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The Heterogeneous Effects of a Food Price Crisis on Child School Enrollment and Labor

Evidence from Pakistan

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Abstract

Using a panel survey, this paper investigates how the increase in food prices in Pakistan in 2008–2010 affected children's school enrollment and labor. The causal identification relies on geographical variations in the price of food (wheat). The results show that the negative impacts of food price increase on school enrollment differ by gender, economic status, and the presence of siblings. The negative effects on school do not directly correspond to the increase in child labor because the transition from being idle to labor activity or from school to being idle are significant, particularly among the poor girls. The results also show that children in households with access to agricultural land are not affected by higher food prices. The analyses reveal a more dynamic picture of the impact of food price increase on child status and contribute to broader policy discussion to mitigate the impact of crises on children's education.

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The Heterogeneous Effects of a Food Price Crisis on Child School Enrollment and Labor – Evidence from Pakistan

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1. Introduction

Dramatic surges in food prices around the world will undoubtedly have a devastating effect on the world's poor. From 2007 to 2008, the price of major staples, wheat and rice, rose by 121 percent and 76 percent, respectively (World Bank 2010), and global food prices almost doubled in the same period of time. The rising cost of food has slowed the pace of poverty reduction worldwide. About 65 million people were estimated to subsist under the $2 per day poverty line in 2009 as a result of the crisis (World Bank 2009).

The assumption that a food crisis will result in increased child labor is largely based on the notion that child labor is a result of poverty. In fact, the negative consequences of income shocks on children's education and health are well documented (Funkhouser 1999; Jensen 2000; Hoddinott 2001; Thomas, Beegle et al. 2004; Beegle, Dehejia et al. 2006). The mechanism to support this conclusion in the case of a food crisis focuses more on the real income loss caused by higher food prices, which leaves little money to pay for children's education. In the worst cases, children are pulled into the labor market in order to provide the family with enough additional income to buy the food they need.

However, as Ferreira and Schady (2009) noted, actual empirical findings do not reveal a simple connection between an aggregate economic shock and negative education and health outcomes. Likewise, in the case of a food price crisis, the impact of the shock depends on whether households have access to other coping mechanisms, such as insurance (Guarcello, Mealli et al. 2010) and household assets (Beegle, Dehejia et al. 2006). Different types of households may respond to a food crisis differently. Agricultural households may be unaffected or even benefit from higher food prices because these households can consume self-produced foods and/or sell their self-produced foods for a higher price in the market. On the other hand, non-agricultural households are likely to be more severely affected by high food prices.

Within households, limited resources sometimes force parents to make choices about the activities their children can engage in: going to school, working, or staying home. The trade-offs that parents have to make are not easy, and may not be based only on demographic

characteristics such as age and gender. While more detailed data are required to gain a more in-depth understanding of parents' preferences and behaviors, limited demographic information can sometimes help researchers better understand parents' preferences. Several recent studies have shed light on these. In Brazil, Duryea et al. (2007) studied the impact of unemployment of household heads and found that older girls are the most likely be pushed into the labor market to help support the family when the head of the household is unemployed. In studying the Indonesian financial crisis, Thomas et al. (2004) found a decline in educational spending in poor households that had more young children and suggested that poor households tended to protect their investment in older children's education. Similarly, Beegle et al. (2006) found a decrease in school enrollment among younger children during the Indonesian financial crisis in 1998, also suggesting that households chose to protect their investment in their older children's education by keeping them in school.

There are a number of studies examining the impact of the 2008 food crisis on children's education; most of them are simulation-based studies. The effects of a food crisis on child labor depend not only on child and household characteristics, but also on social and community factors. Thus it is difficult for cross-sectional or repeated cross-sectional data to capture all of these factors. This study used a panel survey from the Pakistan Standard Living and Measurement (PSLM) 2008 and 2010 and exogenous geographic variations in wheat price changes to identify the impact of the food price increase on children's activity status (attending school, working, or idle).

This paper fills in the literature by analyzing the heterogeneous effects of a food price increase on child labor, including within-household and cross-household differences. It examines how children's age, sex, and pre-crisis activity status are associated with the observed impacts. The same emphasis was placed on children being idle (neither working nor attending school) as on working and attending school because idleness is one major status for children in Pakistan, particularly for girls. The reasons for this are not just economic; due to a strong social stigma against girls' schooling in some areas in Pakistan. Heterogeneous effects of the food crisis on agricultural and non-agricultural households were also examined.

This study finds that the food price crisis in 2008–2010 in Pakistan had a negative impact on children's schooling. Yet the effects are complicated, given household differences in welfare status, gender, access to agricultural lands, and the presence of older brothers and sisters. These findings can help further strengthen the strategies for improving children's education, particularly for girls.

This paper is organized as follows: section 2 discusses the theoretical framework used to examine how food prices affect children's education and labor; section 3 describes the data and empirical strategies; section 4 presents the regression results; the last section concludes and discusses the policy implications.

