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

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

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Abstract

A majority of 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 as well as expenditure, and thereby their labor market decisions. Using the Uganda National Panel Survey and monthly regional food prices, this paper examines the effect of exogenous changes in food prices on child labor. The econometric evidence shows that an increase in food prices leads to an increase in the probability and intensity of child labor. We find the effect of food price increases to be smaller among landowning households, which is consistent with the view that landowning households can better compensate for price shocks. The results suggest that periodic shocks in food prices may have longer lasting effects on human capital development and poverty in developing countries.

JEL-Classification: O12, Q18, J20
Keywords: Development; Child labor; Exogenous shock; Food prices.

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1. Introduction

In 2012, over 168 million children were engaged in child labor, corresponding to about 11 percent of children worldwide according to the International labor Organization (ILO, 2015).[1] A significant amount of child labor is employed in sub-Saharan Africa which has the highest incidence rate of more than 20 percent (USDOL, 2015). Generally, extreme poverty is often seen as a leading determinant of child labor (see, e.g. Carpio, Loayza, & Wada, 2016; Dessy & Pallage, 2001; de Carvalho Filho, 2012; Edmonds, 2003; Hazan & Berdugo, 2002) and adverse income shocks affect child labor (see Beegle, Dehejia, & Gatti, 2006; Bandara, Dehejia, & Lavie-Rouse, 2015 Hou, Hong, & Scott, 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 labor. However, developing countries are also characterized by a high fraction of agricultural households which could as suppliers of commodities benefit from an increase in food prices (World Bank, 2007). Hence, the effect of a food price increase on child labor is, essentially, an empirical question.[2] The present paper contributes to analyzing the effects of exogenous food price changes on the probability and intensity of child labor with an individual-level panel data from Uganda from 2009 to 2012.

Identifying the causes of child labor is highly relevant, particularly, due to potential long-term impact on economic development. Child labor is not only a relevant indicator of the current well-being of the child but it also determines its future income and vulnerability (Baland & Robinson, 2000; Horowitz & Trivitt, 2007; ILO, 2015). These children risk adverse effects on their health, safety and mental development, potentially leading to lower educational achievements and human capital (Baland & Robinson, 2000; Emerson, Ponczek, & Souza, 2017).

The main empirical results of our paper suggest a positive impact of an increase in food prices on both the incidence and the intensity of child labor. A 10 percent increase in food prices leads to a 12 percent higher likelihood that children have to work. This

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

[2] Experience from a recent price boom of quinoa suggests that the welfare effects of rising food prices depends on production responses of small-scale farmers (see The Economist, May 21, 2016.

effect is found to be smaller among land-owning households, which 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 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 large array of robustness checks support our main findings.

The paper proceeds with a review of the literature in Section 2. Section 3 discusses our data and methodology. In Section 4, we present our main findings, along with robustness checks whilst Section 5 concludes.

2. Literature review

This paper contributes to the literature which analyzes the effects of adverse economic shocks on household decision-making with a particular emphasis on child labor.

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).[3] Thus, parents derive dis-utility from child labor and would want to minimize it, unless they are compelled by adverse economic circumstances to generate additional household income. Evidence provides some support for these theoretical models (Edmonds, 2003; Grootaert & Patrinos, 2002; 1999). More importantly, independent of the precise reasons why parents decide to send their children to work, empirical studies clearly indicate that unfavorable production, health and economic shocks increase the probability of child labor (Bandara et al., 2015; Beegle et al., 2006 A. Dillon, 2013; Guarcello, Mealli, & Rosati, 2010; Kruger, 2007).

Adult and child labor are usually seen as substitutes. The productivity of child labor is assumed to be relatively than adult labor (Basu & Tzannatos, 2003; IPEC, 2007).[4]

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

[4]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, & Barage, 1998).

