Child Labour in Sub-Saharan Africa

Empirical Evidence and New Perspectives

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Dedication

to my wife, Felicia, my mother, Janet, and the boys Kwabena, Adom, and Kofi.

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Summary

The eradication of child labour will enhance human capital development and provide a means for sustainable development for the affected countries. However, child labour has persisted despite a significant reduction in monetary poverty in sub-Saharan Africa. The thesis uses econometric techniques to answer three research questions on why the problem persists. First, I study the effect of changes in food prices on child labour. In the second empirical chapter, the thesis examines how agricultural subsidies affect child labour. This chapter is motivated by the widespread use of input subsidies to mitigate the effects of higher food prices on households. The last empirical chapter analyses the effect of relative deprivation on child labour. That chapter extends earlier findings that changes in food prices and the distribution of subsidised inputs affect subjective well-being. The main findings of the study are: (i) an increase in food prices leads to an increase in child labour. (ii) child labour is higher among households which benefit from the subsidised inputs, and (iii) relatively deprived households are more likely to engage in child labour. In addition, the study further notes heterogeneities in the observed effects regarding household characteristics. For instance, changes in food prices have lower effect among landowning households. Also, children living in small-scale farm households are more affected by the subsidised inputs than those in large-scale farm households. These results mean that both economic shocks and governments' policies may explain why the problem has persisted in the sub-region. Based on the findings, the study recommends that policymakers should include labour-saving technologies to the productivity-enhancing inputs to reduce the unintended impact of the programme on child labour. Policy interventions should also consider the heterogeneity of the effects of food price shocks in order not to worsen its inequality and child labour effects.

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List of Abbreviations

AERC	African Economic Research Consortium
BMGF	Bill and Melinda Gates Foundation
FAO	Food and Agriculture Organization
FISP	Farm Input Subsidy Program
ILO	International Labour Organization
IPEC	International Programme on the Elimination of Child Labour
IV	Instrumental Variable
MoAFS	Ministry of Agricultural and Food Security
NSO	National Statistical Office
OLS	Ordinary Least Square
PSM	Propensity Score Matching
SIMPOC	Statistical Information and Monitoring Program on Child Labour
SSA	Sub-Saharan Africa
UBOS	Uganda Bureau of Statistics
UN	United Nations Organization
UN-CRC	UN Convention on the Rights of the Child
UNICEF	United Nations Children's Fund
UNPS	Ugandan National Panel Survey

USDOL	United States Department of Labor
WFP	World Food Program

Chapter 1

Introduction

1.1. Background

A child's access to good health, education, and a secured childhood is an inalienable right that goes beyond moral or social imperative, it is a strategic means to achieve sustainable economic growth and development (UNICEF, 2016). But, child labour denies a significant proportion of the world's children this right. Most of the affected children live in Asia and sub-Saharan Africa (SSA) where poverty is prevalent. Sometimes the deprivations faced by these children manifest in the form of working under hazardous conditions, which not only affect their human capital development but also the economic growth and sustainability of their respective countries.

Because of its effect on long-term economic growth, the Sustainable Development Goals states the elimination of child labour as an explicit goal (UN, 2016; USDOL, 2016). The topic has also generated a lot of attention among development practitioners and economists. Referring to the outcome of the Fourth Global Conference on the Eradication of Child Labour, where governments pledged to take immediate action towards eradicating child labour in all its forms by 2025, Kailash Satyarthi[1], calls on the UN, through its major agencies to bring child labour within the context of sustainable development (The Hindu Business Online, 2017). Despite the efforts and resources that stakeholders have put into eradicating the menace, a significant proportion of children, worldwide, are engaged in

[1] Kailash Satyarthi shared the 2014 Nobel Peace Prize with Malala Yousafzai for his fight against child suppression.

child labour. In SSA, about 20 percent of the children are active labourers (US-DOL, 2015). Most of these children work on cocoa, coffee, tea, tobacco and sugarcane plantations as paid and unpaid family workers, whilst others engage in other dangerous commercial activities such as street hawking, commercial sex trade, and small-scale mining.

In some poor households, income from child labour makes up a significant proportion of household earnings, without which their consumption falls below subsistence (Basu & Van, 1998; Koomson & Asongu, 2016). For these households, child labour provides an important buffer against unfavourable shocks such as bad weather (Bandara, Dehejia, & Lavie-Rouse, 2015), death or sickness of a household member, and a poor harvest. Child labour also serves as a coping strategy, albeit one with negative consequences (ILO, 2017a).

In spite of the significance of absolute poverty as a determinant of child labour, a large percentage of children are engaged in economic activities in developing countries even though there has been an appreciable economic growth, and a significant reduction in poverty in these countries (Dwibedi & Marjit, 2017; Sarkar & Sarkar, 2015). This raises questions about the notion of poverty as the key determinant of child labour (Basu & Van, 1998). Following Bhalotra and Heady (2003), other empirical studies failed to find support for the luxury axiom of child labour (R. Ray, 2000). For example, Kruger (2007) found that a higher income leads to an increase in child labour in Brazil. Even though adherents of the luxury axiom have used the 'wealth-paradox' to explain contrary findings, not all, as noted by Dwibedi and Marjit (2017), of the contrary results can be explained by the wealth-paradox.

In a survey of studies on the determinant of child labour, Bhalotra and Tzannatos (2003) found, in most of the papers, a small and often insignificant correlation between household poverty level (proxied by income or expenditure) and child labour. In Cote d'Ivoire, Ghana, and Zambia, Canagarajah and Nielsen (2001; 1999) suggest that there is not enough evidence to conclude that poverty

is more important than other factors like transportation and education costs in determining child labour. Hence, there is the need to understand the causes of the problem beyond the poverty hypothesis.

Because child labour destroys lives, decimates communities, and undermines a country's potential for economic development more efforts are being made at both local and international levels to curb the problem. Whilst there has been progress in reducing child labour over the years, the prevalence of economic and natural shocks continues to pose a threat to the successful eradication of child labour. Adverse shocks like food price hikes and natural disasters affect both the income and expenditure of poor households in developing countries. Without access to sufficient mitigating and coping strategies, poor households, the landless may rely on child labour to ensure subsistence when they adverse shocks affect them.

Studies have examined the relationship between economic growth and child labour (Grootaert & Patrinos, 2000; Kambhampati & Rajan, 2006; Swaminathan, 1998). In one of these studies, Kambhampati and Rajan (2006) find an inverted 'U' relationship between economic growth and child labour. In their conclusion, they state extreme poverty at the initial stages of the economic growth process as the cause of child labour. The reasons for such a non-linear relationship, according to different studies include the need for a 'supple' hand which could adapt to new machinery (Marx, 1867, p. 372), the widened employment opportunities (Heywood, 2002), and the household's access to more livelihood options (Horrell & Humphries, 1995). There is, hardly, any study on this relationship using an African data set. However, some recent agricultural policy interventions (for example, the provision of subsidized inputs to farmers) make it imperative to study how efforts to induce economic growth by increasing agricultural productivity may affect child labour on the continent.

Since most people in developing countries earn their livelihood from agriculture, we need to understand the role of agricultural development and agriculture-

related shocks in the demand and supply of child labour. Changes in food prices, for instance, presents both opportunities and challenges to smallholder farm households. These opportunities and challenges could affect child labour depending on the socio-economic circumstances of the household. In Pakistan and Uganda, studies have shown that higher food prices affect the poverty status of the household, and this leads to a higher incidence of child labour (Frempong & Stadelmann, 2018; Hou, Hong, & Scott, 2015). Even if higher food prices increased the household's income, there is still the likelihood that child labour would increase because the household may have to increase its own labour including that of children to increase output.

Governments adopt different policies to mitigate the effects of unexpected price shocks on the household. For instance, during the 2008 and 2010 episodes of higher food prices, several countries in Africa (for example, Ghana, Kenya Malawi, Nigeria and, Zambia) provided subsidized inputs to small-scale farmers to increase national food supply and the incomes of the farmers. In line with mainstream economic theories on child labour, one may expect an increase in household income, because of the policies, to reduce child labour and increase school enrolment. However, it is also possible for the policies to cause child labour. The nature of program design and implementation, the imperfect nature of the agricultural labour market, and land tenure systems are some of the reasons child labour may increase because of these subsidies.

The subject of child labour has generated a lot of research interest in the social sciences. However, the multifaceted nature of it, regarding its inter-linkages with the socio-cultural circumstances of the household, has led to little consensus in the literature. Well-understood subjects like the effect of household income and wealth on child labour are still under contention (Bhalotra & Heady, 2003; Canagarajah, Newman, & Bhattamishra, 2001; Patrinos & Psacharopoulos, 1997; D. Ray, 2006). In addition, subjects like the effect of subjective well-being on child labour remains under-researched in economics. It is in the light of this lack

of consensus that I seek to explore how some recent developments in the sub-region have affected child labour.

1.2. Motivation of the Study

The multifaceted nature of child labour makes it one of the active research areas in development economics. However, as new local and international economic developments introduce different dynamics, there is a continuous need for more insights into the problem. In addition, different countries are presented with different challenges to child labour from the same or similar economic shocks. For instance, the effect of higher prices on child labour in a food-sufficient country would differ from that of a net-food importer, this also holds at the household level. Thus, while we may extract from the available theoretical and empirical literature a general understanding of the problem, for an efficient policy targeting, it is important to gain a deeper understanding of the heterogeneous nature of the problem regarding the constraints, incentives, and agencies that cause it.

Target 8.7 of the Sustainable Development Goals demands of the international community to '*[t]ake immediate and effective measures to eradicate forced labour, and modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms'*. Current child labour estimates show that, even though the world has made real progress towards the eradication of the problem, a significant proportion of children are engaged in child labour, and some work under hazardous conditions. According to ILO (2017b), about 19.6 and 8.6 percent of children in Africa alone are engaged in child labour and hazardous work. This makes Africa the continent with the highest incidence of child labour. The report further states that compared to the earlier periods, the pace of progress slowed down between 2012 and 2016.

The persistence of child labour calls for more insight into the underlying causes of the problem. This study examines the impact of recent economic shocks and policies on child labour in Africa. I examine the impacts of changes in food prices (Chapter 2) and agricultural input subsidy (Chapter 3) on child labour. The topics are chosen to show how both economic shocks and policy responses (if not carefully implemented) can have re-enforcing effects to increase child labour. The chapters contribute to the broader discussion on the '*constraints*' and '*incentives*' that cause child labour. The work further demonstrates how a non-pecuniary factor, subjective well-being, affects child labour (Chapter 4).

This dissertation is an extract from my broader research activities, which besides what is presented in this thesis, have examined the effect of women's bargaining power on child labour (Frempong & Stadelmann, 2017), the role of crop diversity[2], and access to secured markets (Novignon, Frempong, & Afoakwah, 2017)[3], and agricultural input subsidy on household welfare and nutrition[4].

The findings from these studies point to the multifaceted nature of the problem. In one of these studies, I find evidence that supports the traditional notions that adverse economic shocks are important determinants of child labour. Some of the papers also provide new insights on how contemporary events could affect child labour. For instance, one study shows that good agricultural policy interventions present opportunities for poverty reduction (Novignon et al., 2017), and by extension child labour. But such programmes could worsen the child labour situation (Chapter 3).

[2] An ongoing research with Elena Groß.

[3] Funded by the African Economic Research Consortium (AERC) and the World Food Programme to assess the impact of WFP's Purchase for Progress Program.

[4] Novignon, J., Chirwa G.C., & Frempong R.B. (2017). Agricultural input subsidies, food price shocks and malnutrition in Malawi. A work-in-progress funded by the Bill and Melinda Gates Foundation (BMGF) through the AERC as part of AERC's thematic research on evaluating the impact of agricultural and food policies on nutritional outcomes in SSA.

1.3. Some Concepts and Conventions on Child Labour

The child labour literature is characterised by arguments and counterarguments concerning definitions and measurements of the various aspects of the problem. Since there is limited consensus regarding several key indicators, much is left for the researcher to decide in an empirical study of this nature. The aims of this section are to (i) situate the study in the broader discussions on child labour, and (ii) provide the bases for the definitions and measures adopted in the subsequent chapters of the thesis.

There seems to be an agreement on the adverse effects of child labour, however, there is no consensus on what constitutes child labour (IPEC & Edmonds, 2009; Satz, 2003). Broadly, child labour may refer to the child's engagement in an activity that may be harmful or *hazardous* to her (IPEC & Edmonds, 2009). Embedded in this definition are the questions: who is a *child*? and what makes up a *harmful* work? Through the ILO's Statistical Information and Monitoring Program on Child Labour (SIMPOC) and the United Nations Convention of the Rights of the Child (UN-CRC), countries are converging towards a uniform definition of a child as a person below 18 years. This notwithstanding, there is no general agreement regarding what constitutes a harmful activity. For empirical studies and statistical computation, the definition of child labour becomes problematic because national surveys rarely contain information on the alternative uses of the child time in the absence of work, that is, there is a lack of a counterfactual evidence (IPEC & Edmonds, 2009). This has led to different definitions of child labour in empirical and theoretical research (IPEC & Edmonds, 2009, see Table 3).

One way to look at the question of harmfulness is to consider the problem from the perspective of Sen (1985, 2001), where a harmful activity may be defined as any engagement that limits or hampers the child's welfare and agency interests.

Here, welfare interest refers to the child's general good, whilst agency interest refers to her ability to meaninfully take part in matters concerning her overall welfare either in the present period or in the future (Satz, 2003).

In operationalising the interests of the child, Article 32 (1) of the UN-CRC states that: State parties recognize the right of the child (below the age of eighteen years) to be protected from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development. The ILO further caters for national differences with regards to what constitutes an economic exploitation and harmful work by allowing member countries, depending on their economy and educational facilities, to specify a minimum age of 14 years. These notwithstanding, the ILO-SIMOPOC uses the following criteria in international child labour statistics:

i. A child under 12 who is economically active for 1 or more hours per week,

ii. A child 14 and under who is economically active for at least 14 hours per week,

iii. A child 17 and under who is economically active for at least 43 hours per week

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

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

As an empirical work, this thesis adopts definitions which reflect both international conventions and domestic laws on child labour in the respective case countries. Traditional norms also inform how I measure the child labour variable. Because of these, the results of the thesis are relevant for policies at the local level and are also comparable across countries for generalisation.

Equally contentious is what we must do to eradicate the problem. A strong policy implication of Basu and Tzannatos (2003) is that stopping child labour can put the household in a good equilibrium. The basis of this conclusion is the assumption that a total ban on child labour will increase adult wage, and if the new wage is above subsistence level, then households will cease to supply child labour (Bhalotra, 2003). In addition, we could also expect a legal ban to increase the cost of hiring child labour, hence reducing employers' incentive to use them. One argument against such a ban is that it may cause households to choose worse options for their children (Satz, 2003). Basu and Van (1998) also argue that if households send their children to work out of desperation from poverty, then the case for a total ban on child labour is weakened. Because these parents are compelled to send their children to work for survival. Hence, such a ban may not necessarily enhance the welfare of the child. Bharadwaj, Lakdawala, and Li (2013) show that child wages decreased, and child labour increased after India's Child Labour (Prohibition and Regulation) Act of 1986. Thus, the evidence, so far, shows that if care is not taken, the attempt to reduce child labour through a legal ban may rather worsen the situation of child labour in developing countries.

1.4. Non-technical Summary of the Main Findings

The section presents the main findings of the three empirical chapters of the thesis in the form of a non-technical summary.

Chapter 2

A significant proportion of the population in developing countries are small-scale farmers who, because of low output and lack of adequate storage facilities, depend on market purchases to supplement their own production for domestic consump-

tion. Most of these people are net food buyers who spend a significant proportion of their incomes on food. Depending on the level of their net market status, they could become more vulnerable when food prices rise. However, higher food prices could also present an opportunity for those who have marketable surplus. But even for this group of households, their ability to take advantage of the higher food prices depend on such factors as land ownership and size, access to credit and capital, and the available agricultural labour market. Therefore, irrespective of the circumstance, higher food prices present real challenges to agricultural households. The situation becomes more pronounced when the increase in prices is global. Because this hampers the ability of domestic governments and importers to supplement domestic production with imports.

For a large part of 2008 through to 2010, global food prices, (especially that of cereal staples like maize, wheat, and rice) increased to a crisis level. In 2008 international food prices hit a 30-year high, the FAO's international food price index increased by 76 percent over the 2006 level and 40 percent from 2007 (FAO, 2009). This affected domestic food prices with a resultant economic, political and social unrest in several parts of the world (FAO, 2009; World Bank, 2010). Sub-Saharan Africa, where a significant proportion of the population are poor net food buyers, was among the regions that experienced the hardest hit of high food prices. The rising cost of food slowed the pace of poverty reduction (Hou et al., 2015) and plunged several households below the poverty line. Among development economists and practitioners there have been concerns about the effect of the high food prices on child labour.

Chapter 2 of the thesis examines the effect of increased food prices on child labour in SSA. The chapter dwells on previous studies on food prices and poverty (Ivanic & Martin, 2008; Ivanic, Martin, & Zaman, 2012) and food prices and child labour (Bibi, Cockburn, Coulibaly, & Tiberti, 2010; Hou et al., 2015) to further investigate nuanced issues like the role of land ownership, net-market status in the relationship between higher food prices and child labour. The study finds

that, even in a food-secured country like Uganda, higher food prices may increase both the incidence (the probability) and the intensity (the number of work hours) of child labour. In addition, the study finds a smaller effect among landowning households. This is consistent with the view that landowning households can better compensate for price shocks. From the endogenous growth models, one can expect the negative effects of child labour on health and human capital development to influence economic growth in SSA.

Chapter 3

Chapter 3 argues that because of the general agricultural factor market failures, in rural Africa (B. Dillon & Barrett, 2017), and the low level of mechanisation among small-scale farmers in SSA, an agricultural input subsidy could have an unintended impact on child labour on the continent. This is because when output increase because of the inputs, an agricultural household must fall on its own members to provide additional labour. Children may be used in such activities as land preparation, fertiliser application, harvesting, and disposal. Even if these children are not directly employed on farms, they may perform additional chores so that adult members can work longer on the farm.

As a response to the persistent low food production and higher food prices in the sub-region, several African countries (Ghana, Kenya, Malawi, Nigeria and, Zambia) started variants of agricultural input subsidy programs. These programs aim to increase food production and reduce poverty among small-scale farmers. Governments have spent huge sums of money on them, and they have achieved varying degrees of success. The programmes may achieve the immediate aims of increased food production and reduced poverty, but the process of achieving them might increase child labour in the sub-region. If this is true, then the poverty-reducing effect of the subsidies may not be sustainable. However, despite the potential impact of the subsidies on child labour, there is no empirical study that has examined this relationship.

Chapter 2, therefore, contributes to filling this knowledge gap by analysing the impact of farm input subsidies on child labour using data from Malawi. Malawi has a long history of input subsidisation, and in recent times, the country has implemented one of the most successful agricultural subsidy programmes in the sub-region. In this study, I analyse three rounds of Malawi's Integrated Household Panel Survey which contains detailed information on household and their members social and economic characteristics. The results suggest that children (from 5 to 13 years) in maize-farming households that received the subsidised fertilisers and improved maize seed are more likely to engage in child labour. The affected children, sometimes, apply and fertiliser and prepare land for cropping.

Chapter 4

If there is any consensus in the child-labour discourse, it is on the fact that poverty is the primary cause of the problem. By poverty, researchers in the field refer to pecuniary absolute poverty. Flowing from this argument is the expectation that child labour should fall with an increase in income. However, even though monetary poverty has declined in some developing countries, the available evidence does not support the income-child-labour hypothesis (Kruger, 2007; Sarkar & Sarkar, 2015). The persistence of child labour in the face of lower poverty calls more research to enhance our understanding of the causes of the phenomenon. Getting the causes of child labour right is a significant step towards appropriate policies to fight it. It is therefore important to identify the right *constraints*, *incentives* and *agencies* that underlie the problem.

The subject of an alternative non-monetary causes of child labour is an active research area (Dwibedi & Marjit, 2017; Sarkar & Sarkar, 2015). Chapter 4 of the thesis contributes to this discussion by examining the role of subjective welfare in child labour. This chapter draws on the findings that the household's subjective welfare affects its happiness and decisions concerning labour and resource allocation (Dwibedi & Marjit, 2017; Fafchamps & Shilpi, 2008; Ravallion

& Lokshin, 2010). A corollary of these findings is that the household may respond to the perceived difference between their consumption levels and that of their neighbours by reallocating resources in a way that optimises its welfare. I argue that because income from child labour is a significant proportion of the incomes of some poor households (Koomson & Asongu, 2016), relative deprivation could increase child labour. The main finding of this chapter is that children from subjectively deprived households are more likely to engage in child labour. This may be a rational response the household increase its income to match its material consumption to that of the average consumption in the neighbourhood.

1.5. Notes to the Reader

The thesis analyses three causes of child labour in SSA using individual micro data. The study is designed so that each chapter builds on certain findings of the others, and all the chapters, together, contribute to the broader discussions in the child labour literature. However, each individual empirical chapter stands alone in an article-like paper, hence they could be read independently of the each other. Different versions of the papers in chapters 2-4 have been presented at both local and international conferences including the Centre for the Study of African Economies conference in Oxford and the International Conference on Shocks and Development in Dresden. A version of Chapter 2 is published in the *Journal of Development Studies* ("The Effect of Food Price Changes on Child Labour: Evidence from Uganda", https://doi.org/10.1080/00220388.2018.1448066)[5].

[5] Co-authored with David Stadelmann

Chapter 2

The Effect of Food Price Changes on Child Labour[1]

[1] A modified version of this chapter has been jointly published with David Stadelmann in the *Journal of Development Studies* as 'The Effect of Food Price Changes on Child Labour: Evidence from Uganda', https://doi.org/10.1080/00220388.2018.1448066.
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Abstract

A majority of the people in developing countries spend about 60 percent of their income on food, even though most of them are farmers. Hence a change in food prices affects both their revenue and expenditure and thereby their labour decision. Using the Uganda National Panel Survey and monthly food prices, this chapter examines the effect of exogenous changes in food prices on child labour. The econometric evidence shows that an increase in food prices leads to an increase in the probability and intensity of child labour in Uganda. We also find the effect to be smaller among landowning households, which is consistent with the view that landowning households can better compensate for food price shocks. The evidence suggests that periodic shocks in food prices may have longer lasting effect on human capital development and poverty of poor households in developing countries because of its effect on child labour.

Key words: Child labour; Exogenous shock; Food price; Uganda.

2.1. Introduction

In 2012, over 168 million children were engaged in child labour, corresponding to about 11 percent of children worldwide according to the International labour Organization (ILO, 2015).[2] A significant number of child labourers are employed in sub-Saharan Africa which also has the highest incidence rate of more than 20 percent (USDOL, 2015). Generally, extreme poverty is often seen as a leading determinant of child labour (see, e.g. Basu & Van, 1998; Carpio, Loayza, & Wada, 2016; Dessy & Pallage, 2001; de Carvalho Filho, 2012; Edmonds, 2005; Hazan & Berdugo, 2002) and adverse income shocks affect child labour (see Beegle, Dehejia, & Gatti, 2006; Bandara et al., 2015; Hou et al., 2015).

As food expenditure constitutes between 40 to 60 percent of the income of the poor in developing countries (Hallegatte, Fay, Bangalore, Kane, & Bonzanigo, 2015; Lee et al., 2013), an increase in food prices may affect real poverty and, thus, the incidence of child labour. However, developing countries are also characterized by a high fraction of agricultural households which could potentially benefit from an increase in food prices (World Bank, 2007). Hence, the effect of a food price increase on child labour is, essentially, an empirical question.[3] The chapter contributes to analysing the effects of exogenous food price changes on the probability and intensity of child labour with an individual-level panel data from Uganda from 2009 to 2012.

Identifying the causes of child labour is highly relevant, particularly, for most African countries due to its long-term impact on economic development. Child labour is not only a relevant indicator of the current well-being of the child but it also determines her future income and vulnerability in numerous dimensions (Baland & Robinson, 2000; Horowitz & Trivitt, 2007; ILO, 2015). These children risk adverse effects on their health, safety and mental development,

[2] The ILO (2015) puts the number of children in hazardous work at 85 million.

[3] Experience from a recent price boom of quinoa suggests that the welfare effect of rising food prices depends on the ability of small-scale farmers to respond competitively (see The Economist, May 21, 2016.

potentially leading to lower educational achievements and human capital (Baland & Robinson, 2000; Emerson, Ponczek, & Souza, 2017).

The main empirical results of our study suggest a positive impact of an increase in food prices on both the incidence and the intensity of child labour. A 10 percent increase in food prices leads to a 12 percent higher likelihood that children have to work. This effect is found to be smaller among land-owning households, this is consistent with the view that land ownership is a relevant mitigating factor against adverse shocks. Nevertheless, we also show that, on average, land owning households cannot fully compensate for the increase in expenditure due to higher food prices. We tackle potential endogeneity problems by including a number of relevant time-variant household control variables, individual fixed-effects, and we employ international food prices changes as instruments to identify exogenous variations in regional domestic prices. An array of robustness checks support our main findings.

The chapter proceeds with a review of the literature in Section 2.2. Section 2.3 discusses our data and methodology. In Section 2.4, we present our main findings, along with robustness checks whilst Section 2.5 concludes the study.

2.2. Literature Review

This study contributes to the literature which analyses the effects of adverse economic shocks on household decision-making with a particular emphasis child labour.

Theoretical studies often model parents as altruistic agents who would keep their children out of work as long as the income level of the household is high enough (Basu & Tzannatos, 2003; Basu & Van, 1998).[4] Thus, parents derive dis-utility from child labour and would want to minimize it, unless they are compelled by adverse economic circumstances to generate additional income. There

[4] Technically, household decision-makers consider the leisure and education of their children as luxury goods in these models.

is evidence which provides support for these theoretical models (Edmonds, 2005; Grootaert & Patrinos, 2002; 2000). More importantly, independent of the precise reasons why parents decide to send their children to work, empirical studies clearly indicate that unfavourable production, health and economic shocks increase the probability of child labour (Beegle et al., 2006; Bandara et al., 2015; Hou et al., 2015).

The literature is replete with finding of how production and economic shocks affect child labour. For example, in Tanzania, both Bandara et al. (2015) and Beegle et al. (2006) estimate a significant and an increasing effect of agricultural shocks on child work hours. Bandara et al. (2015) further notes that note that crop shocks, especially, reduce school attendance and increase child labour. A similar conclusion was reached by (A. Dillon, 2012), who also find, among children in Mali, that the probability of child labour increases by as high as 24 percent when a production shock occurs. As pointed out by some of these studies, the magnitude of the impact depends on factors such as landholding and access to credit (Bandara et al., 2015).

Adult and child labour are usually modelled as substitutes, where productivity of child labour is assumed to be relatively smaller than adult labour (Basu & Tzannatos, 2003; IPEC, 2007).[5] As adverse economic shocks in developing countries may require households to expand their income-generating activities, there will be a higher incentive to employ its own labour, including child labour (Bandara et al., 2015; Beegle et al., 2006). We contribute to the literature on child labour by investigating the effects of an exogenous increase in food prices on the household's child labour decision. If higher food prices push households into poverty, then child labour may, therefore, be expected. At the same time, higher food prices may also provide additional means for food-supplying households in developing countries to increase their incomes, thus alleviating poverty

[5] Proponents of this assumption argue that adults are better skilled than children. However, because adult wages are relatively higher than that of children, firms may use both factors (see Levison, Anker, and Barage (1998)).

rather than increasing it and this may reduce the incidence of child labour.

Following the 2008 and 2010 episodes of food price hikes, a number of studies have examined the relationship between changing food prices and indicators of household welfare (Bibi et al., 2010; Hou et al., 2015; Warr & Yusuf, 2013). Since such price hikes represent an adverse economic shocks to net-food-buying households in developing countries,they may resort to credit or their buffer stocks to smoothing consumption (Sirisankanan, 2015). However, Basu and Tzannatos (2003) argue that poor households may be constrained in terms of mitigating options against such shocks. With limited access to credit and lack of buffer stock, they may, thus, be required to increase their labour supply(Chaudhuri & Ravallion, 1997; Morduch, 1995). Even in the absence of explicit shocks, income from child labour sometimes constitute a significant proportion of the household's income (Koomson & Asongu, 2016). Cockburn (2002) estates that income from child labour accounts for about four to eight percent of household income in Ethiopia.

Exploring the effects of wheat prices on child welfare in Pakistan, Hou et al. (2015) find a negative effect of a price increase on school enrolment.[6] Bibi et al. (2010) suggest that Malian households are more likely to withdraw their children from school and put them into economic activities as commodity prices increase. These studies use a single commodity (rice or maize) as a proxy for the price of the average food basket. However, if household food consumption is made up of more than one major crop, which is likely to be the case, using the price of a single staple may not serve as a suitable proxy (Ravallion, 1990). We contribute to this literature by using a comprehensive measure of food prices captured by the market price index of the food basket of the average Ugandan household.

Focusing specifically on household welfare in Uganda, Benson, Mugarurab, and Wandac (2008) suggest a small but a positive impact of higher food prices on household welfare since the average diet is made up of mostly non-tradable staples. Bellemare, Fajardo-Gonzalez, and Gitter (2016) also find that an increase in food

[6] The effect of the price of wheat on child labour is statistically insignificant in their analysis.

prices have positive impact on household welfare.[7] In contrast, Van Campenhout et al. (2013) and Simler (2010) argue that the incidence and depth of poverty increased in Uganda in the short-term due to higher food prices. This study further contributes to these findings by explicitly focusing on the incidence and intensity of child labour and distinguishing the use of child labour in landowning households.

