The Effect of Food Price Changes on Child Labour: Evidence from Uganda*

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October 27, 2016

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 price affects both their revenue and expenditure and thereby their labour decision. Using the Uganda National Panel Survey and monthly food prices, this paper examines the effect of exogenous changes in food prices on child labour. The econometric evidence shows that increase in food prices leads to 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 will have a longer lasting effect on human capital development and poverty of poor households in developing countries because of its effect on child labour.

Keywords: Child labour; Exogenous shock; Food price; Uganda.

*We are grateful to the participants at the 22ND BPGE conference and the internal research seminar of the Economics Department, University of Bayreuth for their helpful comments.

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1. INTRODUCTION

The International Labour Organization (ILO) estimates that about 168 million (about 11 percent of children worldwide) children engaged in child labour in 2012 (ILO, 2015). The report puts the number of children in hazardous work at 85 million. The incidence of child labour varies across regions with sub-Saharan Africa having the highest incidence rate of more than 20 percent (United States Department of Labor, 2015). These children risk adverse effects on their health, safety and mental development leading to lower educational achievements and human capital development (Baland & Robinson, 2000; ILO, 2015). Generally, poverty is seen as the leading determinant of child labour (Dessy & Pallage, 2001); and child labour itself can cause poverty. Hence, child labour and poverty may have a ratchet relationship; children from poor households are likely to remain poor because they failed to acquire the human capital needed to escape poverty (Edmonds, 2003). Given this relationship, an exogenous event that increases poverty may also indirectly increase the incidence of child labour.

The poverty-child labour relationship means that an increase in food price may affect the incidence of child labour. This claim is supported by empirical studies that have found that income shocks affect child labour (Hou, Hong, & Scott, 2015; Bandara, Dehejia, & Lavie-Rouse, 2015; Beegle, Dehejia, & Gatti, 2006). However, it is intuitively difficult to see the direction of the effect of food price changes on farm households. This is because agricultural households will either benefit, or lose from a rise in food prices depending on their net market positions. When the household's expenditure increases relative to its income because of higher food prices, its coping strategy is contingent on such factors as access to credit, availability of buffer stocks, initial endowment and government policies. Hence, a second strand of the literature argues that the effect of food prices on household welfare, including child labour, could be either positive or negative. Experience from the price boom of Quinoa shows that the welfare effect of rising food prices depends on the ability of small-scale farmers to respond competitively[1].

Identifying the causes of child labour is important, particularly, for most African countries due to its long-term impact on human capital and economic development. It is not only a relevant indicator of the current well-being of the child and her family, but it also determines her future income and vulnerability to poverty. Therefore, identifying both the immediate and remote causes of child labour is important for the effectiveness of education and poverty reduction policies. In spite of the importance of the subject, empirical studies on the effect of a rise in food prices on child labour are relatively limited. In this paper we analyze the effect of changes in food food prices on child labour in Uganda. We make a further contribution to this growing literature by dealing with the potential endogeneity that may bias the impact of food prices.

Using international food prices as instruments for domestic prices in Uganda, the findings of this paper finds a positive impact of an increase in food prices on both the incidence and the intensity of child labour. The impact is found to be smaller among land-owning households. This is a suggestion that land ownership could be an important mitigating factor against the effect of food prices. The remaining of the paper is organized as follows: a review of the

[1]At the onset of higher prices, Quinoa farmers in Peru had a 46 percent increase in household expenditure between 2004 and 2013. However, these same farmers experienced a fall in their expenditure (welfare) when large-scale farmers, both within Peru and outside, began to grow and supply Quinoa on a commercial basis (The Economist, May 21, 2016).

literature is presented in Section 2, Section 3 presents methods of the study. In Section 4 we present the main findings of the study whilst Section 5 presents discussion and conclusion of the main findings of the study.

2. LITERATURE REVIEW

This study relates to several strands of literature. First it relates to the literature on permanent income hypothesis and consumption smoothing. During periods of expenditure distress, a household resorts to credit or buffer stocks to smoothen its consumption (Sirisankanan, 2015). With limited access to credit and lack of buffer stock, the household may increase it labour supply in order to cope with the shock (Chaudhuri & Ravallion, 1997; Morduch, 1995). Depending on the circumstances and the existing time allocations, this additional labour supply could involve child labour.