2. Theoretical Framework

There is a rich amount of literature on the theory and empirical evidence regarding the allocation of children's time and the association between household income and child labor. The "luxury axiom" proposed by Basu and Van (1998) in their seminal paper suggests that children work only when their families are unable to meet their basic needs. This axiom suggests a strong link between child labor and poverty and has been supported by many cross-sectional studies (Maitra and Ray 2002; Ersado 2005) and panel data studies (Edmonds 2005). However, other studies have cast doubt on this axiom by suggesting a more nonlinear relationship between poverty and child schooling and work decisions. For example, Bhalotra and Heady (2003) found a "wealth paradox"—children in land-rich households are more likely to work and less likely to attend school than children in land-poor households. Swaminathan (1998) showed that in Gujarat, India, economic growth led to increases in wage employment among children.

Building on the literature, a simplified theoretical framework (Appendix 1) was developed, which illustrates the potential impact of a food price increase on the allocation of children's time. As expected, the theoretical framework shows that the impacts of a food price increase on children's activities are contingent on household income, and the relationship is not necessarily linear. Thus, in the following empirical strategy, the heterogeneous effects of a price increase on children's schooling and child labor by household economic status was tested and measured by

the asset index. The asset index was chosen over household expenditure primarily because expenditure, as the product of price and quantity, is subject to price change and therefore becomes endogenous to food price shocks. It is not necessarily a good indicator of economic status during a food price crisis, especially when food is a major component of household expenditure. Further, there is little difference in economic gradient of education and health outcomes between using the asset index or expenditure (Filmer and Scott (2009). In fact, the asset index better captures the permanent income, rather than transient income.

3. Data and Methodology

3.1. Data

The 2008 and 2010 rounds of the Pakistan Standard Living and Measurement Survey (PSLM) are used to study the impact of the food price increase on child education and labor. The 2007–2008 PSLM survey is a nationally representative survey, covering about 15,000 households, conducted by the Federal Bureau of Statistics (FBS) in Pakistan. The food price crisis started at the beginning of 2008 and peaked in mid-2008. At the beginning of 2010, in order to understand the impact of the crisis, the FBS, in collaboration with the World Bank team, followed half of the sample households interviewed in 2008 for the 2007–08 PSLM survey. The FBS was able to conduct a follow-up survey of 6,252 of the 8,000 households originally surveyed in 2008 across the 82 districts in Pakistan. All households were surveyed in the equivalent quarters for both rounds, thereby eliminating possible seasonality effects.

The PSLM in both rounds follows the Living Standard Measurement Survey (LSMS) questionnaire, which includes detailed modules on household consumption, education, and labor participation. Labor participation information is only available for household members ages 10 or older. In addition to the standard modules, the PSLM 2010 also includes retrospective questions about the food price crisis. It asked whether the household had experienced a food crisis since the last survey in 2008, to what extent it had affected them, and how they dealt with it. Answers to the questions about their experience with the food crisis were used to construct the self-reported food price shocks.

The use of self-reported data about the food price shock may lead to biased results. Households might report a severe price shock in order to justify reducing their educational investment in children or increasing their labor. In order to avoid this endogeneity problem of the self-reported food price shock, the change in district-level food prices between 2008 and 2010 was used to measure the food price shock. Specifically, the district of PSLM data was mapped to the nearest urban center in which the retail price data were collected. Then the corresponding retail prices of wheat were matched to the sample households based on their residential district and interview month.

Since 1991, the FBS in Pakistan has collected monthly retail price data for 374 goods and services covering ten consumption categories from 71 markets in 35 cities. In this study, the district-level retail price of wheat as a proxy for food prices was used. This measure was chosen because wheat is the single most important source of household calories in Pakistan. According to PSLM 2005–06 and 2007–08, 50 percent or more of the calories consumed in an average Pakistani household come from wheat. Retail prices in rural areas are matched to prices in urban centers, so the implicit assumption is that the wheat price in the rural areas is similar to that in the nearest urban centers. The households in the Balochistan region were excluded from the analysis because there is only one urban center (Quetta) in this region covering a fairly large area (44% of the total geographic area of Pakistan) and the price match with this one urban center with the rest of the region tends not to be reliable. Furthermore, although only 5 percent of the population lives in Balochistan, 18% of the sample households were located in Balochistan due to oversampling in the region.

3.2. Empirical Strategy

This study investigates the impact of the food price increase on child schooling and labor in Pakistan. Three binary outcome measures, attending school, working, and being idle were used to capture children's activities. Children engaged in both work and school were not separately analyzed since only 1 percent of children aged 10–14 fall into this category. Two food price shock measures were used, the self-reported food price shock based on recall data and district-level wheat price changes between two waves. The latter is exogenous because it is based on geographic and temporal (two waves) variations.

Equation 1 is used to examine how child schooling and labor activity were affected by households' perception of the food shock.

$$Y_{i,t} = \delta_0 I(Shock)_{th} + \delta_1 I(Shock)_{th} \times 2ndQrt_{h,t-1} + \delta_2 I(Shock)_{th} \times 3rdQrt_{h,t-1} + \delta_3 I(Shock)_{th} \times 4thQrt_{h,t-1} + X_{it}'\beta + Year_t + \alpha_i + \varepsilon_{it} \quad \text{---(E. 1)}$$

Outcome variables ($Y_{i,t}$) are attending school, working, and being idle, and three separate equations are estimated using an individual fixed-effect linear probability model (LPM). Attending school is coded 1 if the child is enrolled in school; working is coded 1 if the child engaged in economic activity at least one hour last month; being idle is coded 1 if the child is neither enrolled in school nor working.