As adverse economic shocks in developing countries may require households to expand their income-generating activity, there will be a higher incentive to employ its own labor, potentially including child labor (Bandara et al., 2015; Beegle et al., 2006). We contribute to the literature on child labor by investigating the effects of an exogenous increase in food prices on household decisions regarding child labor. If higher food prices pushes households into poverty, then child labor may be expected as a consequence. At the same time, higher food prices may, however, also provide additional means for food-supplying households in developing countries to increase their incomes, thus alleviating poverty rather than increasing it.

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, Cockburn, Coulibaly, & Tiberti, 2010; Hou et al., 2015; Warr & Yusuf, 2014). Such price hikes represent economic shocks to consuming households in developing countries. During periods of distress, households may resorts to credit or buffer stocks to smoothing their consumption (Sirisankanan, 2015). Even in the absence of explicit shocks, income from child labor sometimes constitute a significant proportion of the household's inocme (Koomson & Asongu, 2016). 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 labor supply, potentially including their children (Chaudhuri & Ravallion, 1997; Morduch, 1995).

Exploring empirical evidence on the effects of the price of wheat in Pakistan, Hou et al. (2015) find a negative effect of price rises on school enrollment and statistically insignificant effects on child labor. Bibi et al. (2010) suggest that Malian households are more likely to withdraw 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. If household food consumption is made 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 (see Ravallion, 1990). We contribute to this literature by using a comprehensive measure of food prices reflected by the regional market price index of the food basket of the average Ugandan household.

Focusing specifically on household welfare in Uganda, Benson, Mugarurab, & Wandac, 2008 suggests a small but positive impact of food prices on household welfare as the average diet is made up of mostly non-tradable crops. Bellemare, Fajardo-Gonzalez, Gitter, et al. (2016) find that increases in the purchase price have positive impact on household welfare.[5] In contrast, Van Campenhout et al. (2013) and Simler (2010) argue that the incidence and depth of poverty increases in Uganda in the short-term due to higher food prices. We contribute to these findings by explicitly focusing on the incidence and intensity of child labor and distinguishing the use of child labor in land-owning households and those who do not own land.

The incentive to use the workforce of children on farms tends to be greater among landowning households as the marginal productivity of labor increases with land size (Bhalotra & Heady, 2003). Moreover, landholding is particularly important in this context for two reasons. First, land can be rented out to raise additional income, which reduces the need for additional income from child labor (Kis-Katos, 2010). Second, land could be used as collateral for credit instead of relying on income from child labor (Bhalotra & Heady, 2003). However, with labor market imperfections, landownership can also be a source of higher child labor during period of high food prices (Basu, Das, & Dutta, 2010; Bhalotra & Heady, 2003). Thus it is not clear how landownership will affect the relationship between higher food prices and child labor. We contribute to this open question by investigating the moderating effect of land ownership on the relationship between food prices and child labor.

3. Methodology

3.1. Data Sources, Child Labor and Food Prices in Uganda

Uganda has experienced steady economic growth in the last two decades (UBOS, 2014); and average income levels reached approximately $705.3 in 2015 (World Bank, 2016). However, 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;

[5]Studies for the International Food Policy Research Institute (see Ulimwengu & Ramadan, 2012 and Van Campenhout, Pauw, & Minot, 2013) also analyze 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).

UBOS, 2010).[6] Diverse government reports (see MGLSD, 2012; USDOL, 2015) indicate that activities such as stone quarrying, brick making and laying, clay mining, commercial agriculture and commercial sexual exploitation are among the the predominant activities of child laborers in the country.

Guarcello, Furio, Breglia, and Ssennono (2008) suggest that poverty is among the leading causes for child labor in Uganda. There exist geographical differences in the distribution of child labor 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 the working children are also found in the manufacturing and and service sectors. A detailed report on child labor 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 neighbors, 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[7], cassava, and sorghum) also increased. Changes in weather patterns, weakening currency and export of Ugandan crops to neighboring countries as well as higher fuel prices have been cited as some of the important causes of the rising food prices, though with mixed evidence (B. M. Dillon & Barrett, 2015; Ivanic, Martin, & Zaman, 2012; Mbowa, Mawejje, & Kasirye, 2012).