Most of the empirical studies on child labour have two important underlying assumptions. First, the luxury axiom - which stipulates that a household sends its child to work only when poverty forces it to do so. That is, the household considers the child's leisure and education as luxury goods (Basu & Tzannatos, 2003). Following from this assumption, parents are modelled as altruistic agents who would keep their children out of work as long as income levels are high enough. It also means that parents derive dis-utility from child labour and would want to minimize this, unless they are compelled by adverse economic circumstances. Studies that have found evidence to support this assumption include (Edmonds, 2003; Grootaert & Patrinos, 2002; 1999). Empirical studies have found unfavorable production, health and economic shocks to increase the probability of child labour (Bandara et al., 2015; Dillon, 2013; Guarcello, Mealli, & Rosati, 2010; Kruger, 2007; Beegle et al., 2006). Given this idea, we may expect higher prices to affect child labour through its effects on household income and expenditure. If higher food prices pushes the household below the poverty line, then child labour may be one of the option available to the household to deal with the adverse shock to expenditure.

The second assumption considers adult and child labour as substitutes where the productivity of child labour is relatively smaller than adult labour. Proponents of this assumption argue that adults are at least better skilled than children, thus it is technically optimal to employ only adults (Basu & Tzannatos, 2003). However, because adult wages are relatively higher than that of children, firms may combine both adult and child labour. For example, in the carpet weaving industry in India, children are employed because their wage rate is lower than adults' (Levison, Anker, & Barage, 1998). Thus households may prefer child labour because of the higher direct and supervision costs of hiring adult labour. Hence, even if households have the ability earn higher income from food prices, there is still the potential for child labour to increase because the household may find it cheaper to employ domestic labour.

Following the 2008 and 2010 episodes of food price hikes, a number of studies have examined the impact of changing food prices on household welfare including child labour (Hou et al., 2015; Warr & Yusuf, 2014; Bibi, Cockburn, Coulibaly, & Tiberti, 2010). Using the price of wheat as a proxy for food prices in Pakistan, Hou et al. (2015) found a negative effect on school enrollment, however, the effect on child labour was not significant. Bibi et al. (2010) also found that Malian households were more likely to withdraw children from school

and put them into economic activities due to high food prices. These findings suggest that households may be using child labour as a mitigating factor against food prices. Following the altruistic argument of Basu and Tzannatos (2003) it can be concluded that such households are constrained in terms of mitigating options against adverse economic shocks. However, this relationship is not linear (Hou, 2015; Bhalotra & Heady, 2003). What is peculiar about all these is studies is the use of a single commodity's (rice and maize) as a proxy the price of the average food basket. Using the price of a single staple crop can provide important insights, however, when household food consumption is made of more than one crop , which is likely to be the case for an average households, the errors produced by such an analysis can be considerably large (Ravallion, 1990). In this study, we use a more comprehensive measure of food price, which is the market price index of the food basket of the average Ugandan households. With this we are able to capture the general movement in food prices rather than a single commodity.

Studies on the impact of food prices on household welfare in Uganda have provided two conflicting conclusion. On the one hand, there is a minimal to positive impact of food prices on household welfare (Ulimwengu & Ramadan, 2012, Benson, Mugarurab, & Wandac, 2008). The authors attribute this to the fact that the average Ugandan diet is made up of mostly non-tradable crops; and the lack of a strong pass-through effect of world-to-local food prices (Campenhout, Pauw, & Minot, 2013; Benson et al., 2008). In contrast, Campenhout et al. (2013) and Simler (2010) found Ugandan households to have likely suffered welfare losses because of the rising food prices in the short run. Simler (2010) found that the incidence and depth of poverty increased by 2.6 and 2.2 percentage points respectively.

In respective of the outcome of the recent studies in Uganda, the theories reviewed suggest a possibility of higher child labour because of the increased prices. Even if households in Uganda are able to increase output to gain from the higher food prices (as suggested by Ulimwengu and Ramadan (2012)), their ability to do so without child labour depends on a such factors as ownership of land, an effective labour market, and agricultural wage rate. Landholding is particularly important in this context for two main reasons. First, land can be rented out to raise additional income, which reduces the need for additional income from child labour. Second, land could be used as collateral for credit instead of relying on income from child labour (Bhalotra & Heady, 2003). However, with labour market imperfections, as it is the case in most developing countries, landownership can also be a source of higher child labour during period of high food prices (Basu & Van, 1998; Bhalotra & Heady, 2003). Thus it is not clear how landownership will affect the relationship between higher food prices and child labour.

When there is limited market for agriculture labour, the household's capacity to expand output through hired labour is constrained, children are then used as substitutes. In the same regard, the absence of both formal and informal credit markets means that the household may fail to gain credit to purchase inputs. As a result, there will be a higher incentive to employ its own labour, including child labour, to expand output. The incentive to use children on farms tends to be greater among landowners because the marginal productivity of labour increases with land size (Bhalotra & Heady, 2003). Thus, how landownership affects the relationship between food prices and child labour can go in any direction, hence there is the need for for further empirical evidence. We investigate the moderating effect of land ownership on the relationship between food prices and child labour in this study.

