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# Child Labor, Agricultural Shocks and Labor Sharing in Rural Ethiopia

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**"Child labor must not become the nation's Social Safety net."**

Kailash Satyarthi (1998),
International Coordinator of the Global March

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## Acronyms

| | |
|---|---|
| AAU | Addis Ababa University |
| CCT | Conditional Cash Transfer |
| CRC | Convention on the Rights of the Child |
| CSAE | The Center for the Study of African Economies |
| ERHS | Ethiopian Rural Household Survey |
| IFPRI | International Food Policy Research Institute |
| ILO | International Labor Organization |
| OLS | Ordinary Least Square |
| SIDA | Swedish International Development Cooperation Agency |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| WB | World Bank |

## Abstract

We study the effect of an agricultural shock and a labor sharing arrangement (informal social network) on child labor. Albeit bad parental preference to child labor (as the strand of literature claims), poor households face compelling situations to send their child to work. This is, especially, true when they are hit by an income shock and face a binding adult labor constraint. We used a panel data from the ERHS and employed a fixed effects model to pin down causal relation between shocks, membership in a labor sharing arrangement and child labor. We found that child labor is, in deed, a buffer stock. Though a labor sharing arrangement doesn't affect child labor at normal times, it helps households to lessen the pressure to rely on it when hit by idiosyncratic shocks. While almost the whole effect of these shocks is offset by participation in a labor sharing arrangement, the covariate shock is not. Even if this may well affect a child's academic performance, school attendance doesn't decrease. This differential effect of shocks on child labor in participant households might be because of the extra adult labor made available or due to mutual support that comes with these social networks. Our paper is indicative of the importance of considering social networks in smoothing out consumption. Further, it highlights the difficulty to cope up with covariate shocks and hence, calls for development interventions that are particularly meant to address their impact.

## Keywords

Child labor, shocks, labor sharing, social networks

# Chapter 1

# Introduction

Poor rural households in developing countries face a wide range of agriculture related shocks. Agricultural output being the major source of income in the rural setting, any unexpected event that leads to crop loss usually has unpleasant consequences. One of its repercussions is the use of child labor in domestic chores and farm activities. Consistent with poorly developed credit and risk markets, child labor is used as a means of smoothing incomes of the rural poor (Jacoby and Skoufias 1997). In addition to wage employment, children are engaged in family farm activities. Though some aspect of child work has importance in as far as it increases the skills of children, teach them responsibility and self-reliance, there are ample reasons to be concerned about it. Anker (2000) stated that our concern lies on one of the following aspects: the humanitarian concern, the development concern and the economic concern[1].

That being as it may, there is an enormous incidence of child labor in the world. Basu (1999) shows that the highest rate of labor force participation in the world is in Africa. In Ethiopia, the issue happens to be of a great relevance. Work participation rate for children aged 10-14 in Ethiopia is more than three times higher than the world average (ILO 1996)[2]. Like many other sub-Saharan Africa countries, it is mostly a rural phenomenon which is undertaken either at home or on farm (Levison and Moe 1998).

Ethiopia is a country where about 85% of the population lives in rural areas and almost all are dependent on rain fed agriculture. Unpredictable weather, harvest failure as a result of recurrent drought, pests, frost, output price fluctuations, death of family member and /or livestock are some of the many shocks Ethiopian rural households face. The amount of households who are seriously affected by harvest failure and labor problems in the past 20 years are 78% and 40% respectively (Dercon 2002).

The literature on coping mechanisms points to risk pooling and consumption smoothing (Deaton 1989, Deaton 1993, Kochar 1999, Rosenzweig 1988, Townsend 1995; Bardhan and Udry 1999: 94-109). Households in a given village help each other when some household faces idiosyncratic shocks through delivering labor, cattle for ploughing and even cereals. Another option is inter-temporal consumption-smoothing through saving at normal times and dissaving when a shock hits the household[3]. In areas where the labor market is developed adults increase hours of work supply in the labor market. Besides, a number of studies found that child labor is one of the buffer stocks poor households use to mitigate the effects of shocks. Idiosyncratic shocks like illness/death of a household member are

[1] The humanitarian concern emphasizes the need to protect children from the worst forms of child labour. The developmental concern emphasizes on human capital particularly on schooling while the economic concern is related to its effect on poverty and so on.

[2] Ethiopia has one of the highest rates of participation of children in the labor force in the world (ILO 1996)

[3] For more details see (Bardhan and Udry 1999: 94-109)

accompanied by use of child labor (Guarcello et al. 2009). In addition, covariate shocks that lead to loss of crops have similar effects on intra-household time allocation.

However, households differ in the way they respond to the occurrence of such a shock in output. They may use ex-ante or ex-post measures as a coping mechanism. It is frequently claimed, as in many developing countries, that most Ethiopian agricultural households have an informal social network (a labor sharing arrangement specifically) that renders labor upon need. In many areas this informal network is called '*Debo*' and it has many names in different places-*Jige,Wonfel,Woberra* etc. *'Debo'* is a traditional form of voluntary based collective work. A group of people pools their labor resources and /or material resources (oxen, hand plough, sickles etc) to help fellow neighbors. *'Debo'* is usually carried out in harvest seasons and is often organized for matters beyond the capacity of a single family or household to undertake (Mammo 1999). In general when a household needs extra labor, a '*Debo*' is called. (Kassahun 2004).

Child labor isn't just a coping mechanism but is also a means to supplement household income/output at normal times through engagement in the labor market or otherwise. Nonetheless, in Ethiopia, the vast majority of child labor is engaged in household farm rather than for wages (Cockburn (2002), Admassie (2001)). The theoretical assertion that parent's decision to involve children on farms is primarily due to cost of adult labor (or its shortage) is the starting motivation of this paper[4]. It can then be hypothesized that households with labor sharing arrangement should demonstrate lower child labor hours as the labor endowment constraint is relaxed for them. At times of shocks, not only because of the benefit of an extra labor supply made available but also because of the extra help members possibly get out of the network, we expect that such a network will bring a differential response of child labor to shocks.

However, this hypothesis needs a qualification. Depending on who actually participates on the labor sharing (children or adults), this form of labor sharing arrangement may or may not reduce the incidence and/or magnitude of child labor. Besides, even if the labor endowment constraint for participants is relaxed, the amount of land they should work on will also increase as much as the network is reciprocal. Moreover, as this particular network is not purposely meant to pool risk its role in consumption-smoothening isn't clear. Therefore, we have no strong theoretical ground to claim that it will reduce child labor.

Previous studies on shocks have confirmed the claim that child labor is a buffer stock households use at times of income shocks. Beegle et al. (2006) based on panel data from Tanzania showed that households actively use child labor to smooth their income when they face a transitory income shock. Similarly, Cogneau and Jedwab (2008) found that the drastic cut of the administered cocoa producer price in Cote d'Ivoire increased child labor. Also, a study undertaken in rural India by Jacoby and Skoufias (1997) showed that small farmers are inadequately ex-ante insured. Hence, child labor plays a significant role in self insurance strategies of the poor households. Further, Sawada and Lokshin (2001) found that households might use child labor income as parental income insurance, sacrificing the

[4] Following Basu and Van (1999) child labor is a bad in parental preferences. As such had they had enough adult labor to make a living from, they wouldn't have chosen to send the child to work.

accumulation of human capital. In Ecuador, Calero et al. (2009) also found that aggregate shocks increase work activities.

Many of these studies tend to emphasize the importance of credit and formal insurance markets in lowering the impact of shocks on child labor (for example Beegle et al. 2006, Calero et al. 2009, Guarcello et al. 2009; Jacoby and Skoufias 1997)[5]. Though some acknowledged social network as an ex-ante consumption smoothening mechanism[6], we are not aware of any study which attempted to see its effect on child labor. The only paper, we know, that included participation in labor sharing arrangement as a control variable in child work outcomes is Admassie (2001). He found that specialization in work is positively affected by participation in labor sharing arrangement. One possible limitation of his paper is that it is based on a cross-sectional study which is more likely to suffer from confounding effects. Further, the purpose of his paper was not related to shocks. A thorough empirical investigation is, therefore, necessary to grasp the magnitude and direction of the effect of shocks on child labor in the presence of informal networks.

Our paper is an important addition to the literature as it deals with the role of informal social networks in children's time allocation decisions. The living conditions of peasants and the customary practices they are involved in is an important element that determines their behavior and decision on intra household resource allocation. Development interventions that don't consider the grass root causes were destined to fail. For example, over emphasis on the demand side determinants of child labor brought policies that range from legally banning child labor to setting sector specific labor standards in international trade. Basu (1999) noted that the success of such a policy depends on the context in which it is applied. As such it is vital to study the effect of customary practices like labor sharing to recommend informed development intervention to reduce child labor. Especially in countries like Ethiopia where resettlement intervention as a response to drought related shocks are common, we have to be cautious not to dismiss a potential consumption smoothening mechanism. For example, policy makers need to know to what extent risks are pooled to evaluate alternative strategies like providing formal insurance to small farmers in developing countries. Provision of formal insurance might crowd out informal insurance in as far as the latter plays the role of insuring risk. Even supposing there is no crowding out, studying which types of shocks are socially insured helps to identify priority in insurance schemes. Thus, it is decisive to quantify the role of social networks in lessening impact of shocks on child labor. Also, this paper adds to the literature by explaining how rural households behave amidst labor market imperfection as against to a credit market imperfection that is commonly studied in the literature.

We used panel data from the Ethiopian Rural household survey (ERHS) to estimate the effect of shocks and labor sharing on child labor. We also estimated the differential impact of shocks on child labor in participant households using fixed effects model. Our estimation confirmed the claim that child labor is used as a self insurance mechanism. The increase in farm and domestic child labor hours is significant. Though this could 'cast a shadow' on school performance, our data doesn't provide evidence that school attendance declines with

[5] Calero et al. (2009) noted the importance of trans-national networks and remittances in preserving human capital investments when households are faced with income volatility.

[6] See for example (Bardhan and Udry 1999:94-109)

shocks. While labor sharing doesn't affect child labor at normal times, its benefit in terms of lessening the pressure to draw on child labor at times of shocks is substantial. This is particularly true for idiosyncratic but not covariate shocks. Our result is indicative of the importance of considering social networks to smooth out consumption. Development interventions should be cautious so as not to crowd out this important means of dealing with shocks. It also highlights the difficulty to cope up with covariate shocks and hence, calls for interventions that are particularly meant to address their impact. Given the degree of resource constraint in developing countries, policies should give priority to insure aggregate shocks. However, our paper doesn't distinguish which particular transmission mechanism brought the result we got as there are many kinds of social networks tied to each other. Considering all the different types of social networks in the same equation to get a separate effect of each one of them is vital. Besides, in analyzing impact of shocks on human capital formation it is important to go beyond just school attendance to examine its effect on school performance. These are areas of future research.

The rest of the paper is organized as follows: Chapter two highlights the literature on definitions and determinants of child labor. Theoretical set up and reasons for being concerned about child labor are also enclosed in it. Chapter three describes the data. In chapter four, we discuss labor sharing mechanism in rural Ethiopia. The model and empirical strategy are presented in chapter five. Our result is discussed in Chapter six. Finally chapter seven concludes.

# Chapter 2

# Literature Review

## 2.1 Definitions of child labor

It is unlikely that one would question the fact that children are involved in productive activities across both developing and developed countries. However, there is no as such a clear and universally accepted definition of child labor owing to the fact that the nature and magnitude of the work varies across countries and even places in a country. Often there is a distinction between child labor and child work. The ILO relates the former with coercion and exploitation while the latter is mostly taken to be an activity that doesn't harm the child.

The ILO was the first international organization to adopt binding rules on child labor. In the first half of the 20th century it adopted different conventions which were based primarily on setting minimum ages for admission to employment. These treaties were sector specific and the minimum age was in line with the school leaving age in most western states (Cullen 2005: 87-89). Cullen (2007:2) notes that the sector specific standards have been succeeded by ILO Convention 138 of 1973 which creates three main categories of work. The general category is at least school leaving age, 15 years. The second one refers to light work where children above 13 years of age (12 in developing countries) can combine limited number of hours with schooling. The third type is hazardous work where the minimum age is 18 but could go down to 16 if sufficient protective measures are provided.

Through time child labor issue started involving Children's right issue especially after the Convention on the Rights of the Child (CRC) was opened for signature in 1989( Ibid:3). According to the CRC, the nature of the work is what should determine whether a particular activity should be considered 'labor' or not. Children need protection from any hazardous work that harms their health, compromises their physical, mental, spiritual, moral or social development and affects their education.

More recently, the ILO Global Report on child labor (2006) included more specific terminology and definitions. The following definitions of 'economic activity by children', child labor and hazardous work were given:

- Economic activity by children : "…is a broad concept that encompasses most productive activities undertaken by children, whether for markets or not, paid or unpaid, for few hours or full time, on a casual or regular basis, legal or illegal; it excludes chores undertaken in the child's own household and schooling. To be counted as economically active, a child must have worked for at least one hour on any day during a seven-day reference period…."

- Child labor: "… is a narrower concept than 'economically active children', excluding all those children aged 12 years and older who are working only a few hours a week in permitted light work and those aged 15 years and above whose work isn't classified as "hazardous". The concept of child labor is based on the ILO Minimum age Convention, 1973 (No. 138)…."

- Hazardous work by children: "…is any activity or occupation that, by its nature or type, has or leads to adverse effects on the Child's safety, health (physical or mental) and moral development. Hazards could also derive from excessive work load, physical conditions of work, and/or work intensity in terms of the duration or hours of work even where the activity or occupation is known to be non-hazardous or "safe"".

Clearly there is a concern in the above definition of terms. First the fact that 'economic activity by children' excludes domestic chores is likely to lead to a gender blind analysis of the incidence and intensity of child working hours. In low income countries, girls bear a larger share of these tasks than do boys. Hence, the unequal opportunity for schooling between boys and girls is likely to be neglected if one takes this definition to analyze policy relevant issues. The broad definition definitely entertains child working hours in the household farm activities and as such gives us a scope to study the form of child labor largely prevalent in developing countries. Such a definition, however, reproduces gender inequality by putting the role of girls in household chores as invisible.