Data for the analysis is drawn from the Ugandan National Panel Survey (UNPS) which we merge with relevant monthly consumer price indexes for markets reported by the UBOS. The UNPS is a nationally representative panel, which is based on the World Bank's Living Standards Measurement Survey. The study tracks households and their members over the survey periods. Specifically, we employ the last three waves 2009/2010, 2010/2011 and 2011/2012. The data contains detailed information on all the

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

[7]Matoke is the local name for plantain.

labor 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.

Following Bandara et al. (2015), Beegle et al. (2006), Edmonds (2003) and Hou (2015), we measure child labor with two distinct variables, i.e. (1) with an indicator variable which equals one if the child engaged in any economic activity during the reference period, labeled $ChildWorked$ and (2) With the number of hours the child worked, labeled $HoursWorked$. Thereby, we aim to measure the incidence as well as the intensity of child labor. The unit of observation for our analysis is the child. The measurement of child labor includes paid and non-paid work as common in the literature (Beegle et al., 2006; Carpio et al., 2016; Edmonds, 2003). Indeed, economic shocks may directly affect child labor 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.[8] More importantly, independent of explicit payment or not, the ILO defines child labor to include activities that are considered physically and mentally dangerous for the child. The UNPS 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 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 labor, 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 labor. 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 questions used in constructing the child labor variables are are provided in Appendix A2.

Regarding food prices, we measure the cost of food from the monthly Consumer Price Index (CPI) reported by UBOS. This is computed for seven major markets in Uganda

[8]Thus, a non-restrictive measure of child labor includes non-paid work. Some of the domestic and farm work are sometimes done under hazardous conditions (Admassie, 2002).

(Kampala, Jinja, Mbale, Masaka, Mbarara, Gulu and Arua). 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 labor. We merged these CPIs to households based on their physical proximity to a particular market and the month in which the questionnaire was administered. More precisely, 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 centers. 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, i.e. 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 A1 in the appendix.

3.2. Empirical Methodology and Endogeneity

In line with our objective of analyzing the influence of food price changes on the incidence and intensity of child labor, we start with a conventional regression approach in (1) and (2):

$$ChildWorked_{it} = \alpha_i + \beta_t + \gamma FoodPrice_{it} + Child'_{it}\Phi_1 + HH'_{it}\Phi_2 + COMM'_{it}\Phi_3 + \epsilon_{it} \quad (1)$$

and

$$HoursWorked_{it} = \alpha_i + \beta_t + \gamma FoodPrice_{it} + Child'_{it}\Phi_1 + HH'_{it}\Phi_2 + COMM'_{it}\Phi_3 + \epsilon_{it} \quad (2)$$

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 temperature and rainfall), among others.[9]. $ChildWorked$ is an indicator variable for child labor and

[9]See Tables A1 and A3 (for empirical results) in the Appendix for a complete list of all control

$HoursWorked$ 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 (1) and (2) captured by α_i. β_t is a time fixed effect.

We aim to isolate and identify the causal effect of exogenous food price changes increase on the incidence and intensity of child labor. Although it is unlikely that market-level prices are influenced by individual decisions of households (reverse causality), (1) and (2) may be driven by unobserved household characteristics and potential measurement error, even though we account for individual fixed-effects. Indeed, the decision to engage in child labor is usually made by parents (Webbink, Smits, & de Jong, 2012) and depending on the inter-temporal preference of income of the family head it might be speculated that the effect of food prices on child labor 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 paper involves the use of instrumental variables. We use international food prices as an instrument for domestic market-level food prices (see Smith, 2014 for a similar strategy). More precisely, 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. It is important to examine the proposed instrument within the context of Uganda to ascertain their validity.[10] Uganda constitutes a negligible proportion of global food trade (see 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, however, explain market-level prices in Uganda because the country is a net food importer. Indeed, while Uganda seemed at first 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 (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

variables.