3. METHODOLOGY

3.1. Overview of child labour and food prices in Uganda

Uganda has experienced steady economic growth in the last two decade (UBOS, 2014); however, this growth has not lead to a significant reduction child labour in the country. According to the Uganda National Household Survey (2009/2010) about 2.75 million children, aged 5-17 years, were engaged in economic activities; 51 percent of these children were involved in hazardous activities (UNHS 2009/10). Another report indicates that stone quarrying, brick making and laying, construction, sand and clay mining, commercial agriculture, charcoal burning, hunting and commercial fishing, petty trading, and commercial sexual exploitation are the predominant activities among child laborers (Ministry of Gender, Labour and Social Development, 2012; United States Department of Labor, 2015).

Among the leading causes of child labour in Uganda are rising poverty, inequality and HIV/AIDS (Guarcello, Furio, Breglia, & Ssennono, 2008). There also exist geographical differences in the distribution of child labour. About 42 percent of rural children are economically active compared to just 15 percent of urban children; economically active children are more concentrated in the Eastern, Central and Western regions (Guarcello et al., 2008). Most of the working children in rural Uganda are engaged in family work (97 percent), although some of the working children are also found in the manufacturing and and service sectors (Macro International Inc, 2011).

Aside rice and wheat, Uganda is nearly food self-sufficient in terms of its major staples. The country serves as a source of food imports for its east African neighbors, including Kenyan. Nevertheless, Uganda has experienced a steady increase in food prices consistent with what is observed on the international market (Ulimwengu & Ramadan, 2012). Between December 2008 and April 2009, the price of maize in Uganda increased by 2.1 percentage points over the average world market rate. In the same period, the prices of local staples (matoke[2], cassava, and sorghum) also increased (Ulimwengu & Ramadan, 2012). Changes in weather patterns, weakening currency and export of Ugandan foodstuffs to neighboring countries as well as higher fuel prices have been cited as some of the important causes of the rising food prices (Mbowa, Mawejje, & Kasirye, 2012).

3.2. Source of data and measurement of variables

Data for the analysis is drawn from the Ugandan National Panel Survey (UNPS) (2009/2010, 2010/2011 and 2011/2012) and the relevant monthly consumer price indexes reported by the Uganda Bureau of Statistics. The UNPS is a nationally representative panel, which is based on the World Bank's Living Standards Measurement Survey. The study tracked households and their members over the survey periods. The data contains detailed information on all the labour activities of household member in the last eight days preceding the survey, of individuals who were five years or older at the time of data collection. It also contains detailed questions on the economic and demographic characteristics of the household as well as some community level characteristics.

Following (CITE), we measure child labour with two variables: whether the child engaged in any economic activity during the reference period and the number of hours the child worked.

[2]Matoke is the local name for plantain.

This makes it possible for us to identify the impact on both the decision and the intensity of child labour. Our definition of child labour includes paid and non-paid work. We adopt this approach for two reasons. First, changes in food prices have a direct effect on child labour when the child is made to work for income because of the economic hardship. But there can also be an indirect effect when the child performs chores that were previously done by adults in order to release time for adults to earn more income. Therefore limiting the definition of child labour to only paid work will be too restrictive. Indeed, some of the domestic and farm work are sometimes done under hazardous conditions (Admassie, 2002). Our second reason, as also argued by Beegle et al. (2006) is that, the ILO defines child labour to include activities that are considered physically and mentally dangerous for the child. However, the data does not contain information to distinguish which activity is dangerous or not. To be consistent with the international definition of child labour, we study only children between 5 and 14 years old. We then restrict our sample to the children of whom there is information across the three waves of the UNPS (2009/2010, 2010/2011, 2011/2012). The set of question use in constructing the child labor variables are are provided in Appendix A2.

We constructed the cost of food from the Uganda Bureau of Statistics' (UBOS) monthly Consumer Price Index (CPI) report. This is computed for seven major markets in Uganda (Kampala, Jinja, Mbale, Masaka, Mbarara, Gulu and Arua). We merged these CPIs to households based on their proximity to a particular market and the month in which the questionnaire was administered. We do this, first, by generating the distance between a household and all the seven markets using the geo-coordinates of the household and the markets. 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).

3.3. Empirical model

In line with our objective of estimating the effect of food price changes in child labour, a binary variable is used to measure child labour decision and the number of hours the child worked to measure the intensity of child labour. We estimate the following baseline models in (1) and (2) using market reported food consumption price index as our measure of food prices.

$$Cl_{it} = \alpha_i + fcpi_{it}\Pi + ch'_{it}\Gamma + hh'_{it}\Psi + cm'_{it}\Phi + \epsilon_{it} \tag{1}$$

and

$$hours_{it} = \alpha_i + fcpi_{it}\delta + ch'_{it}\varphi + hh'_{it}\tau + cm'_{it}\gamma + \epsilon_{it} \tag{2}$$

where $fcpi$ is the market level price index of the average basket of food; ch is a matrix of the child's characteristics, hh and cm are matrices of household and community characteristics respectively; Cl is an indicator variable for child labour and hours is the number of hours 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 (1) and (2).