One can easily see a flaw in the definition of what the ILO considered to be 'hazardous work" and 'economic activity of children'. It is not just the nature or the type of work that makes an activity hazardous but also its intensity. If out of a humanitarian concern or development concern, we want to protect children from these forms of hazardous work why is it necessary to exclude domestic chores from the definition of the broader concept, 'economic activity by children'? The intensity of the work (the number of hours a child works in the domestic chores), should be equally important as the composition of work.

In line with this, UNICEF defines child labor as work that exceeds a minimum number of hours, depending on the age of a child and on the type of work. It takes the view that the number of hours and the nature of the work are very important.[7] Hence, it is only if the work risks the child's physical, cognitive, social and psychological development that it should be considered as bad (UNICEF Website).

To put it in a nut shell, whether all kinds of economic activities including unpaid work on family farm, household enterprise, child care, herding, cooking, and, fetching water, which are detrimental to normal development of the child and schooling should be taken as child work or whether child work should be viewed only as wage employment are still controversial issues. However, this study considers these domestic economic activities and involvement in household farm since the major proportion of children's time in rural Ethiopia is put in such activities. Moreover, given the fact that the number of children in these activities is huge, the impact of this form of child work on the long term development of the individual and the nation at large is potentially too high to be left out.

[7] Age 5-11: at least one hour of economic work or 28 hours of domestic work per week; age 12-14: at least 14 hours of economic work or 28 hours of domestic work per week; age 15-17: at least 43 hours of economic or domestic work per week

## 2.2 Why should we be concerned about child labor in Ethiopia?

According to UNICEF Website, one in six children in the world is engaged in child labor. Particularly in sub-Saharan Africa one in three children are engaged in child labor, representing 69 million children[8]. Ethiopia is one of sub-Saharan African countries where there is a huge incidence of child work (Admassie 2001). Child labor force participation rate in Ethiopia is well over 40%. While wage employment in rural Ethiopia is uncommon, participation of children in work activities for long hours even at the cost of school attendance is widespread (Ibid). A study by Jebessa (2002) showed that 25 hours of work per week is the threshold after which an increase in work hours affects regular school attendance of children. Further, Admassie and Bedi (2008) found that three quarter of all children participates in work activities and the average weekly working hour is around 30. While they found a gendered role in rural Ethiopia there is no difference in the total time spent working. What is more striking is the fact that children as young as four have 21% participation rate and spend about five hours a week on work activities. With age child work hours increase before it reaches maximum and descend (Ibid). To conclude, child labor in rural Ethiopia is significant and needs a thorough study that considers different dimensions of its cause and tools to eliminate it. But why are we concerned about child labor?

Anker (2000) described that there are three over arching concerns regarding child labor. The primary reason why many institutions and people are concerned about child labor is related to protection of children. Children should be protected from worst forms of work and exploitation. This is typically a humanitarian concern for the welfare of children. Associated with this is of course an economic concern such as costs due to health impacts of worst forms of work and hazardous work. It is this concern that brought the 1999 ILO Convention on Worst Forms of Child labor. Measuring hazardous and other worst forms of child labor, however, stays problematic despite the consensus on the importance of the convention. The other concern is associated with the development of children. To become productive adults, children need to acquire skills and knowledge which they get through formal schooling, work and life experience. Children might learn valuable skills and knowledge through work especially in developing countries where there is shortage of school. However, child labor might interfere with children's school attendance and/or their performance. While there is a consensus that schooling and child labor might be complementary (say when they need to pay for school by working), certain types of work and number of hours worked are incompatible with school attendance[9] and performance[10]. This is true especially if children work full time. Considering the fact that poverty perpetuates if children are not well educated it is very important to be concerned about child work even when the work isn't hazardous. The third concern is related to economic and labor market impacts of child labor. At a micro level the economic concern is what will

[8] This is from their Website available at http://www.unicef.org/protection/index_childlabour.html

[9] This isn't always true. Some amount of work might be possible with schooling. Ravallion and Woden (2000) evaluated a targeted school enrolment subsidy in Bangladesh and found that child labour doesn't displace schooling

[10] Bedi and Admassie (2008) using data from rural Ethiopia have, for example, found that beyond a certain threshold child work is associated with lower performance in school. After 22 hours of weekly work reading and writing ability and school attendance suffer. Within 16-22 hours of weekly work only reading and writing ability but not school attendance are affected.

happen to poor households if child labor is banned as children contribute to household income. This necessitated the importance of child labor programs: targeting income transfers and/or subsidies for poor families whose children are in school, adjusting school calendars to enable children to work in peak seasons and part time if necessary, providing income generating opportunities for adult men and women as a substitute for child labor. At a more macro level, the third concern is associated with labor market. Especially for unskilled adult labor, child labor displaces adult labor and pushes their wage downwards. In many developing countries, however, children are involved in family farm activities. Thus, the labor market effect of child labor, here, should be different from the effect when they are employed for wages. Possibly, unpaid family farm work by children doesn't affect labor markets. To conclude, it is either one or more of these concerns that derive researchers to dig in to the issue.

## 2.3 Child labor, poverty and shocks

The literature points out different factors that determine the incidence and magnitude of child labor. Broadly speaking, these determinants range from individual to household, school and community characteristics. Asset ownership, poverty, household demographic composition, agricultural shocks, risk, availability of credit markets, labor scarcity, wage rates, illiteracy, schooling facilities, opportunity cost of schooling, permanent income of households, availability of modern agricultural technologies, tradition and so on are some of the determinants that are reviewed in the vast literature.

Assuming child labor is a bad in parental preferences, many studies emphasized that its incidence is mainly explained by poverty. Basu and Van (1999) noted that the occurrence of child labor as a mass phenomenon particularly in developing countries reflects the problem of stark poverty which compels parents to send their child to work (see also Basu 1999, Anker 2000). De Carvalho Filho (2008), also, showed how household income determines child labor and school attendance using a social security reform in Brazil as a source of exogenous variation in household income. In emphasizing the role of poverty, Anker (2000) stated that child labor is often hard on children but is vital for the survival of the family. Many studies which evaluate the impact of a development intervention on child labor arise from the notion that child labor stems from poverty. For example, Ravallion and Wooden (2000) find that 'Food For Education' program in Bangladesh was effective in increasing schooling and decreasing child work. The conditional cash transfer (CCT) component of the Mexican PROGRESSA program increased school enrollment and attendance, and reduced child work activities (Skoufias and Parker 2001). A programme of unconditional cash transfer in Ecuador evaluated by Edmonds and Schady (2009), also, shows that it in fact reduced child labor among those children most vulnerable to transitioning from schooling to work. All these studies illustrate the centrality of poverty in child labor decisions.

Theoretical prediction about the relation between child labor and asset holding is not clear because two opposite effects inter play. The income effect decreases child labor (as the alternatives to child labor are taken to be normal goods) while the substitution effect is such that more child labor may be used to make more productive use of the assets. Many studies including those mentioned below used land as a proxy for assets. According to Jebessa (2002), children who belong to land abundant households tend to be engaged in mainly work

activities showing the dominance of substitution effect on income effect[11] . A different result is found for some other types of assets. Similarly, a research by Admassie (2001) in Ethiopia shows that land and livestock ownership increases the probability that a child works.

Bhalotra and Heady (2003) have attempted to explain this 'wealth paradox' using data from Ghana and Pakistan. In their work, they explained that children in land-poor households are less likely to work than children in land-rich households because of imperfect rural labor market. The standard wealth effect is that large land holding increases income generated and hence makes it easier for the household to forgo the income the child brings to the household. Also, these households can easily borrow using their land as collateral and hence child work will be less prevalent. However, the marginal productivity of the child increases as the stock of productive resource increases. This higher return to child labor works against the standard wealth effect. In rural settings where the labor market is poorly developed, households couldn't hire in and monitor hired labors effectively. Hence, labor market imperfection is one explanation for the 'wealth paradox' that we see in much of the studies quoted above.

Agriculture related risks also affect the incidence and magnitude of child working hours. The demand for child labor may be affected by the fact that there is no a well functioning insurance and credit market. This role of children as insurance tool against unexpected circumstances was proposed by Cain (1982). Further, Portner (2001) noted the lack of formal insurance against disruption of a poor household's income stream due to adverse weather conditions such as drought. The study argued that with absent insurance markets households resort to alternative consumption and income smoothening strategies. Children can help either working at home or as wage labor particularly when saving or borrowing is not viable means (lack of a surplus in other periods) and when 'traditional system of support' fails to insure its inhabitants against bad weather conditions[12]. Fitzsimons (2003) studied the effect of living in a risky environment on education and child labor in developing countries. Using data from Indonesia she found that households that face more uncertainty and with limited access to formal insurance have higher motive for self insurance which might then have bad repercussions on investment on education. The use of child labor as part of a strategy to minimize the risk of interruption of a household's income stream is also noted by Grootaert and Kanbur (1995). Risk is a vital determinant of child labor.

In line with Basu and Van (1999) researchers have made an attempt to test the hypothesis that parents send a child to the labor market if the family's income from non-child labor sources drops very low[13]. Beegle et al. (2006) using panel data from Tanzania showed that households actively use child labor to smooth their income when they face a transitory income shock. Their paper also shows how far household asset holdings mitigate the effects of these shocks. Cogneau and Jedwab (2008) have also found similar results. Using data

[11] He analysed his study by distinguishing the way a child allocates his time: only schooling, only work, schooling and work. However, this result is insignificant for the girls sub group.

[12] Townsend (1995) found high degree of co-variation in risks for the villages and the commons.

[13] Basu and Van (1999) constructed a model of child labor based on two axioms. The Luxury axiom: A family will send the children to labor market only if the family's income from non-child-labor sources drops very low. The Substitution axiom: adult labor and child labor are substitutes from the point of view of the firm.

from Cote d'Ivoire, they found that the drastic cut of the administered cocoa producer price in 1990 which brought a severe income shock increased child labor. Jacoby and Skoufias (1997) based on data from rural India showed that small farmers are inadequately ex-ante insured. Hence, as a result of poorly developed credit markets, child labor plays a significant role in self insurance strategy of the poor households. The effect of credit constraints in combination with poverty is further emphasized in a theoretical model by Ranjan (1999). If a poor household could borrow sufficiently they would value the future returns from education than the current income benefits of sending a child to work. When this is absent, the forgone earning of the child constitutes too much utility cost to opt to send the child to school. Sawada and Lokshin (2001) found that households might use child labor income as parental income insurance, sacrificing the accumulation of human capital. Using data from rural Pakistan they found that exogenous negative shocks have non-negligible effects on the household's educational investment decisions. Similar result was found by Calero et al. (2009) who showed the relevance of liquidity constraints and vulnerability to covariate shocks in human capital decisions. Based on data from Ecuador they found that aggregate shocks increased work activities. Further, they found that remittances from networks are used as informal insurance/ coping mechanisms.

Idiosyncratic shocks that are specific to a household might increase child labor. Yet, if there is social network like labor sharing arrangement this effect may be partly offset depending on the enforceability and strength of the network. Speaking of fertility, Cain (1982) pointed that strong kin networks can be viewed as alternatives to children as a source of insurance. Nonetheless, if a village as a whole is hit by some sort of shock, the social network insurance will not be perfect and fails to smooth income. For example, Townsend (1994) rejected perfect insurance within three ICRISAT villages. Similarly Jacoby and Skoufias (1997) found that aggregate risks are much harder to insure against than idiosyncratic risk. Hence, labor sharing may not be helpful in case of covariate shock. The end result will be use of child labor for smoothing income[14]. Despite the potential importance of such informal social networks little is known about them. Studies tend to be inclined towards the importance of credit and insurance markets in lowering the impact of shocks on child labor (see Beegle et al. 2006, Calero et al. 2009)[15]. An empirical investigation is, therefore, necessary to grasp the magnitude and direction of the effect of shocks on child labor in the presence of informal networks. Some studies, nonetheless, show that informal networks (at normal times) increase child work. An investigation of determinants of children time allocation between schooling and work in rural Ethiopia by Admassie (2001) showed that specialization in work is positively affected by participation in labor sharing arrangement.

Labor shortage in the household is another determinant of child work. Admassie (2001), for example, found that the adoption of labor saving agricultural technologies such as herbicides and mechanical power increase the probability to attend school. His work recommends that adoption of land and labor saving technologies could be used to reduce child labor. Perhaps the transmission mechanism is through increasing agricultural productivity and thereby

[14] For details regarding social capital insurance( informal insurance) in agricultural sector see (Bardhan and Udry 1999: 94-109)

[15] Calero et al. (2009) noted the importance of trans-national networks and remittances in preserving human capital investments when households are faced with income volatility.

decreasing the reliance on child contribution to household income or/and through dwindling the need to have more labor on farm.

In addition to the above determinants, demographic composition of households and the educational level of parents are also used as control variables in different studies on child labor. The share of adult male, household size, share of adult members, the number of younger siblings, the age of the head are some of the variables common in the literature (See for example Grootaert 1998, Fitzsimons 2003, Bhalotra and Heady 2003).

## 2.4 Theoretical set up

The vast literature on child labor takes the view that child labor is a bad in parental preference. Had it not been to poverty parents wouldn't have made such a choice in time allocation decisions. In trying to optimize utility of the household, parents face a resource constraint; the amount of labor and land resource they are endowed with is limited. Hence, depending on the specific circumstance they are facing they should either hire in or hire out labor. However, in many developing countries like Ethiopia the labor market happens to be poorly developed to allow such a situation. Even if over the last 20 years agricultural labor market gradually emerged, in most villages hired labor is still very uncommon. Its supply is extremely thin (Krishnan and Sciubba, 2006). This poor labor market development has a repercussion on the time allocation decisions within households. Household's major source of labor on farm is what is available in the household. However, accruing to the seasonal nature of the agricultural activities, there are times when labor endowment of the household is not sufficient.

We can disentangle the potential labor supply in the household in to adult labor and child labor. Under normal circumstances, taking the strand of the huge literature after Basu and Van (1999), child labor is a bad in parental preferences[16]. The prevalence of child labor is a sign of market and institutional failure and hence it may be the best parental choice given the prevailing constraints (Bhalotra and Heady 2003). It can, thus, be deduced that parents will go for child labor after having used all the available adult labor in the household. This shouldn't be a strong assumption given that children's productivity is less than that of adults. Basu and Van (1999) did also consider child labor and adult labor as substitutes but subjected to a productivity shifter.