The incentive to use children on farms tends to be greater among landowning households because the marginal productivity of labour increases with land size (Bhalotra & Heady, 2003). This is particularly re-enforced by the absence of a well-functioning agricultural labour market (Oryoie, Alwang, & Tideman, 2017), which causes households to rely on their own members to provide labour. Hence, an understanding of the role of land in child labour is relevant in different African countries where post-colonial governments have embarked on land redistribution programmes. In most cases, the land has been taken from commercial farmers to the poor and previously landless households whose only sources of labour is their adult and child members. In Zimbabwe, where one of the largest land redistribution programmes has occurred, Oryoie et al. (2017) show that child labour tends to increase with land holdings. This result is also in line with the argument that asset-based poverty reduction strategies could increase the incidence of child labour (Cockburn & Dostie, 2007).

Moreover, landholding is particularly important in the context of this study for two other reasons. First, land can be rented out to raise additional income, hence, the need for an additional income from child labour may be reduced (Kis-Katos, 2010). Second, households could use their land as collateral for credit which further reduces the need for child (Bhalotra & Heady, 2003). However, labour market imperfections, as it is the case in most developing countries, could

[7] Studies for the International Food Policy Research Institute (see Ulimwengu & Ramadan, 2012 and Van Campenhout, Pauw, & Minot, 2013) also analyse different associations between food prices and household welfare in Uganda. Households may be able to increase output to gain from the higher food prices (as suggested by Ulimwengu & Ramadan, 2012).

make land ownership to increase child labour during periods of higher food prices (Basu, Das, & Dutta, 2010; Bhalotra & Heady, 2003). Therefore, it is not clear how land ownership will affect the relationship between higher food prices and child labour. The chapter contributes to this open question by investigating the moderating effect of land ownership on the relationship between food prices and child labour.

In addition, it is possible to have a non-linear effect of food prices on child labour over time. Agricultural households may adjust both their food consumption and input decisions to meet the new prices. Farm household may try to find additional resources to increase their production to gain higher income from the prices. Therefore, even if higher food prices increase child labour in the initial period, we may expect the impact to diminish over time as farm households adjust their production decisions. In a similar manner, the initial impact resulting from the expenditure effect could also diminish as net-food-buying households also adjust their consumption decisions. As an additional contribution of this chapter to the existing literature, we analyse the short, medium and long-term impacts of higher food prices on child labour.

2.3. Methodology

2.3.1. Context and Data

Uganda has experienced steady economic growth (UBOS, 2014), and the average income levels reached approximately $705.3 in 2015 (World Bank, 2016). However, during the same period about 2.75 million children, aged 5-17 years, were engaged in economic activities, and 51 percent of them were involved in hazardous activities (MGLSD, 2012; UBOS, 2010).[8] Diverse government reports (see MGLSD, 2012; USDOL, 2015) indicates that about 31 percent of children in the country are engaged in child labour. These children work in activities such as stone quarrying,

[8] These reports define a child as between 5-17 years

brick making and laying, clay mining, commercial agriculture and commercial sexual exploitation are among the the predominant activities of child labourers in the country.

Guarcello, Furio, Breglia, and Ssennono (2008) suggest that poverty, like in many African countries, is a leading cause of child labour in Uganda. There also exist geographical differences in the distribution of child labour in the country. About 42 percent of rural children are economically active compared to 15 percent of urban children; economically active children are more concentrated in the Eastern, Central and Western regions. Most of the working children in rural Uganda are engaged in family work (97 percent), although some of them are also found in the manufacturing and service sectors. A detailed report on child labour in Uganda is provided by Guarcello et al. (2008), Macro International Inc (2011) and Walakira et al. (2016).

Regarding food supply, Uganda is nearly self-sufficient in terms of its major staples aside from rice and wheat. The country serves as a source of food imports for its east African neighbours, including Kenya. Nevertheless, Uganda has experienced a steady increase in food prices, consistent with what is observed on the international market (Ulimwengu & Ramadan, 2012), and the prices of local staples (matoke[9], cassava, and sorghum) also increased between 2008 and 2010. Changes in weather patterns, weakening currency and export of Ugandan crops to neighbouring countries as well as higher fuel prices have been cited as some of the important causes of the rising food prices (B. M. Dillon & Barrett, 2015; Ivanic et al., 2012; Mbowa, Mawejje, & Kasirye, 2012), though with producing clear evidence.

Data for the analysis is drawn from the Ugandan National Panel Survey (UNPS) which we merge with relevant market level monthly consumer price indexes reported by the UBOS. The UNPS is a nationally representative panel, which is based on the World Bank's Living Standards Measurement Survey. We

[9] Matoke is the local name for plantain

employ the last three waves 2009/2010, 2010/2011 and 2011/2012. The data contains detailed information on all the labour activities of household member (five years or older at the time of data collection) in the last eight days preceding the survey. It also contains detailed questions on the economic and demographic characteristics of the household as well as some community level characteristics.

2.3.2. Measurement of Child Labour and Food Price Variables

(i) Child labour

Following Bandara et al. (2015), Beegle et al. (2006), Edmonds (2005) and Hou (2015), we measure child labour with two variables: (1) an indicator variable which equals one if the child engaged in any economic activity during the reference period, labelled as $ChildWorked$ in the regression models and (2) the number of hours the child worked, labeled $HoursWorked$. Thereby, we aim to measure the incidence as well as the intensity of child labour. The unit of observation for our analysis is the child. The measurement of child labour includes paid and non-paid work as is common in the literature (Beegle et al., 2006; Carpio et al., 2016; Edmonds, 2005). Indeed, economic shocks may directly affect child labour when the child is made to work for income because of the economic hardship. At the same time, a child may have to performs chores that were previously done by adults in order to release time for adults to earn more income.[10] More importantly, independent of explicit payment or not, the ILO defines child labour to include activities that are considered physically and mentally dangerous for the child. The UNPS, however, does not contain information to distinguish which activity is hazardous or not. In addition, as has been shown by IPEC and Edmonds (2009), domestic activities do not differ from market activities in terms of their impact

[10] Thus, a non-restrictive measure of child labour also includes non-paid work. Indeed, some of the domestic and farm work are sometimes done under hazardous conditions (Admassie, 2002).

on school attendance, hence any attempt to focus only on market activities will provide a partial understanding of the problem.

To achieve consistency with the international definition of child labour, we study only children between 5 and 14 years old. According to the ILO, the minimum age for light work is 12 years (IPEC, 2011), hence any work by children between 5 and 11 years is considered as child labour. We, therefore, perform a separate analysis for children between 5 and 11 years. Finally, the data is restricted to the children for whom there is information across the three waves of the UNPS (2009/2010, 2010/2011, 2011/2012). The set of questions used in constructing the child labour variables are provided in Appendix 2.A3.

(ii) Food price

Regarding food prices, we constructed the cost of food from the monthly Consumer Price Index (CPI) reported by UBOS. This is computed for seven major markets in Uganda (Arua, Jinja, Kampala, Masaka, Mbale, Mbarara and, Gulu). This price index provides a comprehensive measure of the general trend of the average consumption basket in Uganda. Thus, we are able to evaluate the impact of overall changes in food prices on child labour. We merged households to these CPIs based on their physical proximity to a particular market and the month in which the questionnaire was administered. We merged the data by generating the distance between a household and all the seven markets using the geo-coordinates of the household and the market centres. After identifying the nearest market, we then pair questionnaire month to the respective month in the CPI report. This procedure provides variation in both space and time even for households within the same cluster. For instance, households which are in the same community but were interviewed in different months may have different CPIs.

Summary statistics for all these variables and standard controls with the corresponding sources are presented in Table 2.A1 in the appendix of the study.

2.3.3. Empirical Model and Identification

(i) Empirical model

In line with our objective of analysing the influence of food price changes on the incidence and intensity of child labour, we start with a conventional regression approach in equations (2.1) and (2.2):

$$\begin{aligned} ChildWorked_{it} =& \alpha_i + \beta_t + \gamma FoodPrice_{it} + Child'_{it}\Phi_1 + HH'_{it}\Phi_2 \\ &+ COMM'_{it}\Phi_3 + \epsilon_{it} \end{aligned} \tag{2.1}$$

and

$$\begin{aligned} HoursWorked_{it} =& \alpha_i + \beta_t + \gamma FoodPrice_{it} + Child'_{it}\Phi_1 + HH'_{it}\Phi_2 \\ &+ COMM'_{it}\Phi_3 + \epsilon_{it} \end{aligned} \tag{2.2}$$

where, $FoodPrice$ is the market-level food price index. $Child$ is a matrix of the child's time-variant characteristics which includes, among others, age of the child and whether she is in school or not. HH and $COMM$ are matrices of household and community characteristics respectively, including such variables as (the household's size, total expenditure, average schooling of household members; average annual temperature and rainfall).[11] $ChildWorked$ is an indicator variable for child labour and $HoursWorked$ is the number of hours the child worked in the last 8 days prior to the survey. To control for time invariant unobserved characteristics of the child, we estimate fixed effect models for equations (2.1) and (2.2) captured by α_i. β_t is a time fixed effect.

(ii) Identification

We aim to isolate and identify the causal effect of exogenous food price changes on the incidence and intensity of child labour. Although it is unlikely that market-level prices are influenced by individual decisions of households (reverse causal-

[11] See Tables 2.A1 and 2.A2 in the Appendix for a complete list of all control variables.

ity), the coefficient of $FoodPrices$ in equations (2.1) and (2.2) may be driven by unobserved household characteristics and potential measurement errors, even though we account for individual fixed-effects. Indeed, the decision to engage in child labour is usually made by parents (Webbink, Smits, & de Jong, 2012) and depending on the inter-temporal preference for income of the family head, one may speculate speculated that the effect of food prices on child labour could vary both within and across households over time. Thus, our ability to interpret the observed coefficient as a causal effect hinges on the exogeneity of $FoodPrices$.

The identification strategy adopted in this study involves the use of instrumental variables. We use international food prices as an instrument for domestic market-level food prices (see T. G. Smith, 2014 for a similar strategy).More precisely, we used the one-month lag of IMF's monthly international food price index as an instrument for the domestic food price index in Uganda. It It is important to examine the proposed instrument within the context of Uganda to ascertain their validity.[12] Uganda constitutes a negligible proportion of global food trade (see T. G. Smith, 2014) such that world food prices can be seen as exogenous, particularly for individual Ugandan farmers. Therefore, domestic events in Uganda will not affect world food prices. International food prices, however, explain market-level prices in Uganda because the country is a net food importer. Indeed, while Uganda seemed unaffected by global food price hikes at the beginning of 2008, the country started experiencing food prices increases by December 2008, there have been projections of a further increase due to high demand from neighbouring countries (see Ulimwengu & Ramadan, 2012; IFPRI, 2008 for further details). This is an indication that it takes time for domestic prices to respond to changes in international prices, hence our use of the lag of international food prices as an instrument. Based on the above explanations, we modify Equations (2.1) and (2.2) as follows:

[12] For our instrument to be valid, it must correlate with our variable $FoodPrice$ (relevance condition) and it must affect child labour only through $FoodPrice$ (exclusion restriction), or put differently; it must not correlate with the error terms in equations (2.1) and (2.2).

$$Childworked = \alpha_i + \beta_t + \gamma \widehat{FoodPrice}_{iy} + Child'_{it}\phi_1 + HH'_{it}\phi_2 + COMM'_{it}\phi_3 + \epsilon_{it} \quad (2.3)$$

and

$$HoursWorked = \alpha_i + \beta_t + \gamma \widehat{FoodPrice}_{iy} + Child'_{it}\phi_1 + HH'_{it}\phi_2 + COMM'_{it}\phi_3 + \epsilon_{it} \quad (2.4)$$

$\widehat{FoodPrice}$ is the prediction of food prices from the first stage regression of domestic food prices (variable to be instrumented) on international food prices (main instrumental variable) and the other controls.

A relevant and statistically significant effect of $FoodPrice$ alludes itself to either an intensive or extensive marginal effect. The intensive margin represents the effect of economic shocks on the number of work hours of children who were already working before the shock (it refers to a change in working time). The extensive margin represents the effect on the incidence of child labour (the effect of economic shocks on children previously not working). In Table 2.6, we refine equations (2.1) and (2.2) to explore these interpretation issues by estimating the intensive and extensive margin effect of $FoodPrice$ based on whether the child worked or not in the first panel. We then run equations (2.1) on (2.2) conditional on the child working or not in 2009/2010. We distinguish these for scientific interest and policy relevance: if food prices changes affect child labour mainly through the intensive margin, then children from poor households are most likely more affected than richer households.

In addition, we also analyse the interaction effects of land ownership and the household's net-market status with food prices. This is done to examine how the effect of changes in food prices differ across households with different land endowments and food self-sustenance. Thereby we can explore how such factors moderate the relationship between food prices and child labour.

2.3.4. Summary Description of the Main Variables

Table 2.1 shows the distribution of child labour between farm work and off-farm activities as yearly averages for the three periods. The average food prices for the respective are also presented in the table. The proportion of children who worked on family farms during the study periods is between 29 and 35 percent, making family farms the predominant work for children in Uganda. Including all forms of work, more than a quarter of children in Uganda reported to have worked in 2009/2010 while about a third of them worked in 2011/2012. We also note that food prices have increased for the same time period from an average index value of 168 to 249.

Table 2.1.: Labour participation rates of children according to type of work, hours of work and food prices in Uganda

	Proportion of children in:					
Year	family farm	other types of work	all types of work	Avg. Hours (all children)	Avg. hours (working children)	Food price
2009/2010	0.26	0.04	0.29	2.66	9.76	168.15
	(0.01)	(0.00)	(0.01)	(0.13)	(0.38)	(0.17)
2010/2011	0.33	0.02	0.35	3.12	9.68	226.04
	(0.01)	(0.00)	(0.01)	(0.13)	(0.31)	(0.52)
2011/2012	0.34	0.02	0.35	3.04	9.12	249.43
	(0.01)	(0.00)	(0.01)	(0.13)	(0.31)	(0.38)
All years	0.31	0.03	0.31	2.94	9.50	214.54
	(0.01)	(0.00)	(0.01)	(0.08)	(0.19)	(0.44)

Note: Standard errors in parenthesis. Proportion for rows do not sum up to 1 because the groups are not mutually exclusive and the calculation is done over the entire sample for a particular year. Child labour statistics are based on the labour activities of children in the last eight days preceding the survey.

Figure 2.1 provides an illustration and the motivation for our research question. Figure 1a shows a steep upward trend of market-level food prices.[13] We

[13] This upward trend, though less pronounced, is also consistent with movement of international food prices.

plot the overall consumer price index for comparison; this has also been increasing but food prices rose more sharply. Figure 1b plots the percentage of child labour and the change of food prices during the same period in our sample, this show that child labour follows a similar trend as food prices. Since this is just a descriptive graph, the relationship observed is susceptible to biases arising from different things such as general economics growth and openness to trade. To rule out the possibility that correlates at the individual, household or neighbourhood and other forms of endogeneity bias explain the observed association between food prices and child labour, we include a number of relevant control variables in the regression analyses.

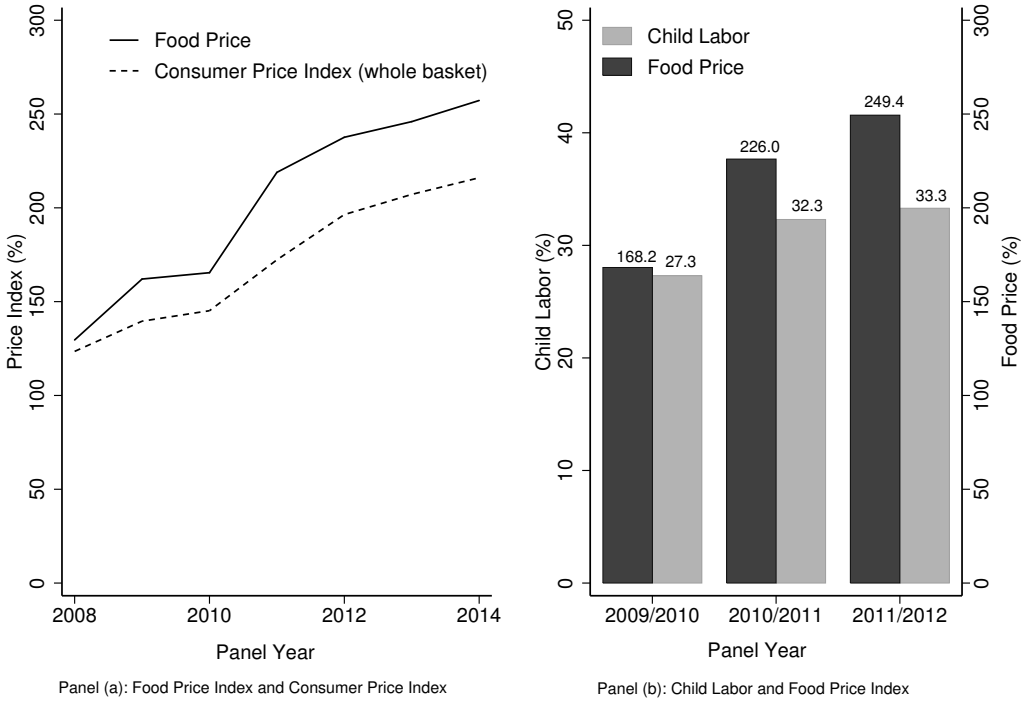

Figure 2.1.: Trend of Child Labour and Food Prices in Uganda (2008-2012)

Table 2.2 presents the prevalence of child labour across a selection of child and household characteristics. As expected, older children (between 10-14 years) have a higher tendency to work than younger children (between 5-9 years), so do male children as compared to their female counterparts. The table indicates that

the proportion of working children in female-headed households is slightly higher than in male-headed households.On the relationship between land ownership and child labour, we observe that child labour is positively associated with landownership. This relationship shows an apparent paradox of wealth, which may be due to labour or credit market imperfections (Basu, 2006; Bhalotra & Heady, 2003; Dumas, 2007).[14] At the same time it has to be noted that land-owning households are usually situated in rural areas where the incidence of child labour is higher. The table reveals that the incidence of child labour tend to be lower in net-food-buying household compared to those who depend on the market for a significant proportion of the their food.

Table 2.2.: Labour participation rate of children in Uganda by age, gender and household land ownership status

Characteristics	2009/2010	2010/2011	2011/2012
	Proportion(SE)	Proportion(SE)	Proportion(SE)
Age of child (years)			
5-11	0.24 (0.01)	0.26 (0.01)	0.23 (0.01)
12-14	0.46 (0.03)	0.54 (0.02)	0.50 (0.02)
Difference	-0.21 (0.03)	-0.28 (0.02)	-0.26 (0.02)
Gender of child			
Female	0.25 (0.01)	0.31 (0.01)	0.31 (0.01)
Male	0.29 (0.01)	0.34 (0.01)	0.35 (0.01)
Difference	-0.04 (0.02)	-0.03 (0.02)	-0.04 (0.02)
Gender of Household head			
Female	0.30 (0.02)	0.39 (0.02)	0.38 (0.02)
Male	0.28 (0.01)	0.33 (0.01)	0.34 (0.01)
Difference	0.02 (0.02)	0.05 (0.02)	0.04 (0.02)
Land owning household?			
No	0.15 (0.02)	0.28 (0.02)	0.26 (0.02)
Yes	0.30 (0.01)	0.33 (0.01)	0.34 (0.01)
Difference	-0.14 (0.02)	-0.05 (0.02)	-0.08 (0.03)
Net-food buying household?			
No	0.33 (0.01)	0.38 (0.01)	0.39 (0.01)
Yes	0.20 (0.01)	0.27 (0.01)	0.27 (0.01)
Difference	0.13 (0.02)	0.11 (0.02)	0.12 (0.02)

Note: SE=Standard error

[14] The empirical literature has not produced a conclusive finding on the effect of land ownership on child labour (Basu, 2006; Bhalotra & Heady, 2003).

2.4. Empirical Findings

2.4.1. Main Results

Table 2.3 reports the findings of the effect of food prices changes on the incidence (columns 1, 3, and 5) and the intensity (columns 2, 4 and 6) of child labour. In all specifications, we control for time-varying individual, household and community characteristics as well as for the season and year fixed effects. Moreover, we always account for either regional or individual fixed effects effects.[15]

Consistent with the pattern illustrated in Figure 2.1, specification 1 and 2 of Table 2.3 show a positive effect of food prices on the incidence and the intensity of child labour even when we control for individual characteristics (age, gender, and schooling status of the child). The coefficient for $FoodPrice$ is statistically significant at the one percent level in the case of specification 1. Specifications 3 and 4 also present a random effect estimates and in specifications 5 and 6 we account for individual fixed effects. In columns 3 to 6 we take account of other costs of living by adding additional price information (prices of clothing, education, transportation, rent and fuel, and health). This is to insure that the results are not driven by the general price increase but by food price increases. The effect of our main variable of interest remains statistically significant in these models. Regarding the economic relevance of the effects, the point estimates of the most stringent fixed-effects model show that an increase in food prices by 10 percent of it initial value will be associated with approximately 12 percent higher probability of a child being engaged in child labour. Similarly, a 10 percent increase in food prices is associated with approximately .20 hours (12 minutes) [16]. Thus, in Uganda where between 2008 to 2011 food prices increased by 58 percent percent, the estimated effects translate into a rise in the intensity of child labour

[15] When accounting for region and individual fixed effects at the same time, our results remain qualitatively and quantitatively the same but we note that the variation then only comes from a comparatively small number of households that changed region.

[16] Barrera-Gomez and Basagana (2015) provides the basis for this interpretation.

by .63 hours (38 minutes) which is higher than the observed difference of .46 hours (28 minutes) of child labour.

Table 2.3.: Effect of food prices on child labour

	(1)	(2)	(3)	(4)	(5)	(6)
	Random Effect				Fixed Effect	
	(Logit-OR) Worked	(Linear) Hours	(Logit-OR) Worked	(Linear) Hours	(Logit-OR) Worked	(Linear) Hours
Log of food price	3.24***	1.32	4.25***	2.80***	3.12**	2.12*
	(1.21)	(0.94)	(1.75)	(1.03)	(1.75)	(1.26)
Other price controls	No	No	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Child fixed effects	No	No	No	No	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	No	No
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	8286	8286	8286	8286	8286	8286
R^2		0.09		0.10		0.19

Note: (#) Standard error; * $p < .1$, ** $p < .05$, *** $p < .01$. Coefficients in columns 1,3 and 5 are the odd ratios (OR) of engaging in child labour. Other price controls (prices of clothing, education, health, rent and fuel, and transportation); child time variant characteristics (age and the square term, gender, whether the child is in school or not, whether the child leaves with parents); Household characteristics (average schooling years of household members, number of children, number of members with paid employees, number of sick adult members, age and gender of the household head, adult equivalence, net market status, log expenditure, ownership of land and asset in index, urban residence). When Child fixed effects are included, only time variant household characteristics are introduced in the setting. Time fixed effects are the season and year of the survey. The complete version of this table is presented in Appendix 2.A2.

These results are consistent with the view that food inflation presents a major shock to expenditure, as a high proportion of household expenditure in Uganda, 30 to 56 percent, goes into food purchases (UBOS, 2013). Thus, the findings support the idea that households may resort to child labour as a survival mechanism when hit by external adverse shocks (de Hoop & Rosati, 2014). Short term survival may be the driving motivation for the household to increase child labour during a period of food inflation. In Uganda, this may be re-enforced by the fact that higher food prices may increase the opportunity cost of a child's

leisure time. Thus, parents may prefer current income from the child's labour to her future income.[17]

Regarding the control variables (the full results are presented in Table 2.A2 in the appendix), we find negative effects of the average years of schooling, number of adult household members, and asset ownership on child labour[18]. In addition, male children and older children are more likely to engage in child labour in Uganda. On the effect on household net market status, we find that child labour increases with higher market dependence.

2.4.2. Double-Hurdle, Instrumental Variables (IV), and Tobit Estimates

In Table 2.4, we first present the result of instrumental variable estimations using international food prices as instrument for market-level prices in Uganda. An assessment of the first stage results shows that the instrument correlates highly with domestic food prices. Indeed, the diagnostic tests show that the instrument performs favourably in the traditional test of weak identification (high F-statistic) and the LM statistic of underidentification and its p-value show that the instrument is relevant.[19] In all specifications, we estimate a positive impact of an increase in food price on child labour. In columns 3 and 4, the estimates translate a 10 percent increase in food price to about 8 percent higher chance of a child working and 1.6 more hours of work.

In columns 5 and 6 of Table 2.4, we explore the truncated nature of child labour hours using the Tobit estimator and the double-hurdle estimator (Cragg,

[17] Given a recent empirical finding by Kavuma, Morrissey, and Upward (2015) that private returns to education have been decreasing in Uganda, parents may find it rational to increase child labour to maximize household income during periods of food price rise.

[18] These results are consistent with the view that households with educated adults are more aware of the negative effects of child labour and the argument that child labour becomes the last resort in the absence of asset and any form of collateral security (Basu & Tzannatos, 2003)

[19] We note, however, that the instruments are constrained in terms of it ability to capture within market variation in food prices because the capture monthly variation across all markets.

1971; D. Dong & Kaiser, 2008; Engel & Moffatt, 2014) for the number of hours worked. The Tobit estimator confirms our earlier findings in terms of statistical significance and effect magnitude. The estimated coefficient indicates that a 10 percent increase in food prices leads to about one hour of extra work. The panel-hurdle estimator employed in column 6 has the advantage that individuals who reported zero hours of child labour can be categorized into two types: those who will never participate in child labour irrespective of the economic circumstances (the so called certain zeros); and those who report zero because of their current circumstances.[20] We apply the bootstrap version of the estimators to establish the standard errors. Following Engel and Moffatt (2014), we match the panel structure of the data by clustering around individual children and drawing successive sample from these clusters. The panel-hurdle estimator also yields a positive and statistically significant effect of food prices on the intensity of child labour. In terms of magnitude the result corresponds to about one extra hour of child worked for a 10 percent increase in food price.

As a further robustness test, we estimate separate individual fixed effect models for the different gender and age groups in Table 2.5. The age categories in Table 2.5 are defined to correspond with the ILO's categorization, where children between 5 and 11 years are not supposed to engage in any form of work. We find that child labour among this age group as well as those between 12 and 14 years tend to increase with an increase in food prices. As expected, columns 1 to 4 show that child labour appears to be higher among the 12 to 14 year group. Table 2.5 also shows that both girls and boys are affected by higher food prices. We find that the incidence and intensity of child labour among boys appears to be higher than girls in Uganda, but the effect on participation rate is similar. This differing impact for boys and girls is a reflection of the fact that child labour in Uganda is

[20] The double-hurdle estimator takes account of the fact that the participation decision in child labour may be determined by two processes, i.e. hurdles: Whether the individual is a zero type, i.e. never engaging in child labour, or not is determined by the first hurdle. Then the second hurdle determines the extent of participation contingent on the individual not being a zero type (Engel & Moffatt, 2014).

predominantly an agriculture phenomenon, where the marginal product of boys tend to be higher than girls. Hence, there is a greater motivation for households to employ more boys than girls.

Table 2.4.: Double-hurdle, IV, and Tobit, estimates of the effect of food prices on child labour

	(1)	(2)	(3)	(4)	(5)	(6)
	Random Effect		Fixed Effect			
	LPM Worked	Linear Hours	LPM Worked	Linear Hours	Tobit Hours	DH Hours
Log of food price	0.66***	10.66***	0.84***	17.06***	10.55***	10.6***
	(0.16)	(2.66)	(0.18)	(3.09)	(3.62)	(3.0)
Other price controls	Yes	Yes	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Child fixed effects	No	No	Yes	Yes	No	No
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	No	No	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	8286	8286	8286	8286	8286	8286
Under ID LM statistic	1019.01	1002.23	752.16	752.16		
	[0.00]	[0.00]	[0.00]	[0.00]		
Weak ID Wald F statistic	1157.97	1136.28	1317.80	1317.80		
Inverse Mills ratio						18.3
						[0.052]

Note: (#) Standard error; [#] p-value of test statistic; * $p < .1$, ** $p < .05$, *** $p < .01$. . LPM in columns 1 and 3 denotes a linear probability model. First lag of the IMF's monthly international food price index is used as the instrument for domestic prices in columns 1-4. The same controls in Table 3 are used. Tobit estimates of column 5 is the marginal effect of predicting positive hours of work. DH= Double hurdle(with Bootstrap results from 1000 repetitions).

Table 2.5 – continued from previous page

Table 2.5.: Instrumental variable estimates of the effect of food prices on child labour-Fixed effects estimates (Sub-samples based on age and gender of the child)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	5-11 years		12-14 years		Girls		Boys	
	Worked	Hours	Worked	Hours	Worked	Hours	Worked	Hours
Log of food price	0.76***	12.02***	0.81*	25.21***	0.81***	19.87***	0.87***	14.48***
	(0.20)	(3.00)	(0.46)	(8.46)	(0.25)	(4.27)	(0.26)	(4.49)
Other price controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5969	5969	1647	1647	4052	4052	4232	4232
Under ID LM statistic	724.40	724.40	194.92	139.72	377.04	377.04	379.31	379.31
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Weak ID Wald F statistic	886.19	886.19	235.22	240.49	667.91	667.91	656.34	656.34

Note: (#) Standard error; [#] p-value of test statistic; * $p < .1$, ** $p < .05$, *** $p < .01$. . LPM denotes a linear probability model. First lag of the IMF's monthly international food price index is used as the instrument for domestic prices in columns 1-8. The same controls in Table 3 are used.

All the previous results have been shown to be robust to the inclusion of the prices of other components of the consumption basket, individual and child characteristics, child fixed effects and region fixed effects, as well as potential endogeneity concerns. An increase in food prices can, therefore, be regarded as an adverse economic shock leading to a higher incidence and intensity of child labour.

2.4.3. Refinements and Additional Results

(i) Extensive and intensive margins

A rise in food price can increase child labour by either causing previously non-working children to work (extensive margin effect) or causing previously working

children to work for more hours (intensive margin effect). Each of these paths tells us more about which households, regarding poverty status, suffer most from the increase in food prices. If the effect only works through the intensive margin, then poorer households disproportionately suffer from price since these children can be assumed to come from already poor household before the price shock. However, if the relationship works through the extensive margin, such that children who previously did not work are made to work now, then a rise in food prices may have widened poverty.