The aim of this paper is to identify the causal effect of exogenous food price increase on child labour. Our ability to interpret the observed coefficient as a causal effect hinges on the exogeneity of $fcpi$. However, under this setting $fcpi$ cannot be said to be exogenous. $fcpi$ is likely to suffer from measurement errors which can lead to endogeneity. It is also important to note that the decision to engage in child labour is made by adults. Hence unobserved

characteristics of the primary decision maker in the household can confound the effect of food price. For instance, depending on the intertemporal preference of income of the family head the effect of food prices on child labour could vary both within and across households over time. Therefore we need an empirical strategy that will enable us to identify the causal effect of $fcpi$.

The identification strategy adopted in this paper involves the use of instrumental variables (IV). However, for an instrument to be valid, it must satisfy the relevance and exclusion restriction conditions. The relevance of an instrument requires that the instruments we adopt correlate with $fcpi$. Exclusion restriction requires our instruments to affect child labour only through $fcpi$, or put differently; they should not correlate with the error terms in equations (1) and (2). We use international food prices as instrument for domestic food prices (see Smith, 2014). It is important to examine the IVs within the context of Uganda to ascertain their validity. First, we argue that changes in world food prices is exogenous because Uganda constitutes a negligible proportion of global food trade (Smith, 2014). Therefore it is unlikely for domestic events in Uganda to affect world food prices. International food prices can explain local prices in Uganda because the country is a net food importer. Additionally, Uganda serves as a source of staple food import for some of its neighboring in the East African Sub-region. Hence even though the country is landlocked, it is not entirely shielded from the happenings on the international food market. Indeed, even though 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 neighboring countries (Ulimwengu & Ramadan, 2012; IFPRI, 2008).

There is the issue of how to interpret the food price effect. A significant effect of $fcpi$ alludes itself to two margins: intensive margin if it causes already working children to remain in child labour or to work for more hours; extensive margin if it causes children who previously not active to work. It is important to identify which of these margins drives the observed results since it has policy relevance. If food prices affects child labour through the intensive margins, then children from poor households are more affected than richer households. We explore these interpretation issues by estimating the intensive and extensive margin effect of $fcpi$ based on whether the child worked or not in 2009/2010 sample. We, therefore, estimate equations (1) on (2) conditional on the child working or not in 2009/2010.

4. EMPIRICAL RESULTS

4.1. Summary and description of data

Table 1 shows the distribution of child labour between farm work and off-farm activities for the three periods. Also, the average working hours and the average FCPI are reported in Table 1 . Working on a family farm is the predominant work for children in Uganda. The proportion of children who worked on family farm during the study periods ranges from about 26 percent in 2009/2010 to 34 percent in 2011/2012. Table 1 shows that a small proportion of Ugandan children engaged in other work, and this figure consistently decreased over the years. In all, more than a quarter of children in Uganda worked in 2009/2010 while about a third of them worked in 2011/2012. Between 2009 and 2012 the FCPI increased from 68 to 249 percent. The table shows that both child labour and FCPI jointly increased over 2009 to 2012, this signals

a positive association between child labour and food price. Figure 1 presents this relationship graphically.

Table 1: Type of work, hours of work and food consumption price index in Uganda (2009-2012)

Year	Proportion of children in:			Av. Hours (all children)	Ave. hours (working children)	Mean FCPI
	Family Farm	Other Works	All			
2009/2010	0.261 (0.008)	0.036 (0.004)	0.273 (0.008)	2.660 (0.133)	9.756 (0.380)	168.151 (0.167)
2010/2011	0.330 (0.009)	0.025 (0.003)	0.323 (0.009)	3.125 (0.132)	9.676 (0.311)	226.045 (0.524)
2011/2012	0.337 (0.009)	0.020 (0.003)	0.333 (0.009)	3.035 (0.130)	9.123 (0.305)	249.426 (0.377)
All years	0.309 (0.005)	0.027 (0.002)	0.309 (0.005)	2.940 (0.076)	9.501 (0.190)	214.541 (0.436)

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 1 shows an upward trend of food prices in a way that is consistent with movement of international food prices. We also observe that the price of the overall consumption basket (the CPI) has been increasing since 2008. The right panel of Figure 1 plots annual average FCPI and the percentage of child labour during the same period in our sample. The observed trend in Figure 1 provides the motivation for further empirical analysis to estimate the impact.