$I(Shock)_{th}$ is an indicator variable measuring whether the household (h) reported experiencing the 2008 food price crisis. This is based on household responses to questions in the second wave of the panel; specifically, each household was asked to rank its perception of the food price shock on a scale from 1 (*Not at all affected*) to 5 (*Severely affected*). If a household answered *At least moderately affected* (3 on the scale), $I(Shock)_{th}$ is coded 1, and 0 otherwise. The assumption is $I(Shock)_{th}$ equals zero in the baseline (first wave of the panel) for all households. This food shock variable is interacted with the household's asset quartile indicator variables in 2008 ($2ndQrt_{h,t-1}$; $3rdQrt_{h,t-1}$; and $4thQrt_{h,t-1}$) and the first asset quartile indicator is omitted for comparison. X_{it} is a vector of household and individual characteristics, and $Year_t$ is to control year fixed effect. The coefficients on the interaction term indicate the heterogeneous impact of shock to the households depending on their initial wealth status.

Idiosyncratic responses to the perceived food crisis shock, however, do not allow us to identify the *impact* of the food price crisis on children's schooling and working since households' perception of the shock is likely to be correlated with unobserved household characteristics that affect child outcomes. For example, a household might have reported experiencing the food price shock in order to justify requiring a child to work or taking a child out of school. Therefore, an

objective measure of the food price crisis, district-level wheat price changes between 2008 and 2010, was used. As noted earlier, the wheat price was used because wheat is the most important staple in Pakistan. Wheat consumption accounts for 50 percent of total calorie intake and 11 percent of total household expenditure in an average Pakistani household. The shares of both calories and budget are even higher among poor households. Poor households spend 20 to 30 percent of their budget on wheat products (Figure 1). Although food prices rose more slowly after 2008, PSLM panel households experienced a 33 percent rise in the wheat price from 2008 to 2010, and a 13 percent rise in costs related to education. However, wheat price variations were not the same across the Pakistan, and there is a large price variation within the country. Figure 2 shows the median wheat price, the top 90th percentile, and bottom 10th percentile. Geographic variations in the price of wheat were used to identify the impact of the food price crisis on children's activity status. Appendix 4 reports the results using the food price index.

The following specification is used:

$$Y_{it} = \gamma_0 \ln(Wheatprice)_{dt} + \gamma_1 \ln(Wheatprice)_{dt} \times 2ndQrt_h + \gamma_2 \ln(Wheatprice)_{dt} \times 3rdQrt_h + \gamma_3 \ln(Wheatprice)_{dt} \times 4thQrt_h + EP'_{dt}\theta + X'_{it}\beta + Year_t + \alpha_i + \varepsilon_{it}, \quad \text{--(E. 2)}$$

Empirical equation 2 (E.2) is estimated using an individual fixed-effect linear probability model in order to remove the potential bias due to time-invariant individual characteristics correlated with district-level food prices and child outcomes ($corr(\ln(wheatprice)_{dt}, \alpha_i) \neq 0$). It estimates how the district-level wheat price change affects child activity status. Since the literature and the theoretical model have shown that the effects tend to be heterogeneous based on welfare status, the interaction between the price and the household asset quartile indicators ($2ndQrt_h$, $3rdQrt_h$ and $4thQrt_h$) were included. Thus, γ_0 captures the impact of the wheat price change on child activity status for households in the first quartile; $\gamma_1, \gamma_2,$ and γ_3 captures the differential impact between households in the first quartile and households in the second, third, and fourth quartiles based on asset index, respectively.

In order to further understand the heterogeneity of the impacts, the (E. 2) was estimated stratified by age of child (ages 5–9 and 10–14), child gender, locality (urban and rural residence), and

access to agricultural land. There are several reasons for these stratifications. First, because the opportunity cost of schooling is higher for older children than for younger children, households may have taken the older children out of school to dampen the shocks. In the meantime, the households may want to protect the investment they have already made in their older children's education by delaying younger children's school enrollment. Second, in Pakistan, the gender difference in school enrollment is significant; the majority of girls in Pakistan neither attend school nor work, while most boys are enrolled in school. It would be a rational decision for households to first put idle children to work instead of sending children to school when food prices are high. Third, the food price crisis may have affected urban and rural households differently since educational investments and types of child labor in urban and rural areas may be systematically different. Last, households with access to agricultural land can consume home-produced food to mitigate the impact of the food price increase. If they are also able to sell their home-produced products at a higher price, the impact of the food price increase could be less severe for households with agricultural land than for households without access to agricultural land.

4. Descriptive Analysis

4.1. The Food Crisis and Coping Strategies in Pakistan

In the five years from 2005 to 2010, food prices in Pakistan more than doubled. Among the major staple foods, the increase in the price of wheat was among the greatest. It increased in almost the same pattern as the consumer price index (CPI) for food and beverages (see Appendix 1). While the wheat price increased dramatically during 2008 and continued to increase through much of 2010, each district in Pakistan experienced a different level of price changes. Figure 2 shows the trend of wheat prices at the median, at the 10^{th} percentile (p10), and at the 90^{th} percentile (p90); the regional gap in wheat prices widened after 2008, when wheat prices increased most sharply.