Parents send children to work if family income is so low that it can't meet subsistence needs. Typically, the income elasticity of child labor is negative as in most cases the alternative placement of time (school and leisure) are taken to be normal goods. Thus, child labor is a function of adult wage rate among other things. We can, now analyze what could potentially happen if there is a decline in the income of the household. Obviously, the major source of income in the agricultural sector, especially in Ethiopia where alternative off-farm business activities are scarce, is the harvest. Nonetheless, harvest failure is a typical problem in Ethiopia. As Dercon (2002) noted , the amount of households in Ethiopia who are seriously affected by harvest failure and labor problems in the past 20 years are 78% and 40% respectively. Agricultural shocks due to unfavorable whether conditions or other reasons

[16] Anker (2000) agrees that some sort of child work can be good for the child. Non- hazardous work can teach, for example, self reliance and responsibility.

have been major causes of harvest failure. A drop in output due to weed damage, insect damage, livestock eating crops, storm/wind, illness of a household member are some of the sources of a decline in output of a household. From theory point of view this has a potential to bring down consumption expenditures unless households are insured against these forms of shocks. However, such formal insurance is less prevalent in rural Ethiopia.

The coping mechanisms described in the literature include borrowing, dissaving, sale of assets, and increasing labor supply (see Bardhan and Udry 1999: 94-109, Mogues 2006, Kochar 1999). Besides, credit market is considered as an important source of coping mechanism. However, many studies in Africa showed that credit market is imperfect such that households need to resort to other forms of coping mechanisms than borrowing. Even when they are credit constrained, households smooth away shocks using other means (Beegle et al. 2003)[17]. One of these is child labor. It is likely that parents, when faced with a compelling situation, will send their children to work to secure 'bread' in situations where the credit market is either unavailable or is poorly developed. For instance, Kochar (1999) found that household males increase their market hours of work in response to unanticipated variations in crop profits. But it should be stressed, here, that in countries like Ethiopia where the labor market is poorly developed the tendency to do this is very rare. It might, however, be that parents distribute children's school and/or leisure time to household farm activities and/or domestic cores.

For some covariate shocks related to rainfall, parents may choose to increase children's time on farm activities to get the most out of what they have especially if adult labor supply is a binding constraint. For certain shocks specific to the household's plot, too, the shock may force parents to go for more careful and labor intensive forms of farming in subsequent periods. Thus, we expect that the prevalence of a shock that affects output in a certain period will increase child labor in the subsequent periods. This will be more probable when household's total labor endowment (excluding child labor) is not sufficient (especially at peak labor demand times).

The importance of informal networks in managing exposure to risk and cope with shocks is studied in a new but growing economic and sociological literature. A study by Haddinot et al. (2005) showed that in Ethiopia there are diverse forms of networks that provide mutual insurance against idiosyncratic shocks. One of these social networks is labor sharing arrangement. In addition to providing labor at times of need, members of the same labor sharing group are mostly tied to fellow members in other form of social network. This might be helpful in different ways. Rather than using child as a buffer stock at times of shocks, parents might make use of the informal labor sharing arrangement. Given the productivity difference between adults and children, we can claim that parents prefer adult labor (from this network) to child labor. In addition, membership might be a proxy for other than labor supply that directly provides mutual insurance against shocks[18]. Therefore, Labor sharing could play the role of insuring shocks. As such, child labor might decrease as a result of this

[17] In this regard, Townsend (1994) demonstrated that household consumption follows a smoother path than household income.

[18] Pan (2009) stated that these networks might not actually be designed to pool risk even if they tend to. She, however, found that transfers from mutual support don't play a role in risk pooling

arrangement and the effect of shock on child labor is supposed to be lower in households that participate in this network[19].

We may put this social arrangement within the context of labor market imperfection. When formal or market interventions displace networks, there might be people who suffer (Haddinot, et al. 2005). If we don't carefully understand the roles of these networks, we might mistakenly design a policy that affects the shock mitigating capacity of the poor agrarians.

[19] Labor sharing arrangement can, then, explain both labor and credit market imperfections.

# Chapter 3

# Data and Descriptive Statistics

## 3.1 The Data

The data used in this paper is from the Ethiopian Rural Household Survey (ERHS). It is a unique longitudinal household data set covering households in different villages of rural Ethiopia. It has six rounds. At first in 1989, households in central and southern Ethiopia were interviewed. The data from that year represented only 6 farming villages. However, in 1994 it was expanded to cover 15 villages across the country representing 1477 households. Late in 1994 another round was made. Further rounds were undertaken in 1995, 1997, 1999 and 2004. The data have been made available by the Economics Department, Addis Ababa University, and the Centre for the Study of African Economies, University of Oxford and the International Food Policy Research Institute. The preparation and public release of the data was partly supported by the WB, USAID, SIDA, IFPRI, CSAE and AAU.

The data is representative of the different areas and agro-ecological zones across the country. As such farming systems were an important stratification basis than administrative boundaries. However, only 15 of the thousands of villages in rural Ethiopia are sampled. Stratified random sampling was used within each village based on female/ male headed households.

This paper uses panel data from the last two rounds, 1999 and 2004 mainly because they contain information relevant for this study. Our data set contains 3038 children (age 5-17; 17 included) in 1999 while in 2004 it drops to 2415. The number of children who exit from our sample due to age in the five years time is 1134[20]. Out of those in 2004, 1149 children are new entrants[21]. However, the panel contains 1347 children[22].

The survey has detailed information on demographics, assets, shocks, income, school attendance, intra household time allocation, and participation in labor sharing arrangement among other things. Also, households were asked about their rationale for involving in this network and the relative demographic composition and wealth of fellow members in the labor sharing arrangement. Despite the detailed information contained, the questionnaires for the last two rounds are not completely the same. Some important information for econometric investigation is available in only one of the two rounds. For example, variables related to the opportunity cost of schooling and direct costs of schooling faced by households are available in 1999 but not in 2004. Ranking of major reasons for loss of output are asked in 1999 but not in 2004. Besides, our data set contains 13 different binary

[20] This refers to those who were more than 12 in 1999, i.e. after five years they are no longer in our sample.

[21] These are those children whose age in 2004 is (5-10], i.e. they were five or below in 1999 and hence didn't form part of our sample that year.

[22] Since our data in 2004 only comprises of continuing members, the number of children in 1999 minus the exit group plus the new entrants should give us the total number of children in 2004. Yet, this isn't the case possibly because of misreporting of age which is visible in some observations.

measures of shocks (loss of output because of different events) which don't allow to capture the degree of the shock. Though the inconsistency in the questionnaire doesn't allow inclusion of some variables in panel data analysis, we have tried to put this imperative information in this chapter and chapter four so that relevant insights can be drawn.

## 3.2 Child labor and School Attendance

In this section we present some descriptive statistics on children's participation in farm and domestic activities and some information on school attendance to better understand why we are concerned about child labor in rural Ethiopia.

In our sample, children start involving in farm and domestic chores at early ages. Some children start as young as two years[23]. Almost one-third of them started working before they turn six and at 10 years of age almost all of them are already engaged in some form of economic activities. While schooling is still uncommon, our sample happens to show that there is a huge improvement in the tendency to send children to school. In 1999 the proportion of school age children who never had schooling was more than half. However, in 2004 this figure declines to around 15%[24]. However, much of the change is seen only in the primary education level with a jump from 41% to 78%. The lack of a major change in the junior and secondary levels might be partly because of drop outs and failure to pass from one grade to another (may be because of child work). In fact using the same data set Admassie and Bedi (2008) have found that child work in Ethiopia affects school performance after a certain threshold. In their study, more than 22 hours of weekly work affects not only school attendance but also reading and writing ability. Table 3.1 below shows the percentage of children who are working above this threshold. The figure is striking as more than half of the children exceed this threshold. What this points to is that for the majority, an increase in weekly child labor hours (say due to shock) comes with a negative impact on human capital formation. This strengthens the rationale for studying the effect of shocks on child labor.

**Table 3.1**
**Child labor hours : age (5-17]**

| | *Domestic child labor* | *Farm child labor* | *Total child labor* |
|---|---|---|---|
| Percentage of children who work | 67.60% | 56.54% | 85.60% |
| Mean hrs/week (among those who work) | 21.27<br>(16.42) | 24.98<br>(18.12) | 33.2<br>(21.87) |
| Percentage of children working above 22 hrs/week | 22.91 | 23.48 | **51.92** |

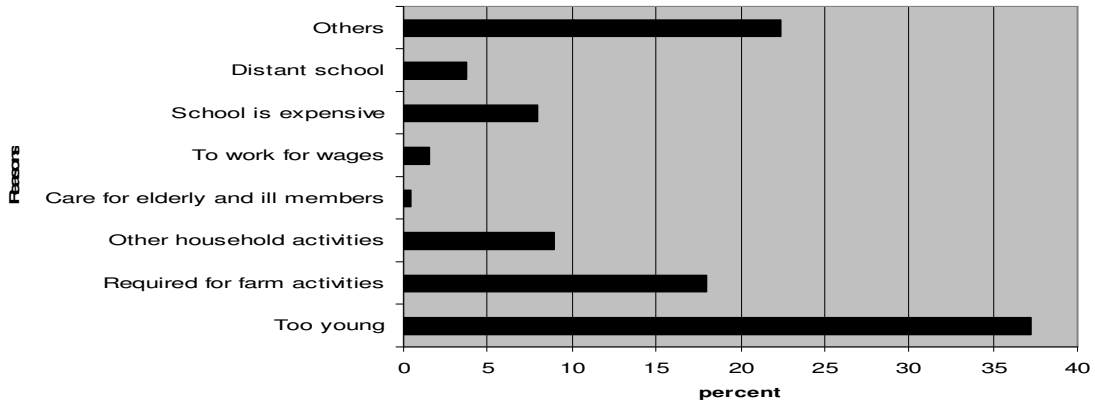
Standard errors in parenthesis

[23] There seem to be some reporting error as some of the observation says children start working as early as 1 year(even below).

[24] School age here is defined as [5-15]. This decline can be attributed to the huge investment the government has been undertaking to increase access to school or the birth giving behavior of parents might have changed. In the latter case, the decline in the figure might solely be because many children are no longer children in 2004.

Withdrawing children from school for help in farm activities is common in these villages. In 2004 about one-fifth of the children have been taken out of school for this purpose. On average, they spend 3.7 weeks away from school. Further, during the last 12 months (of the survey time) 42.5% of the children have never attended school while around 6% have discontinued. Fig 3.1 shows some of the reasons given for not sending the child to school. 29 % of the children are not attending because parents required the child to perform some form of activities that directly or indirectly increase household's income. Out of these, child labor demand for farm activities takes the first position followed by household activities. It can be seen that only 1.5% of those who are not attending school are needed for working for wages, perhaps reflecting the minor role child labor plays in the rural labor market. Some supply side reasons are also given: the cost of schooling and the distance from the nearest school. Relatively speaking direct and indirect costs of schooling are not as strong a reason as the demand for child labor in school attendance decisions[25]. This demonstrates the bad repercussion child labor has on investment on human capital decision and hence on the child's future productivity.

**Fig 3.1 Why not attend school?**




## 3.3 Shocks

Our data set contains information on thirteen types of crop shocks. Households were asked if they had experienced certain events in the previous main farming season that affected the growth and harvest of their crops. These are crop loss due to:

- unfavorable rain at the beginning of the rainy season,
- unfavorable rain in the growing period
- untimely rain in the kiremt (main) season
- rain in the harvest season
- untimely stopping of rain
- flood, wind or storm

[25] In our econometric estimation we don't include these schooling variables since our data lacks information in one of the rounds. Given the minor role it plays in schooling decisions its omission should not cause much bias.

- weed damage , bird damage, plant disease, livestock damage ( eating and trampling crops)
- illness of farmer or other household member to do work at right time
- insect damage and
- shortage of outside labor at the right time of need

Response to these questions is recorded as a shock if it is either too much or too little or too early or too late. Thus, we cannot capture the degree of the shock[26]. These shocks can be classified in to covariate and idiosyncratic. Covariate shocks are those shocks which affect output of all households in the same village while idiosyncratic shocks are shocks that are particular for a household. With such a definition, it is apparent that all the first five shocks described above as well as flood and wind are covariate as they should affect all households in a village though the extent could differ from one to the other. Provided that households farm plots in a particular area they are more likely to face similar events related to rain[27]. Yet, an out put loss due to illness of a farmer or other household member is a typical idiosyncratic shock. Likewise, harvest failure due to insect damage and shortage of outside labor at times of need are idiosyncratic. If a particular household takes a good care of its plot of land it will not face crop loss due to insect damage no matter how others do. Thus, when one member of a village loses output, it need not affect others. One could of course argue that shortage of outside labor reflects the labor market situation and hence is covariate. Nonetheless, it should be clear that not all households in a village face a binding labor endowment constraint. Thus, while some are in short of labor at peak seasons, others need not.

### 3.4 Ex-ante consumption smoothing mechanisms

As it ought to have been clear so far our paper tries to explore if child labor is a buffer stock households use at times of shocks. To get a clear understanding of self insurance, below, we discuss alternative ways of dealing with shocks (ex-ante measures to shun the effect of shocks) and how far they are viable in these villages.

One of the common ways to smooth out consumption is to save at times of surplus and dissave when hit by a shock (see for example Bardhan and Udry 1999:94-109). In the absence of formal financial institutions we expect households to save in kind (mostly food) and in informal institutions. In our sample 40% of the households didn't store food crops during the time the data was collected. The trend has stayed fairly same in both rounds. Further, while the percentage of individuals who save in *Iqub* (a local institution for rotating savings) has increased over the two periods, it is still small (18%). This perhaps shows the poor saving capacity/habit in these villages. A household that isn't saving liquid money and/ or food crops has a narrow set of portfolios to smooth out consumption when hit by a

[26] The questionnaire in the 1999 survey asks the extent of the shock in degrees while in the 2004 survey the questions are pure' yes' and 'no' types. So as to make the two rounds comparable we resorted to changing a slight incidence of a specific shock in 1999 as a 'yes' in 2004. There is clearly a potentially measurement error as we cannot be sure what extent of crop loss is equivalent to a 'yes' in 2004.

