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

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ABSTRACT *Most people in developing countries spend up to 60 per cent of their income on food, even though the majority of them are farmers. Hence, a change in food prices affects both their revenue as well as expenditure, and it may thereby affect their labour market decisions. Using the Uganda National Panel Survey and monthly regional food prices, this paper examines the effect of changes in food prices on child labour. The empirical evidence shows that an increase in food prices is linked to an increase in the probability and the intensity of child labour. 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 empirical results suggest that periodic shocks in food prices may have longer lasting effects on economic development in developing countries through the channel of child labour.*

1. Introduction

In 2012, over 168 million children were engaged in child labour, corresponding to about 11 per cent of children worldwide according to the International Labor Organization (ILO, 2015).[1] A significant amount of child labour is employed in sub-Saharan Africa which has the highest incidence rate of more than 20 per cent (United States Department of Labor [USDOL], 2015). Generally, poverty is often seen as a leading determinant of child labour (see, for example, Carpio, Loayza, & Wada, 2016; De Carvalho Filho, 2012; Dessy & Pallage, 2001; Edmonds, 2003; Hazan & Berdugo, 2002) and adverse shocks have been shown to affect child labour (see Bandara, Dehejia, & Lavie-Rouse, 2015; Beegle, Dehejia, & Gatti, 2006; Hou, Hong, & Scott, 2015).

As food expenditure constitutes between 40 to 60 per cent of the income of the poor in developing countries (Hallegatte, Fay, Bangalore, Kane, & Bonzanigo, 2016; Lee et al., 2013), an increase in food prices may not only affect income poverty (Ul Haq, Nazli, & Meilke, 2008) but it may also affect the number of food insecure (Sarris & Rapsomanikis, 2009) which, in turn, could influence the incidence of child labour. However, most developing countries are also characterised by a high fraction of agricultural households who could potentially, in their role as producers of food commodities, benefit from an increase in food prices (Ivanic & Martin, 2008; Polaski, 2008; World Bank, 2007). In addition, country-specific differences may moderate the extent of the role of food price changes for households. Theoretically, impacts of food prices depend on the net market position of

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households as well as their response strategies (Caracciolo & Santeramo; Wodon et al., 2008). The relationship is further complicated by the ability of higher food prices fostering the transfer of income from higher-income net food buyers to lower-income net food producers (Aksoy & Isik-Dikmelik, 2008). The potential magnitude of the impact of food price changes is, therefore, far from direct (Wodon et al., 2008). Hence, the effect of a food price on child labour is, essentially, an empirical question.[2]

Identifying the causes of child labour is relevant, particularly due to the potential long-term impact on economic development. Child labour is not only a pertinent indicator of the current wellbeing of the child, but it might determine a child's future income and vulnerability (Baland & Robinson, 2000; Horowitz & Trivitt, 2007; ILO, 2015). Working children risk adverse effects on their health, safety, and mental development, potentially leading to lower educational achievements and human capital, which, in turn, might affect long-term economic development (Baland & Robinson, 2000; Emerson, Ponczek, & Souza, 2017). Thus, it is important to investigate potential causes of child labour to better design policy responses. This paper contributes to the literature by analysing the effect of food price changes on the probability and the intensity of child labour with individual-level panel data from Uganda from 2009 to 2012.

The empirical findings are suggestive of a positive link between food price increases and the incidence as well as the intensity of child labour. The results are independent of diverse household characteristics and robust to the inclusion of numerous control variables. The relationship between food prices and child labour 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 in a multitude of ways, by including time-variant household control variables, individual fixed-effects, and we employ international food price changes as instruments to identify exogenous variations in regional prices. A large array of robustness checks supports our findings.

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

2. Literature review

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

Theoretical studies often model parents as altruistic agents who would keep their children out of work if the income levels of the household is high enough (Basu & Tzannatos, 2003; Basu & Van, 1998).[3] Parents derive disutility from child labour and would want to minimise it unless they are compelled to engage in it due to adverse economic circumstances. Empirical evidence provides some support for these theoretical models (Edmonds, 2003; Grootaert & Patrinos, 2002, 2000). More importantly, independent of the precise reasons why parents decide to send their children to work, empirical studies indicate that unfavourable production, health, and economic shocks increase the probability of child labour (Bandara et al., 2015; Beegle et al., 2006; A. Dillon, 2013; Guarcello, Mealli, & Rosati, 2010; Kruger, 2007).