We carry out the analysis by partitioning the data set into two sub-samples; children who worked in 2009/2010 and those who did not. Using the same set of control variables in Table 2.3 we estimate the extensive margins effect with the probability that a child who did not work in 2009/2010 would work in the subsequent years because of increase in food price. Column 2 of Table 2.6 shows a positive and significant effect of food prices changes on the probability that a child will work for the first time after 2009/2010. The effect size shows that the probability that children who were not previously working will work at least once in the subsequent period increases by about 3 percent for a 10 percent increase in food prices in Uganda.

(ii) Lags of food prices

So far, our results implicitly assume that the household responds to changes in food prices instantaneously. However, we may expect that there are time lags before households re-adjust their labour allocations in response to food price hikes. Thus, we examine this issue in Table 2.7 to get a better grasp of the adjustment process. We take account of the time horizon by including lags over the farming season.[21] The immediate impact is approximated by the current price and, we then capture the medium to long-term effects with the average of the first three

[21] A typical farming season in Uganda lasts 3 to 4 months, hence the lags we choose are enough for the household to re-adjust expenditure and labour decisions such that the effect on child labour is observed when the household has fully adjusted to the initial shock.

and first six months lags successively.

Table 2.6.: Instrumental variable estimation of the extensive and intensive marginal effects of food prices on child labour

	(1)	(2)	(3)	(4)
	Extensive margins		Intensive margin	
	Worked	Worked	Hours	Hours
Log of food price	0.11	0.28**	-1.79	-0.14
	(0.09)	(0.13)	(3.53)	(5.11)
Other price controls	No	Yes	No	Yes
Other price controls	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
N	4017	4017	1503	1503
Adjusted R^2	0.26	0.26	0.24	0.25

Note: (#) Standard errors; [#] p-values. * $p < .1$, ** $p < .05$, *** $p < .01$. The same controls in Table 2.3 are used

The inclusion of the lagged terms increases the point estimate of the level of food price observed in Table 2.3. However, the effect tends to be negative after the initial increases as shown by the negative coefficient of the average of the lagged food price. This is an indication that households may gain from higher food prices, but this gain could only be realized with some time lag. This gain could come from higher incomes as households readjust their production and labour decisions to take advantage of the higher prices. For agricultural households, this entails increasing production to increase sales. For non-agriculture, but labour-supplying households, higher food prices may induce higher wages (Mghenyi, 2009; Ravallion, 1990) in the long run to mitigate the higher food prices. Thus, the long-run effect of the initial food price changes could be positive neutral or negative depending on the magnitudes of the expenditure and income effects. In Table 2.7, we observe that the combined effect of the level of food price and the lag term is positive but a formal test shows that the difference in this case is not statistically significant.

Table 2.7.: Effect of food price on child labour with the lags of food price - Fixed effects estimates

	(1) LPM Worked	(2) Linear Hours	(3) LPM Worked	(4) Linear Hours	(5) LPM Worked	(6) Linear Hours
Log of food price	0.14*	2.12*	0.30***	5.96***	0.23**	4.19**
	(0.08)	(1.24)	(0.11)	(1.81)	(0.10)	(1.68)
Avg. of lags 1-3			-0.21*	-5.18***		
			(0.11)	(1.77)		
Avg. of lags 1-6					-0.13	-3.45*
					(0.12)	(1.88)
Other price controls	Yes	Yes	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	8286	8286	8286	8286	8286	8286
Adjusted R^2	0.30	0.19	0.30	0.19	0.30	0.19

Note: (#) Standard error; * $p < .1$, ** $p < .05$, *** $p < .01$. LPM denotes a linear probability model. The same controls in Table 3 are used.

(iii) *Interaction effects of household land ownership and net market status*

Following the literature on household asset ownership and child labour (Hou et al., 2015; Basu, 2006; Bhalotra & Heady, 2003; Basu & Van, 1998), we examine how landownership moderates the effect of food price on child labour. In Table 2.8 we interact landownership with food prices. The effect of a change in food price on the incidence of child labour is lower for landowning households than non-landowning households as evidenced by the negative interaction effect in column 1. In effect, we estimate that for a 10 percent increase in food prices, the probability of participating in child labour is about .02 percent lower for children in landowning households. Thus, we estimate a moderating effect of landownership on child labour participation. This finding supports the poverty hypothesis of Basu (2006). We attribute the moderating effect of land to two reasons. First, landowning households can quickly expand output to take advantage of higher prices to increase income. Second, landownership affords households the opportunity to obtain credit at lower interest rates. This credit can then be used to

buy inputs to increase output or to finance household expenditure. Thus, these households may not have to fall on child labour as a source of extra income.

We assume that net food buyers may be more affected by higher food price than net producers. In columns 3 and 4, we investigate this assertion by interacting food prices with the market status of the households. The results show that the net market position of the household does not have any significant moderation effect on the effect of food prices on child labour in Uganda.

Table 2.8.: Effect of food prices on child labour

	(1) LPM Worked	(2) Linear Hours	(3) LPM Worked	(4) Linear Hours
Log of food price	0.35***	1.50	0.14*	2.45*
	(0.11)	(1.64)	(0.08)	(1.36)
Log food price*HH land ownership	-0.22***	0.65		
	(0.07)	(1.23)		
Log food price*HH net market status			-0.00	1.02
			(0.08)	(1.50)
HH net market status	0.05*	1.12***	0.07	-4.34
	(0.03)	(0.42)	(0.44)	(8.04)
HH land ownership	1.18***	-3.24	0.03	0.21
	(0.39)	(6.59)	(0.02)	(0.33)
Other price controls	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
N	8286	8286	8286	8286
Adjusted R^2	0.30	0.19	0.30	0.19

Note: (#) Standard errors; [#] p-values; * $p < .1$, ** $p < .05$, *** $p < .01$. LPM denotes a linear probability model. The same controls in Table 3 are used.

2.5. Conclusion

We analysed the impact of food price changes on child labour. We carried out the analysis using data sets from Uganda, one of the countries with a high incidence of child labour in Sub-Saharan Africa. We account for endogeneity by employing international food prices as an instrument for domestic market-level food prices.

Empirical results indicate that a rise in food price leads to a higher incidence and intensity of child labour. The quantitative results for a rise in food prices are sizeable: 10 percent increase in food prices leads to about 8 percent increase in the participation rate and about 1.6 increase in the number of hours worked. Thus, global food price hikes between 2008 and 2010 may have contributed to a significant increase in child labour. The results are consistent with similar studies that have highlighted adverse effects of food price hikes on farm households in developing countries. Adverse economic shocks can force households to adopt measures to increase its income; these measures may include child labour.

Moreover, our results show that the effects are stronger for boys than for girls. We also show that higher food prices affect child labour on both the extensive and intensive margins. Importantly, the analysis also indicates that the influence of food price shocks is smaller for children in landowning households. Thus, landownership serves as a critical buffer to mitigate the effect of rising food prices.

A policy implication of the findings is that food price hikes may impact child labour. Child labour is known to have potential long-lasting effect on human capital and, thus, food price hikes may reduce the effectiveness of poverty reduction programs. Hence, programs that aim at alleviating the impact of food prices should be comprehensive enough to deal with its effects on child labour. In doing so, such programs should consider the socio-economic circumstances of households to better address their specific needs. Our results show that providing the same assistance to both landowning and non-landowning households will be more beneficial to children in landowning households than those in landless households for whom the negative impact of a change in food price is higher.

Appendix

2.A. Summary Description of the Main Variables

Table 2.A1.: Descriptive statistics of independent variables

Variable	N	Mean	SD
Whether child worked or not	8286	0.31	0.46
Number of hours the child worked	8286	2.94	6.93
Food Consumption Price Index	8286	214.54	39.70
Price index of beverages	8286	158.91	25.90
Price index of clothing	8286	154.90	25.72
Price index of rent and utilities	8286	189.14	31.39
Price index of household personal goods	8286	184.95	30.01
Price index of transportation	8286	127.28	16.52
Price index of eduction	8286	159.94	20.27
Price index of health	8286	161.40	26.23
Age of child	8286	9.46	2.47
Sex of child	8286	0.51	0.50
Child attends school	8286	0.87	0.34
Child's father is in HH	8286	0.67	0.47
Child's mother is in HH	8286	0.77	0.42
Number of employees in HH	8286	0.99	1.00
Average years of schooling of HH adults	8286	1.73	1.24
Age of household head	8286	45.51	12.26
Sex of HH head	8286	0.74	0.44
HH adult equivalence	8286	5.33	1.95
HH market status	8286	0.46	0.31
Log HH expenditure	8286	10.54	0.73
HH asset index	8286	0.12	0.09
Number of adult ill in HH	8286	0.92	0.96
HH owns land	8286	0.85	0.36
Season of interview	8286	0.51	0.50
Residence	8286	0.17	0.37
Region of residence	8286	2.45	1.07
Year of interview	8286	2.00	0.82
Average monthly temperature	8286	-0.00	11.52
Average monthly rainfall	8286	1.14	166.40

2.B. Full Results of Table 2.3 with Control Variables

Table 2.A2.: Effect of food prices on child labour – Full results with control variables

	(1)	(2)	(3)	(4)	(5)
		RE		FE	
	(Logit-OR) Worked	(Logit-OR) Worked	(Linear) Hours	(Logit-OR) Worked	(Linear) Hours
Log of food price	3.25***	4.30***	2.80***	3.15**	2.18*
	(1.22)	(1.76)	(1.03)	(1.64)	(1.26)
Age of child	2.99***	2.98***	0.96***	1.62**	0.01
	(0.36)	(0.37)	(0.25)	(0.31)	(0.35)
Sqr. of age	0.97***	0.97***	-0.01	0.98**	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Sex of child	1.28***	1.27***	0.68***		
	(0.08)	(0.08)	(0.15)		
Child is in school	2.14***	2.15***	-0.77**	1.57**	-0.44
	(0.27)	(0.27)	(0.32)	(0.33)	(0.33)
Age of HH head	1.00	1.00	0.00	1.02	-0.03
	(0.00)	(0.00)	(0.01)	(0.02)	(0.03)
Sex of HH head	0.91	0.91	-0.36		
	(0.09)	(0.09)	(0.23)		
Child's father is in HH (dummy)	1.07	1.07	0.12	1.17	-0.22
	(0.12)	(0.11)	(0.25)	(0.31)	(0.55)
Child's mother in HH (dummy)	0.87	0.88	0.05	1.06	0.06
	(0.08)	(0.08)	(0.22)	(0.21)	(0.44)
HH mem. ave. years of schooling	0.96	0.97	0.01	0.89*	0.11
	(0.03)	(0.03)	(0.07)	(0.06)	(0.12)
Number of employees in HH	0.94*	0.93**	-0.02	1.01	0.01
	(0.03)	(0.03)	(0.09)	(0.05)	(0.13)
Number of children in HH	1.04***	1.04***	0.04	1.00	0.00
	(0.01)	(0.01)	(0.03)	(0.00)	(.)
HH adult equivalent	0.99	0.99	0.05	1.10**	0.26***
	(0.02)	(0.02)	(0.05)	(0.05)	(0.10)
Net market status (food)	2.52***	2.52***	1.30***	1.37**	1.16***
	(0.29)	(0.29)	(0.30)	(0.22)	(0.42)
Log household exp.	0.92	0.93	0.05	1.14	0.17
	(0.05)	(0.06)	(0.13)	(0.10)	(0.19)
HH Asset index	0.09***	0.09***	-3.10***	0.40	-2.84
	(0.05)	(0.05)	(1.00)	(0.33)	(1.81)
Number of mem. ill	1.16***	1.17***	0.14*	1.17***	0.13
	(0.04)	(0.04)	(0.08)	(0.05)	(0.10)
HH own land (dummy)	1.52***	1.52***	0.26	1.19	0.21
	(0.15)	(0.15)	(0.25)	(0.16)	(0.34)
Second cropping season (dummy)	1.14**	1.12	0.31*	1.06	0.43*
	(0.07)	(0.08)	(0.17)	(0.12)	(0.24)
Urban residence (dummy)	0.32***	0.32***	-1.31***	2.56	0.85
	(0.04)	(0.04)	(0.22)	(1.71)	(0.86)
Ave. monthly temperature	0.99**	0.99**	0.01	1.08***	0.22***

Table 2.A2 – continued from previous page

	(0.00)	(0.00)	(0.01)	(0.02)	(0.04)
Ave. monthly rainfall	1.00	1.00	0.00***	1.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log of education price index		3.76**	-0.54	1.40	-3.56
		(2.49)	(1.64)	(1.80)	(3.04)
Log of transportation price index		0.59	-0.96	0.57	1.33
		(0.22)	(0.89)	(0.30)	(1.37)
Log of clothing price index		0.73	-3.16***	1.00	-1.66
		(0.26)	(0.82)	(0.60)	(1.16)
Log of fuel price index		0.42	-2.79**	0.33	-5.00***
		(0.23)	(1.36)	(0.25)	(1.58)
Log of health price index		2.03	4.07***	3.07	4.50**
		(1.00)	(1.46)	(2.27)	(1.87)
Region of residence(Ref. = Central)					
Eastern	0.61***	0.51***	-1.06***	1.00	1.75
	(0.06)	(0.06)	(0.28)	(0.00)	(1.38)
Northern	0.60***	0.62***	-0.21	1.00	0.00
	(0.06)	(0.09)	(0.41)	(0.00)	(.)
Western	0.34***	0.34***	-1.26***	1.00	0.00
	(0.04)	(0.04)	(0.28)	(0.00)	(.)
Year of survey(Ref. = 2009/2010)					
2010/2011	0.68***	0.62***	-0.49	0.92	0.52
	(0.09)	(0.09)	(0.35)	(0.17)	(0.49)
2011/2012	0.41***	0.36***	-1.11*	0.83	0.85
	(0.07)	(0.08)	(0.59)	(0.30)	(0.95)
Constant	0.00***	0.00***	-2.97		17.40
	(0.00)	(0.00)	(12.35)		(20.93)
lnsig2u					
_cons	0.58***	0.58***			
	(0.10)	(0.10)			
N	8286	8286	8286	3786	8286

Standard errors in parentheses; * $p < .1$, ** $p < .05$, *** $p < .01$

2.C. Questions Used to Construct the Child Labour Indicator

Table 2.A3.: Questions used to construct the child labour indicator and number of hours worked

Question	Response
In the last week did [NAME] work for a wage, salary, commission or any payment in kind, from work in agriculture or non-agriculture, and including doing paid domestic work, even if it was for only one hour?	1 = Yes 2 = No
In the last week, did [NAME] run a business of any size, for themselves or another household member, even if it was for only one hour?	1 = Yes 2 = No
In the last week, did [NAME] help without being paid in any kind of business run by this house-hold, even if it was only for one hour?	1 = Yes 2 = No
In the last week, was [NAME] an apprentice? Include apprenticeships that are paid cash, paid in kind, unpaid, or for which the apprentice pays to participate	1 = Yes 2 = No
In the last week, did [NAME] work on this house-hold's farm? Example: tending crops, feeding animals, etc.	1 = Yes 2 = No
During the last 7 days, how many hours did [NAME] work on each day? Actual number of hours of hours worked starting from the previous day on may job.(From Sunday to Saturday)	Hours
In the last 7 days, how much time in hours did [NAME] spend collecting firewood for the household, including travel time?	Hours
In the last 7 days, how much time in hours did [NAME] spend fetching water for the household, including travel time?	Hours
In the last 7 days, how much time in hours did [NAME] spend constructing your dwelling, farm buildings, private roads, or wells?	Hours
In the last 7 days, how much time in hours did [NAME] spend making major repairs to their dwelling, farm buildings, private roads, or wells?	Hours
In the last 7 days, how much time in hours did [NAME] spend on milling and other food processing for the household?	Hours
In the last 7 days, how much time in hours did [NAME] spend making handicrafts for household use?	Hours
In the last 7 days, how much time in hours did [NAME] spend on agriculture?	Hours
In the last 7 days, how much time in hours did [NAME] spend on hunting and fishing?	Hours

Source: UBOS, 2011/12

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Chapter 3

Agricultural Subsidies and Child Labour[1]

[1] This is an individual project to evaluate the effect of agriculture policy on child labour in Africa.
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Abstract

As a response to the perennial low harvest and high food prices, several Sub-Saharan African countries have instituted agricultural input subsidy programmes to increase food production and reduce poverty among small scale farmers. Given that agriculture employs a large portion of working children on the continent, this chapter studies the effect of these subsidy programmes on child labour. The chapter analyses three rounds of the Malawi Integrated Household Panel Survey to answer the research question. The econometric results show that the farm input subsidy program in Malawi has a significant and positive impact on child labour in the country. The results suggest that despite the success of the programme in achieving its core aims, there are unintended negative consequences that could negatively affect human capital development. This could in turn adversely affect the ultimate poverty eradication efforts in the country and in the sub-region. To mitigate this problem, governments and implementing agencies should consider conditioning the distribution of the inputs on the positive outcome like the school performance of the wards of beneficiaries.

Keywords: Agricultural input subsidy; Child labour; Farm Input Subsidy Programme; Malawi.

3.1. Introduction

Following the success of Malawi's Farm Input Subsidy Programme (FISP), several African countries have adopted various forms of agriculture subsidy in what some researchers have described as the *African green revolution* (Denning et al., 2009; Javdani, 2012). To increase food production and reduce poverty, Governments spend significant proportions of national budgets[2] on these programmes to provide fertilizers and improved crop varieties to small-scale farmers. Agriculture employs the highest percentage of the world's working children (Zdunnek et al., 2008), about 70 percent according to ILO (2017b). It is, therefore, natural to expect that an intervention that targets the agricultural sector could impact on child labour. Higher income, food security, improved nutrition and job creation are often the immediate and direct aims of most agricultural interventions in developing countries. However, these programmes could have unintended impact on the household's decisions concerning child labour.

On the one hand, a successful agricultural intervention could increase income which will allow households to free children from work and ensure that they enjoy quality education and leisure. But some of these interventions may lead to more child labour by increasing the productivity of the child on the farm, and hence the opportunity cost of the child's time outside the household's farm. There is, therefore, the need to study the potential impact of these programmes on child labour. A clear understanding of how agricultural interventions affect child labour will improve the design, targeting and implementation of these programmes to ensure that, not only is the current welfare of the household enhanced, but its future is not affected through the potential unintended negative impact on the child's human capital development. This will maximize the potential gains from these policies.

[2] Jayne and Rashid (2013) reports that 10 African countries spent US$1.05 billion (28.6% of public expenditure) on input subsidies in 2011.

This study evaluates the impact of one of Africa's successful agricultural subsidy programmes, the Malawi Farm Input Subsidy Programme (FISP), on child labour. The study applies different econometrics techniques (fixed effects and instrumental variable models, and propensity score matching) to a micro panel data from Malawi to show that FISP may have worsened the child labour situation in the country.

Child labour is primarily considered a poverty phenomenon (Basu & Tzannatos, 2003; Dwibedi & Chaudhuri, 2014; Ersado, 2005), so that according to the luxury axiom (Basu & Van, 1998), an increase in agricultural income may decrease its incidence among farm households. The fact that good agricultural practices could lead to the elimination of child labour is well documented in the literature (Levy, 1985; Rosenzweig & Wolpin, 1982; Zdunnek et al., 2008). For example, the mechanisation of agriculture leads to a shift in labour demand from unskilled manpower to skilled labour which reduces the need for child labour. In addition, as productivity and income increase, the household can afford better education and more leisure for their children. Therefore, agricultural interventions may reduce the incentive to engage in child labour from both the demand and supply side. However, these present an ideal, but a rather simplistic view of the complex relationship between agricultural interventions and child labour.

The nature of agriculture and agricultural interventions in Sub-Sahara Africa (SSA) could induce child labour. For instance, children may have to take on tasks which adults had to perform because their parents must attend training programmes or farmer-field schools. Also, labour-augmenting[3] interventions which increase the productivity of labour may increase the demand for child labour when the there is an imperfect agricultural market to supply the needed additional labour.

[3] A significant proportion of the agricultural sector in Sub-Saharan Africa can is backward in terms of technology adoption. Therefore, major agricultural interventions that have target smallholder households are labour-augmenting, which increase the productivity and the opportunity of labour.

Aside from the success and the magnitude of FISP, this study focuses on Malawi because it is one of the poorest countries in the world with a high incidence of child labour. The 2015 Malawi National Child Labour Survey estimates that about 48 percent of children in the country were economically active, whilst 30 percent of them worked under hazardous conditions. According to the United States Department of Labor (USDOL), about 20 percent of children in Malawi are engaged in worse forms of child labour (USDOL, 2016). The report cites working on tobacco plantations, fishing, and sexual exploitation as some predominant works for child labourers. These activities expose the children to several risks including nicotine absorption and sexually transmitted diseases. Orphaned and children living with parents suffering from chronic diseases like HIV/AIDS are vulnerable since they sometimes assume the role of household heads at a rather tender age (USDOL, 2016). Child labour in Malawi is, therefore, driven by poverty and the lack of access to viable credit (Hazarika & Sarangi, 2008).

In Malawi, there is little agriculture mechanization (Sheahan & Barrett, 2017), therefore, there is a heavy reliance on basic implements like cutlasses, hoes and manual labour. Therefore, agricultural labour demand is high, and household members supply much of the needed labour on family farms (Fisher & Kandiwa, 2014). The authors further note that the cultivation of modern maize varieties, which requires the application of fertilizers, increases the demand for labour during the peak of the farming season. It is, therefore, intuitive to expect FISP, which provides fertilizer and improved maize variety, to increases labour demand.

The study contributes to the theoretical and empirical studies on how access to productive assets by poor households in developing countries affect the incidence of child labour. In this literature, there are two strands of arguments. The first line of thought argues that limited access to assets is the main determinant of poverty and hence child labour. Hence, providing assets to households present a sustainable strategy for poverty reduction. It also ensures that children are children are sent to school instead of work (De Janvry & Sadoulet, 1995).

However, this argument relies on the assumption that education is a normal good so that an increase in the household's income increases its consumption. But, as explained Rogers and Swinnerton (2004), after a certain level of parental income rises to a certain level, they begin to suspect that children, when adults, will be less willing to remitte to them in recognition of the expenditure they spent on their education. The second strand of the argument maintains that access to productive assets could raise returns to child labour, and increase child labour among poor households (Cockburn & Dostie, 2007). There, is empirical support for this line of thought in Bangladesh, where children from households that own substantive productive asset have a higher likelihood to work (Cain, 1977; Covarrubias, Davis, & Winters, 2012).

In a review of studies on how public policy affects child labour in developing countries, Dammert, de Hoop, Mvukiyehe, and Rosati (2018) draw different conclusions depending on the design and nature of the programme. They conclude, among others, that public work programmes that affect the demand side of labour may have a positive impact on the incidence of child labour in developing countries. The authors further find that labour-supply side interventions aimed at providing skill training or capital to individuals have limited effect on child labour, but there is a significant effect on the child's time allocation to education. Despite the extensive nature of this literature, empirical evidence on the direct impact of an input subsidy programme, like what SSA countries are implementing, on child labour is missing. This study, therefore, contributes to this literature by providing empirical evidence of the effect of farm input subsidies on child labour.

The rest of the chapter is structured as follows, Section 3.2 presents a review of the programme and the empirical literature on the impact of the programme in Malawi. Section 3.3 presents the data, methods, definition of variables, and the identification strategies. The empirical results and discussion are presented in Section 3.4. Section 3.5 draws conclusions and policy implication from the study.

3.2. The Malawi Farm Input Subsidy Programme

The foremost aims of FISP in Malawi are to increase the production and income of smallholder farmers, and improve national food security (Chirwa & Dorward, 2013; Denning et al., 2009). As a result, empirical studies that have sought to evaluate the programme have done so using indicators that correlate with these broader objectives. In this section, I present some of the main findings from these studies and show how they relate to the research objectives of this study.

The programme was introduced, partly, as a response to the recurring food shortages and the abysmal maize harvest of 2005 (Messina, Peter, & Snapp, 2017). At its inception, the programme targeted at least 50 percent of all smallholder farmers in the country to receive subsidized fertilizer and improved maize seedlings. The programme gives qualified farmers coupons for either Hybrid or Open Pollinated Maize variety seeds and four types of fertilizer. Coupon beneficiaries qualify to redeem their coupons for 2-5 Kg of hybrid maize seed for free, and two 50kg bags of fertilizer subsidized between one-third to two-thirds of the market price (Chibwana et al., 2012).

The programme comes at a significant cost to the national budget. The cost of financing the programme as a percentage of the national budgetincreased from 5.6 (US$51.4 million) percent in 2005/2006 to about 16.2 percent (US$265.4 million) of the national budget in 2008/2009. (Dorward & Chirwa, 2011). Out of the total cost in 2008/2009, for instance, international donors provided about 14 percent and the remaining came from the government's budgetary allocations to MoAFS (Dorward & Chirwa, 2011).

Despite some criticisms, FISP has been praised as a huge success (Dugger, 2007). Though the magnitude of the gains from maize production is in contention[4], the consensus is that maize production has increased considerably af-

[4] Messina et al. (2017) reports of an irreconcilable differences between maize production estimates distributed by the Food and Agriculture Organization of the United Nations (FAO), the Malawi Ministry of Agriculture and Food Security (MoAFS) and the National Statistical Office (NSO) of Malawi.

ter the programme was introduced (Arndt, Pauw, & Thurlow, 2015; Dorward & Chirwa, 2011; Messina et al., 2017). Higher maize production, greater allocations of land to other crops, lower food prices, higher wages, and lower poverty in rural areas are, therefore, some documented direct and indirect impacts of the programme (Arndt et al., 2015).

Theoretically, the increased production is expected to raise agricultural labour demand. The literature suggests that among agricultural households, changes in input prices may affect household labour decision directly or indirectly (Skoufias, 1994). The direct effect occurs through its impact on the household shadow profit, and the indirect effect occurs through changes in the shadow wages of household labour. Thus, the subsidy, coupled with its impact on production, is expected to increase agricultural labour demand. However, available evidence suggests that even though demand for labour increased, this labour may have been supplied by household members instead of hired labour(Ricker-Gilbert, 2013). Given this evidence, this study contributes to the literature by extending the evidence on the labour-impact of the programme to by examine its effect on child labour.

Ricker-Gilbert and Jayne (2012) found that the impact of the fertilizer subsidy on annual yield is about $0.69 per household on the average, and about $1.23 for households in the 90th percentile of total crop output per annum. A relevant question is how the higher income impacts on real household welfare – school enrolment, child labour, food consumption, and health status of household members. On this subject, Chirwa, Matita, Mvula, and Dorward (2011) have shown through both qualitative and quantitative analysis, that school enrolment increased among programme beneficiaries. Even though this result is positive regarding the child's human capital development, the result does not translate into a reduction in child labour since most children in sub-Saharan Africa combine school with work. School enrolment differs from educational attainment and performance, two important factors that could be affected by child labour.

3.2.1. Conceptual Framework

Figure 3.1 summarizes the main propositions of this chapter on the pathways through which FISP could affect child labour. The underlying premise of the figure is that, all other factors remaining the unchanged, fertilizer application and improved maize variety will increase productivity leading to a higher demand for farm labour. Given the near agricultural labour market failure in SSA (B. Dillon & Barrett, 2017), households may rely on its members to supply the additional labour. This could either increase child labour or have no effect on it depending on the availability of adult household members. If the household has idle adult members, then child labour may not be affected. Otherwise, children may have to work on the farm. Even if the household only uses its adult members, Figure 3.1 shows that child labour could still occur when children have to undertake chores which adult members had to perform.

Behind the pathways, portrayed in Figure 3.1, are several intervening and confounding variables that may affect the interaction between FISP and child labour. For example, the link from hired labour to a reduced child labour depends on the amount of income realized from the sale of crops. This further depends on community-level factors like the availability of sales outlets and the transportation costs. In the empirical section, I control for these intervening factors with the level of household expenditure and whether there is a market in the community. In addition, the positive effect of the inputs on production depends on natural factors like weather and soil quality. With an optimal amount of rainfall, temperature and other relevant climatic factors, the subsidy will increase productivity, but the resultant effect on child labour, based on Figure 3.1, depends on the household's labour demand. However, even without the subsidized inputs, in a good year with the right weather, production could also increase which could have the same effect on child labour as the case of the subsidized inputs. For insurance, FAO (2017) partly attributes the 2017 increase in maize production to conducive weather

during the farming season. In the empirical analysis, therefore, controls for the effects of weather condition on child labour using the agro-ecological zone of the region.