[10]For our instrument to be valid, it must correlate with our variable $FoodPrice$ (relevance condition) and it must affect child labor only through $FoodPrice$ (exclusion restriction), or put differently; it must not correlate with the error terms in equations (1) and (2).

of international food prices as instrument.

Any economically relevant and statistically significant effect of $FoodPrice$ alludes itself to either an intensive or extensive margin. The intensive margin represents the effect of economic shocks on the number of hours children are working for children who have already worked before, i.e. it refers to a change in working time. The extensive margin represents the effect on the incidence of child labor, i.e. the effect of economic shocks on children previously not working. In Table 6, we refine equations (1) and (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 time period of our panel. We then run equations (1) on (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 labor mainly through the intensive margin, then children from poor households are most likely more affected than richer households.

3.3. Descriptive Statistics

Table 1 shows the distribution of child labor between farm work and off-farm activities as yearly averages for the three periods of our panel as well as market-level food prices. The proportion of children who worked on family farms during the study periods lies 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 were 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. This signals an initial indication of a positive association between child labor and food price.

Table 2 shows the prevalence of child labor for 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.[11] On

[11]This pattern is consistent with other findings in the literature arguing that female-headed households are more prone to poverty and children from such households have higher tendency to work.

Table 1: Labor participation rates of children according to types of work, hours of work and food prices in Uganda

Year	Proportion of children in: 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 labor statistics are based on the labor activities of children in the last eight days preceding the survey.

the relationship between land ownership and child labor, we observe that child labor is positively associated with landownership. This relationship shows an apparent paradox of wealth, which may be due to labor or credit market imperfections (Basu, 2006; Bhalotra & Heady, 2003; Dumas, 2007).[12] At the same time it has to be noted that land-owning households are usually situated in rural areas where the incidence of child labor is higher. We will also explore the moderating effect of land-ownership on the link between food prices and child labor in the empirical analysis.

Table 2: Labor 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)
Does the household own land?						
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)
Is household net food buyer?						
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

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

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

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

price index for a comparison; this has also been increasing but food prices rose more sharply. Figure 1b plots the percentage of child labor and the change of food prices during the same period in our sample, suggesting a clear association between the two. To rule out the possibility that correlates at the individual, household or neighborhood and other forms of endogeneity bias explain the observed association between food prices and child labor, we proceed to the proposed econometric analysis.

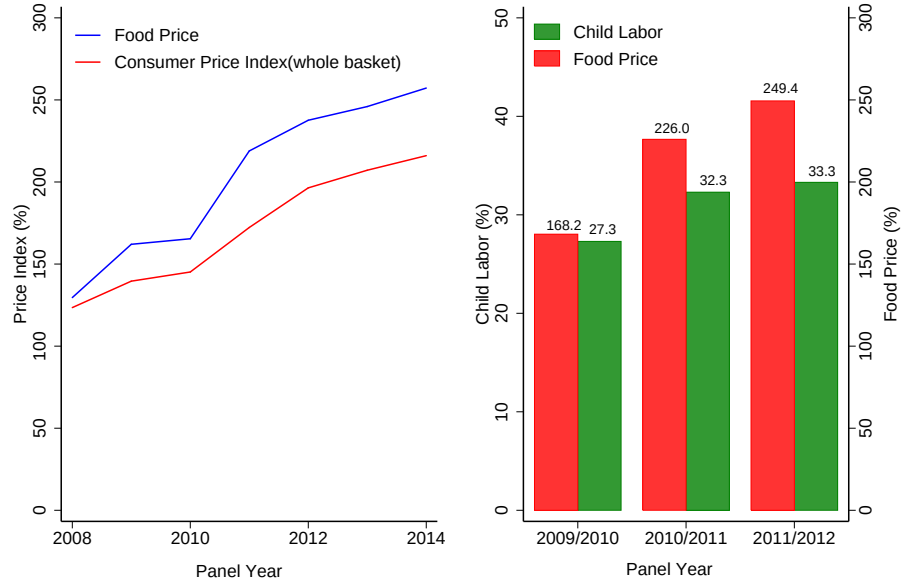

Figure 1a: Food Price and Consumer Price Index in Uganda (2009−2012)