Adult and child labour are usually modelled as substitutes. The productivity of child labour is assumed to be relatively smaller than adult labour (Basu & Tzannatos, 2003; IPEC, 2007).[4] 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 labour, potentially including child labour (Bandara et al., 2015; Beegle et al., 2006). We contribute to this literature by investigating the effects of an exogenous increase in food prices on household decisions regarding child labour. We empirically investigate the effect of a food price increase, holding constant time-variant household characteristics (including household expenditures). If higher food prices push households to

require higher household expenditure, then child labour may be expected as a consequence. At the same time, higher food prices may provide additional means for farming and landowning households in developing countries to increase their incomes, thus potentially alleviating expenditure constraints. Among these households, whether higher food prices will lead to more child labour or not depends on labour market constraints. As argued by Basu, Das, & Duta (2010), parents who decide to send their children to work may be unable to do so because of labour market imperfections. These households may be motivated to employ their children on their farms if they see higher food prices and an opportunity to escape poverty. On the other hand, if parents have access to external labour at a cheaper cost, then due to the luxury axiom, parents may prefer to hire adult labour instead of child labour. In this case, child labour may even fall when food price increases, pointing out that the link between food prices and child labour is an empirical question.

Following the 2008 and 2010 episodes of food price hikes, some 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). Price hikes represent economic shocks to food consuming households in developing countries. Alvi and Dendir (2011) present survey evidence which shows that in the aftermath of floods in Bangladesh, child labour increases with the magnitude of the shock, particularly if households may not resort to credit or buffer stocks to smoothen their consumption (this is also in line with Sirisankanan, 2015). Even in the absence of explicit shocks, income from child labour sometimes constitutes a significant proportion of the household's income (Koomson & Asongu, 2016). Basu and Tzannatos (2003) argue that poor households may be constrained in terms of mitigating options against such economic shocks. With limited access to credit and lack of buffer stock, they may be required to increase their labour supply, potentially including labour of 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 enrolment and statistically insignificant effects on child labour. Bibi et al. (2010) suggest that Malian households are more likely to withdraw children from schools 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 up of more than one major crop, which is likely to be the case, using the price of a single staple may not serve as a suitable proxy (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, and Wandac (2008) suggest a small, but a positive impact of higher 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 of quinoa have a positive impact on household welfare.[5] In contrast, Van Campenhout, Pauw, and Minot (2013) and Simler (2010) argue that the incidence and depth of poverty increased in Uganda in the short-term due to higher food prices. We contribute to these findings by focusing on the incidence and intensity of child labour and find the differences in the use of child labour 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 labour increases with land size (Bhalotra & Heady, 2003). Moreover, landholding is important in this context for two reasons. First, farmland can be rented out to raise additional income, which reduces the need for additional income from child labour (Kis-Katos, 2010). 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, land ownership can also be a source of higher child labour during the period of high food prices (Basu et al., 2010; Bhalotra & Heady, 2003). Thus, it is theoretically not entirely clear how land ownership will affect the relationship between higher food prices and child labour. We contribute to this open question by

investigating the moderating effect of land ownership on the relationship between food prices and child labour.

3. Methodology

3.1. Data sources, child labour and food prices in Uganda

Uganda has experienced steady economic growth in the last two decades according to the Uganda Bureau of Statistics (UBOS, 2014). Average income levels reached about $700 in 2015 (World Bank, 2016). Nevertheless, about 2.75 million children, aged 5–17 years, were engaged in economic activities and 51 per cent of them were involved in hazardous activities (Ministry of Gender, Labour and Social Development (MGLSD), 2012; UBOS, 2010). Diverse 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 predominant activities of child labourers in the country.

Guarcello, Furio, Breglia, and Ssennono (2008) suggest that poverty is among the leading causes of child labour in Uganda. Geographical differences exist in the distribution of child labour in the country. About 42 per cent of rural children are economically active compared to 15 per cent 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%), although some of the working children are also found in the manufacturing and service sectors. Guarcello et al. (2008), Macro International Inc (2011) and Walakira et al. (2016) provide a detailed report on child labour in Uganda.