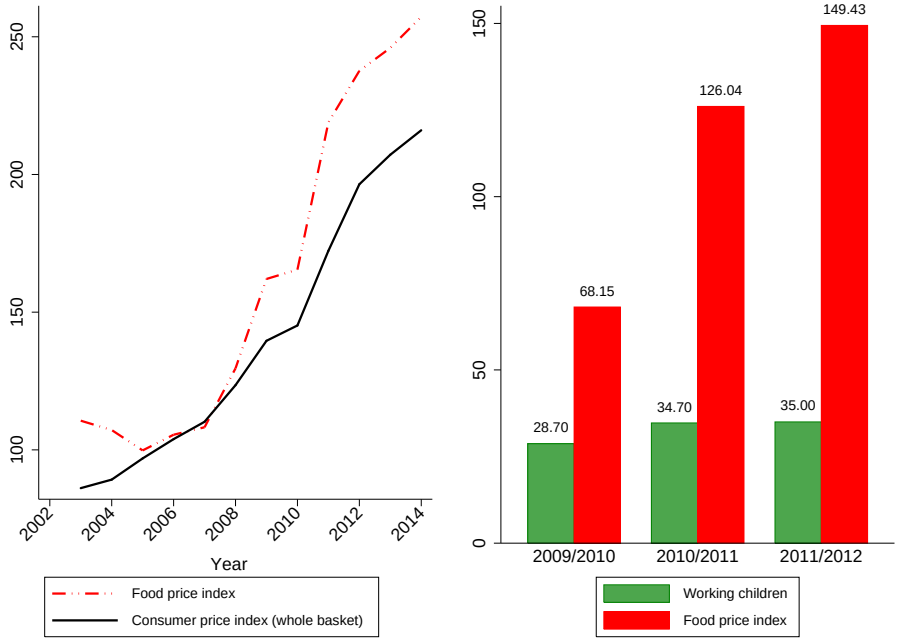

Figure 1: Child Labour and Household Net Market Status

Table 2 shows the prevalence of child labour for some child and household characteristics.

As expected, older children have a higher tendency to work than younger children, so do male children as compared to their female counterparts. The table indicates that the proportion of working children in female-headed households is higher than in male-headed households. This pattern is confirmed by the findings in the literature that female-headed households are more prone to poverty, hence children from such households have higher tendency to work. On the relationship between land ownership and child labour, we observe in Table 2 indicates that child labour increases with landownership. This relationship shows an apparent paradox of wealth, which may be due to labour or credit market imperfections (Basu & Tzannatos, 2003; Bhalotra & Heady, 2003). The empirical literature has not produced a conclusive finding on the effect of land ownership on child labour. We explore the moderating effect of landownership on the relationship between food prices and child labour in the empirical analysis.

Table 2: Labour participation rate of children in Uganda by age, gender and household land ownership status

	2009 - 2010		2010 - 2011		2011 - 2012	
	Mean	SE	Mean	SE	Mean	SE
Age of child						
5-9 years	0.169	0.009	0.171	0.010	0.167	0.011
10-14 years	0.447	0.016	0.486	0.014	0.435	0.012
Gender of child						
Females	0.253	0.012	0.310	0.013	0.311	0.013
Male	0.292	0.012	0.335	0.013	0.353	0.013
Household head						
Female	0.282	0.017	0.357	0.018	0.369	0.018
Male	0.270	0.010	0.310	0.010	0.320	0.010
Household own land?						
Yes	0.298	0.010	0.330	0.010	0.343	0.010
No	0.155	0.016	0.280	0.022	0.260	0.024
Total	0.273	0.008	0.323	0.009	0.333	0.009

Note: SE=Standard error

4.2. Baseline results

Table 3 reports the findings of the empirical models presented in equations (1) and (2). In all specifications we control for season, year and region fixed effects, household characteristics, as well as observable characteristics of the child (A full list of the independent variables are present in Appendix A1). We proceed by testing whether the effect we find is driven by changes in the general cost of living or just by changes in food prices. To do this we omit the prices of other components in column 1 to see how the effect of food price will change after they re-introduced into the subsequent specifications. Comparing the coefficient in column 1 to its counterpart in column 2 shows that effect of food price is robust to changes in the general cost of living, however, the specification without other prices seem smaller. In general, Table 3 shows that increase in food price has a direct effect on the decision to participate in child labour and the number of hours the child works. From the fixed effect model a percentage increase in food price is associated with an increase a .425 increase in the odds that the child will work and an additional 2 hour of work.