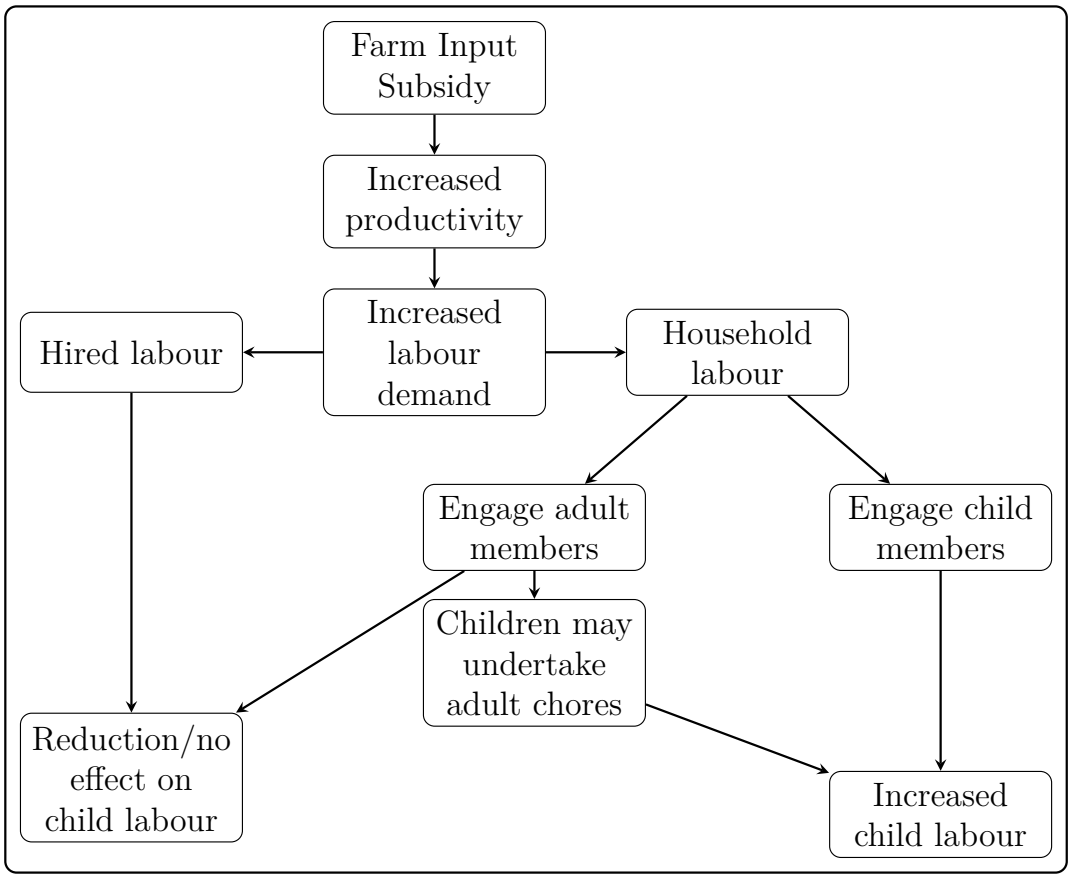

Figure 3.1.: Effect of Farm Input Subsidy on Child Labour
Source: Author

3.3. Methodology

3.3.1. Data

The study uses the Malawi Integrated Household Panel Surveys (IHPS) collected in 2010/2011, 2013 and 2016/2017 by the Malawi National Statistics Office (NSO). These surveys are part of the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) initiative that seeks to provide

a multi-topic data set, with additional agriculture modules. Therefore, besides the demographic, economic, and social variables of the households, they are also representative in terms of size and topics covered. They contain detailed information on the agricultural activities of the household, and whether the household received inputs from FISP in the last wet and/or dry farming seasons. In addition, the data sets provide information on the time use of household members from the age of 5 years and above. This provides adequate information on how the child divided her time between work and other activities. Aside these, there is information on individual and household characteristics that make it possible to control for relevant co-variates of child labour that could confound the effect of FISP. The data, therefore, contains enough information to evaluate the objectives of this study.

Table 3.1 reports the percentage of households that benefited from the programme for the sample periods. As a validation, the table also present the corresponding percentages as reported by NSO (2014). Except for the percentage of households who either received or redeemed a voucher in 2010/2011, there are only minor differences between the two values for the respective years. The differences could be attributed to the variations in sample sizes because of the data cleaning process. Thus, the table shows that the sample for this analysis represents the population characteristics regarding the main variables.

Table 3.1.: FISP participation and maize cultivation trends in Malawi

	2010/2011		2013/2014		2016/2017	
	Author	NSO Report	Author	NSO Report	Author	NSO Report
Percentage of households:						
receiving any voucher	59.79	57.73	45.67	46.33	34.99	*na*
receiving fertilizer voucher	59.70	50.20	44.64	46.20	34.68	*na*
cultivating maize	96.23	97.03	92.89	94.62	97.07	*na*

Note: *na* denotes figures not available in the public report.

In the empirical analysis, I limit the sample to households that cultivated maize in either the rainy or the dry season. The focuses on maize farmers is because the crop is cultivated by most smallholder farmers in Malawi (NSO, 2014). From Table 3.1, between 93 and 97 percent of farmers in the sample cultivated maize in the 2013/2014 and 2016/2017 seasons respectively. Also, the subsidized inputs distributed in the respective sample years were mainly improved maize seeds and fertilizers for maize production.

3.3.2. Measurement of Child Labour and FISP Variables

(i) Child Labour

Even though the ILO's Convention 138 provides guidelines on the definition of a child labour, different countries have defined child labour based on their national circumstance (IPEC & Edmonds, 2008). This makes it difficult to have a universal definition of child labour. Empirical and theoretical studies on the subject have, therefore, used different definitions depending on the context and purpose of the study, and the availability of data (IPEC & Edmonds, 2008). Taking cognizance of the ILO's Convention 138, and the domestic laws and regulations in Malawi, I define child labour as when a person, aged 5 to 13 years, engage in any form of agricultural or commercial work. Work is defined to include farm and non-farm work but excludes domestic chores and unpaid apprenticeship (See Table 3.A12 for the set of specific questions which were used to construct the child labour indicator). I limit the analysis to this age group for two reasons; (i) for this age group, Malawi's domestic laws[5] mimic the ILO's Statistical Information and Monitoring Programme on Child Labour (SIMPOC) criteria[6] for child labour; (ii) the nature of the questions in the IHPS allows to determine child labour for this

[5] The Employment Act, 2000 states, among others, that no no person under the age of fourteen shall be employed or work in any public or private agricultural, industrial or non-industrial undertaking or any branch thereof. This prohibition excludes work done in homes, vocational technical schools or other training institutions

[6] A child under 12 who is economically active for at least 1 or more hours per week

age group without strict assumption on whether the work is appropriate for the age within domestic or international laws.

(ii) The FISP treatment

The FISP variable is measured as a dummy variable that indicates if a household benefited from the programme. A beneficiary household is defined if a member redeemed at least one subsidized coupon for inputs. A child(ren) in this household will, therefore, belong to the treated group. The preference for coupon redemption instead of receipt is because the receipt of coupons may not influence maize production if the recipient does not redeem and use it. There is evidence that some beneficiaries sell their coupons instead of redeeming them. Thus, coupon redemption will, better capture the effects and benefits of the programme than just the receipt of the coupons. This notwithstanding, because households sometimes sell part or all of their coupons, coupon receipt could still affect child labour through the incomes realised from the sales. I, therefore, conduct additional analysis to test the robustness of the results using coupon receipt as the independent variable.

3.3.3. Empirical Model and Identification

The correct identification of how FISP affects child labour relies on the strict exogeneity of the child labour participation equation. An ideal situation to examine the effect of the programme on child labour would be in a randomized setting, where the assignment of the treatment is randomized across geographical and household characteristics. Randomization would eliminate the threat to internal validity by ensuring that households that are already more likely to engage in child labour do not self-select into the programme (Ragasa & Mazunda, 2018). However, as also argued by Ragasa and Mazunda (2018), randomization in this context would be a very expensive exercise to undertake due to the cost of inputs and the need to achieve geographical representation. Hence, due to the lack of

randomization, the internal validity of the result may be questioned, when unobserved characteristics of the household that affects child labour also determine programme participation. The present study solves this problem by using three different econometric techniques to identify the effect of FISP on child labour: (i) individual fixed effects estimation, (ii) instrumental variable method, and (iii) Propensity Score Matching technique. The study proceeds with the following baseline cross-sectional regression models:

$$Childlabour_i = \beta_1 + \beta_2 FISP_i + Child_i'\beta_3 + HH_i'\beta_4 + COMM_i'\beta_5 + \epsilon_i \tag{3.1}$$

and

$$Hours_i = \alpha_1 + \alpha_2 FISP_i + Child_i'\alpha_3 + HH_i'\alpha_4 + COMM_i'\alpha_5 + \nu_i \tag{3.2}$$

The αs and βs are coefficients to be estimated, HH and $Child$ are vectors of household and child level control variables which affect child labour in the literature, $COMM$ is a vector which contains community level controls, and ϵ_i and ν_i are the error terms of their respective models. The variable $FISP$ in equation (3.1) captures programme participation. $Childlabour$ is an indicator variables that determine whether the child worked for at least one hour in the last 12 months. $Hours$ is the number of hours that the child worked and it measures the intensity of child labour.

(i) Instrumental variables method

The causal effect of FISP on child labour depends on the exogeneity of treatment allocation of the inputs. However, there are several factors that threaten the exogeneity conditions in this setting. First, there is documentary evidence that farmers who have political affiliations are favoured in the allocation process. This means that beneficiaries may have similar characteristics which could bias the results. One way to deal with this problem will be to include a variable that captures political affiliation, however, the data does not have a variable that captures this information. Hence, this may cause omitted variable bias since political affil-

iation could affect both the treatment and child labour variables. Assuming the correlation between child labour and political affiliation is negative, and a positive relation between political affiliation and FISP, we expected the estimated coefficients, β_2 and α_2, in equations (3.1) and (3.1) to be biased downwards. Secondary, measurement errors in the form of non-response or failure of the respondents to provide the correct answer may also attenuate the effects of $FISP$ in equations (3.1) and (3.1).

This study uses instrumental variable (IV) estimation (Angrist & Pischke, 2014) to identify the impact of the programme. $FISP$ is instrumented with the presence of a village development committee (VDC) in the enumeration area. The IV technique requires that VDC must predict $FISP$ (relevance criteria) and must not be a significant predictor of child labour (exclusion restriction criteria). The choice of this variable is mainly informed by the observation in the literature that the allocation criteria have not been followed over the years. Fisher and Kandiwa (2014) note that village heads and committee members sometimes allocate the inputs to their cronies, friends and families. Given the importance of proximity to network formation, we expect households in communities where the VDCs are based to have higher chances of benefiting from the programme.

The approach involves two stages of estimation, in the first stage, we regress the endogenous variable, $FISP$ on the instrument and all the control variables in equations (3.1) and (3.2). In the second stage, the predicted value of $FISP$ in the first stage equations replaces the original variable in the child labour participation equations, (3.1) and (3.2). Equations (3.3)-3.5 illustrates the estimation process:

$$FIPS_i = \delta_1 + \delta_2 VDC + Child_i'\delta_3 HH_i'\delta_4 + COMM_i'\delta_5 + \omega_i, \tag{3.3}$$

$$Childlabour_i = \pi_1 + \pi_2 \hat{FISP}_i + Child_i'\pi_3 + HH_i'\pi_4 + COMM_i'\pi_5 + \eta_i, \tag{3.4}$$

and

$$Hours_i = \theta_1 + \theta_2 \hat{FISP}_i + Child_i'\theta_3 + HH_i'\theta_4 + COMM_i'\theta_5 + \nu_i \tag{3.5}$$

where, equation (3.3) is the first stage regression model, and equations (3.4) and (3.5) are the second stage models of the participation and intensity of child labour respectively. $\hat{FISP}$ is the predicted value of $FISP$ from equation (3.3), π_2 and θ_2 are the coefficients of interest in the final estimations. Appendix 3B provides formal test of the exogeneity of $FISP$.

Additional econometric issues arise in estimating equations (3.4) and (3.5) . First, both *Childlabour* and $FISP$ are binary variables, hence, estimating equation (3.4) with a linear probability model in an instrumental variable framework or a control function method may not be appropriate since both require the error term, ω, in (3.3) to be normally distributed (Baum, 2016; Baum, Dong, Lewbel, Yang, et al., 2012; Bontemps & Nauges, 2015). Thus, besides the IV-Probit estimates, I also present results using the special regressor technique[7] (Baum, 2016; Baum et al., 2012; Y. Dong & Lewbel, 2015; Lewbel, 2000; Lewbel, 2007; Lewbel, 2000).

It may be difficult to achieve exogeneity from the proposed instrument. Though issues of child labour are not among the core mandates of VDCs in Malawi, their activities may influence the incidence of child labour in their catchment area in some other ways than the subsidised inputs. Thus, the IV estimates might not be consistent since the assumptions needed to achieve exclusion restriction are too strong to hold. I use individual fixed effects model and propensity

[7] Bontemps and Nauges (2015) provides an empirical exposition of the special regressor

score matching, two techniques that do not require instrumental variables.

(ii) Fixed effects model

Here, I are assume that the unobserved heterogeneities which could bias the coefficient of FISP is fixed over time. Hence, by introducing individual fixed effects in the model, these unobserved effect would be adequately netted out. The following equations outlines the fixed effects model

$$Childlabour_{it} = \gamma_i + \beta_1 + \beta_2 FISP_{it} + Child'_{it}\beta_3 + HH'_{it}\beta_4 + COMM'_{it}\beta_5 + \epsilon_{it} \tag{3.6}$$

and

$$Hours_{it} = \lambda_i + \alpha_1 + \alpha_2 FISP_{it} + Child'_{it}\alpha_3 + HH'_{it}\alpha_4 + COMM'_{it}\alpha_5 + \nu_{it} \tag{3.7}$$

where γ_i and λ_i are the individual fixed effects in their respective equations. it is an index for individual i in time t. $Child$, HH, $COMM$ and $epsilon$ and ν are as in equations (3.1) and 2.2.

(iii) Propensity score matching (PSM)

There could be selection bias If observed and unobserved characteristics of households are associated with the probability of benefiting from the subsidy. For instance, officials may award coupons to hard-working farmers to project a successful programme. It is also possible for already productive farmers to self-select into the programmes. Any of these scenarios could bias the effect of FISP on child labour. PSM overcomes the selection bias by randomizing the co-variates of child labour across both the treated and non-treated groups. This makes it possible to get an efficient estimate of the effect of FISP on child labour. Therefore, as an additional robustness check, I estimate the average treatment effect (ATE) and the average treatment effect on the treated (ATT) of FISP using PSM. The method

involves computing propensity scores for each observation in the treatment and control groups based on the control variables. Observations in the control and treatment groups are then matched based on their calculated propensity scores. The assumption is that if two observations have the same propensity scores independent of the treatment, then the difference in their outcomes is because of the treatment. The following two equation explains the PSM technique:

$$P(X) = Pr(T = 1|X) \tag{3.8}$$

$P(X)$ is the propensity score, T is the treatment variable, and X is a vector of the control variables. Given the estimated probabilities, $P(X)$, the ATT is estimated as

$$ATT_{PSM} = E_{P(X)|T=1} = E[Y^T|T = 1, P(X)] - E[Y^c|T = 0, P(X)] \tag{3.9}$$

3.3.4. Summary Description of the Main Variables

This section presents summary statistics of the variables in the analysis. The study analyses a total sample of 8693 children, comprising 3170 in 2010/2011, 3412 in 2013/2014 and 2111 in 2016/2017. These children come from 1541, 1594 and 1024 households in the respective years. Table 3.2 shows that in all the sampled periods there were almost as many female children as males, and the average age is about 9 years. In terms of school enrolment, the statistics show that the percentage of children in school has increased in Malawi from 79 percent in 2010/2011 to about 86 percent in 2016/2017. This notwithstanding, 41 and 38 percent of children were engaged in an economic activity in the 2012/2013 and 2016/2017. sample year.

We find in Table 3.2 that most of the children in the sample work in agriculture related activities. The reason the 2010/2011 estimate of child labour is smaller is that the definition for the other periods includes all economic activities performed in the last 7 days and the last 12 months. However, with the 2010/2011

questionnaire, no question relates to work in agricultural activities in the last 12 months, hence the variable for this period includes only the contributed to agricultural work during the last 7 days before the survey. In the empirical work, I control for this problem by including the year fixed effects as additional control variables. I also present results for the respective cross-sections.

As shown in Table 3.2, the average age of the household head is between 42 and 44 years for the sampled years, and most households are male-headed. The table further shows that farmers in Malawi are smallholders, with an average plot size of 2 to 5 acres. On coupon receipt and redemption, Table 3.2 shows that the proportion of households that received FISP coupons decreased from 59 to 35 percent between 2010/2011 to 2016/2017. In a similar pattern, whilst 58 percent of households redeemed coupons in 2010/2011, 47 percent in 2013/2014, only 35 percent of the sampled households in 2016/2017 redeemed any coupon. Table 3.2, therefore, shows marginal differences between the receipt and redemption of coupons.

Table 3.2.: Summary of variables used in the regression analysis

	2010/2011		2013/2014		2016/2017	
	Mean	SD	Mean	SD	Mean	SD
Child level characteristics	**n= 3170**		**n=3412**		**n=2111**	
Male child	0.49	0.50	0.50	0.50	0.48	0.50
Child's age	8.69	2.56	8.90	2.55	9.02	2.53
Child in school	0.79	0.41	0.84	0.36	0.86	0.35
Agricultural work	0.13	0.34	0.41	0.49	0.35	0.48
All work	0.15	0.35	0.41	0.49	0.38	0.49
Hours of agricultural work	1.20	4.85	1.03	3.20	0.62	2.96
Hours of all work	1.33	5.20	1.24	4.06	1.07	4.18
Household level characteristics	**n=1541**		**n=1594**		**n=1024**	
Age of HH head	42.48	12.66	44.12	13.63	43.43	12.54
Male headed HH	0.75	0.43	0.77	0.42	0.75	0.44
HH Head schooled	0.76	0.42	0.79	0.41	0.89	0.31
HH head is married	0.78	0.41	0.80	0.40	0.83	0.38
Household size	5.80	1.95	5.99	1.98	5.97	1.95
HH non-food exp./1000 (MK)	3.73	23.45	8.88	37.31	14.82	60.83
HH plot size	4.55	68.93	2.82	19.50	1.95	1.73
HH social benefits	0.21	0.41	0.43	0.50	0.40	0.49

Table 3.2 – continued from previous page

Household agriculture exp./1000 (MK)	0.33	1.44	2.13	11.43	2.36	29.36
Market	0.47	0.50	0.59	0.49	0.46	0.50
Community has a primary sch.	0.20	0.40	0.36	0.48	0.09	0.29
Tropic-warm/semiarid	0.54	0.50	0.50	0.50	0.56	0.50
Tropic-warm/subhumid	0.26	0.44	0.30	0.46	0.27	0.45
Tropic-cool/semiarid	0.14	0.34	0.14	0.35	0.08	0.28
Tropic-cool/subhumid	0.06	0.23	0.06	0.23	0.09	0.28
Northern region	0.11	0.31	0.12	0.32	0.11	0.31
Central region	0.45	0.50	0.42	0.49	0.43	0.50
Southern region	0.45	0.50	0.46	0.50	0.46	0.50

Note: HH=household; MK=Malawian Kwacha (The national currency of Malawi)

3.4. Empirical Findings

3.4.1. Effect of FISP on the Probability of Child Labour

Tables 3.3 and 3.4 present the average marginal effects of $FISP$ on child labour in agriculture and overall work (All work) in Malawi. The tables present four groups of results, one for each cross-section, and last two columns present results using the panel structure of the data. For each of cross-section, the tables present estimates of $FISP$ from the Probit, IV-Probit, and the special regression (SR) models in columns 1 to 9. In the SR models, VDC is the instrument for $FISP$, and the age of the household head is the special regressor. Columns 10 and 11 in each table present the random effects (RE) and the conditional fixed effects (CFE) estimates of the effect of $FISP$ on child labour.

According to the Probit models, $FISP$ affects the probability of child labour in agriculture. On the average, the expected difference in the probability of child labour between those who benefited from the programme and those who did not is about 5 percentage points in 2010/2011 and 4 percentage points in both 2013/2014 and 2016/2917. Thus, without correcting the endogeneity problem, the Probit estimates suggest that $FISP$ may account for 38 percent of the observed occurrence (See the proportion of child labour in Table 3.2) of child labour in agriculture in 2010/2011, 10 percent in 2013/2014, and 11 percent in 2016/2017.

The SR model shows that the probability of child labour associated with the programme is about 11 percentage points higher for children in beneficiary households compared to those in non-beneficiary households 2010/2011. However, there is no significant effect of the programme on child labour in Malawi according to the SR models in columns 6 and 9. From the CFE model, there is a positive and significant effect of the programme on child labour. The average effect of the programme on child labour in agriculture is about 5 percentage points.

Similarly, in Table 3.4, the Probit models shows that children from $FISP$-redeeming households are associated with a 5-percentage point higher probability of child labour in 2010/2011 and 2016/2017. The estimated marginal effects translate to about 35 and 11 percent of the observed child labour incidence in Table 3.2 for the respective years. However, as observed in Table 3.3 the SR model estimates a significant effect of a 4-percentage point increase only in 2010/2011. The average effect of the programme, according to the CFE model, is 5 percentage points increase for a child whose household redeemed a $FISP$ coupon.

The results in Tables 3.3 and 3.4, therefore, show that children from households which benefit from the programme have a higher probability of working on farms. This could be because of the direct use of children on maize farms since the lack of an agricultural labour market limits the ability of the household to hire an external labour. As the inputs increase productivity and output (Chibwana, Shively, Fisher, Jumbe, & Masters, 2014; Denning et al., 2009), the marginal product of the child's time on the farm increases, and this provides additional motivation for the parents to increase her time on farm-related activities. In an economy where farmers use hired labour at an average rate of 2.2 days per year on the farm (Fisher & Kandiwa, 2014), family members, including children, are the primary source of labour when there is the need for extra hands. Low farm mechanisation would further strengthened the demand for child labour on farms (Malawi Government, 2012; Sheahan & Barrett, 2017).

Besides the effect of the programme, Tables 3.3 and 3.4 show theory-consistent and policy-relevant estimates of the relationship between some covariates and child labour. For example, there is a negative effect of plot size (landholding) on child labour. The sign of the landholding variable supports the theoretical argument of Basu and Van (1998) that children from wealthy households are less likely to engage in child labour, but it contrasts with the empirical findings of Bhalotra and Heady (2003) and Oryoie et al. (2017) who found that children from landowning (wealthy) households engage more in child labour. I include the household's non-food expenditure as a proxy for income, however, this variable is insignificant in most of the models.

As discussed in Section 3.2.1, environmental and climatic factors could confound the effect of $FISP$ on child labour. The empirical estimations, therefore, controlled for the effect of climate and other weather factors using the agro-ecological zone as a dummies as proxies. The result shows that there are regional and geographical differences in child labour in Malawi. For example, compared to children in the tropic-warm/semiarid agro-ecological zone, those in the tropic-warm/sub-humid and the tropic-cool/sub-humid zone are more likely to engage in child labour. In addition, Table 3.3 further provides regional differences in the incidence of child labour. According to the CFE model, the incidence of child labour is less in the central and southern region of the country than the northern region.

Table 3.3.: Average marginal effect of FISP on child labour in agriculture in Malawi

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		2010/2011			2013/2014			2016/2017		Panel	
	Probit	IV-Probit	SR	Probit	IV-Probit	SR	Probit	IV-Probit	SR	RE	CFE
FISP	0.05***	0.45***	0.11***	0.04**	0.37**	0.19	0.04*	0.43***	0.19	0.05***	0.05*
	(0.02)	(0.09)	(0.03)	(0.02)	(0.15)	(0.19)	(0.02)	(0.10)	(0.19)	(0.01)	(0.03)
Male child	0.02	0.01	0.00	0.01	0.01	0.02	0.03*	0.03*	0.02	0.02*	-0.02
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.04)
Child's age	0.02***	0.02***	-0.00	0.08***	0.06***	0.03***	0.08***	0.05***	0.03***	0.06***	0.02***
	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)	(0.00)	(0.02)	(0.01)	(0.00)	(0.01)
Child in school	0.00	-0.00	0.00	0.07**	0.04	0.04	0.09**	0.06**	0.04	0.04***	0.02
	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.04)	(0.03)	(0.02)	(0.01)	(0.02)
Age of HH head	0.00***	0.00		0.00***	0.00		0.00***	0.00		0.00***	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
Male headed HH	0.06	0.08*	0.02**	-0.10**	-0.08*	-0.05*	-0.05	-0.01	-0.05*	-0.02	0.05
	(0.04)	(0.05)	(0.01)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.02)	(0.05)
HH Head schooled	-0.00	-0.05**	0.02**	0.04	0.03	0.03	-0.04	-0.05	0.03	-0.01	-0.04
	(0.02)	(0.03)	(0.01)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.01)	(0.04)
Married HH head	-0.07	-0.10**	0.01	0.09**	0.05	0.09**	0.03	-0.01	0.09**	-0.03	0.01
	(0.05)	(0.05)	(0.01)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.04)
Household size	-0.01**	-0.00	-0.01***	-0.01**	-0.01	-0.01***	-0.00	-0.00	-0.01***	-0.00*	-0.00
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)
HH non-food exp.	-0.00	0.00	0.00**	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
HH plot size	-0.00*	-0.00**	0.00	-0.00***	-0.00***	-0.01	0.00	-0.00	-0.01	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
HH social benefits	0.05**	0.04*	0.01**	0.00	-0.02	-0.01	0.03	-0.00	-0.01	0.02***	0.01
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Household agric. exp.	0.00	-0.01*	-0.00*	0.00	0.00	-0.00	0.00	0.00	-0.00	0.00**	0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 3.3 – continued from previous page

Market	-0.00	0.01	0.00	-0.05***	-0.04*	-0.01	-0.06***	-0.05**	-0.01	-0.04***	-0.04
	(0.02)	(0.02)	(0.00)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Primary sch.	0.01	0.04**	0.00	-0.02	-0.03	-0.02	0.03	0.03	-0.02	0.01	-0.04
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)	(0.05)	(0.04)	(0.03)	(0.01)	(0.03)
Tropic-warm/subhumid[e]	0.00	0.01	0.00	0.03	0.02	-0.02	0.05	-0.04	-0.02	0.03**	-0.01
	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.01)	(0.04)
Tropic-cool/semiarid[e]	0.04*	0.00	0.00	-0.00	0.01	-0.02	-0.06	-0.06	-0.02	0.00	-0.10
	(0.02)	(0.03)	(0.01)	(0.03)	(0.03)	(0.03)	(0.05)	(0.04)	(0.03)	(0.02)	(0.08)
Tropic-cool/subhumid[e]	0.05	0.05	0.01*	0.05	0.04	-0.04	-0.04	-0.10	-0.04	0.03*	0.10
	(0.03)	(0.04)	(0.01)	(0.04)	(0.04)	(0.05)	(0.08)	(0.08)	(0.05)	(0.02)	(0.07)
Central[r]	0.08***	0.10***	0.04***	-0.06*	-0.02	-0.04	-0.02	-0.11	-0.04	-0.00	0.00
	(0.03)	(0.03)	(0.01)	(0.04)	(0.05)	(0.06)	(0.08)	(0.08)	(0.06)	(0.02)	(.)
South[r]	0.02	-0.00	0.02**	-0.04	-0.03	-0.02	-0.07	-0.11	-0.02	-0.03**	0.00
	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.05)	(0.07)	(0.07)	(0.05)	(0.01)	(.)
2013				-0.03	-0.01					0.29***	0.22*
				(0.09)	(0.09)					(0.01)	(0.11)
2014										0.28***	0.19
									(.)	(0.06)	(0.13)
2016						-0.06*	-0.05	-0.05	-0.06*	0.23***	0.27*
						(0.03)	(0.05)	(0.04)	(0.03)	(0.01)	(0.16)
2017										0.28***	0.38
										(0.03)	(0.23)
Demeaned age of HH head			0.00***			0.01***			0.01***		
			(0.00)			(0.00)			(0.00)		
Constant			-0.15***			-0.26***			-0.26***		
			(0.04)			(0.09)			(0.09)		
N	3170	3170	3170	3412	3412	2111	2111	2111	2111	9049	3003
McFadden R^2	0.09			0.09			0.21				
Log pseudolikelihood	-1059.68	-3230.33		-1787.61	-4178.43		-1047.00	-2406.10		-4168.56	-429.42
Wald test of exogeneity		7.99			1.98			4.11			

Table 3.3 – continued from previous page

	[0.00]			[0.16]			[0.04]				

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. Definitions and measurements of the variables are provided in 3.A11.
^{e} denotes agro-ecological zone with Tropic-warm/semiarid as the reference category. ^{r} denotes regional dummies with the North as the reference category.
RE denotes Random effects Logit; CFE denotes Conditional fixed effects Logit

Table 3.4.: Average marginal effect of FISP on child labour in all work in Malawi

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	2010/2011			2013/2014			2016/2017			Panel	
	Probit	IV-Probit	SR	Probit	IV-Probit	SR	Probit	IV-Probit	SR	RE	CFE
FISP	0.05***	0.38***	0.10***	0.04*	0.32	-0.06	0.05**	0.40***	0.19	0.05***	0.03*
	(0.02)	(0.13)	(0.03)	(0.02)	(0.19)	(0.17)	(0.02)	(0.13)	(0.16)	(0.01)	(0.01)
Male child	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.03*	0.02	0.01	-0.01
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Child's age	0.02***	0.02***	0.00	0.08***	0.07***	0.05***	0.08***	0.06***	0.03***	0.06***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.00)	(0.02)	(0.01)	(0.00)	(0.01)
Child in school	0.01	0.00	0.00	0.06**	0.04	0.03	0.10***	0.09**	0.05**	0.05***	0.02
	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.04)	(0.04)	(0.02)	(0.01)	(0.02)
Age of HH head	0.00***	0.00		0.00***	0.00		0.00*	-0.00		0.00**	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
Male headed HH	0.04	0.07	0.02*	-0.09**	-0.08*	-0.10***	-0.03	-0.00	-0.06**	-0.01	0.03
	(0.04)	(0.05)	(0.01)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.02)	(0.03)
HH Head schooled	-0.00	-0.04	0.03**	0.04*	0.04	0.10***	-0.04	-0.05	0.05*	-0.01	-0.02

Table 3.4 – continued from previous page

	(0.02)	(0.03)	(0.01)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.01)	(0.02)
Married HH head	-0.08*	-0.11**	0.01	0.09*	0.06	0.14***	-0.01	-0.03	0.08**	-0.04**	-0.00
	(0.04)	(0.05)	(0.01)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)
Household size	-0.01**	-0.00	-0.01***	-0.01***	-0.01*	-0.03***	-0.00	-0.00	-0.01***	-0.00*	-0.00
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
HH non-food exp.	-0.00	0.00	0.00**	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
HH plot size	-0.00**	-0.00***	0.00	-0.00***	-0.00***	-0.00**	0.00	-0.00	-0.01	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
HH social benefits	0.04**	0.04*	0.01**	0.00	-0.02	0.01	0.03	0.00	-0.02	0.02***	-0.00
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)
Household agric. exp.	0.00	-0.01	-0.00**	0.00	0.00	0.00	0.00	0.00	-0.00	0.00**	0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Market	-0.00	0.01	0.00	-0.06***	-0.05*	-0.06***	-0.07***	-0.06**	-0.02	-0.04***	-0.03*
	(0.02)	(0.02)	(0.00)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)
Primary sch.	0.01	0.04*	0.00	-0.02	-0.03	-0.02	0.01	0.02	-0.02	0.00	-0.02
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.05)	(0.04)	(0.03)	(0.01)	(0.02)
Tropic-warm/subhumid[e]	0.00	0.01	0.00	0.04	0.03	0.06***	0.04	-0.03	-0.03	0.03**	0.00
	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.03)	(0.01)	(0.02)
Tropic-cool/semiarid[e]	0.04*	0.02	0.00	0.01	0.03	-0.02	0.02	0.00	0.01	0.02	-0.02
	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.02)	(0.06)	(0.05)	(0.03)	(0.02)	(0.04)
Tropic-cool/subhumid[e]	0.05	0.05	0.02*	0.07*	0.06	0.08**	-0.03	-0.08	-0.03	0.04**	0.07
	(0.03)	(0.04)	(0.01)	(0.04)	(0.04)	(0.03)	(0.08)	(0.08)	(0.05)	(0.02)	(0.05)
Central[r]	0.08***	0.10***	0.04***	-0.05	-0.01	0.07*	-0.02	-0.10	-0.03	0.01	0.00
	(0.03)	(0.03)	(0.01)	(0.04)	(0.05)	(0.03)	(0.08)	(0.08)	(0.06)	(0.02)	(.)
South[r]	0.02	0.00	0.02**	-0.02	-0.02	0.06**	-0.08	-0.11	-0.01	-0.02	-0.43***
	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.02)	(0.07)	(0.07)	(0.04)	(0.02)	(0.13)
2013				-0.02	-0.01	0.02				0.28***	0.12**
				(0.09)	(0.09)	(0.08)				(0.01)	(0.06)
2014										0.26***	0.12*
										(0.07)	(0.07)

Table 3.4 – continued from previous page

2016							-0.04	-0.05	-0.06*	0.24***	0.15*
							(0.05)	(0.04)	(0.03)	(0.01)	(0.08)
2017									0.00	0.27***	0.21*
									(.)	(0.03)	(0.12)
Demeaned age of HH head			0.00***			0.01***			0.01***		
			(0.00)			(0.00)			(0.00)		
Constant			-0.16***			-0.44***			-0.29***		
			(0.04)			(0.14)			(0.09)		
N	3170	3170	3170	3412	3412	3412	2111	2111	2111	9049	3066
McFadden R^2	0.09			0.22			0.21				
Log pseudo-likelihood	-1138.79	-3313.64		-1785.05	-4177.28		-1081.00	-2439.11		-4269.95	-438.83
Wald test of exogeneity		4.65			1.23			2.64			
		[0.03]			[0.27]			[0.10]			

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. Definitions and measurements of the variables are provided in 3.A11.
^{e} denotes agro-ecological zone with Tropic-warm/semiarid as the reference category. ^{r} denotes regional dummies with the North as the reference category.
RE=Random effects Logit; CFE= Conditional fixed effects Logit

3.4.2. Effect of FISP on the Probability of Child Labour Across Household Characteristics

Using the same set of control variables in Tables 3.3 and 3.4, the models are estimated for sub-samples of households, differentiated by the gender of the household head and the size of landholding.[8] These variables are two of the criteria which the committee uses to select programme beneficiaries. The literature, inconclusively, argues that landholding is an important determinant of child labour (Basu & Van, 1998; Bhalotra & Heady, 2003; Oryoie et al., 2017). Following this empirical and theoretical discussions, Table 3.5 presents results for households categorized by the size of their farm plots. Female-headed households are considered in the literature more vulnerable and poorer (Milazzo & van de Walle, 2017) than male-headed households, Table 3.5, therefore, further explores the potential differences between the effect of the programme across female- and male-headed households.