Seventy-seven percent of households reported being at least moderately affected by the food price crisis after 2008. In order to cope with the price increases, most households reported reducing their food intake or switching to lower-quality or less-expensive food (67 percent and

77 percent, respectively). In Pakistan, poor households may have access to cheaper wheat through utility stores which are open to the public and offer government subsidized items. Most customers are from poor or low-income families as high income families attach a stigma to purchasing in the utility stores that is incompatible with their social status. The survey shows that only a small percentage of households reported sending children to work (3 percent), and an even smaller percentage reported taking children out of school (1 percent). These figures suggest that very few households were willing to sacrifice a child's education as a way of dealing with the food crisis. It is possible, however, that households under-reported the incidence of child labor or the sacrifice of a child's education to avoid the social stigma attached to such behavior; alternatively, they may have reported experiencing the food shock to justify requiring a child to work or not sending a child to school.

4.2. Child Schooling and Labor Activity in Pakistan

Child school and labor participation rates in 2008 and 2010 are first described by age cohort and gender (Table 1). The age cohort is based on age in 2008. For the youngest cohort (ages 5–9 in 2008), 68 percent were enrolled in school in 2008 and 78 percent were enrolled in school in 2010. For the older cohort (age10–14), school participation declined from 70 percent in 2008 to 62 percent in 2010. The percentage of working children doubled from 2008 to 2010, from 9 percent to 19 percent, while the percentage of idle children increased slightly, from 23 percent to 26 percent. The difference in school and labor participation rates between 2008 and 2010 is partly due to children growing older. For both genders, as they grow older, children are less likely to be in school and more likely to work. In general, however, boys' school participation rate is much higher than girls'. More girls than boys are idle. Girls are more likely to be idle when they grow older, but the percentage of idle boys does not seem to be related to age.

While Table 1 shows children's activities in two waves, Table 2 reveals how their activity status changed between the two periods. Of the boys who were working in 2010, only 43 percent were working in 2008, 32 percent were attending school, and 28 percent were idle. On the other hand, the majority of idle boys in 2010 were also either idle or in school in 2008. This shows that, for boys, the most likely transition is from attending school to being idle and from attending school or being idle to working. The reverse transition, from being idle or working to attending school,

rarely happens. This pattern holds for girls; however, girls are more likely to move from being idle to working while boys are more likely to move from attending school to working. Not surprisingly, child activity is highly associated with household wealth (Table 3). Children in the lowest quartile based on asset index are less likely to be in school (60% for boys and only 29% for girls), and more likely to be working. Similarly, children in the lowest quartile are most likely to be idle, particularly girls. As wealth increases, more children are enrolled in school, and fewer are working or idle. In the following section, the impact of the wheat price changes on school and labor participation is analyzed.

5. Regression Results

5.1 Perceived Food Price Shock and Child School Enrollment and Labor

An understanding of household perceptions of the food price crisis provides insight into its association with child school enrollment and labor. The expectation that households in the same district would have similar experiences with the food price shock proved faulty. The within-district standard deviation in the self-reported food shock is 0.39, while the between-district standard deviation is 0.16, which means that most of the variation in self-reported food shock occurred within a district. In other words, household perceptions of the food crisis varied even if they were exposed to similar food price increases.

For example, a poor household might report being more severely affected by the food crisis than a non-poor household. The budget share spent on food in poor households is much higher than in rich households (78 percent for the bottom 20th percentile and 62 percent for the top 20th percentile in PSLM 2007–08); poor households will therefore perceive a greater food shock than rich households. Perceptions of the food crisis are also highly correlated with household behaviors. Households may report being severely affected by the food crisis in order to justify some household behaviors, including putting children to work or taking them out of school.

Table 4 describes how the household-level self-reported food price shock is associated with the probability that a child is enrolled in school, working, or idle using an individual fixed-effect linear probability model. Children ages 5 to 14 are 3.6 percentage points less likely to attend

school if households reported experiencing the food price shock; there is little difference across households with different asset levels. A negative association between schooling and food shock is slightly larger for the older age group (children 10–14 years old). For this age group, the self-reported food price shock led to a 5.8 percentage point decrease of school attendance for households in the first quartile; the negative effect is significantly lower for households in the highest quartile. An examination of the impact of the self-reported food shock on whether children were working or idle shows that, for households in the first quartile, the probability of children working increased by 8.2 percentage points; for households in the fourth quartile, the self-reported food shock is associated with an increase in the probability of being idle. However, self-reported food shock is endogenous and, in order to remove the self-reporting bias, the district-level wheat price was used to directly measure the impact of the wheat price increase on child activity status.

5.2 Impact of Wheat Price Changes on School and Labor Participation

First, household-level analysis using the household fixed-effect model was conducted in order to understand how wheat price changes affected child activity at the household level. The dependent variables are the number of children in each activity within the household. The samples were constructed based on the presence of children in specific age group (age 5–14, age 5–9, and age 10–14) in the household. The results are presented in Table 5. It shows the average number of the children enrolled in school dropped as a result of the wheat price increase. The impact does not vary significantly by welfare status measured by the asset index. Further, for the lowest quartile, the drop in the school enrollment rate is mirrored by an increase in the child labor participation rate.