Table 3: Effect of food prices on child labour

	(1)	(2)	(3)	(4)	(5)
		RE		FE	
	Worked	Worked	Hours	Worked	Hours
Log of food price index	3.20***	4.29***	2.80***	4.25***	2.15*
	(1.20)	(1.76)	(1.03)	(1.74)	(1.26)
Other prices	No	Yes	Yes	Yes	Yes
controls	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes
Individual Fixed effects	No	No	No	Yes	Yes
N	8286	8286	8286	8286	8286

Note: (#) Standard errors; * $p < .1$, ** $p < .05$, *** $p < .01$. Coefficients in columns 1,2 and 4 are the odd ratios of engaging in child labour. Additional control variables: child's age and the square term, child sex, schooling status of the child, age of household and the gender, presence of the father and presence of the mother in household, average years of schooling of adult household members, household adult equivalence, net market status of household, log of household real expenditure, household asset index, number of members who were ill, number of wage employees in household, household ownership of land, season of data collection and location fixed effects(urban/rural).

Instrumental variable (IV), Tobit and double-hurdle estimates

In Table 4 we present the result of the instrumental variable estimations. We used the fourth and fifth lags of the IMF's monthly international food price index as instruments for domestic food price index in Uganda. Assessment of the first stage results show that the instruments correlates with domestic food prices. The diagnostic test in Table 4 show that the instruments performs favorable against the traditional test of weak identification, the Hansen J test of overidentification and the underidentification test. However, we note 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. Thus, the lack of a true panel instrument explains why the estimates in Table 4 appears to be relatively lager than those in 3.

From the fixed effect estimates, an increase in food price cause the the number of hours a child works to increases by 0.855 hours (5 minutes). This means that the instantaneous effect of food price increase on household expenditure may be higher than the income effect, such that the household is forced to seek extra income from the supply of child labour. We reason that this is the most plausible channel since Uganda is a net importer of food, hence the net effect of a rise in international food prices on local households will be welfare reducing. Children in most cases are forced to work to support household income during periods of economic hardships (Admassie, 2002). Due to the proportion of household expenditure that goes into food purchases, food inflation presents a major shock to income. This finding, therefore support that the idea that when households may then resort to child labor as a survival mechanism when hit by external adverse shocks that pushes them below the poverty line or that threaten their subsistence. Thus, short term survival may be the driving motivation for household to increase child labour during period of food inflation. In Uganda this may be re-enforced by the increasing opportunity cost of child's leisure and school expenditure because of the higher food prices; then parents prefer current income from the child's labour to her future income. Given

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

In addition to our hypothesis, we found that average years of schooling of adult household members has a negative effect on child labour. This result is an indication that households with educated adults are more aware of the negative consequences of child labour, and are prepared to forgo the current gain from it to maximize the child's future earnings. The negative effect of education on child labour indicates that promoting education can be a effective means of reducing child labour. We also find that both the incidence and intensity of child labour rise as the level of household dependence on purchased food increases. This finding means that children from net food buying households are likely to engage in child labour since the expenditure effect is higher among these households. Household ownership of an asset reduces the incidence and intensity of child labour. This finding is consistent with the argument that child labour becomes the last resort in the absence of asset and any form of collateral security (Basu & Tzannatos, 2003). Conversely, this study finds that the prevalence of child labour is higher among landowning households.

We estimate separate individual fixed effect models for girls and boys using the same specifications and instruments. The results, in columns 5 to 8, show that a rise in food price causes boys to work for more hours than girls. This differing impact for boys and girls is a reflection of the fact that child labour in Uganda is predominantly an agriculture phenomenon where the marginal product of boys tend to be higher than girls. Hence there is greater motivation for households to employ more boys than girls.

In columns 9 and 10 of Table 4 we explore the truncated nature of child labor hours using the Tobit estimator and the panel-hurdle estimator (Engel, Moffatt, et al., 2014; Dong & Kaiser, 2008; Cragg, 1971). The double-hurdle estimator assumes that the participation decision is determined by two process (hurdles): whether the individual is a zero type or not is determined by the first hurdle and then the second hurdle determines the extent of participation contingent on the individual not being a zero type (Engel et al., 2014). This feature of the estimator implies that those who reported zero hours of child labor can be categorized into two types: those who will never participate in child labor irrespective of the economics circumstances; and those who report zero because of their current circumstances. In this case the OLS and Tobit estimators are likely to produce biased estimates of the effect we seek. We apply the bootstrap version of the estimators because the data set has only three time period which does not permit the use of the parametric version of the estimator. Following (Engel et al., 2014), we match the panel structure of the data by clustering around individual children and drawing successive sample from these clusters. The results from the Tobit estimate in column 9 shows a positive effect of food prices on child labour hours. Similarly,the double hurdle estimate in column 10 confirms the positive effect of food price on child labour.