On the heterogeneous effect of the programme on child labour, the results show that the child-labour effect of $FISP$ is significant among smallholder maize-farming households (households who cultivate up to 2 acres of land). From the fixed effects model, the difference in probability of child labour between the beneficiary and non-beneficiary households is about 8 percentage points. Compared to the corresponding estimate for large-scale farmers (landholding of over 2 acres).

For female- and male-headed households, $FIPS$ increases the incidence of child labour by about 6 and 7 percentage points. hence, the programme affects child labour in both types of households. The effect among male-headed households is, however, marginally greater than female-headed households. Thus, the results in Table 3.5 suggest that the child-labour effect of the subsidy may cut across households with different socio-economic characteristics.

[8] Instead of interacting FISP with these characteristics, I choose to run separate models because they provide estimates which are akin to interacting all the control variables with plot size and gender of the household head. This provides further understanding of how the different variables affect child labour in each group of household.

Table 3.5.: Average marginal effect of FISP on child labour in agriculture across different households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Plot size (acres)				Gender of household head			
	Plot <=2		Plot >2		Male		Female	
	RE	CFE	RE	CFE	RE	CFE	RE	CFE
FISP	0.05***	0.08*	0.04***	0.00	0.05***	0.07*	0.03	0.06***
	(0.01)	(0.05)	(0.01)	(0.00)	(0.01)	(0.04)	(0.04)	(0.02)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5512	1317	3537	908	7007	2130	580	2042
Log pseudolikelihood	-2420.72	-160.06	-1706.05	-133.45	-3178.17	-306.80	-84.80	-979.82

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Tables 3.3 and 3.4 are used here.

3.4.3. Effect of FISP on the Probability of Child Labour in Different Agricultural Activities

An understanding of the activities performed by the working children on farms is also important for the design of effective measures to mitigate the problem. Using the same set of control variables in Tables 3.3 and 3.4, Table 3.6 presents the random and fixed effects estimates of how the programme affects the use of children in fertilizer application, weeding, land preparation, planting and harvesting f crops. The sample size is smaller compared to the those in Tables 3.3 and 3.5 because the information on work is available for only a sub-sample of the children in the previous tables[9]

The fixed effects estimates shows no significant impact of the programme on child labour in any of the three activities. But the observed signs show that there may be a positive effect on the likelihood of work in weeding/fertilizer ap-

[9] The questionnaire allowed households to list only four members of the household who worked on the farm. I suppose, since respondents listed adult members before children, some working children were not included in this section because there was not enough space

plication and land preparation activities. However, the random effects models estimate that children from beneficiary households may provide labour in weeding and fertilizer application, and land preparation. If these children are used in fertilizer application then they stand the risk of absorbing poisonous chemical in the fertilizers which could exacerbate the potential negative effects of child labour on their well-being (health and their academic performance).

Table 3.6.: Average marginal effects of FISP on child labour in different agricultural activities

	(1)	(2)	(3)	(4)	(5)	(6)
	Weeding/Fertilizer application		Land Preparation		Harvesting	
	RE	CFE	RE	CFE	RE	CFE
FISP	0.06***	0.01	0.03*	0.01	-0.01	-0.00
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.00)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2741	355	2741	406	2741	263
Log pseudolikelihood	-1640.85	-56.28	-1625.71	-69.87	-1666.62	-77.78

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. Definitions and measurements of the variables are provided in 3.A11.

3.4.4. Effect of FISP on the Intensity of Child Labour

Table 3.7 presents the results of the effect of $FISP$ on the intensity of child labour among children between 5 and 13 years. For each cross-section three models are estimated, the first set of results columns 1, 3, and 7 which are ordinary least square models do not correct for the potential endogeneity between $FISP$ and child labour. The columns 2, 4 and 8 contain 2SLS results that use VDC as an instrument for $FISP$. However, 2SLS assumes, in this case, that $FISP$ is a continuous instead of a binary variable hence although the estimates are

consistent, they may not be efficient in this context. Besides the OLS, and 2SLS estimates, therefore, I present results of the treatment effect model (endogenous binary-variable model) in columns 3, 6 and 9. This model belongs to the family of instrumental variable models, but it delivers a more efficient result when the endogenous variable is binary (Bhaumik, Dimova, & Gang, 2016).

Panel A of Table 3.7 shows that in 2010/2011, there was a significant effect of the programme on child labour. According to the 2SLS estimates, children in beneficiary households worked for about 4 more hours on farms than those whose households redeemed no input. However, the TE model gives a smaller effect of the programme on child labour. Column 3 shows that on the average, a child may have to work for one and a half hours when the household enjoys the programme. On the effect of the programme on child labour in all work, both OLS and TE models estimate a significant effect. According to the model (3), the effect of the subsidy on the intensity of child labour in all work corresponds to about one hour and 25 minutes. The results in 2010/2010 models contrast with the insignificant effect we find in 2013/2014 and 2016/2017 except for TE in column 9 where there is an effect of $FISP$ on child labour in agriculture.

From the panel models, both the random and fixed effects models provide a positive effect of the programme on child labour. However, the coefficient is significant only in the random effect model. The coefficients translate into about 17 minutes in agriculture work and about 15 minutes in all work. The largely insignificant results in these models could be because of recall bias since respondents may not recollect of how many hours the child worked in the reference period. Arthi, Beegle, De Weerdt, and Palacios-López (2016) find a significant recall bias in the estimate of the number of hours in agricultural work gotten in traditional surveys like the one used in this study.

Table 3.7.: Effect of FISP on the number of hours of child labour in Malawi

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	2010/2011			2013/2014			2016/2017			Panel	
	OLS	2SLS	TE	OLS	2SLS	TE	OLS	2SLS	TE	RE	FE
Panel A: Hours of child labour in agriculture											
FISP	0.73***	3.69*	1.42***	0.21	-1.76	-0.25	-0.21	0.17	4.02***	0.28***	0.17
	(0.22)	(2.15)	(0.27)	(0.13)	(1.88)	(0.32)	(0.16)	(1.78)	(0.40)	(0.10)	(0.15)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3300	3300	3300	3552	3552	3552	2197	2197	2197	9049	9049
R^2	0.04			0.07			0.04			0.04	0.02
Under iden. LM statistic		11.28			8.61			8.07			
		[0.00]			[0.00]			[0.00]			
Weak iden. statistic		11.62			9.03			9.53			
Panel B: Hours of child labour in all Work											
FISP	0.73***	2.64	1.40***	0.04	-2.07	-1.21	-0.15	-6.11	-0.63	0.24**	0.17
	(0.23)	(2.27)	(0.32)	(0.15)	(2.09)	(2.40)	(0.21)	(4.77)	(0.42)	(0.11)	(0.15)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3300	3300	3300	3552	3552	3552	2197	2197	2197	9049	9049
R^2	0.04			0.07			0.04			0.04	0.02
Under iden. LM stat.		11.28			8.61			8.07			
		[0.00]			[0.00]			[0.00]			
Weak iden. statistic		11.62			9.03			9.53			

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. Definitions and measurements of the variables are provided in 3.A11. TE=Treatment effects; RE=Random effects; FE=Fixed effects

3.4.5. Effect of FISP on Working Hours Across Different Household Characteristics

Table 3.8 presents the heterogeneous effect of $FISP$ on the intensity of child labour across household characteristics. First, the results mimic what we observed in Table 3.7 in terms of the signs and the significance of the coefficient. There is a positive effect of the programme on child labour across all categories of households, however, the coefficients are significant only in the random effects models for the gender of the household head. On the size of the coefficients, the random effects estimates translate to about 16 and 24 minutes of additional work hours in agriculture for children in female- and male-headed households. Thus, the effect seems larger among female-headed households than male-headed households.

Table 3.8.: Random and fixed effects estimates of the effect of FISP on the number of child labour hours in agriculture across different households

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Plot size (acres)				Gender of household head			
	Plot <=2		Plot >2		Male		Female	
	RE	FE	RE	FE	RE	FE	RE	FE
FISP	0.23	0.10	0.25	0.13	0.26**	0.11	0.40**	0.51
	(0.14)	(0.21)	(0.16)	(0.32)	(0.12)	(0.18)	(0.18)	(0.36)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5512	5512	3537	3537	7007	7007	2042	2042
R^2	0.03	0.03	0.05	0.04	0.04	0.02	0.06	0.06

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here.

3.4.6. Refinements and Additional Results

This section provides additional results to test the robustness of the results in Tables 3.3-3.8. Appendix 3F further tests the stability of the coefficients of FISP using the procedure of Oster (2017).

(i) Propensity score matching estimates

Propensity score matching provides an efficient way to estimate the treatment effect of a policy intervention when a true experimental data is not available. The technique can be used when there is there is the likelihood of selection bias due to non-random assignment of the treatment (Garrido et al., 2014). With $FISP$, aside from the targeting of household with certain characteristics due to the selection guidelines and criteria, there is also evidence that farmers who, for example, have political affiliations may have higher chances of enjoying the programme. Such factors suggest that beneficiaries could be systematically different from non-beneficiaries. Table 3.9, therefore, estimates the average treatment effect (ATE) which measures the average effect of the programme, and the treatment effect on the treated (ATT) which estimates the treatment effect among beneficiaries using PSM. The results are presented in three panels, A, B and C in Table 3.9 for the respective sample periods.

Columns 1–4 present the treatment effects on the incidence and intensity (hours) of child labour in family agriculture, column 5–8 present those for all forms of work. Within beneficiary households, columns 1 and 5 show that $FISP$ increases the likelihood that a child may engage in child labour by about 5 percentage points. From columns 2 and 6, the probability of child labour among children in recipient households is about 5 to 6 percentage points higher than children in the non-beneficiary group.

Beside the negative ATE in 2016/2017, we observe a similar effect of the programme on the number of child labour hours. In 2010/2011, among beneficiary

groups, an average child works for an additional 38 minutes in agriculture, and 42 minutes in overall work than they would if their families had not relieved the inputs. In the same period, these children worked for 45 minutes more than a comparable group of children who live non-beneficiary households. For 2013, the estimated effect of the programme on child labour among beneficiary households is much smaller, about 13 minutes, compared to what we observed in 2010/2011. Table 3.9 shows that the effect of the programme on the intensity of child labour seems to have diminished between 2010 and 2017. Appendix 3.A tests the common support/overlap assumption of the propensity scores.

Table 3.9.: PSM estimates of the effects of FISP on child labour

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Agriculture	(Probability)	Agriculture	(Hours)	All work	(Probability)	All work	(Hours)
	ATT	ATE	ATT	ATE	ATT	ATE	ATT	ATE
Panel A:				2010/2011				
FISP	0.05***	0.05***	0.64***	0.75***	0.05***	0.05***	0.70***	0.76***
	(0.02)	(0.01)	(0.19)	(0.20)	(0.02)	(0.01)	(0.20)	(0.20)
N	3294	3294	3294	3294	3294	3294	3294	3294
Panel B:				2013/2014				
FISP	0.06**	0.05***	0.23*	0.17	0.05**	0.05**	0.10	0.03
	(0.02)	(0.02)	(0.13)	(0.11)	(0.02)	(0.02)	(0.16)	(0.14)
N	3552	3552	3552	3552	3552	2196	3552	3552
Panel C:				2016/2017				
FISP	0.05*	0.06**	-0.33	-0.29**	0.06**	0.06**	-0.11	-0.12
	(0.03)	(0.03)	(0.23)	(0.13)	(0.03)	(0.03)	(0.26)	(0.20)
N	2196	2196	2196	2196	2196	2196	2196	2196

Note: (#) AI robust standard errors. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively.

(ii) Results with the kind of coupon redeemed

Table 3.10 provides additional results using the kind of input redeemed as the treatment variable. The table presents results for the three cross-sections and

another set of results using panel models. The households are put into four categories based on whether they received no input (reference category), fertilizer only, maize only, or all inputs. According to the conditional fixed effects Logit models, there is a significant difference in child labour between households that redeemed only fertilizers and those that redeemed no inputs. Compared to children whose households did not benefit from any of the inputs, children in fertilizer-redeeming households have, on the average, about 5 percentage points higher chance of engaging in agricultural work. The effect is smaller, about 3 percentage points for the incidence of all work in Panel B. Likewise, there is a positive effect of fertilizer redemption on the number of hours worked in agriculture. According to model (10) in Panel A, children from fertilizer-redeeming households work for 17 minutes more than their age mates whose household did not redeem fertilizer.

The cross-section models also show significant differences between the different households. For instance, in 2010/2011, child labour was higher among beneficiary households than non-beneficiary households. Those who redeemed all three inputs are about 7 percent more likely to work on the farm than those who did not. In a similar vein, children whose household got both fertilizer and maize are more liable to work as compared to those living in households that received not inputs in 2013/2014. However, there appear to be a limited and inconsistent effects on the number of child labour hours, both in agriculture and overall work. For examples, whilst there is only a significant difference of about an hour in agriculture between fertilizer-redeeming household and non-input receiving households in 2010/2011, we find no statistical significance in 2013/2014, in 2016/2017 the estimates show that there was a negative effect of the programme.

Table 3.10.: Effect of type of input subsidy on Child Labour in Malawi

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	2010/2011		2013/2014		2016/2017		Panel			
							Logit		Linear	
	Probit	OLS	Probit	OLS	Probit	OLS	RE	CFE	RE	FE
	Work	Hours	Work	Hours	Work	Hours	Work	Work	Hours	Hours
Panel B: Child labour in agriculture										
Fertilizer only	0.06***	0.93***	0.04*	0.10	0.05*	-0.21	0.05***	0.05*	0.38***	0.28*
	(0.02)	(0.28)	(0.02)	(0.17)	(0.03)	(0.18)	(0.01)	(0.03)	(0.14)	(0.17)
Fertilizer+maize	0.05**	0.39	0.05*	0.13	0.02	-0.35**	0.04***	0.02	0.06	-0.12
	(0.02)	(0.25)	(0.03)	(0.20)	(0.04)	(0.17)	(0.01)	(0.02)	(0.14)	(0.26)
All inputs	0.08*	-0.18	0.03	0.29	0.06	-0.11	0.05***	0.03	0.16	0.03
	(0.04)	(0.27)	(0.03)	(0.19)	(0.03)	(0.27)	(0.01)	(0.03)	(0.15)	(0.30)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comm. Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3300	3300	3552	3552	2197	2197	9049	3003	9049	9049
R^2	0.07	0.04	0.07	0.07	0.21	0.04			0.04	0.02
Log pseudolikelihood	-1098.01		-1874.50		-1090.70		-4171.93	-430.03		
Panel B: Child labour in all work										
Fertilizer only	0.06***	0.93***	0.04*	0.10	0.05*	-0.21	0.05***	0.05*	0.38***	0.28*
	(0.02)	(0.28)	(0.02)	(0.17)	(0.03)	(0.18)	(0.01)	(0.03)	(0.14)	(0.17)
Fertilizer+maize	0.05**	0.39	0.05*	0.13	0.02	-0.35**	0.04***	0.02	0.06	-0.12
	(0.02)	(0.25)	(0.03)	(0.20)	(0.04)	(0.17)	(0.01)	(0.02)	(0.14)	(0.26)
All inputs	0.08*	-0.18	0.03	0.29	0.06	-0.11	0.05***	0.03	0.16	0.03
	(0.04)	(0.27)	(0.03)	(0.19)	(0.03)	(0.27)	(0.01)	(0.03)	(0.15)	(0.30)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comm. Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3300	3300	3552	3552	2197	2197	9049	3066	9049	9049
R^2	0.07	0.04	0.07	0.07	0.21	0.04			0.04	0.02
Log pseudolikelihood	-1098.01		-1874.50		-1090.70		-4171.93	-430.03		

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. The reference category for input type is "No inputs redeemed"

3.5. Conclusion

This chapter has analysed the effect of agricultural input subsidies on child labour using data sets from Malawi, a country that has implemented one of the most successful, and long-running input subsidy programmes in Africa in recent years. The chapter uses different econometric techniques(instrumental variable and individual fixed effect techniques, and the propensity score matching method), and specifications to identify the causal effects of an agricultural subsidy on the incidence and intensity of child labour in Malawi.

The results from the analyses suggest that the farm input subsidies may increase the incidence and intensity of child labour. Chapter 3 further shows that the effect may cut across households of different socio-economic background. When farming is grouped into specific tasks, the results indicate that children from beneficiary households sometimes applied fertilizer. This may put them at the risk of poisonous chemical absorption. The findings mean that the recent agricultural input subsidy programmes could have unintended negative consequences on child labour. This may, in the long run, hamper the overall poverty-reduction programmes and efforts in the country.

The results of the study have policy implications for the future design and implementation of input subsidy programmes in in the sub-region. The government and the various implementing agencies should try to reduce the child-labour impact of the programme. As part of the monitoring and evaluation process, the implementers must pay attention to beneficiary households that engage children in farm activities to the detriment of their health and education. One way to do this is to tie the programme to positive outcomes like school enrolment and the academic performance of school-going children in the beneficiary households. In addition, future implementation of the programme could also add labour saving inputs to reduce the demand for child labour.

Appendix

3A. Additional Results with Coupon Receipt

Table 3.A1 provides additional results using the household's receipt of coupons instead of redemption as a proxy for$FISP$. The results are consistent with those in Tables 3.3 and 3.4. The signs and magnitude confirms the main findings that the incidence of child labour may increase when an agricultural household benefits from the programme.

Table 3.A1.: Effect of coupon receipt on child labour in Malawi

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2010/2011		2013/2014		2016/2017		Panel (Logit)	
	Probit	SR	Probit	SR	Probit	SR	RE	CFE
Panel A: Effect of Coupon Receipt on Child Labour in Agricultural Work								
Received FISP	0.05***	0.11***	0.05**	-0.02	0.04*	0.20	0.05***	0.06**
	(0.02)	(0.04)	(0.02)	(0.19)	(0.02)	(0.19)	(0.01)	(0.03)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3170	3170	3412	3412.00	2111	2111	9049	3003
R^2	0.09		0.09		0.21			
Log pseudo-likelihood	-1058.43		-1786.36		-1048.46		-4167.90	-427.60
Panel B:Effect of Coupon Receipt on Child Labour in all Work								
Received FISP	0.05***	0.09**	0.04**	-0.05	0.06**	0.22	0.05***	0.03**
	(0.02)	(0.04)	(0.02)	(0.17)	(0.02)	(0.19)	(0.01)	(0.02)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3170	3170	3412	3412	2111	2111	9049	3066
R^2	0.09		0.22		0.21			
Log pseudo-likelihood	-1138.95		-1784.51		-1079.89		-4268.75	-436.90

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here.

3B. Durbin-Wu-Hausman Test of Endogeneity of FISP

Before proceeding to with the regression analysis, the Durbin-Wu-Hausman test is used to test the exogeneity of the$FISP$ in equation(3.1) (Durbin, 1954; Hausman, 1978; Wu, 1973). The null hypothesis of the test is that $FISP$ is exogenous in equations (3.1) and (3.2). A rejection of the null means that the variable is endogenous in the child labour participation equation, hence, there is the need for a techniques that can take care of the endogeneity problem (Baum, Schaffer, Stillman, et al., 2003). In Table 3.A2, two versions of the test conclude that $FISP$ is endogenous in the child labour equation. The null hypothesis is rejected in the sample periods.

Table 3.A2.: Durbin-Wu-Hausman test of endogeneity of FISP

Test	Statistic	2010/2011	2013/2014	2016/2017
Wu-Hausman F-test:				
	F-statistic	9.156	4.67	7.53
	df	F(1,3278)	F(1,3530)	F(1,2175)
	p-Value	[0.003]	[0.031]	[0.006]
Durbin-Wu-Hausman χ^2 test:				
	χ^2	9.19	4.69	7.58
	df	$\chi^2(1)$	$\chi^2(1)$	$\chi^2(1)$
	p-Value	[0.002]	[0.030]	[0.006]

H0: Regressor ($FISP$) is exogenous

3C. Tests of the Common Support and Overlap Assumption of the Propensity Scores

Figure 3.A shows the densities of the predicted probabilities that a $FISP$ beneficiary is a non-beneficiary over different propensity scores. Two observations in the figure indicate that the common support or overlap assumption is not violated. First the the distribution of the estimated probabilities of the two groups of households overlap each other, and second, none of the plots are concentrated near

zero and one. A further test of the balancing property confirms that balancing property is also satisfied.

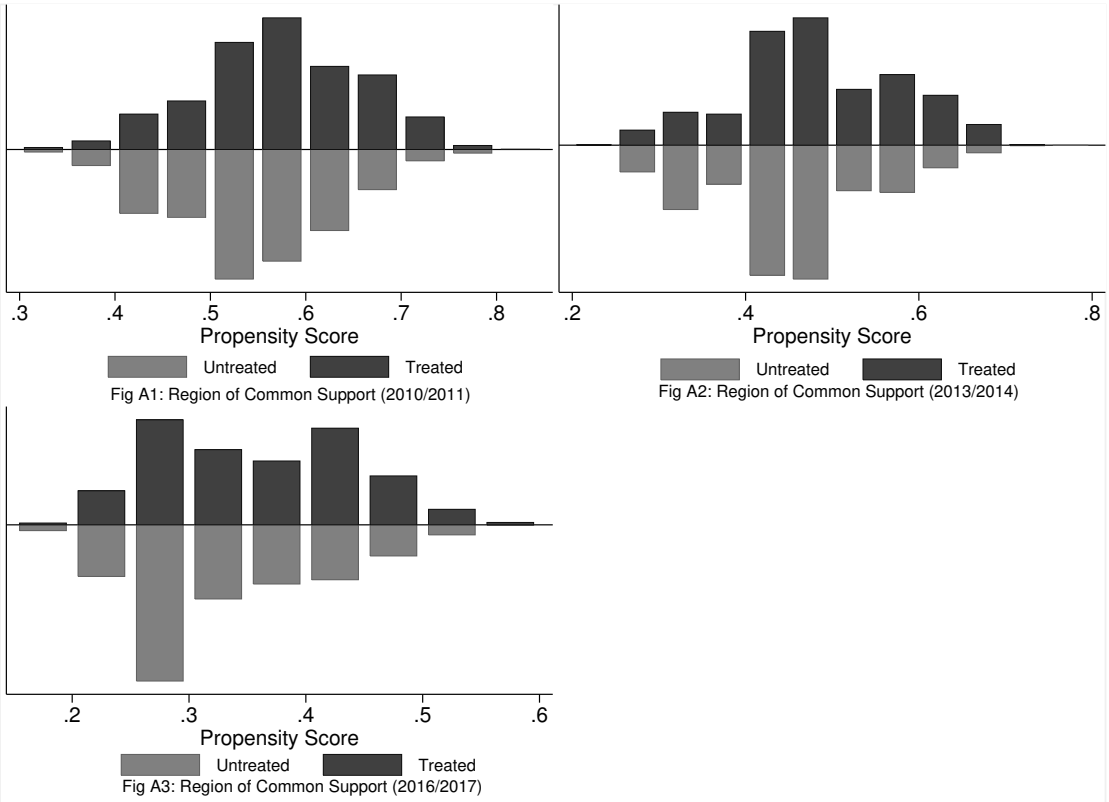

Figure 3.A.: Overlap Plots of Propensity Scores

Table 3.A3.: Propensity score matching quality test

Year	Sample	Pseudo R^2	χ^2	p-Value	Mean bias
2010/2011	Unmatched	0.022	98.73	0.000	10.3
	Matched	0.001	5.54	0.698	2.2
2013/2014	Unmatched	0.026	128.77	0.000	12.1
	Matched	0.001	3.48	0.901	2.3
2016/2017	Unmatched	0.023	65.28	0.000	9.6
	Matched	0.006	12.82	0.118	4.3

3D. Effect of FISP on Child Labour-Children Between 5 to 17 Years

This section provides additional results using the full sample of children from 5 to 17 years to reproduce the main results in the study. The results in Tables 3.A4-3.A8 show that the effect of $FISP$ on child labour remains almost the same even when we use the 5–17 definition of a child.

Table 3.A4.: Average marginal effect of FISP on child labour (5-17 years)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2010/2011		2013/2014		2016/2017		Panel	
	Probit	SR	Probit	SR	Probit	SR	Logit-RE	Logit-CFE
Panel A: Average Marginal Effect of FISP on Child Labour in Agriculture work								
FISP	0.05***	0.17***	0.05***	0.19	0.04**	0.26	0.06***	0.02*
	(0.02)	(0.05)	(0.02)	(0.14)	(0.02)	(0.19)	(0.01)	(0.01)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4170	4170	4559	4559	2909	2909	12115	4941
McFadden Adj R^2	0.11		0.11		0.27			
Log pseudolikelihood	-1642.81		-2247.85		-1451.60		-5739.56	-653.77
Panel B: Average Marginal Effect of FISP on Child Labour in All Work								
FISP	0.06***	0.19***	0.04**	0.13	0.05**	0.19	0.06***	0.02
	(0.02)	(0.05)	(0.02)	(0.14)	(0.02)	(0.18)	(0.01)	(0.01)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4170	4170	4559	4559	2909	2909	12115	4975
McFadden Adj R^2	0.12		0.29		0.27			
Log pseudo-likelihood	-1765.27		-2215.26		-1449.42		-5809.63	-661.84

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. Definitions and measurements of the variables are provided in 3.A11.

Table 3.A5.: Average marginal effect of FISP on child labour in agriculture across different households (5-17 years)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Plot size (acres)				Gender of Household Head			
	Plot <=2		Plot >2		Male		Female	
	RE	FE	RE	FE	RE	FE	RE	FE
FISP	0.05***	0.04	0.05***	0.00	0.06***	0.02	0.06***	0.06
	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.05)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comm. Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	7270	2170	4845	1500	9283	3485	2832	955
R^2								
Log pseudolikelihood	-3312.59	-257.07	-2365.63	-211.40	-4380.89	-469.20	-1342.45	-121.79

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. Definitions and measurements of the variables are provided in 3.A11.