Regarding food supply, Uganda is nearly self-sufficient in terms of its major staples aside from rice and wheat. The country serves as a source of food imports for its east African neighbours, including Kenya. Nevertheless, Uganda has experienced a steady increase in food prices, consistent with what has been observed on the international market (Ulimwengu & Ramadan, 2012); and the prices of local staples (matoke,[6] cassava, and sorghum) increased too. Changes in weather patterns, weakening currency and export of Ugandan crops to neighbouring countries as well as higher fuel prices have been cited as some of the causes of the rising food prices, though with mixed evidence (Dillon & Barrett, 2015; Ivanic, Martin, & Zaman, 2012; Mbowa, Mawejje, & Kasirye, 2012).

Data for our empirical analysis is drawn from the Ugandan National Panel Survey (UNPS) which we merge with the relevant monthly consumer price indexes for the major markets in Uganda as reported by the UBOS. The UNPS is a nationally representative panel, which is based on the World Bank's Living Standards Measurement Study. 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 the labour activities of all household members (five years or older at the time of data collection) in the last eight days preceding the survey. It also contains questions on the economic and demographic characteristics of the household as well as community-level characteristics.

Following Bandara et al. (2015), Beegle et al. (2006), Edmonds (2003) and Hou (2015), we measure child labour with two distinct variables: (1) an indicator variable which equals one if the child engaged in any economic activity during the reference period, labelled *ChildWorked*; and (2) the number of hours the child worked, labelled *HoursWorked*. Thereby, we aim to measure the incidence as well as the intensity of child labour. The unit of observation for our analysis is the child. Child labour in this paper includes paid and non-paid work (see Beegle et al., 2006; Carpio et al., 2016; Edmonds, 2003; for similar proxies to measure child labour). Economic shocks may directly affect child labour when the child is made to work for income because of economic hardship. At the same time, a child may have to perform chores that were previously performed by adults to release time for adults to earn more income.[7] More importantly, independent of explicit payment or not, the ILO defines child labour to include activities that are considered physically and mentally dangerous for

the child. The UNPS does not contain enough information to distinguish which activity is hazardous or not. In addition, as has been shown by IPEC (2011) and Edmonds and IPEC (2009), domestic activities may not differ from market activities in terms of their impact on variables potentially important for the development of a child such as her school attendance. Hence an attempt to focus only on market activities may only provide a partial understanding. To achieve consistency with the international definition of child labour, we study children between five and 14 years. According to the ILO, the minimum age for light work is 12 years (IPEC, 2011), hence any work by children between five and 11 years is defined as child labour. We restrict our sample to 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 labour variables is provided in the Supplementary Material to this paper (see Table S1).

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

Summary statistics for variables employed for the analysis with the corresponding sources are presented in the Supplementary Material (see Table S2).

3.2. Empirical methodology and identification

In line with our objective of analysing the influence of food prices on the incidence and intensity of child labour, we start with a conventional regression approach presented in Equations (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 include, among others, the age of the child and whether she attends school or not. *HH* and *COMM* are matrices of household and community characteristics respectively, including such variables as the household's size, total expenditure, education of father and mother; average temperature and rainfall, among others. *ChildWorked* is an indicator variable for child labour and *HoursWorked* is the number of hours the child worked in the last eight 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) which are captured by α_i. β_t captures the time fixed effects. The coefficient of interest, γ, measures the effect of food price change on child labour.

We aim to identify the causal effect of exogenous food price changes on the incidence and intensity of child labour. Although it is unlikely that market-level prices are influenced by individual decisions of households (reverse causality issue), Equations (1) and (2) may be driven by unobserved time-variant household characteristics and potential measurement error, even though we account for individual fixed-effects. Indeed, the decision to engage in child labour is usually made by parents

(Webbink, Smits, & De Jong, 2012) and depending on the intertemporal preference of income of the family head it might be speculated that the effect of food prices on child labour could vary both within and across households over time. Thus, our ability to interpret the observed coefficient as a potential causal effect hinges on the exogeneity of *FoodPrices*.