Table 4: Effect of food prices on child labour-IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	RE		FE		Girls - FE		Boys - FE		Tobit	DH
	Worked	Hours	Worked	Hours	Worked	Hours	Worked	Hours		
Log of food price index	0.46***	10.54***	0.20	8.55***	0.10	8.21**	0.29	9.24**	0.23***	10.17***
	(0.15)	(2.33)	(0.18)	(2.75)	(0.26)	(3.49)	(0.26)	(4.27)	0.06	(2.97)
Other prices	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
N	8286	8286	8286	8286	4052	4052	4232	4232		9286
Under ID			826.31	826.31	412.97	412.97	412.68	412.68		
			[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]		
F-stat of Weak ID			528.28	528.28	262.42	262.42	261.03	261.03		
Over ID			0.80	0.07	0.00	0.75	1.52	0.15		
			[0.37]	[0.78]	[1.00]	[0.39]	[0.22]	[0.70]		
Inverse Mills ratio										18.92
										[0.02]

Note: (#) Standard errors; [#] p-values; * $p < .1$, ** $p < .05$, *** $p < .01$. LPM in columns 1, 3, 5, and 7. Lags of international food price index. The same controls in Table 3 are used. Tobit estimates of column 9 is the marginal effect of predicting positive working hours. DH=Bootstrap estimate of Double. Bootstrap results from 1000 repetitions.

4.3. Robustness checks

The results we have shown is 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. In this section we present additional robustness checks.

(i) *Lags of food prices*

The results in Tables 3 and 4 implicitly assume that the household responds to changes in food prices instantaneously. This assumption may not hold since there may be time lags before households re-adjust their labour allocations to contain food price changes. This rather strict assumption is relaxed in Table 5. We reason that the effect of food price could differ depending on the time horizon, we take account of this by including measures of the short to long-term effect of food price. The short-run effect is captured by the current price and one month lag of food price, medium term is captured by the average of two to four month lags the long-term effect by the average of five to seven months lags. 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.

The inclusion of the lagged terms reduce the level effect observed in Table 3 to insignificant. However, the conclusion drawn in terms of the short-run effect remains, through the significance of the first lag. Thus, even though the results show that there is a time lag of one month before the effect of food price on child labour is felt, the effect, nevertheless, is positive in the short run. However, in the medium term, a rise in food price reduces child labour. This is an indication that the income effect of a rise in food price is slower, with time lags. Food price changes induce both expenditure and income effect on the household. The expenditure effect is the immediate reduction in the purchasing power of income so that the household needs more income to maintain the same consumption level. The income effect

come from two different sources. First, households can increase their production because of higher food prices. But for reasons such as higher input prices, time lags between planting and harvesting, the production response is likely to be slower than the consumption adjustments leading to a short-term reduction in household welfare. The other channel through which higher food prices affect household income is it's effect on wages, again this also usually happen with time lags (Mghenyi, 2009). 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.

The inclusion of the lag terms in Table 5 shows that it takes approximately one month for the effect on child labour to be realized. However, the main conclusion drawn regarding the short-run effect in Tables 3 and 4 largely remains the same. Our measure of the medium-term effect shows that higher food prices leads to a fall in child labour after 2 to 4 months of the initial price increases. This indicates that the income effect may be higher in the medium term reducing the need for additional income from child labor. This means that the short-run positive effect could be a short term coping strategy. But we note that the absolute effects of the two to four months average term is lower, except column in 4, than those of the first lag. This means that the reducing effect will not be large enough to offset the increasing effect a rise food price has on child labour. The total effect will, therefore, be positive.

Table 5: Effect of food prices on child labour-With lagged terms

	(1)	(2)	(3)	(4)
	RE		FE	
	Worked	Hours	Worked	Hours
ln food price index	0.07	-0.44	0.11	3.18
	(0.12)	(1.85)	(0.14)	(2.04)
Lag 1	0.38***	4.40**	0.35**	3.76*
	(0.13)	(2.13)	(0.15)	(2.13)
Average of lags 2-4 months	-0.24**	-1.00	-0.49***	-6.88***
	(0.11)	(1.76)	(0.13)	(1.96)
Average of lags 5-7 months	-0.10	-1.01	0.20	1.62
	(0.09)	(1.46)	(0.12)	(1.99)
Other prices	Yes	Yes	Yes	Yes
controls	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Individual Fixed effects	No	No	Yes	Yes
N	8286	8286	8286	8286

Note: (#) Standard errors; * $p < .1$, ** $p < .05$, *** $p < .01$. The same controls in Table 3 are used Lag 1= 1 month lag of food prices: Average of lags 2-4 months= average of the second to fourth lags; and Average of lags 5-7 months=average of fifth to seventh lags

(ii) *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 by causing non-working 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 price rise. For instance, if the effect

only works through the intensive margin, then poorer households disproportionately suffer from price increase since the literature has established that poorer households tend to engage in child labour. In this case, a rise in food price deepens the depth of poverty. However, if the relationship only works through the extensive margin, such that children who previously did not work are made to work now, then a rise in food price widens 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 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. Table 6 shows that the likelihood that these children will work increases by 0.004 percent for every percentage increase in food price. On the intensive margins, the number of hours worked in the subsequent periods by children who worked in 2009/2010 was used and the results show that such children tend to work for .085 hours more for a percentage increase in food price. Hence an increase food price deepens and widens poverty in Uganda.