Table 3.A6.: Average marginal effects of FISP on child labour in different agricultural activities (5-17 years)

	(1)	(2)	(3)	(4)	(5)	(6)
	Weed/Fertilizer		Land Preparation		Harvesting	
	RE	FE	RE	FE	RE	FE
FISP	0.05***	0.01	0.04***	0.04	-0.00	-0.01
	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)	(0.02)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Community ontrols	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4958	951	4958	977	4958	823
R^2						
Log pseudo-likelihood	-2773.97	-220.41	-2726.86	-207.70	-2953.48	-235.06

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. Definitions and measurements of the variables are provided in 3.A11.

Table 3.A7.: Effect of FISP on the hours of child labour in Malawi (5-17 years)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	201/2011			2013/2014			2016/2017			Panel	
	OLS	2SLS	TE	OLS	2SLS	TE	OLS	2SLS	TE	RE	FE
Panel A: Effect on Hours of Child Labour in Agriculture											
FISP	0.87***	6.79**		0.30*	-1.48		-0.10	1.75		0.37***	0.15
	(0.25)	(2.87)		(0.18)	(2.47)		(0.17)	(1.98)		(0.12)	(0.18)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4341	4341	4341	4744	4744	4744	3028	3028	3028	12113	12113
R^2	0.07	-0.21		0.11	0.08		0.05	-0.02		0.07	0.03
UnderID LM Stats		10.33			9.48			6.62			
		[0.00]			[0.00]			[0.01]			
Weak ID F-statistic		10.71			9.87			7.30			
Panel B: Effect on Hours of Child Labour in All Work											
Redeemed coupon	0.86***	4.57		0.05	-1.67		0.07	-4.01		0.29**	0.15
	(0.27)	(3.09)		(0.21)	(2.66)		(0.25)	(4.96)		(0.14)	(0.18)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Community Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4341	4341	4341	4746	4746	4746	3028	3028	3028	12115	12113
R^2	0.09	0.01		0.12	0.10		0.08	-0.05		0.09	0.03
UnderID LM Stats		10.33			9.47			6.62			
		[0.00]			[0.00]			[.01]			
Weak ID F-statistic		10.71			9.87			7.30			

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here. Definitions and measurements of the variables are provided in 3.A11.

Table 3.A8.: Effect of FISP on the number of hours of child labour in Malawi (5-17 years)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Plot size (acres)				Gender of Household Head			
	Plot <=2		Plot >2		Male		Female	
	RE	FE	RE	FE	RE	FE	RE	FE
FISP	0.15	0.25	0.20	-0.32	0.13	-0.16	0.58*	0.13
	(0.24)	(0.74)	(0.32)	(0.79)	(0.22)	(0.54)	(0.32)	(0.92)
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Comm. Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ecological Zone	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2899	2899	2028	2028	3478	3478	1449	1449
R^2	0.06	0.05	0.08	0.13	0.06	0.10	0.09	0.09

Note: (#) Standard error, clustered at the household. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same child, community, household, regional and ecological controls in Table 3.3 and 3.4 are used here.

3E. First Stage Result of IV-Probit Models

Table 3.A9.: First stage results

	(1)	(2)	(3)
	2010/2011	2013/2014	2016/2017
Male child	0.02	-0.01	-0.01
	(0.02)	(0.02)	(0.02)
Child's age	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)
Child in school	0.01	0.02	-0.03
	(0.03)	(0.03)	(0.04)
Age of HH head	0.01***	0.01***	0.00***
	(0.00)	(0.00)	(0.00)
Male headed HH	-0.07	0.01	-0.06
	(0.07)	(0.06)	(0.06)
HH Head schooled	0.12***	-0.00	0.06
	(0.04)	(0.04)	(0.05)
Married HH head	0.09	0.05	0.06
	(0.07)	(0.06)	(0.07)
Household size	-0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.01)
HH non-food exp.	-0.00***	-0.00	-0.00
	(0.00)	(0.00)	(0.00)

Table 3.A9 – continued from previous page

HH plot size	0.00***	0.00***	0.02*
	(0.00)	(0.00)	(0.01)
HH social benefits	-0.01	0.06**	0.04
	(0.04)	(0.03)	(0.03)
Household agric. exp.	0.03***	0.00	0.00***
	(0.01)	(0.00)	(0.00)
Market	-0.04	0.00	0.03
	(0.03)	(0.03)	(0.03)
Primary sch.	-0.10***	0.04	-0.02
	(0.03)	(0.03)	(0.07)
Tropic-warm/subhumid	-0.03	0.01	0.18***
	(0.04)	(0.04)	(0.05)
Tropic-cool/semiarid	0.10**	-0.05	0.02
	(0.05)	(0.05)	(0.07)
Tropic-cool/subhumid	-0.02	0.01	0.20
	(0.06)	(0.06)	(0.14)
Central	-0.08	-0.10*	0.26**
	(0.05)	(0.05)	(0.13)
South	0.04	-0.00	0.15
	(0.05)	(0.05)	(0.13)
2013		-0.02	0.00
		(0.14)	
2016			0.04
			(0.06)
VDC	0.14***	0.12**	0.16***
	(0.04)	(0.04)	(0.05)
Constant	0.16	0.12	-0.43**
	(0.10)	(0.17)	(0.18)
N	3170	3412	2111

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. Definitions and measurements of the variables are provided in 4.A4.
[e] denotes agro-ecological zone with Tropic-warm/semiarid as the reference category.
[r] denotes regional dummies with the North as the reference category.

3F. Stability of the Coefficients

Table 3.A10 tests the stability of the coefficients against bias from potential unobservables explanatory using the procedure of Oster (2017). This test relies on the movement of the coefficient to draw conclusions on the possible bias that may arise due to the omission of unobservables. By successively including control variables that have explanatory power in a model, the R^2 of the model is expected to increase, however, if the increase in R^2 leaves the coefficient unchanged, then

it can be concluded that even if the unobservables were included, the coefficient might not change significantly (Oster, 2017).[10]. The procedure is used to test whether the observed coefficients of FISP suffers from omitted variables bias that could change the sign and significance of the coefficient.The test assumes that the researcher has already included most of the important control variables. The procedure formalises the approach of heuristically determining the robustness of a coefficient from its movement because of the inclusion of control variables. Oster (2017) argues that given a coefficient of proportionality δ we can approximate the level of bias by:

$$\beta^* = \widetilde{\beta} - \delta[\mathring{\beta} - \widetilde{\beta}]\frac{R_{max} - \widetilde{R}}{\widetilde{R} - \mathring{R}} \tag{3.10}$$

where β^* is the bias adjusted coefficient. $\widetilde{\beta}$ and $\widetilde{R}$ are the coefficient of interest and the R^2 from the complete model with all the control variables in equations (3.1) and (3.2), $\mathring{\beta}$ and $\mathring{R}$ are the coefficient and R^2 from the model with $FISP$ as the only explanatory variable. R_{max} is the maximum R^2 obtainable if all control variables were to be included. And δ denotes the coefficient of proportionality that shows the relative importance of the unobserved characteristics in relation to the observed characteristics. The higher the value of δ the more importance we attach to the unobservables. For instance, $\delta = 1$ implies equal selection so the unobservables are assumed to be equally important as the included control variables.

The essence of equation (3.10) is to determine which value of delta will produce an estimated treatment effect of zero. Oster (2017) suggests an upper bound of $\delta = 1$, which means that the unobservables could only be as important as the observables. Hence, if the estimated effect is different from zero for $\delta = 1$ then the coefficient is considered as robust. The second parameter to be determined is R_{max}, for this Oster (2017) suggests an $R_{max} = \Pi\widetilde{R}$. Here Oster (2017) proposes a Π of 1.3.

[10] Arnold, Freier, Pallauf, and Stadelmann (2016) and Birthal, Roy, and Negi (2015) provide a recent application.

However, Table 3.A10 uses $\Pi = 0.3$ since the recommended value tends to be too small compared to the $\widetilde{R}$ in one of the models. Table 3.A10, therefore, reports the bias-adjusted coefficients using $R_{max} = .3$ for different values of δ. The table contains two panels of results one for the models that estimate the probability of labour in Panel A, whilst Panel B presents that of the intensity of child work. For determining the robustness of the coefficients of $FISP$, the last row of each panel $\delta = 1$ is of interest. Because the test is only appropriate for linear models, I estimate the linear probability version of the respective binary models in Table 3.4. For easy reference, I attach the respective coefficient of $FISP$ to the bias-adjusted estimates in parentheses.

Panel A of the Table 3.A10 shows that, if included all possible explanatory variables of child labour, under the condition that $\delta = 1$, we may still estimate a robust coefficient of the programme on child labour. However, the figures show that the bias-adjusted coefficient is smaller than the estimated coefficients in parentheses. The magnitude of the difference shows that the estimates of in 3.4 may suffer, marginally, from omitted variable bias. Hence, we can conclude that our estimates of the effect of $FISP$ on child labour in Table 3.4 are robust. Panel B provides the same conclusions on the effect of the programme on the intensity of child labour.

Table 3.A10.: Stability of the $FISP$ coefficients with Varying δ

Delta (δ) value	(1) 2010/2011 β^*	(2) 2013/2014 β^*	(3) 2016/2017 β^*
Panel A: Based on columns 1, 4 and 7 of Table 3.4			
δ=0.25	0.038	0.034	0.049
δ=0.50	0.029	0.033	0.048
δ=0.75	0.020	0.032	0.047
δ=1.0	0.010 [0.05***]	0.032[0.04*]	0.046[0.05**]
Panel B: Based on columns 1, 4 and 7 of Panel B in Table 3.7			

Table 3.A10 – continued from previous page

δ=.25	0.562	-0.016	-0.326
δ=.50	0.413	-0.073	-0.505
δ=.75	0.234	-0.134	-0.711
δ=1.0	0.015[0.73***]	-0.198[-2.07]	-0.955[-6.11]

Note: R_{max}=.30. [#] coefficient of FISP from Tables 3.4 and 3.7 ***, ** and * indicate significance level of 1, 5 and 10 percent respectively.
The results in Panel A are based of the linear probability model counterparts of columns 1, 4, and 7 of Table 3.3 since the the test is only suitable for linear models.

Table 3.A11.: Definition and measurement of variables

Variable	Measurement	Meaning	Definition
FISP	Dummy	Did the household redeem coupon?	Yes=1; No=0
Male child	Dummy	Sex of child	Male=1; Female=0
Child's age	Discrete	Age of child	Years
Child is in school	Dummy	Is the child currently in school?	Yes=1; No=0
HH head's age	Discrete	Age of household head	Years
HH head's is male	Dummy	Sex of household head	Male=1; Female=0
HH head edu.	Dummy	Has the household ever been to school?	Yes=1; N=0
HH head is married	Dummy	Is the household head married?	Yes=1; N0=0
Household size	Discrete	The number of people in the household	Number of people
Non food expenditure	Continuous	Household expenditure on non-food	Malawian Kwacha
Plot size	Continuous	Size of household land	Acres
Social safety dummy	Dummy	Does the household benefit from any social safety net?	Yes=1; No=0
Agriculture expenditure	Continuous	Amount spent on rent and purchase of agriculture assets	Malawian Kwacha
Comm. has market	Dummy	Does the community have a market?	Yes=1; No=0
Comm has primary sch.	Dummy	Does the community have a primary school?	Yes=1; N0=0

Table 3.A12.: Questions used to construct the child labour indicator and number of hours worked

Question	Response
In the last 12 months, did you work on household agricultural activities (including farming, raising livestock or fishing, whether for sale or for household food) even if only for one hour?	1 = Yes; 2 = No
In the last 12 months, did you run a non-farm business of any size for yourself or the household, even if only for one hour?	1 = Yes; 2 = No
In the last week, did [NAME] help without being paid in any kind of business run by this house-hold, even if it was only for one hour?	1 = Yes; 2 = No
In the last 12 months, did you work as an employee for a wage, salary, commission, or any payment in kind: including doing paid apprenticeship, domestic work or paid farm work, excluding ganyu, even if only for one hour?	1 = Yes; 2 = No
In the last 12 months, did you engage in casual, part-time or ganyu labour, even if only for one hour?	1 = Yes; 2 = No
How many hours in the last seven days did you spend on household agricultural activities (including livestock and fishing-related activities) whether for sale or for household food?	Hours
How many hours in the last seven days did you run or do any kind of non-agricultural or non-fishing household business, big or small, for yourself?	Hours
How many hours in the last seven days did you help in any of the household's non-agricultural or non-fishing household businesses, if any?	Hours
How many hours in the last seven days did you engage in casual, part-time or ganyu labour?	Hours
How many hours in the last seven days did you do any work for a wage, salary, commission, or any payment in kind, excluding ganyu?	Hours

Source: NSO (2014)

Chapter 4

Relative Deprivation and Child Labour[1]

[1] This is an individual project to evaluate the effect of relative deprivation on child labour in Africa.

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Abstract

Child labour is often conceived as an absolute poverty phenomenon; however, empirical evidence shows that the problem has persisted in the face of a significant reduction in poverty in several developing countries. Using a representative sample of 5442 from the Malawi Integrated Household Survey, this study tests the hypothesis that subjective poverty is a significant determinant of child labour. The potential endogeneity between subjective poverty and child labour is addressed by employing instrumental variables. The results that child labour increases when the household thinks it is poorer than its neighbours and friends. The findings of the study mean that policies that seek to reduce poverty such as conditional cash transfers and input subsidies should consider their impact on relative deprivation, and child labour.

Keywords: Child labour; Malawi; Poverty; Subjective Poverty; Relative Poverty.

4.1. Introduction

Child labour is a major developmental challenge facing developing countries. In sub-Saharan Africa alone, about 72 million (20 percent) of the children were engaged in child labour in 2016 (ILO, 2017b). Most of these children work on cocoa, tobacco and sugarcane plantations in various countries. They work as both paid labour and unpaid contributing family workers. Some tasks assigned to these children are hazardous according to international conventions[2]. Because of its negative effects on long-term economic growth, the elimination of the worst forms of child labour has been stated as an explicit target of the Sustainable Development Goals' roadmap for eradicating poverty (UN, 2016; USDOL, 2016).

A significant amount of the literature suggests that poverty is, perhaps, the foremost determinant of child labour (Basu & Van, 1998). This idea suggests that we should expect child labour to decline when there is appreciable income growth. However, the rate of decline of child labour is below what is expected from the steady poverty reduction in developing countries (Sarkar & Sarkar, 2015). This raises questions about the importance of monetary poverty as a determinant of child labour (Basu & Van, 1998). Following Bhalotra and Heady (2003), who found that children from land-rich (a measure of wealth in most developing countries) households are more likely to engage in child labour, other empirical studies have failed to find support for the luxury axiom (Kruger, 2007; R. Ray, 2000). For example, Kruger (2007) found that a higher income leads to an increase in child labour in Brazil. Even though adherents of the luxury axiom have used the 'wealth-paradox' to explain contrary findings, not all, as noted by Dwibedi and Marjit (2017), of the contrary results can be explained by the wealth-paradox. The results of these studies, coupled with the persistence of child labour despite the steady reduction in poverty across developing countries, call for a deeper understanding of the causes of child labour beyond monetary poverty.

[2] About 85 million children worldwide, were engaged in hazardous labour in 2012 (ILO & IPEC, 2013)

The aim of this chapter is to estimates the effect of relative deprivation on child labour and contribute to the broader discussion of the non-pecuniary determinants of the problem. The chapter derives its motivation from the theoretical findings of Dwibedi and Marjit (2017), and the empirical works of Fafchamps and Shilpi (2008) and Ravallion and Lokshin (2010), which show that subjective poverty has significant effects on the household's well-being and child labour. According to these studies, some of the household's decisions are either a direct or an indirect response to observed differences between their level of consumption and that of their neighbours. This is done to optimise the gap between their own material well-being and that of their neighbours to maximise utility (happiness). The utility-maximising strategy results in either a decrease or an increase in the supply of child labour depending on the net effect of child labour on a household's utility. The net effect of child labour on overall household welfare may be determined by the difference between the utility from additional consumption due to the child's income and the dis-utility from child labour.

Whether relative poverty leads to an increase in child labour or not depends, also, on the household's aspirations regarding the child's education and future expectations. If poorer households see the education of their wards as the means to escape poverty, then these households may demand more schooling and less child labour for their wards. However, if the costs of education and the economic conditions are not favourable, then these households may send their children to work to increase current consumption. Thus, the relationship between subjective poverty and child labour is open for empirical investigation.

Despite the importance of the relationship between relative deprivation and child labour, research on the subject is sparse. With the notable exception of the theoretical work of Dwibedi and Marjit (2017), there is little empirical work on this relationship. This chapter, therefore, contributes to this strand of the literature by analysing the effect of relative deprivation on child labour. The aim of the study is important given the volume of studies that have questioned

the significance of absolute poverty as a determinant of child labour (Bhalotra & Heady, 2003; Kruger, 2007; R. Ray, 2000; Sarkar & Sarkar, 2015).

This chapter studies the relationship between relative deprivation and child labour using a Malawian dataset. The study concentrates on Malawi for two reasons, first, there is a comprehensive microdata that has questions on the household's subjective well-being. Second, despite the various international conventions[3] that the country has ratified, and the domestic laws against the problem, child labour is still a major socio-economic problem in Malawi. According to the 2015 Malawi National Child Labour Survey, about 48 percent of all children from 5 to 17 years were economically active, 20.9 percent of them engaged in hazardous activities (ILO & NSO, 2017). The United States Department of Labor also estimates that about 20 percent of children in Malawi are engaged in worse forms of child labour (USDOL, 2016). The report cites working on tobacco farms, fishing, and sexual exploitation as some predominant activities of children between 5 and 14 years. These activities expose Malawian children to several risks including nicotine absorption and sexually transmitted diseases.

4.2. Literature Review

This section situates the study in the broader discussion on the role of hope, aspirations and inequality in household decision making. Human aspiration is influenced by culture, and the outcomes of complex interactions within an individual's network (Appadurai, 2004; Manski, 2000; D. Ray, 2006). One outcome of such interactions is the awareness of one's position relative to other members of society, and this leads to the evolution of aspirations. For example, Genicot and Ray (2017) argue that aspirations, income, and its distribution co-evolve such

[3] According to USDOL (2016) Malawi has ratified the following international conventions: (1) ILO Convention 138, Minimum Age; (2) ILO Convention 182, Worst Forms of Child Labour; (3) UN Convention on the Rights of the Child (UN-CRC); (4) UN-CRC Optional Protocol on Armed Conflict; (5) UN-CRC Optional Protocol on the Sale of Children, Child Prostitution and Child Pornography and Palermo Protocol on Trafficking in Persons

that they influence each other.

According to this literature, relative deprivation provides a reference point (a social norm, or some perceived average of the subject) for the individual to classify outcomes into two groups, a *good* or a *bad*. A bad outcome occurs when the level of consumption (or any other welfare measure) falls below the threshold, whiles a good outcome is when consumption is above the threshold (Genicot & Ray, 2017; Mo, 2014). If the household finds itself in a bad outcome, it tries to optimise welfare by allocating resources including labour. Such labour allocation decisions may involve the distribution of the child's time between education and work.

We can analyse the decision to send children to work because the household feels deprived with the prospect theory of Kahneman and Tversky (1979), and with the altruistic model of Basu and Van (1998). In a two-period setting, If the household sees favourable prospects of the child, then relative deprivation in the current period may induce more investment in the child's education and leisure in the present period since parents expect higher remittance from the child in period two. An unfavourable outlook, however, could induce more child labour to maximise current consumption. Depending on the social norms, and altruism, child labour could have a welfare-reducing effect on the households. In this setting, the household may choose less child labour even if it feels deprived. This is a rational strategy to increase both its utility and social status. Thus, the relationship between relative deprivation and child labour is not determined *apriori*.

Studies in economics and other social sciences have examined the effect of subjective well-being on the household's decision, consumption, and happiness (Davis, 1959; Easterling, 1974; Fafchamps & Shilpi, 2008; Ferrer-i-Carbonell, 2005; Graham & Felton, 2006; Pavot, Diener, & Suh, 1998; Ravallion & Lokshin, 2010). The increased interest in the topic is due to its potential to provide insights into questions on what makes people happy, and how economic agents

allocate their resources to maximise satisfaction subject to their relative status in the neighbourhood. A large body of the literature on the subject shows that an individual's level of consumption and the happiness derived from it, is partly influenced by the consumption levels of their neighbours (Asadullah & Chaudhury, 2012; Easterling, 1974; Fafchamps & Shilpi, 2008; Ferrer-i-Carbonell, 2005; Ravallion & Lokshin, 2010). This observation implies that the consumption/income of a reference group may influence the decisions and resource allocations of individuals and their households (Andreoni & Scholz, 1998; Bandiera & Rasul, 2006; Charness & Grosskopf, 2001; Collewet, de Grip, & de Koning, 2017; Ferrer-i-Carbonell, 2005; Woittiez & Kapteyn, 1998). A natural extension of this literature would, therefore, be analyses of the household decisions that are affected by subjective deprivation, and the trade-offs that are involved when the household increases its consumption to the *socially optimal* level. This study, therefore, contributes to this literature by analysing how child labour supply responds to the household's level of relative deprivation.

The theoretical findings of Dwibedi and Marjit (2017) motivate the objectives of this chapter. In this work, the authors analysed the effect of relative income on child labour. The findings of their study show that the supply of child labour could increase even when the economic conditions of the household improve in absolute terms but fall in relation to the average neighbourhood income. Thus, the authors conclude that relative deprivation is an important determinant of child labour. Despite the volume of literature on the economic and non-economic determinants of child labour, empirical work on the relationship between relative deprivation and child labour is scanty. This notwithstanding, the findings of some previous studies are relevant for this work. The first of these studies is Ravallion and Lokshin (2010). In their paper, the authors used the Malawi Integrated Household Survey (IHS) to examine whether relative deprivation is an important determinant of the household's welfare. They find that even though relative deprivation is not a dominant concern among most of their sample, well-

off households, in both rural and urban areas, tend to be concerned about their relative position in the society.

The findings of their paper support the notion that deprivation could serve as a source of demotivation to individuals. First, individuals at the bottom of the social ladder may be indifferent about what happens in society (C. A. Smith & Kirby, 2001; H. J. Smith & Pettigrew, 2014). Such individuals may, therefore, not respond to further changes in their relative deprivation. If this assertion holds then we may not expect any child-labour effect of relative deprivation among poor households.

Much of the studies on the relationship between subjective deprivation and human welfare has been done with data sets from developed countries. For example, in Germany, Ferrer-i-Carbonell (2005) finds that people are happier when, in comparison with their neighbours, they have a larger income. Therefore, to test whether the observed relationship between the two variables is a universal human trait or an artefact of a prosperous market-oriented lifestyle. The second study, Fafchamps and Shilpi (2008), used data set from a remote area in Nepal to test whether isolated households care less about their relative consumption. The paper further investigates whether poor households care less about relative consumption than the non-poor. The study rejects the argument that poor households in isolated communities care less about the consumption of their neighbours. Fafchamps and Shilpi (2008), therefore, conclude that sensitivity to relative deprivation is a common human trait, hence the results could be generalised to other settings. This means that irrespective of the level of poverty and market orientation, relative deprivation may matter for household welfare. The relevance of their results to the current study is that even in Malawi where the average income is low, relative deprivation may still be an important determinant of household welfare and child labour decision.

4.3. Methodology

4.3.1. Data

Data for the study is the Malawi Integrated Household Survey (IHS), which the Statistical Office of Malawi (NSO) collected in 2013 as part of the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) initiative. The aim of the survey was to provide the government and stakeholders variables to evaluate and monitor the conditions of Malawian households, to foster evidence-based policy formulation, and monitor the country's progress towards the Millennium Development Goals (MDGs) and the goals of the Malawi Growth and Development Strategy (MGDS) (NSO, 2014). The data, therefore, contains comprehensive information on households socio-economic and demographics characters, including consumption and non-consumption expenditure, household labour supply, economic and non-economic shocks, sources of livelihood and agricultural activities.

Besides the variables on the household demographics, economic, and housing characteristics, the survey collected data on the labour supply of individuals aged five years and above. This makes it possible to determine if a child worked in the last 12 months. The data set is suitable for this study because it contains questions on the subjective assessment of the poverty status of the household, its neighbours and friends, hence, there is information to construct a proxy for relative deprivation.

4.3.2. Definition of Variables

(i) Subjective deprivation

Subjective deprivation is constructed from three questions relating to the household's assessment of its well-being, and the well-being of its friends and neighbours. The enumerator asked a person with adequate information on the household or

the available respondents to assess the poverty status of the household, its friends and neighbours using the six-scale ladder in Appendix 4.A1. The accompanying questions to Figure 4.A1 are: Imagine six steps, where on the bottom, the first step, stand the poorest people, and on the highest step, the sixth, stand the rich; (i) On which step are you today? (ii) On which step are most of your neighbours today? and (iii) On which step are most of your friends today? I use the answers to these questions to construct two proxies, one for the difference between the well-being of friends and that of the household ($RD\text{-}friends$), and the other for the difference between the well-being of neighbours and that of the household ($RD\text{-}neighbours$).

Most theoretical studies on happiness and relative deprivation consider a utility function of the form $U_i = u(y_i, (y_i/Y_i^*))$. Where y_i is a measure of wealth or income of the individual, the term y_i/Y_i^* captures relative deprivation, and Y^* is the average income of the reference group (Verme, 2009). In empirical work, Y^* could be proxied with the average income of a defined group. However, there is a lack of agreement in the literature on the best way to define such a reference group (Ferrer-i-Carbonell, 2005). The literature does not provide clear guidelines on whether the reference household should include all other households in the same community, district or region; or whether it should include only households with similar characteristics (such as the educational status, gender of the household's head, occupational and poverty status of the household) within these geographical boundaries. For example, van de Stadt, Kapteyn, and van de Geer (1985) defined the reference group based on the observed characteristics of education, age and employment status. Yet, Ferrer-i-Carbonell (2005) combined these definitions in his study.

The appeal of this study's measure of relative deprivation is that the nature of the questions allows the household to define its own reference group. Hence, there is no need for the researcher to make strict assumptions regarding demographic and geographical characteristics to define an ex-ante representative house-

hold. In addition, by adopting this definition, the study provides a natural extension to the previous related studies that have used these variables in similar settings (Cojocaru, 2016; Ravallion & Lokshin, 2010).

(ii) Child labour

The study proxies child labour with a dummy variable that shows whether, a person from 5 to 13 years, worked in the last 12 months before the survey. The variable takes a value of 1 if a child worked for at least one hour or more in either agricultural or commercial activities. Table 4.A5 contains the full set of questions used to construct the child labour indicator. Thus, a child engages in child labour if she answered yes to any of the questions in Table 4.A5. The definitions of work and child in this study are consistent with Malawi's domestic laws and regulation[4] on child labour and, international conventions covering the minimum age for work. For example, ILO's Convention 138 stipulates that a child, under the age of 12 years engages in child labour in A child under 12 who is economically active for at least one or more hours per week. The set of questions is also consistent with definitions used in chapters 2 and 3 of this thesis as well as other empirical studies on child labour (Ali, 2018; Frempong & Stadelmann, 2018).

4.3.3. Empirical model and identification

(i) Empirical model

To evaluate the effect of relative deprivation on child labour, I estimate the following child-labour participation equations:

$$\begin{aligned} ChildWorked_i =& \alpha_1 + \alpha_2 lnexp_i + \alpha_3 RD\text{-}friends_i + Child_i'\alpha_4 + HH_i'\alpha_5 \\ &+ COMM_i'\alpha_6 + \epsilon_i \end{aligned} \tag{4.1}$$

[4] The Employment Act, 2000 states, among others, that no person under the age of fourteen shall be employed or work in any public or private agricultural, industrial or non-industrial undertaking or any branch thereof. This prohibition excludes work done in homes, vocational-technical schools or other training institutions

and

$$ChildWorked_i = \gamma_1 + \gamma_2 lnexp_i + \gamma_3 RD\text{-}neighbours_i + Child_i'\gamma_4 + HH_i'\gamma_5 + COMM_i'\gamma_6 + \nu_i \quad (4.2)$$

where *lnexp*, the logarithm of the household's expenditure, captures the material well-being (actual consumption level of the household) of the household. *RD-friends* is the difference between the subjective well-being of the friends of the child's household and that of the household itself, and *RD-neighbours* is the difference between the subjective well-being of the neighbours of the child's household and that of the household itself. *Child* is a vector of child characteristics including the age, gender, health in the last two weeks preceding the survey, and whether she is in school. *HH* is a set of household characteristics, and *COMM* is a vector of community-level variables.

(ii) Identification

To identify the effect of relative deprivation on child labour, the two variables, *RD-friends* and *RD-neighbours* must be exogenous in the child labour participation equation. However, the coefficients of these variables in equations (4.1) and (4.2) may suffer from endogeneity bias. The source of endogeneity, in this case, is the likely bi-causal relationship between child labour and relative deprivation. The theoretical literature (Basu & Van, 1998) shows that an altruistic parent/household may derive dissatisfaction/dis-utility from child labour, hence such a household may consider itself to be subjectively poor if it has an economically active child. Thus, we expect such a household with a child labourer to report a lower position in Figure 4.A1. Therefore, if the endogeneity is not corrected, we may have an inverse relationship between the two variables. Empirical evidence also suggests that child labourers contribute to their household's income, as a result, child labour may affect the level of consumption in the household. If any of these situations hold, then the observed coefficients, α_3 and γ_3, in equations

(4.1) and (4.2) could not be interpreted as the causal effect of relative deprivation on child labour.

Hence, instead of estimating a Probit model, equations (4.1) and (4.2) are estimated with the IV-Probit model. The IV-Probit model uses a two-stage estimation technique, where, in the first stage, relative deprivation is regressed on the set of control variables in equations (4.1) and (4.2) and an additional instrumental variable. The instrumental variable must satisfy the *relevance* and *exogeneity* conditions. To meet the relevance criteria, the proposed variable(s) must significantly explain relative deprivation. The exogeneity condition means that the instrumental variable(s) must not be (i) a significant predictor of child labour, and (ii) it should only indirectly influence child labour through its effect on relative deprivation.