The identification strategy adopted involves the use of instrumental variables. We employ international food prices as an instrument for domestic market-level food prices (see Smith, 2014 for a similar strategy). More precisely, we used the one-month lag of IMF's monthly international food price index as an instrument for the domestic food price index in Uganda. It is important to examine the proposed instrument within the context of Uganda to ascertain its validity.[8] Uganda constitutes a negligible proportion of global food trade such that changes in world food prices can be regarded as exogenous (see Smith, 2014), particularly for individual Ugandan farmers. Therefore, domestic events in Uganda will not affect world food prices. International food price, however, has the potential to 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 price increases with a lag. Moreover, there have been projections of a further increase due to high demand from neighbouring countries (see IFPRI, 2008; Ulimwengu & Ramadan, 2012; for further details). This is an indication that it takes time for domestic prices to respond to changes in international prices, hence our use of the lag of international food prices as an instrument. Based on the above explanations, we modify Equations (1) and (2) as follows:

$$ChildWorked_{it} = \alpha_i + \beta_t + \gamma \widehat{FoodPrice}_{it} + Child_{it}\Phi_1 + HH_{it}\Phi_2 + COMM_{it}\Phi_3 + \epsilon_{it} \tag{3}$$

and

$$HoursWorked_{it} = \alpha_i + \beta_t + \gamma \widehat{FoodPrice}_{it} + Child_{it}\Phi_1 + HH_{it}\Phi_2 + COMM_{it}\Phi_3 + \epsilon_{it} \tag{4}$$

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

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

3.3. Descriptive statistics

Table 1 shows the distribution of child labour between farm and off-farm work as yearly averages for the three periods analysed as well as market-level food prices. The proportion of children who worked on family farms during the study periods lies between 26 and 34 per cent, making family farms the predominant work for children in Uganda. Including all forms of work, more than a quarter of children in Uganda reported having worked in 2009/2010 while about a third of them worked in 2011/2012. We also note that food prices have increased in the same period from an average index value of 168 to 249. This provides an initial indication of a positive association between child labour and food price.

Table 2 shows the prevalence of child labour across different child and household characteristics. As expected, older children (between 10–14 years) have a higher tendency to work than younger children (between five to nine years), so do male children as compared to their female counterparts. The data also indicates that the proportion of working children in female-headed households is slightly higher than in male-headed households.[9] On the relationship between land ownership[10] and child labour, we observe that child labour is positively associated with land

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

	The proportion of children working in:					
	The 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	9.26	168.15
	(0.01)	(0.00)	(0.01)	(0.13)	(0.37)	(0.17)
2010/2011	0.33	0.02	0.35	3.12	9.00	226.04
	(0.01)	(0.00)	(0.01)	(0.13)	(0.30)	(0.52)
2011/2012	0.34	0.02	0.35	3.04	8.67	249.43
	(0.01)	(0.00)	(0.01)	(0.13)	(0.30)	(0.38)
All years	0.31	0.03	0.33	2.94	8.96	214.54
	(0.01	(0.00)	(0.01)	(0.08)	(0.18)	(0.44)

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

Table 2. Labour participation rate of children in Uganda by age, gender, and household landownership status

	2009/2010		2010/2011		2011/2012	
Characteristics	%	SE	%	SE	%	SE
Age of child (years)						
5–11	0.26	0.01	0.28	0.01	0.25	0.01
12–14	0.48	0.03	0.58	0.02	0.52	0.02
Difference	−0.22	0.03	−0.30	0.02	−0.27	0.02
Gender of child						
Female	0.27	0.01	0.34	0.01	0.33	0.01
Male	0.31	0.01	0.36	0.01	0.37	0.01
Difference	−0.04	0.02	−0.02	0.02	−0.05	0.02
Gender of household head						
Female	0.30	0.02	0.39	0.02	0.38	0.02
Male	0.28	0.01	0.33	0.01	0.34	0.01
Difference	0.02	0.02	0.05	0.02	0.04	0.02
Does the household own land?						
No	0.16	0.02	0.31	0.02	0.27	0.02
Yes	0.31	0.01	0.35	0.01	0.36	0.01
Difference	−0.15	0.02	−0.04	0.03	−0.09	0.03
Is household net food buyer?						
No	0.35	0.01	0.40	0.01	0.41	0.01
Yes	0.22	0.01	0.30	0.01	0.28	0.01
Difference	0.13	0.02	0.10	0.02	0.13	0.02

Note: SE = Standard error.

ownership. This relationship shows an apparent paradox of wealth, which may be due to labour or credit market imperfections (Alvi & Dendir, 2011; Basu, 2006; Bhalotra & Heady, 2003; Dumas, 2007).[11] At the same time, it must be noted that land-owning households are usually situated in rural areas where the incidence of child labour is higher.