Next, the child-level regression analysis was conducted. The analysis controls for child fixed effects, and the standard errors are clustered at the household level. In order to investigate the heterogeneous impacts of wheat price increases, the impact of the wheat price changes on school participation probability, by age group, gender, and locality (Table 6) was examined. When children ages 5 to 14 were examined as a group, the wheat price increase corresponds to lower school enrollment. A 100 percent increase in the wheat price decreased the probability of school enrollment by 12 percentage points for children in the first quartile based on the asset index.

Although this negative impact does not significantly differ across the four quartiles, the coefficient of the interaction term indicates a less negative impact on the better-off group (the first column of Panel A in Table 6). Surprisingly, the negative impact is mainly on boys. As the second column in the same panel shows, a 100 percent wheat price increase results in an almost 20 percentage point decrease in school attendance probability for boys in the bottom quartile. However, as the positive coefficients for the interaction terms indicate, the negative effect is reduced as the asset index increases.

To the contrary, there is little difference in the impact of the wheat price increase for girls' schooling across different asset index quartiles. Most likely, the weak impact on girls' schooling is due to the initial low school enrollment rate for girls. Therefore, the change is less significant in both size and number. This is also consistent with the observation that girls in the second quartile were the most affected (a 100 percent wheat price increase led to a 12 percentage point decrease in school enrollment), because girls' school enrollment in the first quartile was already very low, 29 percent, as shown in Table 3. Analysis by urban and rural status shows that a wheat price increase significantly reduces the probability of school enrollment in rural areas, but not in urban areas.

The analysis is then broken down by two age groups: children age 5–9 and children age 10–14. There are two reasons for this breakdown. First, the employment module in the survey only applies to household members age 10 and older; therefore there is no labor participation information for children age 5–9. The breakdown clarifies the transition for children age 10–14 from a different initial activity status. Second, the breakdown reveals household preferences for having older or younger children in school. Subsequent analysis examines how the existence of younger or older siblings in a household affects child school enrollment.

The probability of school enrollment for children in both age groups decreases when wheat prices increase (Panel B and Panel C). The coefficient is higher for the younger age group. A 100 percent increase in the price of wheat indicates a 16 percentage point decrease in schooling for children age 5–9 and a 10 percentage point decrease for children age 10–14. Although these aggregate figures show that younger children might suffer more as a household copes with the

food price increase, the differences across gender and welfare status are nuanced. There is a large significant negative impact for boys in the lowest quartile (a 24 percentage point decrease in schooling probability after a 100 percent wheat price increase), however this negative impact is significantly mitigated as family assets rise. Such mitigation effects are much less pronounced for children age 5–9. Similarly for girls, a higher level of welfare mitigates the impact of wheat price increase on schooling probability, but is only significant for older girls.

The next area of analysis focuses on children's time allocation by looking at the probability of labor participation or being idle (Table 7). As discussed earlier, this analysis is restricted to children age 10 to 14. As column 3 in Panel A shows, in the lowest quartile there is a large significant increase in the probability of children working. A rising asset level mitigates the effect of a wheat price increase on labor participation, as shown by the three interaction coefficients with the 2^{nd}, 3^{rd}, and 4^{th} quartiles. A huge gender gap exists. A wheat price increase does not increase the probability of boys entering the labor force, though it has a large impact on girls entering the labor force. For girls in the lowest quartile, a 100 percent increase in wheat price leads to a 26 percentage point increase in the probability of girls working. Most of these working girls are engaged in economic activities as unpaid family workers (Appendix 3). However, this result does not fully complement the results for school participation. Analyses of the impact on the probability of being idle fill the gap.

The wheat price increase does not seem to affect the probability of being idle for the whole sample, even for children in the lowest asset quartile. However, the gender difference masked its impact. The probability of being idle increased for boys but decreased for girls for households in the first asset quartile. With the analysis of being idle, the dynamics of the change in activity status for children in the bottom quartile become clear. For poor boys, a wheat price increase led to an increase in the probability of being idle and a decrease in school participation without affecting their labor participation. For poor girls, a wheat price increase led to a decline in the probability of being idle and an increase in labor participation without affecting their school enrollment.

However, the dynamics for girls' activities in households with greater asset index are different from those in households in the bottom quartile. The third column in Table 7 shows the negative differential impacts between the second, third, and fourth quartiles and the first quartile. Since the size of the impact is similar (-0.258, -0.293 vs. 0.255) except the fourth quartile (-0.368), it indicates that a wheat price increase has little impact on girls' working status for households in the second and third quartiles. However, the coefficients in panel B, which measure the differential impact on idleness between households in higher quartiles and the first quartile, are bigger, implying that a wheat price increase may have increased girls' idleness in these slightly better-off households. This increased idleness is mirrored by a decrease in school enrollment for girls in the second quartile, as shown in column 3 of panel C in Table 6.

