0.597	0.25274671
10	1.170	14.8050929
20	2.938	867.2349312
30	4.706	50799.8451
40	6.473	2975692.249
50	8.241	174306522.8
60	10.01	10210317920
70	11.78	5.98088E+11
80	13.544	3.50341E+13

Source: LSMS−ISA Ethiopia Rural Socioeconomic Survey, 2011/2012