Figure 1 provides an illustration and a motivation for our research question. Panel (a) shows a steep upward trend of local market-level food prices.[12] We plot the overall consumer price index for comparison; this has also been increasing but food prices rose more sharply, a fact that we account for in our empirical specifications. Panel (b) plots the percentage of child labour and the change of food

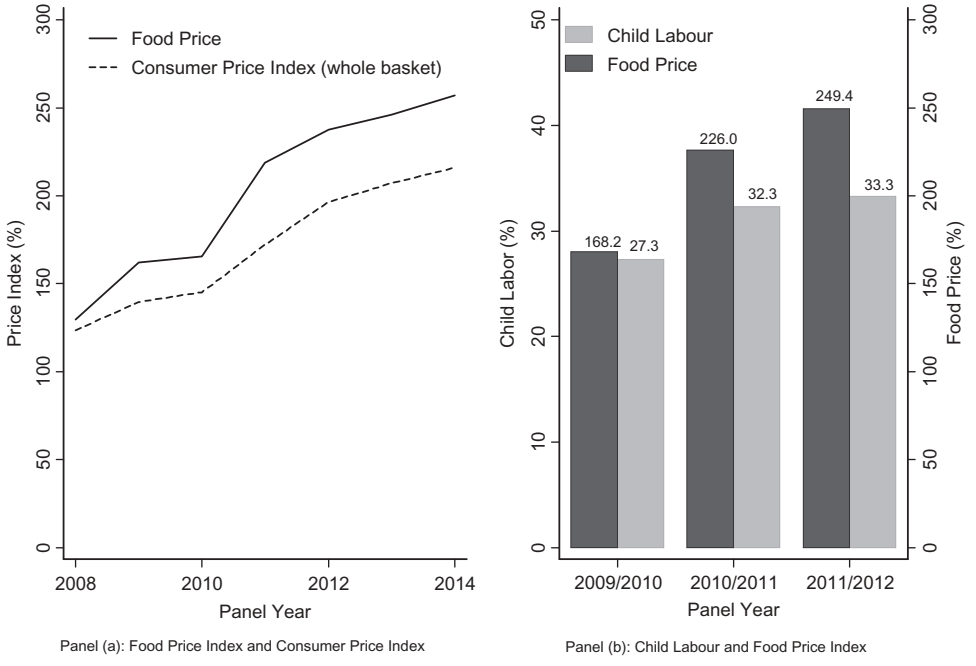

Figure 1. Trend of child labour and food prices in Uganda (2008–2012).

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 neighbourhood and other forms of endogeneity bias explain the observed association between food prices and child labour, we proceed to the proposed econometric analysis.

4. Econometric results

4.1. The relationship between food prices and child labour

Table 3 reports the regression results for the relationship between food prices and child labour in Uganda. In columns 1–4, we present results of Equations (1) and (2). In all these specifications, we control for time-varying individual, household and community characteristics as well as for the season and year fixed effects.[13] We account for either regional fixed effects or individual fixed effects.[14] The results in columns 1–4 show that an increase in food prices is statistically significantly associated with higher child labour – in terms of incidence (columns 1 and 3, estimated using logit)[15] and intensity (columns 2 and 4 estimated using OLS).