[27] This might not be the case if all people in a village have their plots of land in different villages. However, the possibility is rather very small.

shock (especially in rural areas where other alternatives are scanty). Even worse, credit markets are imperfect in many developing countries. Either a household will fail to get a credit as it may not have a *guarantee* / collateral or the amount it gets isn't sufficient enough to smooth out consumption. This shows how far an agricultural shock may have a devastating effect on the welfare of the household and hence 'casts a shadow' on the child labor outcome of shocks. Perhaps, mutual assistance among social networks that are organized on the basis of kinship and neighborhood helps. Chapter six will verify this.

# Chapter 4

# Labor Sharing in Rural Ethiopia

In this chapter, we describe what a labor sharing arrangement is in the context of rural Ethiopia. We then highlight the different forms of labor sharing arrangement. Next, reasons for participation in this network are explored in light of the literature and the data from these villages. A brief analysis is given regarding who actually is sharing labor. Here, we discuss the basis of its formation and the age range of the participant members. This helps us to examine the enforceability of the reciprocal nature of the labor sharing arrangement and scope of insurance it could potentially provide. We then proceed to describe the differences between households who are in labor sharing and those who are not (if any). At last, we use different variables to investigate if a household is sharing labor with those having similar features or not. If a group is heterogeneous there will clearly be a potential source of support when a household faces a shock.

A labor sharing arrangement is an informal network which involves a group of people who are organized for a particular agricultural task like harvesting, weeding, ox-ploughing, digging, threshing, manuring, ploughing, loading and transporting grain from the farm field. In many areas this informal network is called '*Debo*' and it has different names in different places-*Jige, Wonfel, Qabo* etc. Though the particulars depend from place to place they generally have similarities. The two most common forms are *Debo and Wonfel.* In the former, a group of people pools their labor resources and/or material resources to help fellow neighbors. It is usually carried out in harvest seasons and is often organized for matters beyond the capacity of a single family or household to undertake (Mammo 1999). In general when a household needs extra labor, a *Debo* is called (Kassahun 2004). In *Wonfel*, the host should reciprocate for each member in that season whereas in *Debo* it can be any time in the future upon demand. Besides, while *Debo* hosts prepare food and drinks, *Wonfel* doesn't involve such feasts (Dercon and Hoddinot 2004).

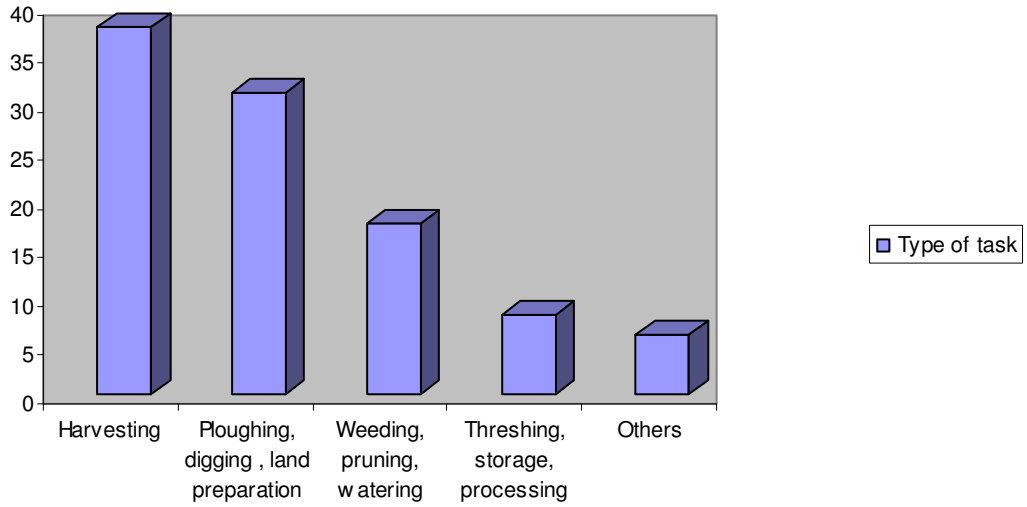
## 4.1 Why labor sharing?

In ancient times reciprocal forms of farm labor by which households in need of extra help either exchanged an equal number of days work with their neighbors or entertained work parties of neighbors with feasts and drinking were common (Erasmus 1956). Through time such institutions are being increasingly replaced by wage labor. In Ethiopia where more than four-fifth of the population live in the agrarian sector, labor market is very thinly developed. Historical accounts show that this is partly attributed to the strict controls imposed by policy makers at different times (Krishnan and Sciubba 2006). The land reform in 1975 prohibited all private ownership of land, sale, or transfer of land by lease. Land is state owned and allocated to farmers by Peasant Associations[28]. Tenancy and wage labor were also prohibited

[28] The PA's have wide range of powers as local authorities. To keep land tenure closely linked to household size and needs, till the late 1980's PA's were responsible for the programme of continuous land redistribution. Although this continuous land redistribution has, in principle ceased, registration with the PA remains essential for farm households ( Dercon and Hoddinot, 2004).

in the reform[29]. One year before the socialist Derg regime was over thrown, land tenancy and wage labor were made legal as part of the economic reforms. Even though since then there is an emergence of wage labor, the labor market is still poorly developed and households draw a lion share of their labor from members of the household. However, there are seasons where farm labor demand of a household goes beyond what the household is endowed with. In the year 1999, only 34% of households who had labor shortage managed to hire in labor from the market (See Table 4.1). What is puzzling enough is that there are some households that hired in even if they reported that they have no problem of labor shortage (about 18% in the same year). The peak labor demand seasons are mostly seasons of ploughing, weeding and harvesting. In these seasons, it is very common among rural households of Ethiopia to exchange labor for farm activities. For example in the year 1999, 65% of the households have called work parties at least in one of their plots. Fig 4.1 shows that the major tasks for which work party is called: harvesting (37.6%), ploughing and land preparation (30.8%) and weeding and watering (17.4%).

**Fig 4.1 Type of task work party was called for (2004)**




There could be multiple economic advantages of such an arrangement. It is useful in as far as there is no well established labor market. This is potentially true in the Ethiopian context as the market for wage labor is poorly developed. In the year 1999, 50% of the households in the ERHS had a problem of labor shortage. However, only 27% of the total households actually hired in. Out of those households who reported labor shortage, 85% were engaged in labor sharing (see Fig 4.2). Surprisingly, about 44% of those households who reported having no problem of labor shortage are actually using labor sharing in at least one of their plots. This signifies the fact that household's decision to enter in such a network doesn't emanate solely from the problem of labor shortage. Further, labor sharing and hiring labor are not complete substitutes as some households share labor and also hire in. About 28% of those who share labor do also hire in.

[29] However, some groups (female headed households with dependents, ill land holders and soldiers) were allowed to lease out their land and to hire labor.

**Fig 4.2 Percentage of households who used labor sharing given conditions of labor shortage**

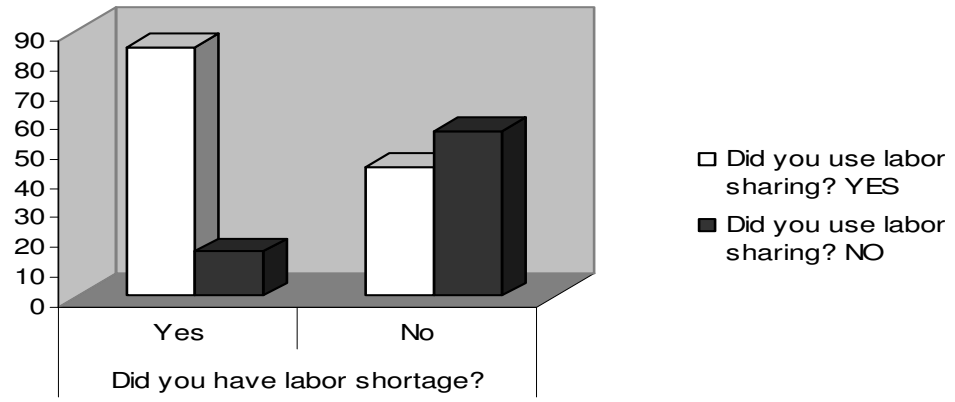
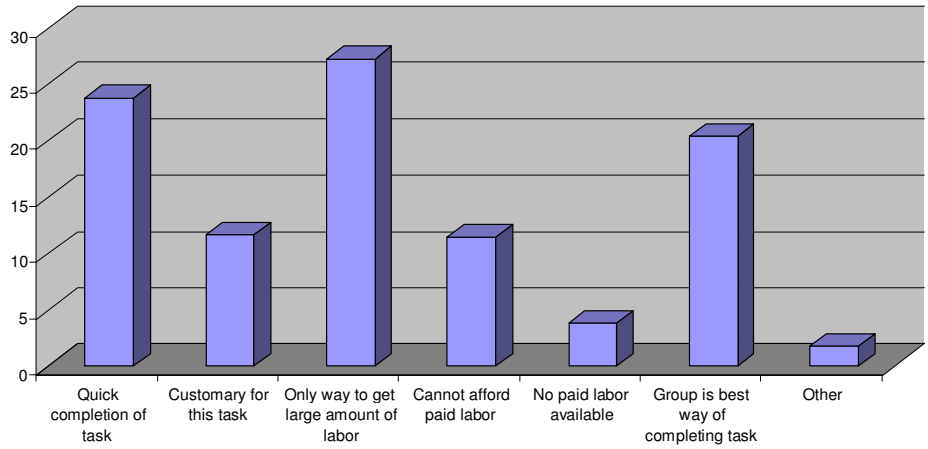



**Fig 4.3 Reasons for calling work party**

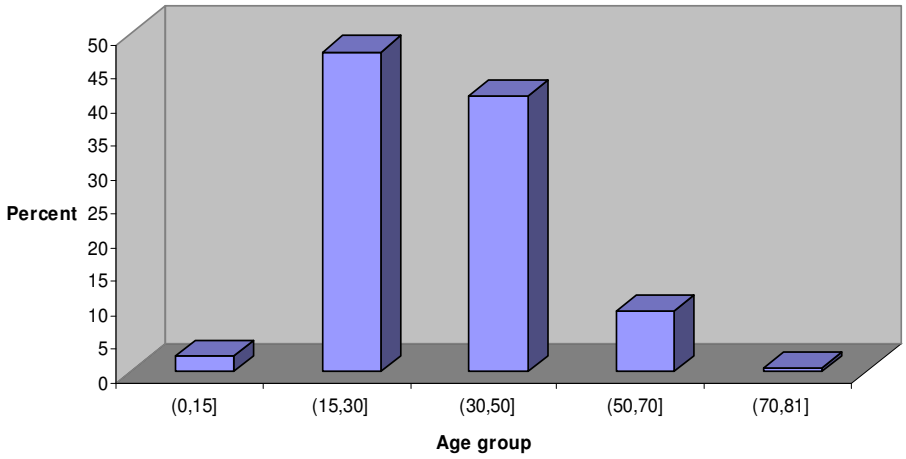



Secondly, there could be unpredictable requirement for larger labor parties. A household can easily meet its need if it has established a good reputation among the networks. Third, households can enjoy the economies of scale attached to it. Last but not least it creates large motivation in doing tedious tasks (Moore 1975). Fig 4.3 shows the major reasons why households call a work party in the 15 villages of Ethiopia under study. Perhaps, the major reason is quick completion of tasks in a group work. The other two reasons are related to labor market imperfection. Households reported that the absence of a paid labor and the lack of a large labor upon demand made them to prefer to call a work party. Moreover, inability to afford paid labor drives some households to be a member of the labor sharing arrangement. Further, it has been reported that the institution is customary and that is the reason why some do so. This might explain why some households who don't have labor shortage actually call a work party.

## 4.2 Who are sharing labor?

One of the important considerations we need to make when we see effect of labor sharing on child labor is whether children are participants. In our sample, Labor sharing is concentrated in the productive age group. Fig 4.4 shows that the number of children who are participating in the labor sharing arrangement is insignificant[30]. Ignoring for the possible measurement or reporting error the minimum age of the members is 10 and the maximum is 81. However, these are rather uncommon in the data set. The concentration is in the productive age group (15-50).

**Fig 4.4 Age structure of labor sharing participants**




Mostly members of labor sharing arrangement are from same villages. The group is organized on the basis of kinship, friendship and neighborhood. The lion share of the respondents with labor sharing arrangement is in the same village (about 95%). Of this the majority is in the same neighborhood. When asked if they are relatives a bit more than half responded 'yes' (Table 4.2).

Being an informal network, enforcement is usually because of the kinship and also the possibility of ruining reputation. 'Word of mouth' works best as the members are mostly close to each other and are tied with one another through other forms of social networks. The existence of repeated interaction and the possibility of a social sanction are important ingredients in the realization of commitment. In the 2004 survey year households were asked if members of their labor sharing arrangement didn't come to help when they were called. Accruing to the different ways of enforcement only below one-fifth didn't come without good reason (Table 4.3).

A household that calls a work party needs to reciprocate either immediately or in the future upon need. Only in about one-sixth of the cases members shouldn't reciprocate. Otherwise, they have either reciprocated, or will reciprocate either in the same season or later (Table 4.4). This repeated interaction might also be a way to guarantee the effectiveness of the

[30] The data contains outliers which are very unlikely and I have considered them as a measurement or reporting error. i.e children as young as 2 and 3 years are reported but they are not many. Thus, 2.24% is even an exaggeration.

social network. To this end, there is a high tendency to call someone who has been called previously[31]. Table 4.2 illustrates that over 90% of the households had called the same individual in either the previous season or in another party. Also, 86% of them responded that they will call the same individual again in the future. This guarantees the fact that participation in labor sharing in a certain year could well imply membership in labor sharing arrangement. This argument can be strengthened by the fact that some households call 'work party' just because it is customary. We also saw that households who don't have labor shortage in deed participate. Also, the primary reason for calling work party, as described above, is quick completion of task. Considering all these reasons, we tend to believe that calling work party in a certain year could proxy membership in labor sharing arrangement (It isn't endogenous).