The study uses the educational status of the father of the household's head, and whether the head's father or mother is alive as instruments for relative deprivation and household expenditure. The choice of these variables is premised on the results of different studies that have shown a positive effect of parental education on their children's earnings (Dubow, Boxer, & Huesmann, 2009) so we can expect the education status of the grandparents to predict the current income of the child's parents. This is because educated parents are more likely to provide their children with better education and hence higher income. In addition, the literature also shows that the death of a parent(s) could have a significant negative consequence on the well-being of their adult children (Glatt, 2018; Marks, Jun, & Song, 2007; Stokes, 2016). Therefore, Therefore, I argue that whilst there is a direct effect of parental education and death on the well-being of adult children, such a relationship may not exist for the child labour status of the grandchild.

The IV-Probit estimates of α_3 and γ_3 are implemented in two stages, in the first stage, equation (4.3) and (4.4) estimate $RD\text{-}friends$ and $RD\text{-}neighbours$ as functions of the instruments and the control variables in equations (4.1) and (4.2) as:

$$RD\text{-}friends_i = \pi_1 + \pi_2 grandparentedu_i + \pi_3 grandparentalive_i + Child_i'\pi_4 + HH_i'\pi_5 + COMM_i'\pi_6 + \zeta_i \quad (4.3)$$

$$RD\text{-}neighbours_i = \tau_1 + \tau_2 grandparentedu_i + \tau_3 grandparentalive_i + Child_i'\tau_4 + HH_i'\tau_5 + COMM_i'\tau_6 + \epsilon_i \quad (4.4)$$

and

$$lnexp_i = \phi_1 + \phi_2 grandparentedu_i + \phi_3 grandparentalive_i + Child_i'\phi_4 + HH_i'\phi_5 + COMM_i'\phi_6 + \psi_i \quad (4.5)$$

then, in the second stage, the child labour participation equation is estimated as a function of the predicted values of *lnexp* and relative deprivation from equations (4.3) and (4.4) as

$$ChildWorked_i = \beta_1 + \beta_2 \widehat{lnexp}_i + \beta_3 \widehat{RD\text{-}friends}_i + Child_i'\beta_4 + HH_i'\beta_5 + COMM_i'\beta_6 + \omega_i \quad (4.6)$$

and

$$ChildWorked_i = \theta_1 + \theta_2 \widehat{lnexp}_i + \theta_3 \widehat{RD\text{-}neighbours}_i + Child_i'\theta_4 + HH_i'\theta_5 + COMM_i'\theta_6 + \varpi_i \quad (4.7)$$

where *grandparentedu* is the education status of the grandparent of the child, *grandparentalive* is a dummy variable which indicates whether at least one of the grandparents is alive. $\widehat{RD\text{-}friends}$ and $\widehat{RD\text{-}neighbours}$ in equations (4.6) and (4.7) are the predicted values of relative deprivation from (4.3) and (4.4) respectively, and $\widehat{lnexp}$ is the predicted value of household expenditure from estimating equation (4.5).

4.3.4. Summary Description of the Main Variables

Table 4.1 presents a summary description of the main variables used in the analysis. The rate of child labour, according to Table 4.1, is 23 percent. The average

household thinks they are on step 2 of the six-step ladder, while their neighbours are on step 2.37 and 2.54. About 47 percent of Malawian household think their friends have higher well-being, and another 44 percent of them think their neighbours are better off. According to Table 4.1, the average household expenditure in the sample is MK119,553.55($766)[5]. The table further shows that about 93 percent of the sampled households engage in farming. It is, therefore, possible that most of the children work in agriculture since the sector employs most of the child labourers in Malawi. About 75percent of the children live in the male-headed household.

Table 4.1.: Summary statistics of main variables

Variable	Mean (N= 5442)	SD
Child labour	0.23	0.42
Total real annual consumption per capita	MK119,553.55	102,270.43
On which step is the household today?	2.04	0.90
On which step are your neighbours today?	2.37	1.02
On which step are your friends today?	2.54	1.08
Neighbours are better off	0.44	0.50
Friends are better off	0.47	0.50
Male child	0.51	0.50
Child's age	10.33	3.59
Child is in school	0.83	0.38
Child was ill in last 2 weeks	0.13	0.34
Biological child of the HH head	0.82	0.39
Age of HH head	45.26	14.06
Male-headed household	0.75	0.43
No. of male HH mem. <=14	1.37	1.24
No. of male HH mem. 15-19	0.35	0.62
No. of male HH mem. 20-59	0.75	0.71
No. of male HH mem. >=60	0.09	0.29
No. of female HH mem. <=14	1.36	1.26
No. of female HH mem. 15-19	0.30	0.56
No. of female HH mem. 20-59	0.87	0.65
No. of female HH mem. >=60	0.13	0.34
Agricultural household	0.93	0.26
Comm. has primary sch.	0.34	0.47
Comm. has a secondary sch.	0.02	0.15
Average distance to road	9.80	10.19
No. of shocks suffered by HH	4.23	2.48
HH resides in an urban area	0.13	0.33
HH resides in the northern region	0.10	0.30

[5] The dollar equivalent is calculated with the 2011 exchange from the World Bank's Official exchange rate (Local currency unit per US$ for 2011)

Table 4.1 – continued from previous page

HH resides in the central region	0.46	0.50
HH resides in the southern region	0.44	0.50
HH is in tropic-warm/subhumid	0.28	0.45
HH is in tropic-cool/semiarid	0.14	0.34
HH is in tropic-cool/subhumid	0.05	0.23

Tables 4.2 and 4.3 present the distribution of the household's assessment of their well-being, and their assessment of their friends and neighbours' well-being. About 38 percent of the respondents who think their household is on step 1 also think their neighbours are on the same step of the ladder, 43 percent of them said their neighbours are on step 2, whilst only 1 percent put their neighbours on the 6th step of the ladder. Those who think they are on the 6th step reported that none of their neighbours is on step 1 or 2, however, the majority (57.9 percent) of this group said they are in the neighbourhood of households who are on step 5 or 6. Most of the households think their neighbours are a step below or above them on the ladder. For instance, among those on step 3, about 37 said other households in their neighbourhood are on step 2 and 19 percent on step four. In summary, Table 4.A1 shows that about 20 percent of household think they enjoy higher welfare than their neighbours, 36 percent have the same welfare as their neighbours, and another 44 are worse compared to their neighbours.

Table 4.3 also shows that people choose friends who share similar characteristics with them. For instance, 40 percent of step 1 households believe their friends are on step 1, 36 and 18 percent put most of their friends on steps and 2 and 3. In summary, only 13 percent of all households believe their welfare level is better than their friends, however, 41 percent think they have the same welfare as their friends, and 46 believe they are worse off. This could bias the coefficient of relative deprivation in the econometric models.

Figure 4.1 compares the respondents' assessments of their households with their assessments of their friends and neighbours' welfare. The figure also presents

the prevalence of child labour across the levels of self-assessed poverty. To generate Figure 4.1, I generated two dummy variables to capture whether the household is poorer than its neighbours and friends. First, a household is classified as poorer than its neighbours if the respondent puts her household on a lower step than its neighbours. A richer household is the one which thinks it has higher welfare than its neighbours. We observe from the figure that the proportion of poor households (in comparison with both friends and neighbours) falls as subjective welfare increases. For example, 61 percent of households in step 1 think their neighbours are richer, but the figure decreases to 12 and zero percent for those on steps 4 and 5, whilst 60 percent of the poorest think their friends are richer, none of the richest group thinks they are poorer than their friends.

Table 4.2.: Distribution of neighbours' poverty by household's poverty

	On which step is your household?						Total
	Step	1 %	2 %	3 %	4 %	5 %	6 %	%
On which step are most of your neighbours?	1	38.34	13.36	6.36	2.54	0.00	0.00	18.16
	2	42.97	39.16	37.38	23.73	16.67	0.00	38.68
	3	13.42	38.13	29.67	31.36	33.33	14.29	28.47
	4	2.88	6.51	19.27	27.97	27.78	28.57	9.94
	5	1.28	2.17	6.17	11.86	22.22	28.57	3.65
	6	1.12	0.68	1.16	2.54	0.00	28.57	1.11
Total		100	100	100	100	100	100	100
N		2164	2164	2164	2164	2164	2164	2164

Table 4.3.: Distribution of friends' poverty by household's poverty

	On which step is your household?						Total
	Step	1 %	2 %	3 %	4 %	5 %	6 %	%
On which step are most of your friends?	1	39.94	8.45	5.20	2.54	5.56	14.29	16.45
	2	36.26	45.09	24.66	11.86	0.00	0.00	35.30
	3	17.57	34.59	37.57	25.42	22.22	14.29	29.71
	4	3.99	9.02	24.08	33.05	38.89	0.00	12.71

Table 4.3 – continued from previous page

	5	1.28	1.94	6.55	19.49	27.78	14.29	4.07
	6	0.96	0.91	1.93	7.63	5.56	57.14	1.76
Total		100	100	100	100	100	100	100
N		2164	2164	2164	2164	2164	2164	2164

On the association with child labour and subjective welfare, Figure 4.1 shows that much of the child labour cases are concentrated among the poor group. For instance, 24 percent of children from households on the lowest step worked within the reference period, the respective figures for the second and third steps are 26 and 20 percent. However, a bivariate result of the nature in Figure 4.1 is susceptible to confounding variables and endogeneity which makes it difficult to find any effect if it exists. In the regression analysis, I take care of these problems by including relevant control variables, and instrumental variables to estimate the effects of relative deprivation on child labour.

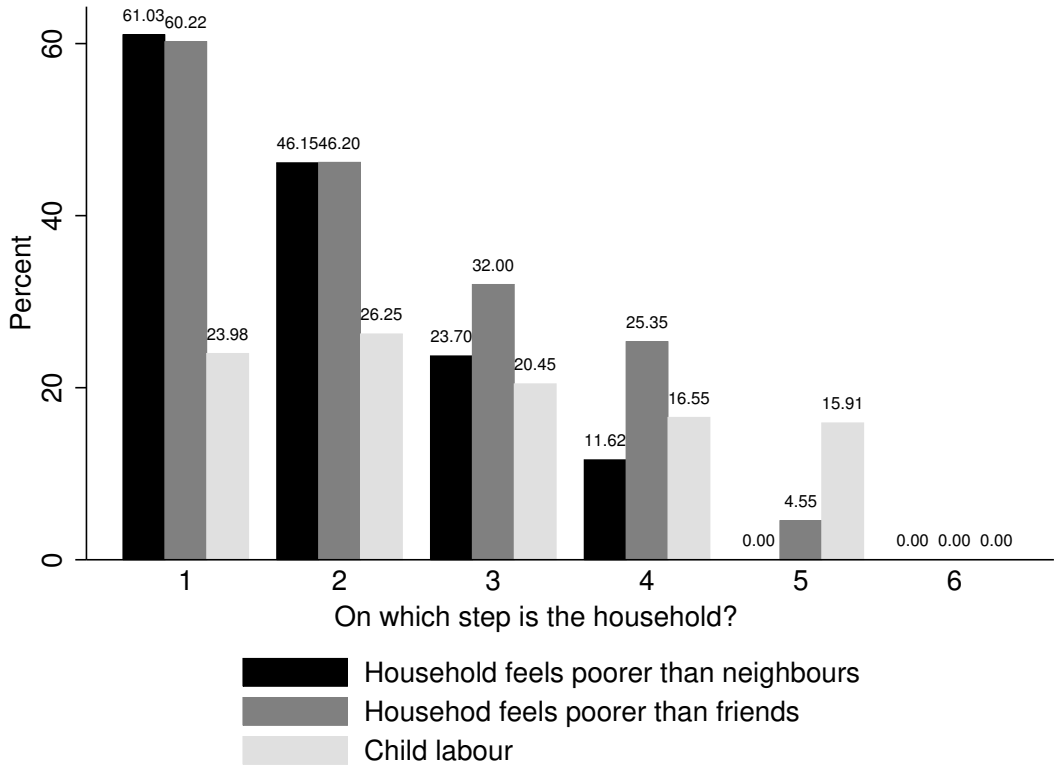

Figure 4.1.: Relative Deprivation and Child Labour across Self-assessed Poverty Status

4.4. Empirical Findings

4.4.1. Effect of Relative Deprivation on Child Labour

Table 4.4 presents the estimates of equation (4.1), (4.2), (4.6), and (4.7). In columns 1 and 2, the independent variable of interest is the difference between the household and its neighbours' poverty, *RD-neighbours*, that of its friends, *RD-friends*, are presented in columns 3 and 4. Columns 1 and 3 present the marginal effects of the Probit estimates whilst columns 2 and 4 present the IV Probit estimates.

The Probit estimates show that the effect of relative deprivation on child labour is negative and significant. Because of how the variables were created, this means that child labour falls as the households consider itself to be poorer than its neighbours or friends. Theoretically, this result is tenable since house-

holds could be motivated by their perceived deprivation to invest in the future of their children by sending them to school. The reduction in child labour could, therefore, be a direct strategy by the households to shore up its image in society. However, because of the threat of endogeneity, the Probit estimates may not be the exogenous effect of relative deprivation on child labour. Thus, the marginal effects in columns 1 and 3 may only be taken as the correlation between the two variables (like what is shown in Figure 4.1).

Columns 2 and 4, therefore, use instrumental variables (the education status of the household's head's father, and whether his/her father and mother are alive) to isolate the exogenous effects of relative deprivation and household expenditure on child labour. After including several relevant control variables, and the level of the household's subjective poverty, the marginal effects of *RD-friends* and *RD-neighbours* in columns in 2 and 4 show that both forms of deprivation have an increasing effect on child labour in Malawi. Thus, a household is more likely to engage a child in child labour if it thinks it is deprived compared to its friends and neighbours. The size of the coefficients means that a one-point difference between the position of neighbours and the household in Figure 4.A1 increases the probability of child labour by about 15 percentage points. The same point difference between friends and the household increases the probability of child labour by about 22 percentage points.

An explanation of the observed relationship is that the households use child labour to raise additional income to increase consumption. Earlier studies have shown that income from child labour makes up a significant proportion of the income of poor households in developing countries (Bandara et al., 2015; Koomson & Asongu, 2016). This means that the additional income from child labour, and the associated consumption and utility/satisfaction is more than enough to offset the dis-utility that the household may drive from it. The positive net utility from child labour is expected because, in Malawi most households do not make enough to ensure subsistence. Hence, the need for immediate consumption may be higher

than concerns about the adverse effects of child labour.

On the effect of household expenditure on child labour, the results show that an increase in the household's total expenditure may increase child labour. However, the coefficient is significant only in column 2. The results, therefore, show that an exogenous increase in household expenditure may increase child labour in Malawi. This result lends support to the poverty-child labour hypothesis which is explained by the altruistic axiom of Basu and Van (1998). According to the coefficient of log expenditure, at the means of the other variables, a 10 percent increase in expenditure translate into about a 0.04 percentage points increase in the probability that the child will work.

Some of the control variables also have significant effects on child labour. For instance, an increase in the general prices of goods and services is associated with a higher incidence of child labour in Malawi. This effect is consistent with the conclusion of Frempong and Stadelmann (2018), Hou et al. (2015), and the main findings in Chapter 2. Thus, households engage in child labour when the cost of living goes up. Consistent with the observation that majority of the child labour cases involve agricultural or farm work, Table 4.4 shows that children who live in farm households and those in rural areas have a higher probability of child labour as compared to those in non-farm households or urban areas.

Some authors have argued that reducing the cost of education could be an effective means to reduce child labour (Canagarajah & Nielsen, 2001; Canagarajah & Nielsen, 1999). In the estimations, I control for access to education with two dummy variables that capture primary and secondary schools in the community. The signs and the insignificance of the coefficients of these variables show that access to schools is associated with a lower incidence of child labour. Children in the communities that have primary schools have a lower probability of child labour. This results further show that communities that have secondary schools have lower child labour incidence. Thus, reducing the cost of education by increasing access could reduce child labour in Malawi.

On the effects of environmental factors on child labour, I include a set of dummy variables as proxies for the different agro-ecological zones in Malawi. The ecological zones are defined to reflect the major climatic variations across the country, hence, they capture important weather conditions like rainfall and temperature. Table 4.4 shows that there are significant differences between child labour across the different agro-ecological zones. Compared to children in the tropic-warm/semiarid (the omitted zone), the estimates show that children in both the tropic-warm/sub-humid and the tropic-cool/sub-humid zones are more likely to work. Since both the tropic-warm/sub-humid and the tropic-cool/sub-humid receives more moisture and can support crop production than the tropic-warm/semiarid (HarvestChoic, 2010), this finding supports the notion that child labour is an agricultural phenomenon in Malawi. For instance, a child who lives in tropic-warm/sub-humid region is about 4 percentage points more likely to engage in child labour than a child with similar characteristics in tropic-warm/semiarid.

Table 4.4.: Average marginal effects of relative deprivation on child labour in Malawi

	(1) Probit	(2) IV-Probit	(3) Probit	(4) IV-Probit
RD-neighbours	-0.01	0.15*		
	(0.01)	(0.09)		
RD-friends			-0.02***	0.22***
			(0.01)	(0.08)
Log HH expenditure	0.00	0.22*	0.00	0.11
	(0.01)	(0.13)	(0.01)	(0.17)
Subjective well-being	-0.02**	0.04	-0.03***	0.07
	(0.01)	(0.07)	(0.01)	(0.07)
Male child	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Child's age	0.03***	0.03***	0.03***	0.02**
	(0.00)	(0.00)	(0.00)	(0.01)
Child in school	-0.02	-0.03*	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)
Ill last 2 weeks	0.01	0.00	0.01	0.01
	(0.02)	(0.01)	(0.02)	(0.01)
Child of head	0.01	0.01	0.01	0.01
	(0.01)	(0.02)	(0.01)	(0.02)
Age of HH head	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Male headed household	-0.02	0.02	-0.02	0.00
	(0.01)	(0.02)	(0.01)	(0.02)
HH head's years of schooling	-0.00	-0.01*	-0.00	-0.00
	(0.00)	(0.01)	(0.00)	(0.01)
No. of male HH members <=14yrs	-0.00	0.01	-0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
No. of male HH members 15-19yrs	-0.01	0.00	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
No. of male HH members 20-59yrs	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
No. of male HH members >=60yrs	0.05**	-0.01	0.05**	0.03
	(0.02)	(0.03)	(0.02)	(0.02)
No. of female HH members <=14yrs	-0.00	0.02	-0.00	0.01
	(0.00)	(0.01)	(0.00)	(0.01)
No. of female HH member 15-19yrs	0.00	0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
No. of female HH members20-59yrs	-0.02*	-0.04***	-0.02*	-0.03**
	(0.01)	(0.01)	(0.01)	(0.02)
No. of female HH members >=60yrs	0.02	0.01	0.03	0.00
	(0.02)	(0.02)	(0.02)	(0.02)
Agricultural household	0.14***	0.13***	0.13***	0.10*
	(0.02)	(0.03)	(0.02)	(0.05)
Community has primary school	-0.02*	-0.04***	-0.02*	-0.03

Table 4.4 – continued from previous page

	(0.01)	(0.02)	(0.01)	(0.02)
Community has a secondary school	-0.16***	-0.17***	-0.16***	-0.17***
	(0.05)	(0.05)	(0.05)	(0.06)
Log price index	0.55***	0.48*	0.55***	0.44
	(0.11)	(0.26)	(0.11)	(0.32)
Distance to road	-0.00	0.00*	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
No. of shocks suffered by HH	0.00	0.00*	0.00*	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Urban HH	-0.28***	-0.33***	-0.27***	-0.29***
	(0.04)	(0.05)	(0.04)	(0.10)
HH is in Central region^{r}	0.01	-0.05*	0.02	-0.06**
	(0.02)	(0.03)	(0.02)	(0.03)
HH is in Southern region^{r}	0.01	-0.03	0.02	-0.05
	(0.03)	(0.04)	(0.03)	(0.04)
HH is in tropic-warm/subhumid zone^{e}	0.04**	0.03*	0.04**	0.04**
	(0.02)	(0.02)	(0.02)	(0.02)
HH is in tropic-cool/semiarid zone^{e}	-0.02	-0.01	-0.02	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)
HH is in tropic-cool/subhumid zone^{e}	0.05**	0.08***	0.05**	0.02
	(0.02)	(0.02)	(0.02)	(0.04)
N	5442	5442	5442	5442
Log pseudolikelihood	-2500.73	-13707.04	-2491.83	-14030.58
McFadden's R^2	0.15		0.15	
Wald test of exogeneity		10.86		32.82
		[0.00]		[0.00]

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. Definitions and measurements of the variables are provided in 4.A4. HH denotes households ^{e} denotes agro-ecological zone with Tropic-warm/semiarid as the reference category. ^{r} denotes regional dummies with the North as the reference category.

The estimated marginal effects of the relative poverty variables and household expenditure may not be an accurate representation of their true effects since they are continuous variables (Williams, 2017a, 2017b). Panels (a) and (b) of Figure 4.2 plot the probability of child labour against relative deprivation with respect to neighbours and friends respectively from columns 2 and 4 in Table 4.4. The essence of the graph is to provide an idea of the curvature of the effects of the two variables at their different values. Panel (a) shows an upward-sloping curve for $RD - neighbours$, which means that the magnitude of the effect increases as

the level of subjective deprivations increases. Similarly, Panel (b) also shows that the child-labour effect of subjective deprivation with respect to friends increase as the perceived difference widens. This means that the need to raise additional resources through child labour to meet the consumption levels in the neighbourhood increases with the magnitude of relative deprivation.

It is also interesting to note that the graphs flatten off their upper and lower ends. At the lower end are the subjectively rich households, who may be content with their level of consumption and assets. Hence, these households may care less about the level of consumption of their friends and neighbours. The upper parts of the graphs are those households who think their positions are lower than the rest of society. The curvature of the graphs at this point also shows that these households may have already given up because, in their view, it may be impossible to catch up with their neighbours. Here, we could not expect relative deprivation to have any more effect on the household's decision concerning child labour. Deprived people may respond to their situation with sadness in which case they are likely to withdraw or be indifferent to changes in their surroundings (C. A. Smith & Kirby, 2001; H. J. Smith & Pettigrew, 2014).

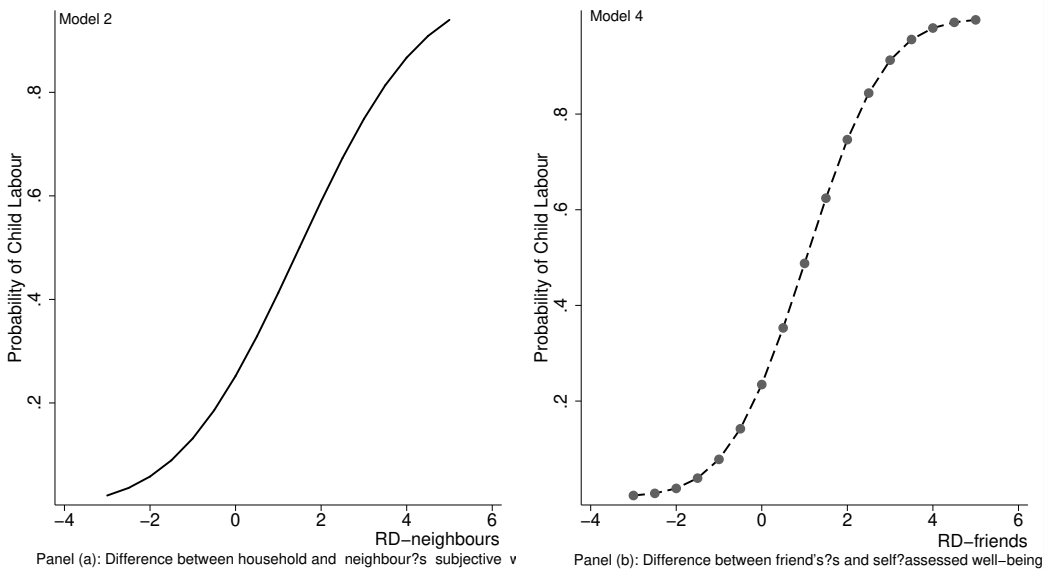

Figure 4.2.: Average Marginal Effects of *RD-neighbours* and Household Total Expenditure on Child Labour

4.4.2. Refinements and Additional Results

(i) Sub-sample results for cases where the respondent is either the household's head or the spouse of the head

The validity of the results in Table 4.4 depends on whether the respondent to the subjective deprivations questions takes part in the household's decision making. If she does not take part in the general decisions of the household, especially those concerning the child's time, her views may not necessarily affect the decision process in the household. This may happen if, for example, her views about the welfare of the household differs from that of the decision maker. Thus, to identify the true effect of relative deprivation on child labour we need the assessment of the major decision maker in the household. In Table 4.5, I rely on the assumption that household heads and their spouses are the decision makers of the households to restrict the sample to the cases where the respondent is the household. In all 221 respondents were non-household heads, hence they were excluded from the analysis. I then run models 1-4 in Table 4.4 using this restricted sub-sample of the data.

The coefficients in Table 4.5 are consistent with those in Table 4.4. First, the results reveal that without correcting for endogeneity, relative deprivation seems to reduce the incidence of child labour. However, although the results in columns 1 and 2 are plausible, they could also be driven by the bi-causal relationship between child labour and relative deprivation. Hence, the IV-Probit estimate is more credible since it is able to correct the endogeneity between the two variables. According to the IV-Probit estimate in Table 4.5 for every step that the household falls below its friends, the probability of child labour increases by about 16 percentage points. The effect of relative deprivation regarding neighbours is also significant and positive. The results show that on the average the probability of child labour increases by about 18 percentage points if the household the household thinks it falls below their neighbours.

Table 4.5.: Average marginal effects of relative deprivation on child labour in Malawi

	(1) Probit	(2) IV-Probit	(3) Probit	(4) IV-Probit
RD-neighbours	-0.01	0.16**		
	(0.01)	(0.07)		
RD-friends			-0.03***	0.19***
			(0.01)	(0.07)
Log HH expenditure	0.00	0.19	0.00	0.11
	(0.01)	(0.13)	(0.01)	(0.14)
Subjective well-being	-0.02***	0.05	-0.03***	0.06
	(0.01)	(0.06)	(0.01)	(0.06)
Male child	0.00	0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Child's age	0.03***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.00)	(0.01)
Child is in school	-0.02	-0.03	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)
Ill last 2 weeks	0.01	-0.00	0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.01)
Child of HH head	-0.00	-0.00	-0.00	0.00
	(0.01)	(0.02)	(0.01)	(0.02)
Age of HH head	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Male headed household	-0.02	0.02	-0.02	-0.00
	(0.02)	(0.02)	(0.02)	(0.02)
HH head's years of schooling	-0.00	-0.01	-0.00	-0.00
	(0.00)	(0.01)	(0.00)	(0.01)
No. of male HH members <=14yrs	-0.00	0.01	-0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
No. of male HH members 15-19yrs	-0.01	0.01	-0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
No. of male HH members 20-59yrs	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
No. of male HH members >=60yrs	0.06***	-0.00	0.05**	0.04*
	(0.02)	(0.03)	(0.02)	(0.02)
No. of female HH members <=14yrs	-0.00	0.02	-0.00	0.01
	(0.01)	(0.01)	(0.00)	(0.01)
No. of female HH members 15-19yrs	0.01	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
No. of female HH members 20-59yrs	-0.02*	-0.03**	-0.02	-0.03**
	(0.01)	(0.01)	(0.01)	(0.01)
No. of female HH members >=60yrs	0.03*	0.01	0.03*	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
Agricultural household	0.15***	0.14***	0.14***	0.12***
	(0.02)	(0.03)	(0.02)	(0.04)
No. of shocks suffered by HH	0.00	0.00*	0.00	0.00

Table 4.5 – continued from previous page

	(0.00)	(0.00)	(0.00)	(0.00)
Community has a primary school	-0.02	-0.04**	-0.02	-0.03
	(0.01)	(0.02)	(0.01)	(0.02)
Community has secondary school	-0.16***	-0.17***	-0.16***	-0.19***
	(0.05)	(0.05)	(0.05)	(0.05)
Log price index	0.58***	0.42*	0.57***	0.51**
	(0.12)	(0.24)	(0.12)	(0.23)
Distance to road	-0.00	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Urban HH	-0.28***	-0.31***	-0.27***	-0.31***
	(0.04)	(0.05)	(0.04)	(0.07)
HH is in Central region^r	0.01	-0.05	0.02	-0.05*
	(0.02)	(0.03)	(0.02)	(0.03)
HH is in Southern region^r	0.03	-0.03	0.03	-0.03
	(0.03)	(0.04)	(0.03)	(0.04)
HH is in tropic-warm/subhumid zone^e	0.04***	0.04**	0.04**	0.05***
	(0.02)	(0.02)	(0.02)	(0.02)
HH is in tropic-cool/semiarid zone^e	-0.01	-0.01	-0.01	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)
HH is in tropic-cool/subhumid zone^e	0.06**	0.09***	0.06***	0.04
	(0.02)	(0.02)	(0.02)	(0.03)
N	5221	5221	5221	5221
Log pseudolikelihood	-2385.26	-13112.42	-2375.27	-13395.54
McFadden's R^2	0.15		0.16	
Wald test of exogeneity		10.47		20.59
		[0.01]		[0.00]

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. Definitions and measurements of the variables are provided in 4.A4. HH denotes households ^{e} denotes agro-ecological zone with Tropic-warm/semiarid as the reference category. ^{r} denotes regional dummies with the North as the reference category.

(ii) Relative deprivation, child labour and the location of residence

In this section, I examine whether the effect of relative deprivation on child labour among rural households differs from urban households. This question is in line with the suggestions in the literature that isolated households may care less about relative deprivation than households and individual in market-oriented communities (Cox, 1987; Fehr & Falk, 2002; Inglehart & Klingemann, 2000; Ravallion & Dearden, 1988). If this assertion is true, then relative deprivation should have

a lower effect on child labour in rural areas than in urban areas. In Table 4.6, I partitioned the sample into two sub-samples, rural and urban households and perform the regression analysis using the same set of control variables. According to the results, the household's deprivation in relation to its neighbours has a significant effect on child labour in both urban rural areas. The effect of deprivation regarding friends is insignificant in both groups of households. In each case where *RD-neighbours* is significant, the effect on the probability of child labour is about 25 percentage points. Thus, this sample provides no evidence to suggest that relative deprivation has a larger effect on child labour in urban areas than rural. The coefficient of log expenditure also shows that the effect of expenditure on child labour appears to be larger for rural children than it is for urban children.