In columns 5–8, we use international food prices as instruments for domestic food prices. The *LM statistic* and *Wald F statistic s*how that changes in international food prices are relevant instruments, and they strongly correlate with domestic food prices. The IV models for the probability of child labour are estimated using a linear probability model.[16] The IV coefficients show that higher food prices may increase both the likelihood and the hours of child labour in Uganda. Even our most stringent and conservative estimates, using instrumental variables and fixed effects in columns 7 and 8, yield a positive and statistically significant coefficient of food prices when explaining the incidence and the intensity of child labour. The quantitative effects of a 10per cent rise in food prices

Table 3. The link between food prices and child labour

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Logit/OLS – assuming no endogeneity				Instrumental variable estimates			
	Random effects		Fixed effects		Random effects		Fixed effects	
Variables	Worked	Hours	Worked	Hours	Worked	Hours	Worked	Hours
Log food price	3.62***	2.70***	3.23**	2.16*	0.66***	11.60***	0.85***	17.12***
	(1.48)	(1.03)	(1.83)	(1.25)	(0.17)	(2.80)	(0.18)	(3.11)
Other price controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8286	8286	3786	8286	8286	8286	8286	8286
LM statistic					1021.80	1006.48	750.63	750.63
					[0.00]	[0.00]	[0.00]	[0.00]
Wald F statistic					1161.45	1141.62	1320.32	1320.32

Note: (#) Standard error; *p < 0.1; **p < 0.05; ***p < 0.01. Coefficients in columns 1 and 3 are the odds ratios (OR) of engaging in child labour from a logistic model (columns 5 and 7 are from a linear probability model). In column 3, all children whose child labour status does not change over the sample period are dropped by the estimation procedure. Other price controls (price 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 lives with parents); household characteristics (education levels of the father and mother, 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 full version of this table is presented in the Supplementary Material.

correspond to an increase of about 8 percentage points that a child must work and about a 1.6-hour increase of child labour.

We further explore the truncated nature of the number of hours by estimating a Tobit and a double-hurdle for the effects of food prices on the number of hours of child labour. The results are presented in the Supplementary Materials (see Table S3). All results support the estimates in Table 3.

4.2. Analysing robustness and differential effects of food prices on child labour

It is well established in the literature that the incidence of child labour may be different between boys and girls, and across different age groups. Table 4, therefore, explores the differential impact of food prices on child labour by the gender and the age of the child using instrumental variables again.[17] This also serves as a robustness test. We categorise the data set into sub-samples of gender (boys and girls) and age groups (five to11 and 12 to14 years). The age categories are defined to correspond with the ILO's categorisation, where children between five and 11 years are not supposed to engage in any form of work. We estimate separate individual fixed effect models for the different gender and age groups. As expected, the coefficient of the variable food prices tends to be higher for older children (11- to14-year-olds) than younger children (five- to 11-year-olds). In addition, whilst higher food prices increase the probability of child labour for boys compared to girls, girls tend to work for more hours than boys when the price of food increases. This differing impact for boys and girls may be the result of boys tending to engage in commercial activities whilst girls usually perform domestic chores which may require more time.

Table 4. Instrumental variable estimates of the effect of food prices on child labour – fixed effects estimates (sub-samples based on age and gender of the child)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	5–11 year		12–14 years		Girls		Boys	
	Worked (LPM)	Hours	Worked (LPM)	Hours	Worked (LPM)	Hours	Worked (LPM)	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 < 0.1; **p < 0.05; ***p < 0.01. LPM denotes a linear probability model. The 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.

Our results are consistent with the view that food inflation represents an economic shock to households which has an impact on child labour. Having controlled for both household expenditure and other correlates of household poverty status, we interpret food price shocks in our empirical models as pure economic shocks that impact household welfare and its labour market decisions. The results suggest that the effect of food prices on child labour may reflect a coping strategy or an income maximisation strategy of households. Indeed, the transmission mechanism from food price changes to child labour could be complex depending on the household's endowments and the relevant period under consideration (Caracciolo & Santeramo, 2013; Wodon et al., 2008). So far, our results suggest that households follow a coping strategy if food prices increase. To better explore the channels of transmission, we investigate the moderating effect of land ownership, the farming status of the household, and the net-market status of the household on the relationship between changes in food prices and child labour.