The results show that for households in the lowest quartile, a wheat price increase had little effect on girls' schooling because their initial school enrollment rate was very low; yet, the wheat price increase pushed girls from idle to work status. For the slightly better-off households (in the second and third quartile), the wheat price increase pulled girls from schooling to being idle. The wheat price increase decreased poor boys' school enrollment. Rather than working, these boys were more likely to be idle.

5.3 Impact of Wheat Price Changes on Children's Education and Labor Based on Access to Land

In the presence of high food prices, having the capacity to produce food or grain might have diminished or reversed the negative effect of high food prices on welfare if producers benefited from the higher wheat price. But as Bhalotra and Heady (2003) asserted, access to agricultural land and other productive assets may impose greater risk to child schooling for poor and vulnerable households because of the foreseeable high opportunity cost of child labor.

Table 8 describes the heterogeneous effects of wheat price increases between households with and without access to land. In this table, access to agricultural land is coded 1 if a household owned, rented, or had access to community land in 2008. The results clearly show that households with access to land were not affected while households without access to land were adversely affected, particularly the bottom quartile households. School enrollment rates dropped

for boys in the lowest quartile, and the working rate significantly increased for both boys and girls in households without access to land in the first quartile. This implies that having access to agricultural lands helped households to mitigate the impact of the 2008 food crisis, either through consumption from home production or by selling products at a higher price. However, poor boys and poor girls in households without access to lands had no such buffering. The pattern of transition is similar to that previously observed. Boys were more likely to be pulled out of school, and poor girls who had been idle were more likely to enter the labor market.

5.4 Sibling Effect

The presence of older siblings affected the schooling of younger children (5–9 years old). For families with limited budgets during the food crisis, younger children were more vulnerable because parents tended to protect their educational investment for older children; once older children leave school, it is very difficult for them to return. In this scenario, the enrollment of younger children may be delayed; alternatively, parents may pull older children from school to work since the opportunity cost of their schooling is higher than it is for the younger ones. In countries where gender discrimination is significant, the presence of older brothers or sisters also makes a difference.

Table 9 presents the results of the impact of wheat price change on schooling, with the interaction of having older sisters or brothers. The coefficients in the first column crossed with the second and third row show that, on average, there are no sibling effects on children's schooling. However, for the poorest households (first asset quartile group), having older children influenced whether younger children attended school. In particular, if there was an older sister in the family, younger children were more likely to remain in school; but in families with an older brother, younger children were more likely to be pulled from school during the food price crisis. This result is consistent with earlier findings on gender difference; older girls (age 10–14) in the first asset quartile group are more likely to be put to work, which allowed younger children to remain in school, benefiting from the work of the older sister(s).

6. Conclusions and Policy Implications

When food prices rise unexpectedly or dramatically, the well-being of the poor is threatened. Many new studies have looked at how households are affected, focusing on household consumption as a measure of household welfare. This paper focused on how food price increases have affected child school enrollment and child labor in Pakistan. Though food price shocks are transitory, the impact on children's school enrollment and child labor can be long lasting because children's education will ultimately affect their welfare status over the life cycle.

The significance of the effects is associated with the magnitude of price change and the effectiveness of the social protection system in the country. This paper revealed that the food price crisis in 2008–2010 in Pakistan indeed had a negative impact on children's schooling. Further, there is a profound variation in the impact based on gender and economic status. For girls in the poorest quartile, the food crisis impacts on school enrollment were limited due to low pre-crisis enrollment rates. Instead, most of the girls who were called to work in response to the crisis had previously been idle. In the second quartile, however, the food price crisis had a significant negative impact on schooling for girls; those girls were more likely to be pulled from school and thereafter likely remained idle.

The wheat price increase decreased poor boys' school enrollment. Rather than engaging in economic activities, however, these boys were more likely to be idle. The results also show that children in households with access to agricultural lands were not affected by large increases in the wheat price, suggesting that access to agricultural lands helps to protect children's education and to prevent child labor during a high food price period. The sibling effects indicate that in the presence of older sisters, younger children are less likely to be pulled from school. However, the presence of older brothers seems only to worsen the negative effects of a wheat price increase on children's school attendance.

This paper contributes to the understanding of household behaviors in the event of sudden food price increases, and identifies the children who need to be better protected through welfare programs. Strong evidence shows that poor children are more affected than those from better off

households. Both boys and girls were affected by the crisis but the mechanisms are quite different due to societal gender values. Because there is much lower investment in girls' education from the beginning, regardless of any shock, they are more likely to be pulled into labor market when households are exposed to high food prices. Boys' school enrollment was significantly reduced during periods of high food prices. Therefore, while incentives to promote school enrollment of girls should be provided continuously it is equally important to retain boys schooling status during a crisis to prevent negative outcomes and ensure long term social and economic improvement and stability.

Despite many challenges Pakistan has made moderate achievement in children's education in the past decades. The evidence presented in this paper shows that food price increases have the potential to undermine improvements in school enrollment that have been achieved. More than that, it can further widen the gender gap in education. Programs promoting children's education (particularly targeting poor boys and girls' education) that cover the direct and indirect costs of primary and secondary schooling would diminish the negative impact of a food price shock or other economic shocks. More importantly, this research indicates the value of designing and implementing a national education system (particularly at the primary and secondary level), which would be economically resilient and would protect children from the various shocks that poor households may suffer, including food price shocks.