One important insight from this is the scope of mutual support that households can provide when an idiosyncratic shock hits a certain household. Since membership is based on kinship and neighborhood and since there is a great deal of repetition in interaction that strengthens enforceability, we expect that there will be a possibility that children from participant households could experience smaller increase in working hours as a result of shocks (than otherwise). This argument can be strengthened in view of the fact that majority of those who are in the same labor sharing arrangement don't have plots near plots of fellow members (though they live in the same village). Only 27% of them have so. Our point is that members could better be insured against shocks that affect a specific part of a village. This argument is strong under the weak assumption that members of a certain labor sharing arrangement are also tied with other forms of social networks that might help to pool at least idiosyncratic risks.

## 4.3 Differences between participants and non-participants

Our survey contains information on whether households participate in the labor-sharing arrangement or not and the number of other household members that participated on the 'work party' called. Since a household may call different types of work party, the data is aggregated such that a household that calls a party at least once is recorded as having participated (for reasons outlined earlier this is a good proxy for membership in labor sharing arrangement). Table 4.5 gives a summary statistics of some variables for which the mean of participants and non-participants is statistically not unequal. These two groups have statistically similar mean composition of sex of the household and sex of the members. Thus, it doesn't seem that participation is driven by the presence of more male labor. The mean age at which children start participating in farm and or household activities is around 6.5 years. Of course there are some who start as early as 2 years[32]. Households' demographic feature in terms of the mean proportion of children below 15 years and share of adults is also similar among participants and non-participants[33]. In both groups the share of adults is greater than the share of children. Nevertheless, the mean of share of adult males and share

[31] Our data tells us that the group might be formed when need arises, sometimes well before the season and at times when the season begins.

[32] The data set seem to have some measurement error as some observation report that a child as young as 1 year participates in these activities.

[33] Shares are all computed as a proportion of total household size.

of children below five years show a statistically higher figure for participants. Perhaps, this makes inference about demographic features more difficult.

Considering the economic position of households in terms of poverty status, we don't find a difference in means between these groups. In both cases, on average, about 41% of the individuals live in households who are under poverty line. Other measures of assets, number of 'chicken and beehive owned a year before' and 'owned and present at farm in the current year', also tell us that the two groups are similar in means. It is also clear that the average amount of individuals coming from a household which saves in the rotating local saving institution, *Iqub*, is statistically the same. However, the average number of 'big farm animals' owned by the participants is significantly higher in both the current and recall periods (Table 4.6). May be those who have more oxen which is primarily used for ploughing in rural Ethiopia tend to be attracted to the labor sharing. For some other assets (average amount of transport and small animals owned both currently and in the past) we see that non-participants are better positioned economically. Hence, the descriptive analysis doesn't show a clear image on whether or not there is difference in economic status between these groups.

The average number of child labor hour spent on both domestic and farm activities are statistically significantly higher in participants than otherwise (Table 4.6). From this one may claim that children are involved in work parties and labor sharing tends to increase the number of hours they work. Yet, in the previous section we saw that very insignificant number of children participates in labor sharing. We also found that children in participant households, on average, have less school attendance and years of schooling. Could there be any indirect effect of the arrangement on child labor hours or is this emanating from differences in economic status of households? We live the answer to the econometric analysis.

Coming to shock variables, however, only in one of the 13 subjective shock measures is the mean statistically similar across participants and non-participants. This variable is crop lost because of wind or storm. In all other subjective measures of shocks, on average, individuals from participant households faced more shocks than non-participants. The result is statistically significant at 1% level of significance (Table 4.7). Even though this tends to put a doubt on whether participation is driven by the incidence of these shocks, none reported this as a reason for participation (as discussed in the previous section). Even in cases where there is no labor shortage households tend to participate for the mere reason that it is customary. Hence, it is our firm conviction that participation in work party isn't driven by shocks. It is more of its customary nature, and its help to accomplish the task fast that makes households to call work party. We have also seen that there is a repetition in the interaction among member households (many households reported they had called the same households before and will call them in the future). As such if a household has called work party in the past season it means it belongs to that network[34]. As such before output loss/shock is realized households have already been either a members or not. But after the shock the network might help by providing labor or other assistance, which we will explore later in the econometric analysis.

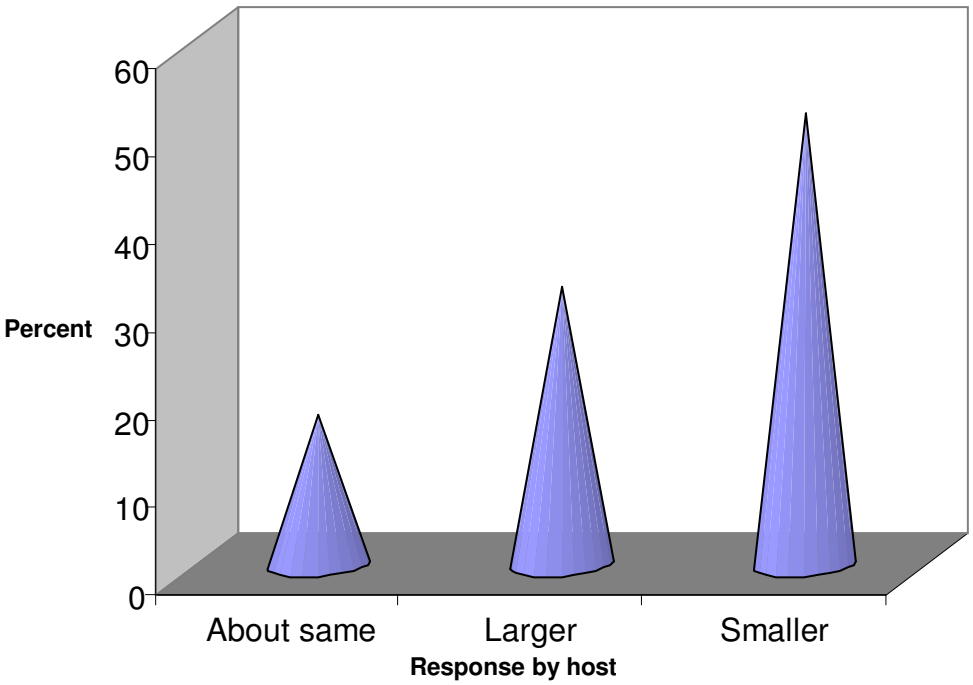
[34] If there is any correlation between shock and labour sharing it could probably affect the length of days in work but very unlikely to affect decisions to call work party or not (This doesn't hold for all the shocks but strengthens our argument)

## 4.4 Are they homogeneous groups?

For members of a labor sharing arrangement to effectively support each other at times of idiosyncratic shocks, it is important that the group is heterogeneous. This is especially true if the network has advantages other than labor supply. Hoddinot et al. (2005) stated that households can use networks to smooth out the adverse effects of shocks( e.g. obtaining credits for food and health expense) and these networks have mostly other ties, one of which is labor sharing. Group heterogeneity helps to have a promising room for mutual support. If, however, there is selection on, say, household composition and land ownership where the well to do form a group and the poor another group, little room is available for a mutual support. Our data helps to check this as respondents are asked the relative importance of their land and household composition with respect to other members[35].

Members in a labor sharing arrangement tend to be highly varied in as far as land ownership is concerned. Only in about 23% of the cases are members having similar amount of land. 45% reported that they have less land than the people who they called for a 'work party'. The remaining has more land. This tends to show that there is heterogeneity in wealth among those sharing labor. Hoddinot et al. (2005), also, found that network groups are varied as measured by age and land-ownership[36]. Therefore, a labor sharing arrangement can potentially be a way by which households can lessen the impact of shocks on incidence of child labor.

**Fig 4.5 Relative size of participant households**




[35] Though not all members are reflected in the sample, we can know what kind of households are working with the respondent household.

[36] In fact their study treats labor sharing as another form which ties the networks.

Moreover, clear group heterogeneity is seen in terms of household size. A little more than 50% of the hosts called a work party from a network with smaller household size (Fig 4.5). Only about 17% have similar size. Hence, small households are not thrown out from the potential benefit of this arrangement. Furthermore, about 18% of the participant households do not have adult male. Perhaps, these are female headed households or households where there are no adults at all. A little less than 50% have only one adult labor (Table 4.8). This is an interesting finding as the arrangement is not systematically biased towards households with a lot of adult male labor. Labor sharing might possibly relief households from the pressure of sending children to work when a household with few adult male labor faces a shock.

To conclude, the majority of households in the 15 villages under the ERHS still rely on reciprocal exchanges of labor. Even when a household uses hired labor, it doesn't use it exclusively. Rather a combination of the two is common. The work groups take various forms in different places and have different names. The major reasons for being a member are quick completion of tasks and labor market imperfection, in addition to its 'customary' nature. There is a huge room for enforcement as membership is based on kinship and neighborhood beside the fact that there is repetition in interaction, possibly making a scope for mutual support at times of shocks. A summary statistics of participants vis-à-vis non-participants showed that child labor and occurrence of shocks are more prevalent among participants. Given the mixed result on economic status differences among these groups we can't be sure what brought higher farm child labor among members of labor sharing arrangement. Also considering the fact that households call labor sharing for reasons other than shocks and since they responded they had called the same participant before and they intend to call him/her in the future, we tend to believe those who participated in the previous season are members of such a network. Hence, we will use it as an exogenous proxy for membership. Last but not least, we found that group members are fairly heterogeneous with respect to land ownership and household composition which is useful in as far as mutual assistance at times of shocks is concerned.

# Chapter 5

# Model Specification and Empirical Strategy

## 5.1 Model Specification

In chapter two we discussed the theoretical set up and the relation between child labor, poverty and shocks. Here, we outline the empirical strategy and specification we used in order to identify a causal effect of shocks and labor sharing on child labor. It also helps to see the extent to which membership in labor sharing arrangement helps households to smooth away the impact of shocks.

We first estimate the following equation to examine the effect of shocks and labor sharing on child labor:

$$Y_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \alpha_2 shock_{ijt} + \alpha_3 LS_{ijt} + \varepsilon_{ijt} \text{ ---------- } Eq(1)$$

Where $Y$ is child labor hours (either farm, domestic or total child labor); the subscript stands for individual $i$, in household $j$ and survey round $t$. $X_{ijt}$ refers to a vector of control variables related to the community, household and individual characteristics. Shock is a vector of dummies for the occurrence of an event that affects output and $LS$ is a dummy for participation in a labor sharing arrangement. The last term ($\varepsilon_{ijt}$) captures the time variant and time invariant unobservables.

In order to capture the role of labor sharing in lessening impact of shocks we model the above equation by adding an interaction term of labor sharing and shock dummies:

$$Y_{ijt} = \alpha_0 + \alpha_1 X_{ijt} + \alpha_2 shock_{ijt} + \alpha_3 LS_{ijt} + \alpha_4 (shock_{ijt} * LS_{ijt}) + \varepsilon_{ijt} \text{ --} Eq(2)$$

A shock is defined to be an event that affected the growth and harvest of crops in the previous main season. In our data, the survey asks households if they have lost crops due to various agriculture related events. If child labor is a buffer stock a household uses at times of shock, we expect $\alpha_2$ to be positive. Further, the coefficient of the dummy for membership in labor sharing arrangement, $\alpha_3$, is expected to be negative if membership relaxes a binding labor endowment constraint and children do not participate in it. Besides, if labor sharing helps for consumption smoothing (or if it is used as an alternative source of labor), we expect the interaction of labor sharing dummy variable with these shocks ($\alpha_4$) to have a negative sign (equation 2). This represents differential response of child labor to shocks in households which are participants of a labor sharing arrangement.

These two equations are also used to estimate effect of the variables on the right hand side of the equation on school attendance. In that case the dependent variable will be a school attendance dummy.

Our empirical strategy started by estimating equation (1) using pooled OLS. Considering the wide range of unobservables that could be correlated to shocks and also child labor, estimating pooled OLS model for the above equations might induce a biased result. The unobservable $(\varepsilon_{ijt})$ is composed of time variant and time invariant features of the child or the parents who make the decision. It can also reflect the features of the community where the child resides. If those features are correlated to the occurrence of shocks and also to the tendency to send a child to work, our estimates in OLS will be biased. Apparently there are convincing reasons to suspect this.

Some parents might, for example, be less forward looking and as such might be more prone to shocks. They may also be discounting the future so much that they don't want to send the child to school. The intelligence of parents in terms of avoiding possible future shocks and their smartness in terms of valuing the benefit of school against work is also unobservable. The cultural element that might affect the work habit (hence, some shocks) and also the allocation of work among household members is an additional source of selection in unobservables. So as to control for this confounding effect, the paper allows for individual fixed effects. Thus, our credible empirical strategy relies on the following fixed effects model:

$$Y_{ijt} = \alpha_0 + \alpha_1 t + \alpha_2 X_{ijt} + \alpha_3 shock_{ijt} + \alpha_4 LS_{ijt} + \mu_{ij} + \varepsilon_{ijt} \text{ ---------- } Eq(1^*)$$

$$Y_{ijt} = \alpha_0 + \alpha_1 t + \alpha_2 X_{ijt} + \alpha_3 shock_{ijt} + \alpha_5 (shock_{ijt} * LS_{ijt}) + \alpha_4 LS_{ijt} + \mu_{ij} + \varepsilon_{ijt} \text{ --} Eq(2^*)$$

Where $t$ stands to capture time trend, $\varepsilon_{ijt}$ is the time variant unobservable and $\mu_{ij}$ refers to the individual fixed effects. Individual level fixed effects consider selection on unobservables at household and community levels too. Thus, $\mu_{ij}$ will be swept away.

However, this doesn't guarantee the absence of all sorts of selections on unobservables. Conditional on covariates, the time variant error term in equation (1*) and (2*) might not be orthogonal to the shock variables and/ or labor sharing variables. There could be differential time trends due to shocks which can't be captured by fixed effects model. For example, the poor are more vulnerable and susceptible to shocks and they could have restricted access to insurance. As long as child labor decisions are correlated with being poor, our estimates could still be biased. To this end, we tested if child labor at time $t$ predicts shocks at time $t+1$ but our result shows that child labor doesn't predict most of the shock variables. Though our strategy doesn't guarantee sweeping away all confounding effects, it controls for many sources of bias.