Figure 1b: Trend of Child Labor and Food Price in Uganda (2009−2012)

Figure 1: Trend of Child Labor and Food Prices in Uganda (2008-2012)

4. Empirical Findings

4.1. Main Results

Table 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 labor. In all specifications, we control for time-varying individual, household and community characteristics as well as for the season in year and year fixed effects. Moreover, we always either account for regional fixed effects or individual fixed effects.[14]

Consistent with the associations illustrated in Figure 1, specification (1) and (2) of

[14]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 change region.

Table 3 show a positive effect of food prices on the incidence and the intensity of child labor even when controlling 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) 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) which also accounts for real changes in living standards. This is to insure that the results are not driven by a general price increase but instead specifically by food price increases. The effect of our main variable of interest remains statistically significant.

Regarding the economic (quantitative) relevance of the effects, the point estimates of the most stringent fixed-effects show that an increase in food prices by 10 percent of it initial value is associated with approximately 12 percent higher probability of a child being engaged in child labor. Similarly, a 10 percent increase in food prices is associated with approximately 0.20 hours (12 minutes) more work[15]. Thus, our results suggest that the rise in the incidence and intensity of child labor in Uganda can be explained to a large part the sharp and sudden rise in food prices between 2008 and 2011.

Table 3: Effect of food prices on child labor

	(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 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 labor. 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 A3.

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

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 labor as a survival mechanism when hit by external adverse shocks (de Hoop & Rosati, 2014). Short term survival may be the driving motivation for household to increase child labor during period of food inflation. In Uganda, this may be re-enforced by the fact that higher food prices may increase the opportunity cost of child's leisure time and school expenditure, thus, parents may prefer current income from the child's labor to her future income.[16]

Regarding other covariates (full results presented in Table A3 in the appendix), we find negative effects of the average years of schooling, number of adult household members, and asset ownership on child labor.[17] In addition, male children and older children are more likely to engage in child labor in Uganda. On the effect on household net market status, we find that child labor increases with higher market dependence.

Double-hurdle, Instrumental variables (IV), and Tobit estimates

In Table 4, we first present the result of instrumental variable estimations using international food prices as instrument for market-level prices in Uganda. Assessing the first stage results shows that the instrument correlates highly with domestic food prices. Indeed, the diagnostic tests show that the instrument performs favorably 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.[18] In all specifications, we estimate a positive and statistically significant impact of an increase in food prices on child labor. 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.

[16]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 labor to maximize household income during periods of food price rise.

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

[18]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.

In columns (5) and (6) of Table 4, we explore the truncated nature of child labor hours using the Tobit estimator and the double-hurdle estimator (Cragg, 1971; 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 in the last 8 days. The panel-hurdle estimator employed in column (6) has the advantage that individuals who reported zero hours of child labor can be econometrically categorized into two types: those who will never participate in child labor irrespective of the economic circumstances (the so called certain zeros); and those who report zero because of their current circumstances.[19] 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 yields a positive and statistically significant effect for food prices on the intensity of child labor. In terms of magnitude the result corresponds to about one extra hour that a child worked in the last 8 days for a 10 percent increase in food price.

[19]The double-hurdle estimator takes account of the fact that the participation decision in child labor may be determined by two processes, i.e. hurdles: Whether the individual is a zero type, i.e. never engaging in child labor, 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).

Table 4: Double-hurdle, IV, and Tobit, estimates of the effect of food prices on child labor

	(1)	(2)	(3)	(4)	(5)	(6)
	Random Effect		Fixed Effect			
	LPM Worked	Linear Hours	LPM Worked	Linear Hours	Tobit Hours	DH Hours
Log 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 5: Instrumental variable estimates of the effect of food prices on child labor-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 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.