Table 4.6.: Average marginal effects of relative deprivation on child labour - Residence of the child

	(1)	(2)	(3)	(4)
	Rural residence		Urban residence	
	IV Probit	IV Probit	IV-Probit	IV-Probit
RD-neighbours	0.25***		0.25***	
	(0.06)		(0.06)	
RD-friends		0.16		0.16
		(0.18)		(0.18)
Log HH expenditure	0.39***	0.39***	0.37***	0.37***
	(0.14)	(0.14)	(0.14)	(0.14)
Child controls	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes
Community Controls	Yes	Yes	Yes	Yes
Ecological Zone fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
N	4302	4302	1140	1140
Log pseudolikelihood	-10459.94	-10459.94	-3005.14	-3005.14
Wald test of exogeneity	114.56	114.56	46.14	46.14
	[0.00]	[0.00]	[0.00]	[0.00]

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same, child, household and community controls, as well as, ecological zone and region fixed effects, as those Tables 4.4 and 4.5.

(iii) Relative deprivation, child labour and the gender of the child

Table 4.7 further partition the sample into boys and girls to examine how the effects of relative deprivation on child labour differ according to the gender of the child. The table shows that the male child's probability of child labour increases by 28 and 19 percentage points when the household feels poorer than their neighbours and friends. However, the variables have no significant effect on girls.

Table 4.7.: Average marginal effects of deprivation on child labour-Gender

	(1)	(2)	(3)	(4)
	Boys		Girls	
	IV Probit	IV Probit	IV-Probit	IV-Probit
RD-neighbours	0.28***		0.05	
	(0.05)		(0.22)	
RD-friends		0.19**		0.03
		(0.09)		(0.16)
Log HH expenditure	0.01	-0.08	0.37**	0.39***
	(0.19)	(0.21)	(0.16)	(0.12)
Child controls	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes
Community Controls	Yes	Yes	Yes	Yes
Ecological Zone fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
N	2712	2712	2730	2730
Log pseudolikelihood	-6950.17	-6832.78	-7029.30	-6826.33
Wald test of exogeneity	104.43	7.42	12.94	12.65
	[0.00]	[0.02]	[0.00]	[0.00]

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same, child, household and community controls, as well as, ecological zone and region fixed effects, as those Tables 4.4 and 4.5.

4.5. Conclusion

This study has analysed the effect of relative deprivation on child labour decision. The empirical section uses questions on subjective welfare from a publicly available Malawian dataset to answer the research question of the study. Two variables, the household's poverty status regarding friends and neighbours are used

to proxy relative deprivation. To correct for the endogeneity between relative deprivation and child labour, the education status of the child's grandparents and whether they are alive are used to instrument relative deprivation and household expenditure.

The results of the study show that, after controlling for actual expenditure, perceived relative deprivation is still a significant input in the household's child-labour decision. The study finds that the probability of child labour falls if the household thinks it is richer than it neighbours and friends. Thus, this study finds support for the relative deprivation hypothesis which states that, besides absolute income, relative income also affects the household's utility and utility maximisation decisions. In addition to this finding, some control variables provide interesting policy-relevant results. For instance, we find that an increase in the male wage rate is associated with a reduction in a child in Malawi.

The contribution of this chapter to the existing literature is that it provides empirical evidence of the effect of relative deprivation on child labour. The study contributes to the broad discussion in the literature and policy spheres on the importance of non-monetary determinants of child labour. In Malawi, there is empirical evidence that the government's agricultural input subsidy programme has an effect on subjective poverty. Hence, this chapter has shown that the effect of the programme on child labour, as observed in Chapter 3 may be re-enforced through its effects on relative deprivation. In terms of policy relevance, the findings of the study mean that the households' perception of income poverty is an important determinant of child labour. Thus, contrary to the received literature that ignores the effect of relative deprivation in child labour analysis, the results of the study mean that any development policy that is neutral to the relative deprivation concerns may be less effective in addressing child labour.

Appendix

4A. Aid for Subjective Welfare Assessment

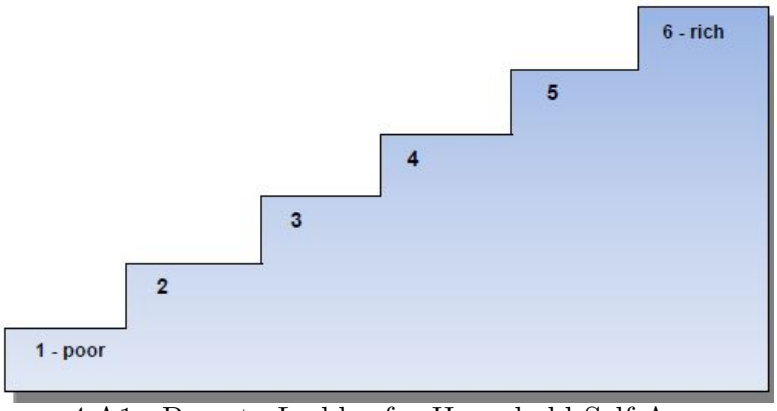

Figure 4.A1.: Poverty Ladder for Household Self Assessment
Source: NSO, 2013

4B. Distribution of Households According to their Comparison with their Friends and Neighbours

Table 4.A1.: Household comparison with their friend and neighbours

	Neighbours %	Friends %
Better	19.92	13.45
Same	35.86	41.04
Worse	44.22	45.52

4C. Effect of Relative Deprivation on Child Labour according to Gender of the Household Head

Table 4.A2 presents results for female- and male-headed households. Using the same set of controls and instruments, the table does not show many differences between in the coefficient between the two sub-groups. This notwithstanding, the

result shows that whilst, subjective deprivation regarding a neighbour is significant in predicting child labour among male-headed households, female-headed rather respond to deprivation regarding their friends.

Table 4.A2.: Effect of subjective deprivation on child labour -Gender of household head

	(1)	(2)	(3)	(4)
	Male-headed household		female-headed household	
	Boys		Girls	
	IV Probit	IV Probit	IV Probit	IV Probit
RD-neighbours	0.13		0.25*	
	(0.10)		(0.14)	
RD-friends		0.24**		0.19
		(0.10)		(0.13)
Log HH expenditure	0.14	0.13	0.26*	0.17
	(0.29)	(0.27)	(0.15)	(0.20)
Child controls	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes
Community Controls	Yes	Yes	Yes	Yes
Ecological Zone fixed effects	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
N	4139	4139	1303	1303
Log pseudolikelihood	-10435.42	-10679.77	-3145.75	-3222.16
Wald test of exogeneity	3.38	24.57	52.99	20.41
	[0.18]	[0.00]	[0.00]	[0.00]

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. The same, child, household and community controls, as well as, ecological zone and region fixed effects, as those Tables 4.4 and 4.5.

4D. First Stage Results From the IV-Probit Models

Table 4.A3.: First stage results

	RD-neighbours	*RD-friends*	log expenditure
Subjective well-being	-0.63***	-0.48***	0.22***
	(0.02)	(0.02)	(0.01)
Male child	-0.01	-0.00	-0.00
	(0.03)	(0.03)	(0.01)
Child's age	-0.02	-0.03	0.00
	(0.03)	(0.03)	(0.01)
Child is in school	-0.00	0.01	0.08***
	(0.04)	(0.04)	(0.02)
Ill last 2 weeks	0.03	-0.02	0.00
	(0.04)	(0.04)	(0.02)
Child of HH head	0.05	0.01	-0.05**
	(0.04)	(0.04)	(0.02)
Age of HH head	-0.00***	0.00	0.00***
	(0.00)	(0.00)	(0.00)
Male headed household=1	0.03	0.19***	0.00
	(0.05)	(0.05)	(0.03)
HH head's sch. years	0.02**	0.02***	0.05***
	(0.01)	(0.01)	(0.00)
Male headed household=1 # HH head's sch. years	-0.03***	-0.04***	-0.01***
	(0.01)	(0.01)	(0.00)
No. of male HH mem. <=14	0.00	0.01	-0.08***
	(0.01)	(0.01)	(0.01)
No. of male HH mem. 15-19	-0.00	-0.06***	-0.05***
	(0.02)	(0.02)	(0.01)
No. of male HH mem. 20-59	-0.04*	-0.03	0.04***
	(0.02)	(0.02)	(0.01)
No. of male HH mem. >=60	0.25***	-0.02	0.05
	(0.06)	(0.05)	(0.03)
No. of female HH mem. <=14	-0.01	-0.01	-0.08***
	(0.01)	(0.01)	(0.01)
No. of female HH mem. 15-19	0.01	0.03	-0.05***
	(0.02)	(0.03)	(0.01)
No. of female HH mem. 20-59	0.03	0.05**	0.08***
	(0.02)	(0.02)	(0.01)
No. of female HH mem. >=60	0.06*	0.05	0.02
	(0.04)	(0.04)	(0.02)
Agric household	0.00	-0.05	-0.11***
	(0.05)	(0.05)	(0.03)
No. of shocks	-0.01	0.01	0.00
	(0.01)	(0.01)	(0.00)
Comm primary sch.	0.03	0.02	0.11***
	(0.03)	(0.03)	(0.02)
Comm.seondary sch.	0.02	0.24***	0.17***
	(0.08)	(0.08)	(0.05)
Log price index	1.23***	-0.00	-1.05***
	(0.26)	(0.29)	(0.14)

Table 4.A3 – continued from previous page

Dist. road	-0.01***	-0.00	-0.00***
	(0.00)	(0.00)	(0.00)
Urban HH	0.20**	0.38***	0.33***
	(0.09)	(0.10)	(0.05)
Central	0.25***	0.23***	0.11***
	(0.05)	(0.06)	(0.03)
South	0.37***	0.27***	-0.06*
	(0.06)	(0.07)	(0.03)
Tropic-warm/subhumid	-0.12***	-0.11***	0.07***
	(0.04)	(0.04)	(0.02)
Tropic-cool/semiarid	-0.01	0.01	0.00
	(0.05)	(0.05)	(0.03)
Tropic-cool/subhumid	-0.13**	0.09	-0.09***
	(0.05)	(0.06)	(0.03)
Head's father schooled	0.07*	0.05	0.08***
	(0.04)	(0.04)	(0.02)
head's father is alive	-0.09***	-0.03	0.05***
	(0.03)	(0.03)	(0.02)
Constant	-3.79***	1.29	15.56***

Note: (#) Standard error, clustered at the household. [#] p-value of test statistic. ***, ** and * indicate significance level of 1, 5 and 10 percent respectively. Definitions and measurements of the variables are provided in 4.A4.
^{e} denotes agro-ecological zone with Tropic-warm/semiarid as the reference category. ^{r} denotes regional dummies with the North as the reference category.

4E. Definition of Variables Used in the Regression Analysis

Table 4.A4.: Definition and measurement of variables

Variable	Measurement	Meaning	Definition
Child labour	Dummy	The child worked in the last 2 weeks	No=0; Yes=1
Subjective well-being	Discrete	On which step is the households	Count
Log HH expenditure	Continuous	logarithm of household expenditure	log units
RD-friends	Discrete	Subjective deprivation with reference to neighbours	
RD-neighbours	Discrete	Subjective deprivation with reference to friends	
Male child	Dummy	Sex of child	Female=0; Male=1
Child's age	Discrete	Age of child	Years
Child in school	Dummy	Is the child currently in school?	No=0; Yes=1
Ill last 2 weeks	Dummy	Child was ill in the last 2 weeks	No=0; Yes=1
Child of head	Dummy	Biological child of the head	No=0; Yes=1
Age of HH head	Discrete	Age of household head	Years
Male headed household	Dummy	Sex of household head	Female=0; Male=1
No. of male HH mem. <=14	Discrete	No. of male members less than 14 years	count
No. of male HH mem. 15-19	Discrete	No. of male members from 15-19 year	count
No. of male HH mem. 20-59	Discrete	No. of male members from 20-59 year	count
No. of male HH mem. >=60	Discrete	No. of male members from 60 years and above	count
No. of female HH mem. <=14	Discrete	No. of female members less than 14 years	count
No. of female HH mem. 15-19	Discrete	No. of female members from 15-19 year	count
No. of female HH mem. 20-59	Discrete	No. of female members from 20-59 year	count
No. of female HH mem. >=60	Discrete	No. of female members from 60 years and above	count
Agricultural household	Dummy	The household cultivated crops	No=0; Yes=1
Comm primary sch.	Dummy	Community has a primary school	No=0; Yes=1
Comm. has a secondary sch.	Dummy	Community has a secondary school No=0; Yes=1	

Table 4.A4 Definition and measurement of variables– continued from previous page

Average distance to road	Continuous	Average distance from community to road	Kilometres
No. of shocks	Discrete	Number of adverse shocks suffered by the household	Count
Urban HH	Dummy	Housheold is located in an urban area	No=0; Yes=1
North region	Dummy	Household resides in the northern region	No=0; Yes=1
Central region	Dummy	Household resides in the Central region	No=0; Yes=1
South region	Dummy	Household resides in the Southern region	No=0; Yes=1
Tropic-warm/subhumid	Dummy	Household resides in the subhumid zone	No=0; Yes=1
Tropic-cool/semiarid	Dummy	Household resides in the semiarid zone	No=0; Yes=1
Tropic-cool/subhumid	Dummy	Household resides in the subhumid zone	No=0; Yes=1

4F. Questions Used to Construct the Child Labour Indicator

Table 4.A5.: Questions used to construct the child labour indicator

Question	Response
In the last 12 months, did you work on household agricultural activities (including farming, raising livestock or fishing, whether for sale or for household food) even if only for one hour?	1 = Yes; 2 = No
In the last 12 months, did you run a non-farm business of any size for yourself or the household, even if only for one hour?	1 = Yes; 2 = No
In the last week, did [NAME] help without being paid in any kind of business run by this house-hold, even if it was only for one hour?	1 = Yes; 2 = No
In the last 12 months, did you work as an employee for a wage, salary, commission, or any payment in kind: including doing paid apprenticeship, domestic work or paid farm work, excluding ganyu, even if only for one hour?	1 = Yes; 2 = No
In the last 12 months, did you engage in casual, part-time or ganyu labour, even if only for one hour?	1 = Yes; 2 = No
How many hours in the last seven days did you spend on household agricultural activities (including livestock and fishing-related activities) whether for sale or for household food?	Hours
How many hours in the last seven days did you run or do any kind of non-agricultural or non-fishing household business, big or small, for yourself?	Hours
How many hours in the last seven days did you help in any of the household's non-agricultural or non-fishing household businesses, if any?	Hours
How many hours in the last seven days did you engage in casual, part-time or ganyu labour?	Hours
How many hours in the last seven days did you do any work for a wage, salary, commission, or any payment in kind, excluding ganyu?	Hours

Source: NSO (2014)

4G. Stability of the Coefficients

Following the discussion in Appendix 3F, Table 4.A6 provides robustness test for the relative deprivation proxies. Table 4.A6 reports the bias-adjusted coefficients using $R_{max} = 0.3$ for different values of δ. For the determination of the robustness of the coefficients of *RD-neighbours* and *RD-friends* the last row, $\delta = 1$, is of interest. Because the test is only appropriate for linear models, I estimate the linear probability version of the respective binary models in columns 1 and 3 of Table 4.4. For easy reference I attach the respective coefficient of FISP to the bias-adjusted estimates in parentheses.

The table shows that the bias-adjusted coefficients RD-friends and RD-neighbours the same as the Probit estimates of Table 4.4. Hence the regression estimates in 4.4 may not change significantly even if all relevant omitted variables were included.

Table 4.A6.: Stability of Coefficients (β) with Varying δ

Delta (δ) value	(1) *RD-neighbours* β^*	(2) *RD-friends* β^*
$\delta = 0.25$	-0.01	-0.02
$\delta = 0.50$	-0.01	-0.02
$\delta = 0.70$	-0.01	-0.02
$\delta = 1.0$	-0.007[-0.01]	-0.022[-0.02***]

Note: R_{max}=.30. [#] Coefficient of *RD-neighbours* and *RD-friends* columns 1 and 3 of Table 4.4 ***, ** and * indicate significance level of 1, 5 and 10 percent respectively.

Chapter 5

General Conclusions, Policy Implications, and Further Research

5.1. General Conclusions

Far from being a recent problem, child labour has been a standing phenomenon that has engaged the interest of academics, in the fields of economics, history, sociology etc. (Bhalotra, 2003). Most countries have had to grapple with the problem at certain times in their history. Today, child labour presents a real threat to human capital development and the fight against poverty in developing countries. Child labour is multifaceted in all its aspects and therefore requires a thorough understanding to prescribe effective solutions. The aim of the thesis has been to explore some less studied causes of child labour in SSA to provide further insights into the main determinants of child labour in the sub-region. I employed empirical analysis using data sets from two African countries – Malawi and Uganda.

The central questions considered in the work are: (i) What is the impact of changes in food prices on child labour? (ii) What is the child-labour effect of agricultural input subsidies designed to combat higher food prices and low food production? and finally (iii) How does relative deprivation affect child labour in Africa? These set of questions address aspects of the three central themes

in discussions concerning the causes of child labour: *constraints*, *incentives*, and *agency*. The constraint aspect is expressed through the relationship between food prices and household income/poverty within the context of Africa where most of the population are farmers. On incentives, I argue that input subsidies could motivate households to engage in child labour by increasing the marginal product of the child's time on the farm. Relative deprivation poverty could also induce both constraints and agency problems.

Farming and other agriculture-related activities remain the main economic activity for more than half of the people in SSA. In most cases, however, these people are small-scale farmers, who barely produce enough for household consumption. A majority of the people are, therefore, net-consumers who spend a sizeable proportion of their income on food. Therefore, when food prices increase, these people face a real threat to their livelihoods and subsistence. Chapter 2 of this thesis examined the impact of higher food prices on the household supply of child labour. The chapter argues that higher food prices present both challenges and opportunities to farm households in Africa. The ability or not to take advantage of high food prices depends, among other factors, on the household's ownership of land, access to credit, a well-functioning labour market, and the time horizon.

As a contribution of this thesis, Chapter 2 analyses the effect of food prices on child labour by taking into consideration some factors that could moderate the observed effect. The study was designed to show the potential effect of a short-term shock on child labour and consequently the future potentials of the child. We used three rounds of a panel data from Uganda in this study. The main finding in Chapter 2 is that an increase in the price of the average basket of food leads to a significant increase child labour. The effect, as expected, is found to be higher among households that live below the poverty line. We also noticed that children in landowning farm households are less affected in terms of the probability that they would engage in child labour.

There are two channels through which changes in food prices could affect child labour in the context of a small developing economy like Uganda. These are the expenditure and the income effects. The income effect suggests that a higher price could increase the income of farm households, and thus, the ability to afford education/leisure of their children. However, due to the labour market imperfections, the higher prices which increase the value of marginal product could further induce household labour demand leading to more child labour. If the second channel of the income effect was true, we would expect child labour to be higher among farming households that own land. However, two results from Chapter 2 do not support these channels; (i) the total effect is positive, and (ii) the effect tends to be lower for landowning-farm households. Hence the most plausible reason for the results of the study is that the expenditure effect dominates the income effect, which means that households may be using the income from child labour to supplement income.

Theoretically, the chapter lends towards Basu and Van (1998) who argue that income/poverty constraint is the main cause of child labour. Empirically, whilst the study is corroborated by the result of Hou et al. (2015) and Bibi et al. (2010), our findings differ from the results of Edmonds and Pavcnik (2006) and Alessie, Baker, Blundell, Heady, and Meghir (1992) who find that the income effect of a higher price of rice (Vietnam) and cocoa (Côte D'Ivoire), respectively, dominates than the substitution effect.

The complex nature of child labour in terms of both causes and effects means that most public policies may directly or indirectly have an impact on child labour (Bhalotra, 2003). Indeed, the effect of public programmes on child labour has inspired several theoretical and empirical studies in development economics (see Dammert, de Hoop, Mvukiyehe, and Rosati (2017) for a survey of the literature). Following this strand of the literature, Chapter 3 examined the effect of an agricultural input subsidy program on child labour in Africa.

The topic of Chapter 3 was selected to show how a policy response to food price surges could have an unintended effect on child labour if not planned and implemented well. Using an individual level panel data from Malawi, I show in this chapter that agricultural input (fertilizer and improved maize varieties) subsidy could have a significant effect on child labour. The major findings of this study are (i) children from households that receive subsidized inputs are more likely to engage in child labour. The results are significant for both agricultural work and non-agricultural work. The chapter further shows that children, as young as 5 to 13 years, may be involved in farm activities like land preparation, weeding and fertilizer application.

Considering the significant effect of the program on child labour, if policy makers do not make a deliberate attempt to make the program more sensitive to child labour, the future of the children in recipient households may be adversely affected. Relating child labour to its effects on educational outcomes and human capital development, the results of the study suggests that even though there may be a marginal increase in the incomes of poor farm households in the interim, these households have a potential risk of living under a vicious cycle of poverty because future members may not be very productive. There could be health implications, especially for the young children who directly work in the application of chemical fertilizers. A way to mitigate the child-labour effect of the programme is to select program beneficiaries based on desirable academic indicators like school enrolment and retention, and most importantly, the performance of the school-going child in the households. This will not only ensure that the immediate aims of the program are achieved, but it will also guarantee the future of these children and by extension the ability of their households to escape poverty in the long run.

Finally, in Chapter 4, I evaluate the effect of subjective poverty on child labour. In this chapter subjective poverty is measured by the self-assessed comparison between the household on the one hand, and its friends and neighbours on the other hand. Very often economists model child labour as a function of

absolute poverty/income or their correlates. However, emerging evidence shows that household decisions on resources allocation and child labour may depend on factors other than monetary poverty. This may explain why child labour seems to persist despite a reduction in absolute poverty in some countries. The chapter bears direct relevance to the central theme of the thesis since both food price shocks and the distribution of input subsidies could have a direct impact on subjective poverty.

The results show that children from households that feel poor compared to their friends and neighbours are more likely to engage in child labour. We further find that the effect of subjective poverty is lower among households that are richer in monetary terms. In the broader theme of this thesis, the observed results in Chapter 4 could re-enforce the effect of higher food prices and the input subsidy program. For instance, Alem and Köhlin (2014) find that higher food price could reduce subjective well-being. This means that aside from the direct impact of higher food prices on child labour, it effects on subjective well-being could worsen the child labour problem in the affected countries. In a similar vein, Chirwa et al. (2011) find that the input subsidy program in Malawi has a significant effect on subjective well-being such that households which receive the inputs consider themselves well-off in comparison to non-recipient household. Thus, by extension, their results further show how distributing inputs to political cronies and the already worthy farmers could further worsen child labour.

5.2. Policy Implications

The findings of this study have policy implications in terms of the design and implementation of mitigating measures against food price changes and agricultural policies in general. To begin, the results show that the effects of higher food prices go beyond its immediate impact on expenditure and by extension poverty level. The thesis has demonstrated that households, in addition to other things, may

increase the supply of child labour because of higher food prices. The results of Chapter 2, therefore, is supported by other empirical findings that income from child labour constitutes a significant proportion of household income, especially in times of adverse economic shocks. The bigger question, therefore, is whether a total ban on child labour will enhance or further diminish the welfare of households in such times. In situations like this different policy options are available, and each choice must be weighed vis-a-viz the pro and cons. For some of these children and their families, a total ban on child labor will significantly reduce household income such that these children may have to drop out of school. In this case, policymakers must devise instruments that will optimise children's education without necessarily putting a total ban on child labour.

The first policy option is based on the luxury axiom of Basu and Van (1998). Policy makers could give subsidies and tax rebates that ensure that food prices are within the reach of the poor and the vulnerable. This will ensure that the higher food prices do not cause household consumption to fall below the level of subsistence. However, apart from the high cost to the already constrained government budget, such a policy may not be very effective, and may not provide a lasting solution. Indeed, some countries in SSA adopted variants of this option with varying degrees of success. However, assessments of their effectiveness in protecting poor households against food price hikes has shown that such an approach has been less effective. The ineffectiveness is attributed to the fact that such subsidies did not target the right households and food items (World Bank, 2012). Thus, given the findings of Chapter 2, Bibi et al. (2010) and Hou (2015), one can conclude that this approach may not be an effective option in combating the child-labour effects of increased food prices. Targeted food subsidies could even worsen child labour among poor households because of the price distortions that may be associated with it. Such subsidies usually affect imported cereals to the disadvantage of locally produced staples, hence the demand for the products of small-scale farmers may even fall due to the subsidies.

The foregoing means that some factors must be considered if subsidies to curb the effect of food prices on child labour are to be effective. It is important that policy markers pay attention to the heterogeneous effects of the problem. The analysis shows that landless-agricultural households, and poor households, in general, are more likely to suffer the child-labour consequences of a food price surge. As a result, food subsidies should target food items that constitute the average basket of poor households. This would ensure that households who benefit from the policy are those who really need it. Even with this, governments should ensure that the relative prices of domestically produced goods do not increase excessively since this may re-enforce the child-labour effect of higher food prices.

Another popular policy option entail providing subsidized inputs to farmers as a lasting solution to curb the re-occurring food price shocks and low production (Abbott & de Battisti, 2011). The effect of this on child labour was studied in Chapter 3. The chapter argued that if the market for agricultural labour is underdeveloped or does not exist in most SSA countries, the provision of subsidized input to poor farmers may be a potential source of increased child labour. This assertion is shown by the results of the empirical analysis. The fact that even relatively richer farmers (those who cultivate more than 2 acres of land) tend to engage in child labour when they receive inputs shows that unless labour saving inputs are also provided, the mere provision of labour-augmenting inputs like fertilizer and improved seeds could worsen the child labour situation among small-scale farmers. To reduce the child-labour effects of the input subsidies, two policy directives are deduced from the findings of Chapter 3. First, the government could ban the use of child labour among beneficiary farmers. However, this option is likely to fail since the evidence shows that such laws and regulations have largely failed to eliminate child labour. In this case, regulation may be difficult to endorse because of the *agency* problem. It will be difficult to expect adult household members/parents who demand the services of the children on farms to respect this directive in the absence of an external monitor/supervisor.

Aside, this policy option raises the debated question of whether a total ban on child labour will enhance or diminish the welfare of these households. From all indications, farm households may suffer significant welfare losses if there were a total ban on child labour.

However, I tend to favour a second alternative which can present a situation where everyone benefits, the household achieves sustainable livelihood without negatively affecting the child's human development. This is to condition subsidies, cash transfers and input, on desirable outcomes like school enrolment, and if possible, the academic performance of the children. The added-advantage of this alternative is that such outcomes are easily verifiable at a minimal extra cost to the subsidy program. Prospective beneficiaries could be asked to present the report cards of their wards as a condition precedent to subsequent benefits. This could also solve the *agency* problem since the schooling outcomes of the child become part of the immediate needs of the households. Parents may, therefore, make efforts to ensure that the type of tasks allocated to children are age appropriate and do not interfere with the educational progress of the child.

5.3. Suggestions for Future Research

This dissertation has analysed the effects of recent economic happenings in SSA on child labour. The analysis and results of the dissertation suggest possibilities for additional research. In Chapter 2, our findings suggest that food prices have a positive effect on the incidence of child labour. The first policy-relevant question from these results is, what are available means to reduce the child labour impact of higher food prices. Theoretically, Dwibedi and Chaudhuri (2014) suggests that direct cash transfer may be an effect policy to reduce child labour among poor households. However, even though the effect of direct cash transfers on child labour has been studied, to the best of my knowledge there has no empirical study that tests the proposition of this theory in the face of economic shocks like

the 2008 food price hikes. It will, therefore, be worthwhile for future research to study the efficacy of direct cash transfers as means to eliminate the effect of higher food prices on child labour.

The effect of food price changes on child labour has been the subject of different research studies for a long time. The results from these studies, including ours in Chapter 2, show conflicting results. A clear limitation of our study is the focus on a single country. This is partly due to time and cross-country data constraints. Further evidence from different developing countries may, therefore, help to see how the results of our study generalize. This will be particularly helpful in policy making in Africa where the heterogeneous nature of the countries makes it very difficult to generalize results from one country.

To provide an assured means to cope with changes in food prices, it will be interesting to know if households are willing to buy an insurance policy against food price shocks. Therefore, research in this regard to ascertain the willingness to buy an insurance policy of this kind could provide valuable information for our ability to design effective policies to deal with future occurrence of the problem.

In Chapter 3, we show that children in input receiving households are more likely to engage in child labour than their counterparts in households that did not receive any inputs. However, another study suggests that school enrolment tends to be higher among children in recipient households. In the context of an African country, these conflicting results are not surprising since children normally combine schooling and some form of work to support their family and to take care of their school bills. However, these results provide the basis for research into the academic performance of these children. Indeed, school enrolment does not necessarily lead to better performance and higher achievement neither does child labour necessarily result in poor academic performance, therefore, such a study will help provide the missing link between the policy and human capital development of the children in these countries.

We also find evidence of children engaging in fertilizer application. We argue that such children stand the risk of chemical absorption. If our assertion is true, then this has serious health consequences for these children. However, a study of the actual chemical effect of the policy on children falls beyond the scope of this work. The results, however, suggests the need for a more comprehensive study on the level of chemical contamination suffered by these children and health implication associated with their handling of chemical fertilizer.

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Eidesstattliche Erklärung

Hiermit erkläre ich eidesstattlich, dass ich die vorliegende Arbeit selbständig angerfertigt habe. Die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht. Die Arbeit wurde bisher keiner anderen Prüfungsbehörde vorgelegt und auch nicht veröffentlicht. Ich bin mir bewusst, dass eine unwahre Erklärung rechtliche Folgen haben kann.

Bayreuth, den July 23, 2019

Raymond Boadi Frempong

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