## 5.2 Choice of variables

Studies on child labor have used a huge variety of explanatory variables in studying its determinants. These variables include both supply and demand side factors. Our concentration in this paper, yet, is on the supply side. Even though demand side variables are important, the available data isn't convenient for a panel analysis as the survey questionnaire changed from round to round. Further, in the context we are dealing with, it appears that there are a scanty number of children working for wage in the labor market.

One of the major determinants of child labor is related to the characteristic of the child itself. The age and gender of the child have been distinguished to have an impact on the probability to work and the number of hours worked (Grootaert 1998, Deb and Rosati 2004, Cogneau and Jedwab 2009). However the magnitude and direction of these effects differ from country to country and type of work. Our model has considered these variables as control variable.

Another dimension that affects child labor relates to the parents' characteristics. Given that the decision to send a child to work rests on the parents, including the education level and employment status of the parents has been considered vital in the literature[37]. In our estimation we made use of information on the head of the household's sex and educational level. The later is especially vital as we assume that better educated heads tend to value the future benefits of schooling and hence are less likely to send children to work.

There are also several household characteristics that are exhaustively studied in the literature. As discussed in the theoretical framework, the decision to send a child to work depends on the economic status of the household. As such it is vital to control for income of the household. However, this variable is typically endogenous. Income of the household affects child labor and child labor also affects income of the household. Thus, it would be better to consider variables that are relatively less endogenous. Our paper has considered ownership of livestock as a fairly exogenous proxy for economic status. The survey has also enabled us to use the number of different livestock the household had in the previous year. This shouldn't be seen with doubt as what the household owned last year is unlikely to be affected by the child labor this year. In addition we have controlled for area of land cultivated[38].

Further to this is the demographic composition of the household. The size and the composition of members are likely to determine if a child will be sent to work. As child labor is hypothesized to be driven by poor economic status of a household, a larger household size will put a constraint on the capacity of the parents to send their children to school. As a result, children may be forced to be 'bread winners'. Also, the more the number of dependent members the higher will be the likelihood to send a child to work than school. To put it in a nut shell, age and gender composition in the household do matter. Our estimation, hence, considered both of them.

[37] For further inspection see Grootaert and Kanbur (1995); Patrinos and Psacharopoulos (1995); and Grootaert (1998).

[38] Land cultivated is less exogenous than land owned. Owing to data constraint, however, we are forced to use land cultivated.

To end with, many studies have used information on the direct and indirect cost of schooling in estimating determinants of child labor. Considering the fact that schooling is a substitute (though imperfect) for child work, these sets of variables are worth including. However, our data set doesn't have the necessary information for a panel analysis[39].

## 5.3 Econometric concerns

A credible identification strategy when dealing with shocks requires shocks to be unexpected, exogenous to child labor decisions and transitory. Following Beegle et al. (2003) we checked if our shock variables fulfill these criteria. If households forecast shocks and use child labor in advance to smooth out consumption, our estimates will be biased. We, thus, estimated a Probit model for each of the shocks considered. Shocks in 2004 were regressed on covariates and child labor hours in 1999. It was found that, out of the three shocks we used in our major specification, farm child labor in 1999 predicts only crop loss due to insect damage in 2004. Besides, domestic child labor in 1999 doesn't predict shocks in 2004 except for crop loss due to shortage of outside labor (see appendix B, table 5.1). Even this is significant at only 10% level of significance. Further, considering the five years gap between the two rounds, it is hard to believe that a household will use more child labor in advance expecting that it will be hit by a shock five years later. We may, hence, conclude that the shocks aren't anticipated[40].

As to the exogeneity of shocks, we might expect that households with a higher prevalence of child labor (poorer households) may also be more prone to income shocks. To this end, we have controlled for all sets of variables that represent assets. Further, we estimated a pooled regression of child labor on various covariates and shocks (all in their first differences) and included the level shocks in the right hand side (see appendix B, table 5.2). Under the assumption of exogeneity the level shock shouldn't add any information. We found that all our shock variables are exogenous to child labor decisions (both domestic and farm child labor). Next, to verify whether these measures of shocks are transitory, we checked if they are correlated over time. Even after controlling for various covariates, all shocks at a time $t$ predict shocks at a time $t+1$ (see appendix B, table 5.1). Nonetheless, our fixed effect model will at least help to avoid sorting due to people's ability. Finally, for our measures of shocks to affect child labor they have to be of a sufficient magnitude. Unfortunately our data set can only provide a binary response to the shock variables.

[39] The fifth round (1999) has some information on how far the school is (the number of minutes it takes), and the fees charged, if any. However, the 6th round doesn't have this information.

[40] This, also, could mean that the poor (where there is more child labor) are not more likely to face such shocks in the future (except those shocks mentioned above).

# Chapter 6

# Results and Discussion

In the following section the result of our basic estimation using farm, domestic and total child labor as dependent variable is presented. Also, specifications using different definitions of shocks are considered. After presenting our preferred specification, we estimate the role of labor sharing using two categories of shocks: covariate and idiosyncratic. Effect of shocks on school attendance and its differential effect in households that participate in labor sharing arrangement (if any) are as well estimated. We start with the whole range of shocks available in the data set but then emphasize on the significant ones.

## 6.1 The effect of shocks on child labor and school attendance

As discussed in the previous chapter our estimation relies on fixed effects model. While pooled OLS estimates will be biased, for the sake of comparison results are presented in Table 6.1. This table reports the impact of shocks and membership in labor sharing arrangement on child labor and school attendance for children aged 5-17.[41] As expected the estimates are highly different from the fixed effects estimates presented in Table 6.2. None of our relevant estimates look significant in pooled OLS while the fixed effect has estimates which are both significant and with higher coefficients. Hence, in due of confounding effects discussed in chapter five, we resort to reporting the more credible fixed effects output.

Our estimates show that output loss due to too much or too little rain on fields at the beginning of the rainy season, output loss due to insect damage and shortage of outside labor at peak seasons are significantly increasing farm child labor in subsequent periods (Table 6.2 column 1)[42]. These shocks represent 37%, 40% and 15% of the observations in our data set respectively. On average, farm child labor increases by almost 5.4 hours per week as a result of a shock due to unfavorable rain in the beginning of the rainy season. This figure is about one-fifth of the average farm child labor among those who actually work. Besides, children from households who faced a shock due to insect damage increase their farm labor hours by almost 4.2 hours per week. Even more is the effect of a shock due to shortage of outside labor at peak seasons. It increases weekly farm child labor hours by about 6.9 in the subsequent periods.

Child's time can be allocated in to leisure, farm activities, domestic activities and school. Hence, the impact of a shock can be to increase farm child labor out of one or more of these activities. In column 2 (table 6.2) it can be seen that output loss due to unfavorable rain at the beginning of the rainy season significantly decreases domestic child labor hours. In households which are hit by such a shock parents may have reallocated children's time away from domestic chores to farm activities where the expected contribution is more important.

[41] Our estimation is on children above five and less than or equal to 17 following the ILO report 2008. We first estimated effect of all these shocks on farm child labor using the more credible fixed effects model. Then we eliminated each insignificant shock step by step till we are left with these three significant shock variables. Appendix C, table 6.1 column (1) gives the estimation with all the shock variables.

[42] The whole output is given in Appendix C, table 6.1 column (2)

In absolute value the coefficient (3.69) is in fact less than the increase in farm child labor due to the same shock (5.41). As such the result isn't surprising since the net effect is an increase in child labor.

In column 3 of table 6.2, the same equation is estimated for total child labor. While the significance of the rain related shock vanishes[43], the other two significantly increase child labor hours. Though the coefficients are a bit higher in this case they are within the same confidence interval.

**Table 6.1**
**Effect of shocks and labor sharing on child labor and school attendance**
**(Pooled OLS)**

| Explanatory variables | Total child labor | Farm child labor | Domestic child labor | School attendance |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| ***Shocks*** | | | | |
| Rain Beg. Season (RBS) | 1.359 | 0.993 | 0.253 | -0.0172 |
| | (1.097) | (0.835) | (0.752) | (0.0207) |
| Insect damage (ID) | 1.751 | 0.943 | 0.792 | 0.0248 |
| | (1.161) | (0.887) | (0.793) | (0.022) |
| Shortage of outside labor (SOL) | -1.443 | -1.064 | -0.61 | 0.0224 |
| | (1.429) | (1.085) | (0.979) | (0.0276) |
| Labor sharing Participant | 0.97 | 0.997 | -0.0838 | -0.00285 |
| | (1.065) | (0.807) | (0.731) | (0.0196) |
| Constant | -24.83*** | -10.62* | -13.97** | -0.874*** |
| | (8.157) | (6.203) | (5.588) | (0.157) |
| Observations | 1870 | 1865 | 1868 | 1777 |
| Number of groups | 1633 | 1629 | 1631 | 1558 |

- Standard errors in parentheses
- *** p<0.01, ** p<0.05, * p<0.1
- Other control variables not reported here include: age age^2, gender-year ,sex, school grade, marital status, head years of schooling, share of children below 5, share of children below 15, share of adult males, dummy if head has changed, year dummy, different livestock owned, cared for, own away with others, livestock owned last year, land cultivated

Our result tends to confirm the claim that households use their child labor as buffer stocks. Even if rural labor markets are poorly developed to send a child to wage work, parents increase their use of child labor on the household's own farm so as to optimize production (and may be to curb possible loss of output in the future). Our result is similar to the findings of Beegle et al. (2006) and Cogneau and Jedwab (2008). A shock in period *t* increases child labor hours in subsequent periods, perhaps explaining an attempt to smooth out consumption or ex-ante measure to reduce risk.

[43] This could be because total child labor is a summation of domestic and farm child labor. If the effect of domestic child labor is negative the effect on total child labor can be insignificant despite the significance of the effect on farm child labor. This is actually the case (see column 3 on table 6.2).

In order to check if this increase in child labor hours comes by withdrawing the child from school we estimated the same equation on school attendance. Our result tells us that shocks don't affect school attendance showing that the latter is less sensitive to shocks than child labor (table 6.2, column 4). Similar result was found by Calero et al. (2009) who showed that at times of aggregate shocks households use remittances to finance education while child labor increases. Perhaps, rather than taking away school hours parents reallocated part of the child's leisure time to work. This, however, doesn't mean its effect on human capital formation is insignificant as it may well affect the performance of the child by, say, reducing study time.

**Table 6.2**
**Effect of shocks and labor sharing on child labor and school attendance**
(Fixed Effects)

| Explanatory Variables | Farm child labor (1) | Domestic child labor (2) | Total child labor (3) | School Attendance (4) | Farm child labor (5) | Domestic child labor (6) | Total child labor (7) | School Attendance (8) |
|---|---|---|---|---|---|---|---|---|
| ***Shocks*** | | | | | | | | |
| Rain Beg. Season (RBS) | **5.412**** | **-3.695*** | 1.667 | -0.0165 | **5.225** | -3.859 | 1.273 | -0.0592 |
| | (2.461) | (1.912) | (2.963) | (0.067) | (3.935) | (3.012) | (4.651) | (0.109) |
| Insect damage (ID) | **4.205*** | 1.616 | **5.836**** | 0.043 | **10.12***** | 2.715 | **12.88***** | 0.0293 |
| | (2.332) | (1.815) | (2.811) | (0.0668) | (3.411) | (2.613) | (4.035) | (0.0976) |
| Shortage of outside labor (SOL) | **6.863**** | 0.569 | **7.644*** | -0.109 | 8.105 | **9.785**** | **17.97***** | 0.00278 |
| | (3.437) | (2.647) | (4.1) | (0.095) | (5.127) | (3.926) | (6.064) | (0.147) |
| ***Participation*** | | | | | | | | |
| Labor sharing participant | -1.975 | -0.0381 | -2.061 | -0.0304 | 2.42 | 3.269 | 5.587 | -0.0398 |
| | (2.545) | (1.978) | (3.065) | (0.0728) | (3.375) | (2.581) | (3.986) | (0.095) |
| ***Interaction Term*** | | | | | | | | |
| *RBS * participation* | | | | | -0.438 | -0.628 | -0.994 | 0.0589 |
| | | | | | (4.721) | (3.615) | (5.584) | (0.132) |
| *ID * participation* | | | | | **-10.87**** | -1.468 | **-12.40**** | 0.0331 |
| | | | | | (4.693) | (3.595) | (5.552) | (0.131) |
| *SOL * participation* | | | | | -3.829 | **-16.26***** | **-19.81***** | -0.169 |
| | | | | | (6.223) | (4.747) | (7.331) | (0.181) |
| Constant | 5.473 | -15.93 | -9.776 | -1.267** | -0.687 | -18.52 | -18.47 | -1.259** |
| | (20.73) | (16.07) | (24.9) | (0.595) | (20.71) | (15.81) | (24.42) | (0.603) |
| Observations | 1865 | 1868 | 1870 | 1777 | 1865 | 1868 | 1870 | 1777 |
| R-squared | 0.183 | 0.189 | 0.123 | 0.29 | 0.209 | 0.237 | 0.18 | 0.294 |
| Number of groups | 1629 | 1631 | 1633 | 1558 | 1629 | 1631 | 1633 | 1558 |

- Standard errors in parentheses
- *** p<0.01, ** p<0.05, * p<0.1
- Other control variables not reported here include: age age^2, gender-year ,sex, school grade, marital status, head years of schooling, share of children below 5, share of children below 15, share of adult males, dummy if head has changed, year dummy, different livestock owned, cared for, own away with others, livestock owned last year, land cultivated

## 6.2 The effect of labor sharing on child labor and school attendance

Another important objective of this paper is to probe the effect of labor sharing on child labor. In all columns of table 6.2 our estimate for the participation dummy (which is more or less a dummy for membership in labor sharing arrangement) is not statistically different from zero. As such participation by itself doesn't affect child labor. In our preferred specification (table 6.2) it can be seen that even though the direct effect of participation on child labor is insignificant households who are members of a labor sharing arrangement face a differential effect of shocks on child labor. Column 5-7 show that all the interaction terms are negative which is the more plausible expectation we initially put.