Table 6: Extensive and Intensive Margins Effect of Food Price on Child Labour

	(1) Extensive Margin	(2) Intensive margin
ln food price index	0.35***	8.50***
	(0.06)	(2.19)
Other prices	Yes	Yes
controls	Yes	Yes
Region fixed effects	Yes	Yes
Individual Fixed effects	Yes	Yes
N	4016	1502
Under ID	244.37	89.31
	[0.00]	[0.00]
F-stat of Weak ID	121.16	43.23
Over ID	2.01	8.53
	[0.37]	[0.01]

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

(iii) *Interactions effects of land ownership and number of employees*

Following the literature (Hou et al., 2015; Basu, 2006; Bhalotra & Heady, 2003; Basu & Van, 1998) on household asset ownership and child labour, we set up to examine how the household's ownership of land moderates the causal effect of food price on child labour. In Table 7 we interact landownership with food price. First, the effect of food price on child labour is lower for landowning households than non-landowning households. The results also show that the significance of land ownership is driven by the level of food prices. 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 either

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

Because a rise in food prices can induce wage increase (both agriculture and non-agriculture), it is important to control for the compensating effect of the higher wages that is caused by the increasing food price. We controlled for the effect of wage in Table 3. In Table 7 we take this argument further by interacting the number of wage employees with food price. The rationale is that, even though we do not directly observe wage rate in our data sets, the number of household members who are engaged in paid employment is a good proxy for the household's wage earnings. Table 7 show that the effect of a food price rise is lower for a household with a higher number of wage earners. The result is robust to the inclusion of the average education level of the household members.

Table 7: Effect of food prices on child labour

	(1)	(2)	(3)	(4)
	Land		Employee HH Members	
	Worked	Hours	Worked	Hours
Log of food price index	0.49**	9.04***	0.33*	10.52***
	(0.22)	(3.43)	(0.19)	(2.81)
HH own land	1.32***	-1.82	0.03	0.18
	(0.45)	(8.40)	(0.02)	(0.33)
Num. of employees	-0.00	0.06	0.32**	4.87*
	(0.01)	(0.12)	(0.15)	(2.62)
Food price*land	-0.24***	0.37		
	(0.09)	(1.57)		
food price*employees			-0.06**	-0.90*
			(0.03)	(0.49)
N	8286	8286	8286	8286
Under ID	812.19	812.19	819.09	819.09
	[0.00]	[0.00]	[0.00]	[0.00]
F-stat of Weak ID	260.85	260.85	265.31	265.31
Over ID	1.27	0.48	1.38	0.70
	[0.53]	[0.78]	[0.50]	[0.71]

Note: (#) Standard errors; [#] p-values; * $p < .1$, ** $p < .05$, *** $p < .01$. Interaction terms are instrumented with the interaction of the respective variables and international food prices. The same controls in Table 3 are used.

5. CONCLUSION

Global food prices increased in 2008 and 2010 on both domestic and international markets. The effect on household welfare, according to some studies, has been mainly adverse among farming household in developing countries. This forces the household to adopt measures to increase it's income; these measures may include child labour. Motivated by the likely impact of child labor on human capital and development and poverty, this study has evaluated the

impact of changing food prices on child labour. We carry out the analysis using data sets from Uganda, one of the countries with high incidence of child labour in Sub-Saharan Africa.

In summary, we find that a rise in food price increases both the incidence and intensity of child labor in Uganda. Besides, boys tend to work for more hours than girls. Additional analysis also show that the effect is smaller for children in landowning households, and for those in households with wage earners. Thus, landownership serves as a critical buffer to mitigate the effect of rising food prices. The study reveals that higher food prices affect child labour on both the extensive and intensive margins. This an indication that both the rich and the poor may be adversely affected by higher food prices.

The policy implication of the findings of the study is that a rise in food price can have a long-lasting effect on human capital through its impact on child labor. This will indirectly reduce the effectiveness of poverty reduction programmes, and also affect the chances of these children to escape poverty in the future. Hence, programs that aim at alleviating the impact of food prices should be comprehensive enough also deal with its long-term impact on child labor. In doing so, policy makers should consider the socio-economic circumstances of households in order to directly address their specific needs. For instance, 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.

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APPENDIX

Table 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

Table A2: Questions used to construct the child labor 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 house-hold 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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