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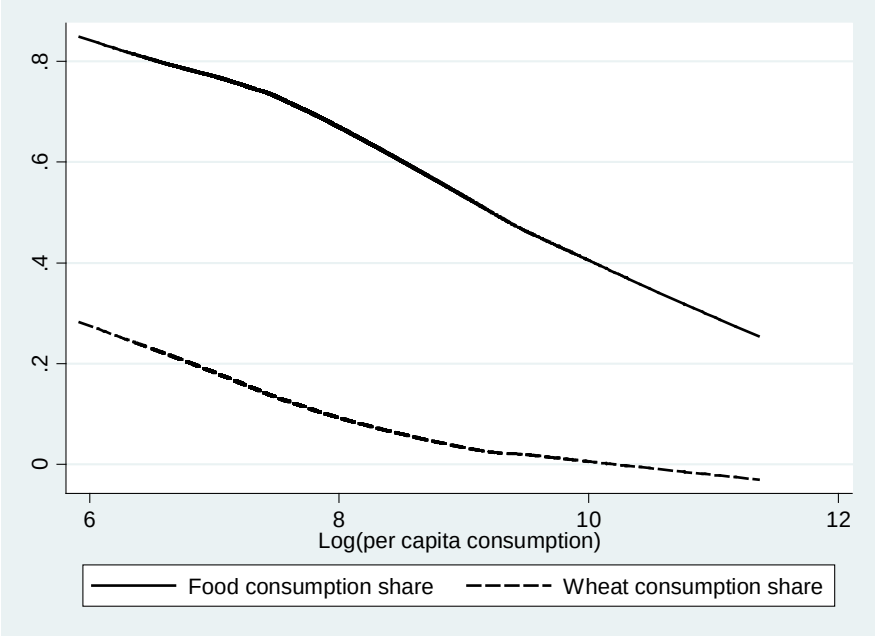
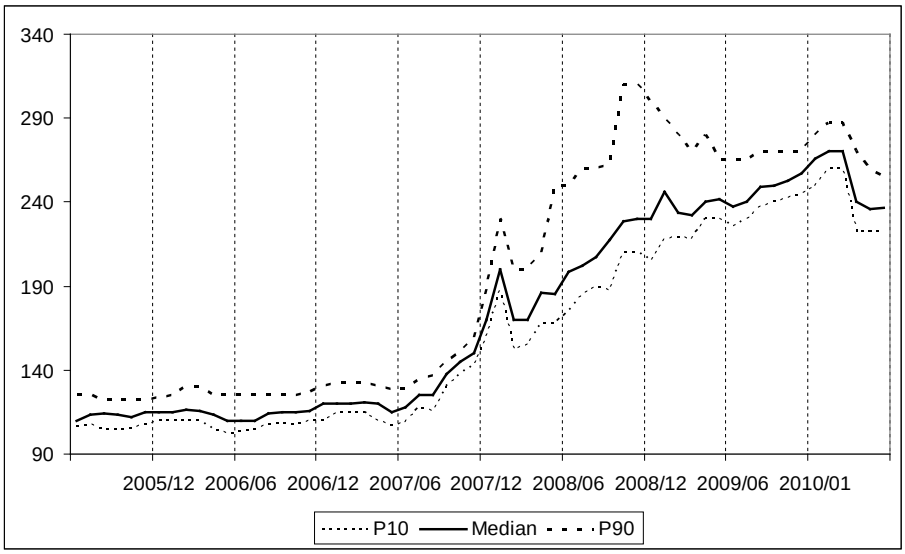
Figure 1. Budget share of wheat consumption and food consumption



Data source: PSLM 2007-08

Figure 2. Wheat Price Trend (June, 2005-June, 2010)



Note: A bag of wheat (10kg) measured in rupees. Ten percent of districts are at or below the 10th percentile price level, and 90 percent of districts are at or below the 90th percentile price.