Of special interest is the coefficient of the interaction term with output loss due to insect damage and shortage of outside labor (column 7 of table 6.2). Almost all the pressure on relying on child labor due to insect damage is off set in households which are members of a labor sharing arrangement. The effect of this shock on total child labor in households which don't participate in such an arrangement is to increase weekly child work by 12.88 hours. Children who came from households that are participants, however, face less than half an hour increase in total child work per week (12.88-12.40). Similarly, the effect of an output loss due to shortage of outside labor is to increase child working hours. Our estimate tells us that children in non-participant households experience 17.97 hours more work per week when faced with such a shock. However, the effect of the shock is more than offset in households that participate in labor sharing arrangement i.e. total child work declines by nearly two hours (17.97-19.81).

Parents might reallocate children's time in different ways, one of which is taking some time from leisure or school to farm and/or domestic activities. In order to see if this informal insurance works differently for farm and domestic child labor we estimated the same equation separately (column 5 and 6 of table 6.2). Even though labor sharing is not meant for domestic chores it helps to reduce impact of shocks on domestic child work indirectly.

Our estimate tell us that children in non-participant households experience 9.79 hours more domestic work per week when faced with output loss due to shortage of outside labor. However, the effect of the shock is more than offset in households that participate in labor sharing arrangement (column 6 of table 6.2). As a result, weekly domestic child work declines by 6.47 hours (9.79-16.26). Perhaps, the positive effect in non-participant households is due to the fact that adult labor (male plus female) is increasingly taken out from domestic chores to farm and possibly to off-farm activities. In such a case, children might be required to take care of the wide range of domestic chores and decrease their involvement in the alternative activities. This change in parental decision on time allocation may have emanated out of the need to smooth out consumption in that period or can be an ex-ante measure to avoid similar shocks in the future season. In both instances, the attempt of the parents is to get the most out of what is available in the household. However, for participant households the story is some how different. These households could make use of the networks in two ways. Firstly, they may get a direct support from the members to smooth out consumption in that period. Secondly, they have an external source of adult labor that could be made available at times of need. Hence, the requirement to take an ex-ante measure by altering time allocation decisions is minimal.

As to the other shocks, as expected all the interaction terms are negative, yet insignificant[44].

The importance of labor sharing in lessening the pressure to rely on child labor as a buffer stock is also confirmed in the case of farm child labor. Column 5 of table 6.2 presents the relevant estimates. The coefficient of the interaction between participation and output loss due to insect damage shows how far an idiosyncratic shock is insured in these villages. The whole effect of this shock on child labor is off set in households which are members of a labor sharing arrangement. In households which don't participate in such an arrangement its effect is to increase weekly farm child work by 10.12 hours. Children who came from households that are participants, however, face a decline in farm work of 0.75 hours a week (10.12-10.87). Though the other two shocks are not significant in their interactions (possibly because the corresponding shock variables are no longer significant), their sign is in line with our expectations.

Hence, we can conclude that even if membership in informal labor sharing network doesn't affect farm child labor at normal times it has a role in lessening the pressure to rely on child labor at times of shocks. This demonstrates its potential importance in human capital formation. Yet, our main specification (column 8, table 6.2) shows that this social arrangement doesn't guarantee that children go to school even though it does prohibit them from working more at times of shock. While their school attendance remains unaffected, they might get more time to study and perform better at school.

Our next question is then, 'what is the transmission mechanism that makes labor sharing helpful at times of shocks and why is there a difference in the level of insurance across shocks?' As Krishnan and Sciubba (2006) noted there are important market and non-market transactions that take place within social networks in these villages. Since a group of people in the same labor sharing arrangement are more likely to be in other sorts of informal networks, the differential effect of shocks in participant households might reflect the adult labor made available from the membership or/ and the other sort of mutual support that membership implicitly stands for. One form of this could be transfers from mutual support groups. Though one could hypothesize that this would play a role of insuring shocks, the degree of risk pooling depends on the type of shocks: covariate or idiosyncratic (Pan 2009)[45]. Given the fact that labor sharing groups are mostly neighborhoods there is least a chance that a covariate shock can be pooled[46]. Our estimates also tend to confirm this. Apparently, output loss due to too little or too much rain at the beginning of the rainy season should be common to those households in the same village. As such it is not a surprise that participation doesn't minimize the pressure on relying on child labor.

On the other hand, output loss due to insect damage and shortage of outside labor are fairly idiosyncratic in their nature. As to insect damage, households who are more careful in agricultural activities are less likely to face this shock. Also, use of modern technologies by

[44] For the covariate shock (unfavorable rain at the beginning of the rainy season) the effect of the shock is negative. Thus, we don't expect the interaction term to significantly affect child labor. A shock due to insect damage doesn't affect domestic child labor. Hence, it isn't a surprise that it is not insured.
[45] However,Pan (2009)found that this transfer from mutual support groups don't play a role in risk pooling
[46] Haddinot et al. (2005) stated that 85% of the networks in these rural areas of Ethiopia are from the same village.

some in the village makes the shock unlikely to be covariate[47]. Further, though one could say that the labor supply constraint in the labor market applies for all households in the same village, not all households need external labor. It could be a binding constraint for some but not for all. Our result, hence, tells us that participation in labor sharing arrangement lessens the pressure to draw on child labor when households face idiosyncratic but not covariate shocks. In the next section, we present the effect of covariate and idiosyncratic shocks constructed from the available shock variables.

### 6.3 Covariate shocks, idiosyncratic shocks, child labor and school attendance

In our basic model we opted for certain shocks which are significantly affecting farm child labor. One of our reasons for excluding the other shocks is that they don't add value to our analysis. In this section, we make use of more of them in a different way. The estimation is based on constructing a covariate and idiosyncratic shock from these sets of shocks. Our definition of a covariate shock emanates from the presumption that rain related shocks will be common to households living in the same village. Five types of rain related shocks are taken to construct it: shock due to too much or too little rain during growing seasons, beginning of rainy season, unfavorable rain in kiremt (main rain) season, rain in harvest season, and shock if rain stopped at unexpected time. On the other hand, idiosyncratic shock is composed of shocks which can particularly affect a household. It consists of crop loss as a result of livestock, weed and bird damage and illness of a household member.

Table 6.3 reports that neither of the shocks affects child labor or school attendance when we estimate equation (1*). However, ones we include interaction terms we see that idiosyncratic shock shows a big difference. This result is especially true for farm child labor. Column 6 of table 6.3 shows that idiosyncratic shock increases weekly farm child labor by 7.4 hours in households which don't participate in labor sharing arrangement. Children from participant households, however, experience a reduction in farm child labor of 6.36 hours a week (7.408-13.77). This result confirms the widely held view that informal social networks are capable of pooling idiosyncratic shocks (e.g. Fitzsimons 2003, Townsend 1995). Yet, our estimate for the covariate shock isn't statistically different from zero. Added to our basic specification, we conclude that membership in labor sharing arrangement helps households to lessen the impact of idiosyncratic shocks on farm child labor even if it has no effect at normal times[48].

With regards to school attendance, both covariate and idiosyncratic shocks have negative but insignificant coefficients showing that shocks don't affect the probability to attend school. However, when an idiosyncratic shock hits a household, participation in labor sharing arrangement helps children to have more probability of attending school[49]. This result, added to the effect on child labor hours, highlights the benefit of the arrangement in human capital formation.

[47] Extension works in Ethiopia are being spread these days. Hence, insecticides and pesticides should at least reach certain better off households in a village. Since the members of a labor sharing group are fairly heterogeneous, we expect a scope for risk pooling.

[48] The coefficient of the participation dummy is consistently insignificant in all the specifications.

[49] Unlike the case in child labor, we expect the interaction term, in school attendance estimation, to be positive if participation does contribute to lower the downward pressure on school attendance.

**Table 6.3**
**Effect of shocks (aggregated) and labor sharing on child labor and school attendance**
(Fixed Effects)

| Explanatory variables | Total child labor (1) | Farm child labor (2) | Domestic child labor (3) | School attendance (4) | Total child labor (5) | Farm child labor (6) | Domestic child labor (7) | School attendance (8) |
|---|---|---|---|---|---|---|---|---|
| Covariate shock (CS) | 3.916 | 2.753 | 1.1 | -0.0288 | 5.55 | 1.066 | 4.36 | -0.0575 |
| | (3.241) | (2.709) | (2.07) | (0.0758) | (4.616) | (3.824) | (2.973) | (0.107) |
| Idiosyncratic shock (IS) | -0.0987 | 0.86 | -0.981 | 0.0506 | 4.756 | **7.408**** | -2.624 | *-0.0444* |
| | (2.805) | (2.342) | (1.791) | (0.0657) | (3.851) | (3.187) | (2.481) | (0.0917) |
| Labor sharing participant | -1.897 | -1.906 | 0.0492 | 0.00896 | 9.956 | 6.676 | 3.339 | -0.207 |
| | (2.996) | (2.502) | (1.913) | (0.0707) | (6.358) | (5.261) | (4.095) | (0.148) |
| CS * participation | | | | | -5.097 | 0.972 | -5.994 | 0.0945 |
| | | | | | (6.261) | (5.181) | (4.032) | (0.144) |
| IS * participation | | | | | **-11.18**** | **-13.77***** | 2.488 | ***0.209**** |
| | | | | | (5.336) | (4.418) | (3.437) | (0.125) |
| Constant | -15.94 | 6.171 | -22.62 | -1.614*** | -29.06 | -5.778 | -23.97 | -1.347** |
| | (23.89) | (19.98) | (15.25) | (0.566) | (24.27) | (20.11) | (15.63) | (0.58) |
| Observations | 1889 | 1884 | 1887 | 1795 | 1889 | 1884 | 1887 | 1795 |
| R-squared | 0.083 | 0.125 | 0.166 | 0.293 | 0.109 | 0.165 | 0.175 | 0.307 |
| Number of groups | 1646 | 1642 | 1644 | 1572 | 1646 | 1642 | 1644 | 1572 |

- Standard errors in parentheses
- *** p<0.01, ** p<0.05, * p<0.1
- Other control variables not reported here include: age age^2, gender-year ,sex, school grade, marital status, head years of schooling, share of children below 5, share of children below 15, share of adult males, dummy if head has changed, year dummy, different livestock owned, cared for, own away with others, livestock owned last year, land cultivated

# Chapter 7

# Conclusion

This paper gives empirical evidence on the role of an informal social network, labor sharing arrangement in particular, on parent's decision regarding children's time allocation and the impact of shocks on the same. We, particularly, examined the effect of membership in a labor sharing arrangement, in rural Ethiopia, on child labor hours both at normal times and at times of shocks. Emanating from the presumption that child labor is a bad in parental preferences and that parents will not opt for it unless they face a compelling situation, we hypothesized that both at normal times and at times of shocks, participation in a labor sharing arrangement reduces weekly child labor hours.

Two measures of idiosyncratic shocks (output loss due to insect damage and shortage of outside labor) and one measure of covariate shock (output loss due to unfavorable rain at the beginning of the rainy season) were used to pin down a causal relation using fixed effects model. Based on a sample of children aged 5-17 in the last two rounds of the ERHS, we found that membership in a labor sharing arrangement doesn't affect child labor hours at normal times. However, it does enable households to lessen the pressure to rely on child labor when faced with an idiosyncratic shock.

Output loss due to rain at the beginning of the rainy season, insect damage and shortage of outside labor all increase farm child labor by 5.4, 4.2 and 6.9 hours per week, confirming the literature on use of child labor as a buffer stock. While almost the whole effect of a shock due to insect damage and shortage of outside labor on total child labor is counterbalanced by participation in labor sharing arrangement, the rain shock is not. This is an evidence for the literature that claims covariate shocks are less likely to be insured among social groups in a village than idiosyncratic shocks. Our result is confirmed when we use alternative definitions of shocks, too. This differential effect of shocks on child labor in participant households might have come because of the extra adult labor made available or due to the mutual support that comes with these social networks.

Further, it was found that school attendance is less sensitive to shocks than child labor. Though the increase in child labor hours could 'cast shadow' on academic performance, our data doesn't provide evidence that school attendance declines with shocks. Besides, our alternative specification tells us that when households face a shock, participation in such a network increases the probability of attending school by about 21%.

This paper is indicative of the importance of considering social networks in smoothing out consumption. In as far as child labor is a policy issue, development interventions should be cautious so as not to crowd out this important informal way of dealing with shocks. It also highlights the difficulty to cope up with covariate shocks and hence, calls for interventions that are particularly meant to address their impact. Given the limited resource available in many developing countries, the need for effective and efficient policies requires that we address those shocks which are less insurable by the households themselves.

Apparently there are questions that this paper doesn't address empirically. For example, it doesn't distinguish which particular transmission mechanism brought the result we obtained as there are many kinds of social networks tied to each other. Future research should consider all the different types of social networks in the same equation to get a separate effect of each one of them. Besides, in analyzing impact of shocks on human capital formation it is important to go beyond just school attendance to inspect its effect on school performance. These are areas of future research.