Higher food prices could, in fact, present a potential opportunity for a landowning household to increase income by either expanding their output through more cultivation or renting out available land to raise more income. The ability of these households to increase output without increasing child labour depends on the labour market conditions, access to credit and other inputs. If landowning households wish to increase their output but there is agricultural labour market failure, then they may resort to child labour to increase output/income. Conversely, if there exists a perfect labour and credit markets, then a landowning household could leverage its land to increase output and income without necessarily increasing child labour. In Table 5 we interact food prices with landownership to see how the effect of food price changes is different between landowning and non-landowning households. To do this, we partition the sample into two sub-samples: agricultural households and non-agricultural households. The rationale is that landowning-agricultural households may be in a better position to reallocate their resources to take advantage of the higher food prices compared to non-agricultural households. Moreover, we run similar interaction models employing the net market position of the household, where net-market position is defined by the household's level of food self-sufficiency. Food self-sufficiency is measured here as the proportion of household food consumption that comes from its own produce. To facilitate interpretations of the interaction effect, we run linear probability models throughout Table 5.

Table 5. LPM estimates of the effect of food prices on child labour with the interaction effects of land ownership and net-market position

	(1)	(2)	(3)	(4)	(5)	(6)
	All households		Agriculture households		Non-agriculture households	
	Worked	Worked	Worked	Worked	Worked	Worked
ln Food Price	0.35***	0.14*	0.44***	0.09	0.16	−1.42
	(0.11)	(0.08)	(0.13)	(0.09)	(0.19)	(0.91)
Household own land	1.17***	0.03	1.76***	0.03	0.93	−0.01
	(0.39)	(0.02)	(0.51)	(0.02)	(0.63)	(0.02)
Net market status	0.05*	0.08	0.05*	0.61	0.19	11.02*
	(0.03)	(0.44)	(0.03)	(0.53)	(0.24)	(6.64)
Landownership*food price	−0.22***		−0.33***		−0.18	
	(0.07)		(0.10)		(0.12)	
Net market status*food price		−0.01		−0.10		−2.01*
		(0.08)		(0.10)		(1.21)
Other price controls	No	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	7509	7509	777	777

Notes: Standard errors in parentheses *p < 0.1; **p < 0.05; ***p < 0.01. 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 1–6 The same controls in Table 3 are used.

The results in Table 5 suggest that whilst children from landowning households are more likely to engage in child labour, probably because land ownership is also related to farming and rural labour, the effect of food price changes is moderated by land ownership. The effect of a change in food prices is lower for a child in a landowning household as the statistically significant and negative interaction term between land ownership and food prices shows. Moreover, we find that whether the households engaged in agriculture is of statistical relevance for the moderating effect of land ownership. Comparing columns (3) for households who engage in agriculture and (5) for households who do not engage in agriculture indicates that the significant effect observed in column (1) is largely driven by landowning households that engage in agriculture. This observation is consistent with theoretical expectations that households engaging in agriculture who own their own land may be in a better position to benefit from higher food prices as they present a positive shock for them on the supply side to a certain degree.

Regarding the moderating effects of net-market status, we find a non-significant interaction effect in both the full sample and the sub-sample of agricultural households, however, the effect of food prices tends to be lower for households that did not engage in agricultural activities.

Columns (5) and (6) also indicate that food prices do not statistically affect the intensity of child labour for non-agriculture households.

We provide further refinements and extensions in the Supplementary Materials to this paper. 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*, that is, it refers to a change in working time. The extensive margin represents the effect on the incidence of child labour, that is, the effect of economic shocks on children previously not working. In the Supplementary Materials (see Table S6), we refine Equations (3) and (4) 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.[18]

We further analyse how households adjust to the initial food price changes as time elapses (in Table S7). Intuitively, one may expect households to adjust to an initial change in food price so that the impact may diminish over a certain period. We tend to find that the initial effect on child labour reduces after the third month of the original increase. Finally, we also look at sub-samples of poverty status (in Table S8) and find that the effect of food prices on child labour tends to be more relevant among households that live below the poverty line.

5. Conclusion

We analyse the impact of changing food prices on child labour using data from Uganda, one of the countries with a high incidence of child labour in sub-Saharan Africa. The empirical results indicate that a rise in food prices is linked to a statistically significantly higher incidence and intensity of child labour. The quantitative results for a rise in food prices are sizable even when controlling for numerous other factors which may be associated with child labour. Thus, the global food prices hike between 2008–2010 in both domestic and international markets may have contributed to a substantial increase in child labour which is consistent with empirical observations and anecdotes during that period.