As a further robustness test, we estimate separate individual fixed effect models as a stringent specification for the different gender and age groups in Table 5. The age categories in Table 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 labor 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

labor appears to be higher among the 12 to 14 year group. Table 5 also shows that both girls and boys are affected by higher food prices. We find that the incidence and intensity of child labor 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 labor in Uganda is 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.

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 labor.

4.2. Refinements

(i) Extensive and Intensive margins

A rise in food price can increase child labor 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 food price rises. If the effect only works through the intensive margin, then poorer households are likely to disproportionately suffer more from price increase since the literature has established that poorer households in general tend to engage in child labor, i.e. food price hikes tend to increase 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 prices may widen 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 increases in food price. Column (2) of Table 6 shows a positive and significant effect of food prices on the incidence that children will now work. 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.

Table 6: Instrumental variable estimation of the extensive and intensive marginal effects of food prices on child labor

	(1)	(2)	(3)	(4)
	Extensive margins		Intensive margin	
	Worked	Worked	Hours	Hours
Log 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 3 are used

(ii) Lags of food prices

Our results, so far, 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 labor allocations in response to food price hikes. Thus, we analyze lags of food prices in Table 7 to get a better grasp of the adjustment process. We take account of the time horizon by including lags over the farming season.[20] 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 and first six months lags successively.

The inclusion of the lagged terms increases the point estimate of the level of food price observed in Table 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 labor decisions to take advantage of the higher

[20]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 labor decisions such that the effect on child labor is observed when the household has fully adjusted to the initial shock.

prices. For agricultural households, this entails increasing production to increase sales. For non-agriculture, but labor-supplying households, higher food prices might 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 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 7: Effect of food price on child labor 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 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 (Hou et al., 2015; Basu, 2006; Bhalotra & Heady, 2003; Basu & Van, 1998) on household asset ownership and child labor, we examine how the ownership of land moderates the effect of food prices on child labor. In Table 8 we interact landownership with food prices. The effect of a change in food price on the incidence of child labor 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 labor is about .02 percent lower for children in landowning households. Thus, we estimate a moderating effect of landownership on child labor participation. This findings supports the poverty hypothesis of Basu (2006) and we speculate that the moderating effect of land may be attributed 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 would not have to fall on child labor as a source of extra income.

We assume that net buyers of food are likely to be more affected by higher food prices 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 labor in Uganda.

Table 8: Effect of food prices on child labor

	(1) LPM Worked	(2) Linear Hours	(3) LPM Worked	(4) Linear Hours
Log 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.

5. Conclusion

We analyze the impact of changing food prices on child labor. We carried out the analysis using data sets from Uganda, one of the countries with a high incidence of child

labor in Sub-Saharan Africa. Empirical results indicate that a rise in food price leads to a higher incidence and intensity of child labor. The quantitative results for a rise in food prices are sizable: A 10 percent increase in food prices leads to an about 8 percent increase in the probability of child labor and also significantly affects the number of hours worked. Thus, in particular global food prices hikes between 2008–2010 in both domestic and international markets may have contributed to a substantial increase in child labor.

Our results are consistent with other studies that have highlighted adverse effects of food price hikes on farming households in developing countries. Adverse economic shocks can force the households to adopt measures to increase their incomes and these measures may include child labor.

In our empirical setting, we account for endogeneity by employing international food prices as an instrument for domestic market-level food prices. Moreover, our results show that the effects are stronger for boys than for girls. We also show that higher food prices affect child labor on both the extensive and intensive margins. Our analysis indicates that the influence of food price shocks is smaller for children in landowning households. Thus, landownership serves as a potential buffer to mitigate the effect of rising food prices.

From a policy perspective, it is relevant to be aware that sudden food price hikes may impact child labor. Child labor 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, also, with the effects of food prices on child labor. 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.

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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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Table A3: Effect of food prices on child labor-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 index	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***
	(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)
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_cons	0.58***	0.58***			
	(0.10)	(0.10)			
N	8286	8286	8286	3786	8286

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