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# Appendices

## Appendix A

**Table 4.1**
**Labor shortage and hiring labor from the market (1999)**

| *Do you have labor shortage?* | *Did you hire workers?* | | |
|---|---|---|---|
| | YES | NO | Total |
| YES | 220 | 413 | 633 |
| NO | 114 | 500 | 614 |
| Total | 334 | 913 | 1247 |

**Table 4.2**
**Relation between members**

| *Relation between members?* | | | |
|---|---|---|---|
| Questions | ***YES*** | ***NO*** | ***Not sure*** |
| Are any of your plots next to or near theirs? | 27 | 73 | |
| Have you ever called him before? | 91.21 | 8.78 | |
| Will you call him in the future? | 86.12 | 5.19 | 8.7 |
| Is he a neighbour? | 68.06 | 31.94 | |
| Is he a relative? | 55.34 | 44.66 | |

**Table 4.3**
**Did anyone fail to come with out good reason?**

| **Did anyone you invited failed to come without good reason** | |
|---|---|
| | ***Percent*** |
| NO | 66.02 |
| YES | 18.93 |
| Yes but sent a substitute | 15.05 |

**Table 4.4**
**Will you have to reciprocate?**

| Will you have to reciprocate this in terms of your own labor or any other way? | | |
|---|---|---|
| | | ***Percent*** |
| YES | This season | 44.67 |
| | In the future | 8.19 |
| | Already reciprocated | 33.11 |
| NO | | 14.03 |

**Table 4.5**
**Summary statistics of variables by participation**

| Variables | Non-participants | | Participants | | Difference in means ( Non participants – Participants) | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | | Statistical significance |
| Sex of the member( male=1) | 0.499 | 0.500 | 0.504 | 0.500 | -0.005 | no |
| Age participated in farm/hh activities for 1st time | 6.533 | 3.103 | 6.625 | 1.894 | -0.093 | no |
| Sex of the head (male=1) | 0.831 | 0.375 | 0.836 | 0.370 | -0.005 | no |
| crop lost because of wind/storm ( Yes=1) | 0.144 | 0.351 | 0.150 | 0.357 | -0.006 | no |
| Member of Iqub( yes=1) | 0.150 | 0.357 | 0.141 | 0.348 | 0.009 | no |
| chicken and beehive owned 1 year ago | 1.855 | 4.161 | 1.953 | 4.146 | -0.097 | no |
| chicken and beehive owned and present at your farm | 1.731 | 3.520 | 1.768 | 3.553 | -0.036 | no |
| marital status (living together=1) | 0.356 | 0.479 | 0.364 | 0.481 | -0.008 | no |
| Poverty status ( poor=1) | 0.412 | 0.492 | 0.418 | 0.493 | -0.007 | no |
| share of children below 15 | 0.423 | 0.215 | 0.424 | 0.204 | 0.000 | no |
| share of adults( age>15) | 0.577 | 0.215 | 0.576 | 0.204 | 0.000 | no |

**Table 4.6**
**Summary statistics of variables by participation (con'd)**

| Definition of variables | Non-participants | | Participants | | Difference in means ( Non participants – Participants) | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | | Statistical significance |
| Domestic child labor hours | 18.049 | 19.891 | 20.998 | 22.509 | -2.949 | *** |
| Farm child labor hours | 12.465 | 17.182 | 14.150 | 17.936 | -1.685 | *** |
| Big farm animals owned a year ago | 3.422 | 3.876 | 3.838 | 3.063 | -0.415 | *** |
| Transport animals owned a year ago | 0.902 | 1.577 | 0.810 | 1.205 | 0.092 | *** |
| Small animals owned a year ago | 5.231 | 8.372 | 4.695 | 7.416 | 0.536 | *** |
| Big farm animals owned and present at own farm | 2.916 | 2.976 | 3.317 | 2.640 | -0.400 | *** |
| Transport animals owned and present at own farm | 0.839 | 1.472 | 0.797 | 1.296 | 0.043 | * |
| Small animals owned and present at own farm | 4.552 | 7.360 | 4.124 | 6.060 | 0.428 | *** |
| attending school? Yes=1 | 0.573 | 0.495 | 0.492 | 0.500 | 0.081 | *** |
| school grade | 1.970 | 2.934 | 1.867 | 2.772 | 0.103 | * |
| schooling level of head | 1.527 | 2.789 | 1.683 | 2.863 | -0.155 | *** |
| Household size | 6.215 | 2.495 | 6.492 | 2.622 | -0.277 | *** |
| children < 5 | 0.232 | 0.503 | 0.381 | 0.648 | -0.149 | *** |
| adults >15 | 3.130 | 1.664 | 3.429 | 1.800 | -0.299 | *** |
| children <15 | 2.613 | 1.885 | 2.782 | 1.867 | -0.169 | *** |
| adult male | 1.458 | 1.167 | 1.645 | 1.110 | -0.187 | *** |
| share of children <5 | 0.038 | 0.084 | 0.056 | 0.094 | -0.019 | *** |
| share of adult males | 0.270 | 0.189 | 0.283 | 0.175 | -0.013 | *** |

*,**,*** significant at 1%, 5% and 10% respectively

**Table 4.7**
**Summary statistics of variables by participation (cont'd)**

| | Non participants | | Participants | | Difference in means ( Non participants – Participants) | |
|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | | Statistical significance |
| ***Definition of variables*** | | | | | | |
| Shock due to insufficient rain at the beginning of the rainy season? Yes=1 | 0.319 | 0.466 | 0.408 | 0.491 | -0.089 | *** |
| shock b/c of bird damage | 0.305 | 0.460 | 0.450 | 0.498 | -0.145 | *** |
| shock b/c of flood | 0.125 | 0.331 | 0.156 | 0.363 | -0.031 | *** |
| shock b/c of rain in growing period | 0.353 | 0.478 | 0.447 | 0.497 | -0.093 | *** |
| shock b/c of rain at harvest season | 0.281 | 0.450 | 0.381 | 0.486 | -0.099 | *** |
| shock b/c hhd member ill | 0.182 | 0.386 | 0.238 | 0.426 | -0.056 | *** |
| shock b/c insect damage | 0.305 | 0.461 | 0.466 | 0.499 | -0.161 | *** |
| shock b/c of kiremt rain | 0.326 | 0.469 | 0.396 | 0.489 | -0.070 | *** |
| shock b/c of livestock damage | 0.247 | 0.431 | 0.361 | 0.480 | -0.113 | *** |
| shock b/c outside labor not enough | 0.123 | 0.329 | 0.178 | 0.383 | -0.055 | *** |
| shock b/c plant diseases | 0.479 | 0.500 | 0.622 | 0.485 | -0.143 | *** |
| shock b/c rain didn't rain on time | 0.466 | 0.499 | 0.529 | 0.499 | -0.063 | *** |
| shock b/c of weed damage | 0.289 | 0.453 | 0.435 | 0.496 | -0.147 | *** |

*,**,*** significant at 1%, 5% and 10% respectively

**Table 4.8**
**Adult male composition of participants**

| Number of adult males of the participant's household | Percent |
|---|---|
| 0 | 17.68 |
| 1 | 47.58 |
| 2 | 19.39 |
| 3 | 8.55 |
| 4 | 3.88 |
| 5 | 1.08 |

# Appendix B

**Table 5.1**
**Does child labor in year 1999 predict shocks in 2004? And Are Shocks correlated over time?**

| Explanatory Variables | Rain Beg. Season (RBS): 2004 | Insect Damage (ID): 2004 | Shortage of outside labor (SOL): 2004 |
|---|---|---|---|
| Rain Beg. Season (RBS): 1999 | **0.467*** ** | | |
| | (0.0864) | | |
| Insect damage (ID) 1999 | | **0.212** ** | |
| | | (0.0945) | |
| Shortage of outside labor (SOL): 1999 | | | **0.614*** ** |
| | | | (0.12) |
| Domestic child labor 1999 | **0.000692** | **5.31E-05** | **0.00334*** |
| | (0.00172) | (0.00186) | (0.00197) |
| Farm child labor 1999 | **0.00206** | **0.00627** ** | **-0.00252** |
| | (0.00229) | (0.00244) | (0.00275) |
| Big farm animals owned last year | 0.015 | -0.0459 | 0.0653*** |
| | (0.0212) | (0.0288) | (0.0202) |
| Transport animals owned last year | -0.231*** | 0.132** | -0.113 |
| | (0.0528) | (0.0653) | (0.0692) |
| Small animals owned last year | 0.0106 | -0.0227 | 0.0217* |
| | (0.0111) | (0.0149) | (0.0114) |
| Chicken and beehive owned last year | 0.00717 | -0.0379** | 0.0314* |
| | (0.0153) | (0.0193) | (0.0179) |
| Big farm animals owned this year | 0.135*** | 0.0742** | -0.0104 |
| | (0.0306) | (0.0374) | (0.0341) |
| Transport animals owned this year | 0.0232 | -0.133* | -0.0372 |
| | (0.043) | (0.0753) | (0.0651) |
| Small animals owned this year | -0.0205 | -0.0112 | -0.0227 |
| | (0.0146) | (0.0201) | (0.0149) |
| Chicken and beehive owned this year | -0.0394** | -0.0235 | -0.0208 |
| | (0.0173) | (0.0192) | (0.0214) |
| Poor | -0.189** | -0.144 | -0.539*** |
| | (0.0911) | (0.0972) | (0.108) |
| share of adult male | -1.114*** | 0.477 | -0.263 |
| | (0.345) | (0.376) | (0.381) |
| share of adults | 0.780*** | -0.581* | 0.191 |
| | (0.279) | (0.315) | (0.305) |
| Constant | -0.394* | -0.950*** | -1.145*** |
| | (0.21) | (0.242) | (0.241) |
| Observations | 1131 | 1130 | 1117 |

- *** p<0.01, ** p<0.05, * p<0.1
- Standard errors given in parenthesis
- Other control variables not reported : Sex of head, Cost of building constructed, schooling years of the head

**Table 5.2**
**Exogeneity of shocks**

| Explanatory Variables | D(farm child labor) | D(domestic child labor) |
|---|---|---|
| ***First difference of shocks*** | | |
| D (Rain Beg. Season (RBS)) | 2.79 | -3.071 |
| | (3.262) | (2.595) |
| D (Insect damage (ID)) | 4.492 | 1.992 |
| | (3.049) | (2.421) |
| D (Shortage of outside labor (SOL)) | 4.079 | 0.745 |
| | (4.165) | (3.271) |
| ***Level Shocks*** | | |
| Rain Beg. Season (RBS) | **3.187** | **-1.683** |
| | (4.264) | (3.385) |
| Insect damage (ID) | **-2.779** | **-1.738** |
| | (5.092) | (4.019) |
| Shortage of outside labor (SOL) | **1.809** | **-0.752** |
| | (5.289) | (4.199) |
| ***Control variables*** | | |
| D (share of children below 5) | 19.72 | 9.608 |
| | (15.81) | (12.35) |
| D (share of children below 15) | 6.402 | -11.9 |
| | (12.25) | (9.672) |
| D (share of adult male) | -24.62 | 6.809 |
| | (15.28) | (12.13) |
| Constant | -2.977 | 7.839** |
| | (4.025) | (3.203) |
| Observations | 257 | 258 |
| R-squared | 0.176 | 0.158 |

- *** p<0.01, ** p<0.05, * p<0.1
- Standard errors given in parenthesis
- Other control variables not reported here include: The first difference of (age age^2, gender-year, school grade, marital status, head years of schooling, dummy if head has changed; different livestock: owned, cared for, own away with others, owned last year; land cultivated)

# Appendix C

**Table 6.1**
**Effect of shocks and labor sharing on Farm child Labor (Age:5-17)**
(Fixed Effects)

| Explanatory variables | Farm child Labor | Farm child Labor |
|---|---|---|
| | (1) | (2) |
| ***Shocks*** | | |
| Rain Beg. Season (unfavorable) | **6.987* (3.567)** | **5.412**(2.461)** |
| Rain in harvest season(unfavorable) | 1.836 (2.747) | |
| Bird damage | 1.275 (3.45) | |
| Rain in growing season(unfavorable) | 0.0258 (3.359) | |
| illness of a member | -2.844 (3.408) | |
| Insect damage | **6.893** (3.266)** | **4.205*(2.332)** |
| Rain in kiremt (main) season(unfavorable) | -2.741 (3.382) | |
| livestock damage | -2.386 (3.833) | |
| Plant disease | -3.759 (3.237) | |
| Rain stopped at unfavorable time | 0.792 (2.773) | |
| weed damage | -3.32 (4.002) | |
| Wind/storm | 0.57 (3.817) | |
| Shortage of outside labor | **7.698* (3.92)** | **6.863** (3.437)** |
| Flood | -4.525 (3.42) | -4.029(3.025) |
| ***Participation*** | | |
| labor sharing participant | 0.0221 (3.038) | -1.975 (2.545) |
| ***Control Variables*** | | |
| Age | -0.485 (3.327) | 1.515 (3.017) |
| age2 | 0.0269 (0.139) | -0.059 (-0.125) |
| gender * year | 0.506 (3.231) | -0.00878 (3.01) |
| years of schooling | 0.612 (0.988) | 0.787 (0.898) |
| Marital status | -31.00* (17.39) | -29.70* (16.65) |
| years of schooling of the head | 0.0929 (0.95) | -0.406 (0.857) |
| share of children below 5 | 7.823 (18.64) | 10.51 (17.22) |
| share of children below 15 | 2.759 (14.12) | 2.635 (12.98) |
| share of adult male | -23.79 (17.29) | -26.42* (15.74) |
| head changed (zero in the first year) | 0.806 (6.476) | -0.523 (5.253) |
| year dummy | -4.604 (4.503) | -2.101 (3.763) |
| Big farm animals owned this year | 1.347 (1.17) | 1.05 (0.979) |
| Small animals owned this year | -0.481 (1.998) | 0.354 (1.795) |
| Transport animals owned this year | 0.0965 (0.538) | 0.0689 (0.461) |
| Chicken and beehive owned this year | -0.353 (0.658) | -0.477 (0.579) |
| Big farm animals owned but away with others | -1.18 (3.64) | -0.382 (3.342) |
| Small animals owned but away with others | 3.844 (16.67) | 5.014 (15.98) |
| Transport animals owned but away with others | 2.47 (2.894) | 1.809 (2.69) |
| Chicken and beehive owned but away with others | -1.252 (4.134) | -1.95 (3.735) |
| Big farm animals cared for others | -4.261* (2.242) | -4.528** (1.933) |
| Transport animals cared for others | 0.798 (16.93) | 2.235 (15.75) |
| Small animals cared for others | 0.839 (0.915) | 0.874 (0.849) |
| Big farm animals owned last year | 0.0194 (0.689) | 0.149 (0.605) |
| Transport animals owned last year | 0.000608 (1.608) | -0.826 (1.445) |

| | | |
|---|---|---|
| Small animals owned last year | 0.289 (0.398) | 0.337 (0.345) |
| Chicken and beehive owned last year | 0.0646 (0.567) | 0.365 (0.476) |
| Area of land cultivated | -0.873 (1.519) | -0.278 (1.339) |
| Constant | 18.36 (23.36) | 5.473 (20.73) |
| Observations | 1810 | 1865 |
| R-squared | 0.201 | 0.183 |
| Number of id | 1592 | 1629 |

- *** p<0.01, ** p<0.05, * p<0.1
- Standard errors given in parenthesis