Our results align with the literature highlighting potential adverse effects of food price hikes on farming households (see, for example, Bibi et al., 2010; Hou et al., 2015). Adverse economic shocks can force the households to adopt measures to increase their incomes and such measures may include child labour (see, for example, Bandara et al., 2015). We complement the existing literature by providing further evidence on how the effects of food price changes on child labour differ across household characteristics such as land ownership or net-market status, and whether the household engages in agriculture.

In our empirical setting, we account for endogeneity by employing fixed-effects and international food prices as instruments for domestic market-level food prices. Our results support the view that the influence of food prices on child labour tends to be more relevant for boys than for girls. Moreover, we provide evidence that higher food prices affect child labour on both the extensive and intensive margins, and we explore moderating effects of land ownership. Results indicate that the effect 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. A clear limitation of our study is that we analyse a single country. Further evidence from other developing countries may help to see if our results generalise. In the wake of the food price surge, different policies were adopted by governments to curb the problem. For future research it would be interesting to study the impact of such policies on child labour and potentially provide cost-benefit analysis.

From a policy perspective, it is relevant to be aware that sudden food price hikes can potentially impact child labour. Child labour is often suggested to have a potentially long-lasting effect on human capital and, thus, food price hikes may reduce the effectiveness of poverty reduction programmes. Our results suggest that programmes that aim at alleviating the impact of food prices should be comprehensive enough to deal, also, with the effects of food prices on child labour. In doing so, such programmes should consider diverse socio-economic circumstances of households including land ownership 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 likely to be higher.

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Notes

1. The ILO (2015) puts the number of children in hazardous work at 85 million.
2. For example, the experience from a price boom of quinoa suggests that the welfare effects of rising food prices depend on production responses of small-scale farmers (see The Economist, 21 May 2016). It is also noteworthy that food price rises and food scares do not only affect poor, developing countries (see Desmarchelier & Fang, 2016).
3. Technically, household decision makers consider the leisure or education of their children as luxury goods in these models.
4. Proponents of this assumption argue that adults are better skilled than children. However, adult wages are relatively higher than that of children such that firms may use both types of labour (see Levison, Anker, & Barage, 1998).
5. Studies for the International Food Policy Research Institute (see Ulimwengu & Ramadan, 2012; Van Campenhout et al., 2013) analyse different associations between food prices and household welfare in Uganda. Households may indeed be able to increase output to gain from the higher food prices (as suggested by Ulimwengu & Ramadan, 2012).
6. Matoke is the local name for plantain in Uganda.
7. Thus, a non-restrictive measure of child labour includes non-paid work. Some of the domestic and farm work are sometimes done under hazardous conditions too (Admassie, 2002).
8. For our instrument to be valid, it must correlate with our variable FoodPrice (relevance condition) and it must affect child labour only through FoodPrice (exclusion restriction), or put differently; after controlling for other covariates and fixed-effects, it must not correlate with the error terms in Equations (1) and (2).
9. 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 a higher tendency to work.
10. A household is defined as land owning if it owns any agricultural land.
11. The empirical literature has not produced a conclusive finding on the effect of land ownership on child labour (Basu, 2006; Bhalotra & Heady, 2003).
12. This upward trend, though less pronounced, is consistent with movement of international food prices.
13. Our results also remain qualitatively similar using a different stepwise inclusion or omission of control variables such that our broader interpretations are not affected by a particular choice of controls.
14. When accounting for region and individual fixed effects at the same time, our results remain qualitatively and quantitatively the same. We note that the variation then only comes from a comparatively small number of households that change region.
15. The results are qualitatively identical and quantitatively similar when estimating a logit or a probit model.
16. We apply a linear probability model for reasons of a lack of fully implemented, appropriate techniques for a binary dependent variable with an endogenous regressor and time/year fixed effects. An alternative is to pool the data sets, apply the Newey's two-step estimator (Newey, 1987), and control for time/year fixed effects in the form of dummies. We tried this option and the results remain qualitatively similar to what we have presented in Table 3.
17. Qualitative results remain similar when associations are analysed, that is, when no instrumental variables are used.
18. We distinguish extensive and intensive effects of food price increases for scientific interest and policy relevance: if food prices changes affect child labour mainly through the intensive margin, then children from poor households are most likely more affected than richer households.

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