Figure 3. Relationship between Children's Activity and Household Asset in 2008

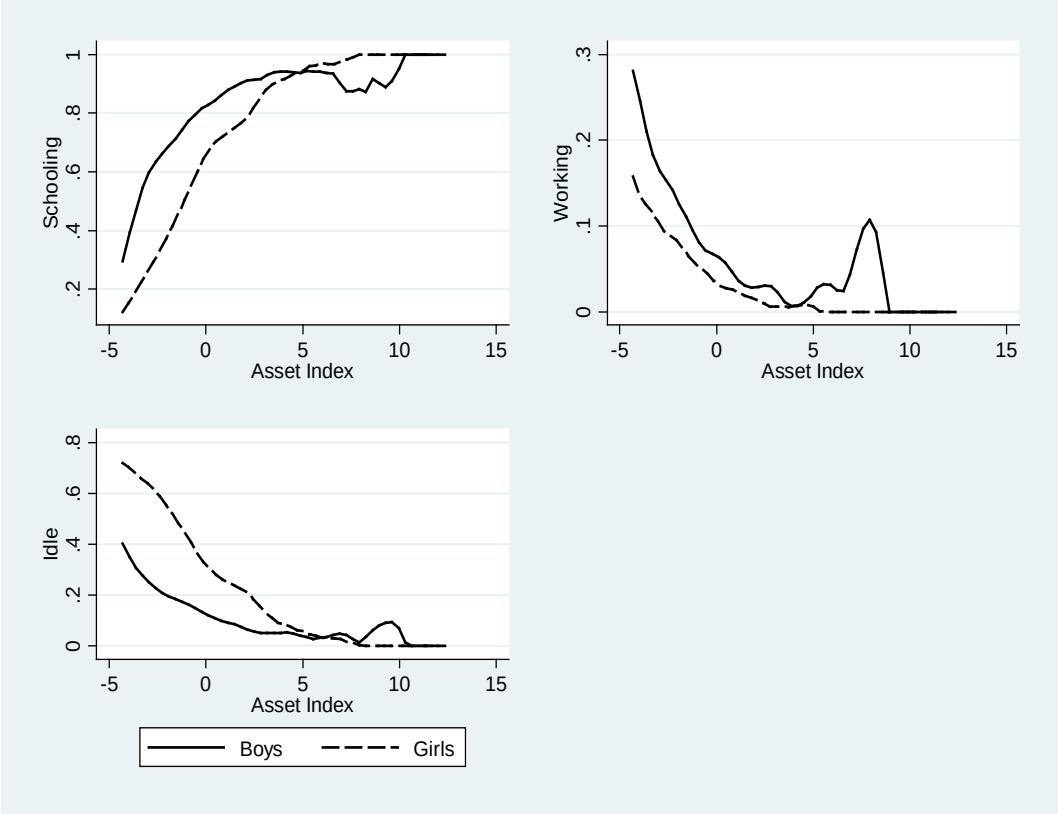


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Table 1. Children in school, working, and idle (%) in 2008 and 2010, by age cohort and gender

	In 2008			In 2010		
	Schooling	Working	Idle	Schooling	Working	Idle
Age 5–9	68%	-	-	78%	-	-
Age 10–14	70%	7%	23%	62%	14%	26%
Age 10–14, Boys	78%	9%	14%	70%	19%	14%
Age 10–14, Girls	62%	6%	33%	54%	10%	38%

Note: Work status is not available for children ages 5–9. Age here is the age in 2008; therefore, in 2010, the children were two years older.

Table 2. Transitions between School, Work, and Being Idle between 2008 and *2010*

	2010					
	Boys			Girls		
	In School	Working	Idle	In School	Working	Idle
In school in 2008	94%	43%	46%	94%	21%	29%
Working in 2008	2%	32%	13%	1%	32%	5%
Idle in 2008	5%	28%	42%	6%	50%	66%
Number of Observations	1691	452	340	1236	229	869

Note: Work status is not available for children ages 5–9. Age here is the age in 2008; therefore, in 2010, the children were two years older.

Table 3. Children in School, Working, and Idle in 2008 by Asset Quartile

	In School		Working		Idle	
	Boys	Girls	Boys	Girls	Boys	Girls
1st asset quartile	60%	29%	18%	12%	24%	60%
2nd asset quartile	77%	54%	8%	6%	17%	41%
3rd asset quartile	86%	77%	5%	3%	10%	21%
4th asset quartile	92%	92%	3%	1%	5%	8%

Note: Sample includes children age 10-14 years old in 2008.

Table 4. Relationship between self-reported food shock and the probability that children are in school, working, or idle

	In School, age 5-14	In School, age 10-14	Working, age 10-14	Idle, age 10-14
Food Shock	-0.036**	-0.058***	0.081***	-0.026
	(0.015)	(0.018)	(0.019)	(0.022)
Food Shock x 2nd asset quartile	-0.007	-0.021	-0.053***	0.081***
	(0.015)	(0.020)	(0.020)	(0.025)
Food Shock x 3rd asset quartile	-0.006	0.004	-0.083***	0.082***
	(0.015)	(0.019)	(0.019)	(0.023)
Food Shock x 4th asset quartile	-0.005	0.045**	-0.099***	0.057***
	(0.014)	(0.018)	(0.018)	(0.022)
Number of Observations	19644	9417	9417	941

Note: Regressions are estimated using an individual fixed-effect linear probability model, and standard errors are clustered in household level. Bootstrap standard errors are reported. The variables included in the regression but not shown are the household head's gender, age, and education level, and the number of female and male household members between 0 and 5 years old, 6 and 15 years old, 16 and 55 years old, and 56 years old or older. The coefficient is significant at the1% level (***), the 5% level (**), and the 10% level.

Table 5. Impact of wheat price changes on number of children in school, working, or idle in the household

	In School			Working	Idle
	Number of children (age 5-14)	Number of children (age 5-9)	Number of children (age 10-14)	Number of children (age 10-14)	Number of children (age 10-14)
Log(Wheat Price)	-0.328***	-0.306***	-0.166*	0.235**	-0.068
	(0.118)	(0.115)	(0.096)	(0.100)	(0.118)
Log(Wheat Price)x2nd asset quartile	-0.102	-0.040	-0.044	-0.247**	0.298**
	(0.123)	(0.121)	(0.101)	(0.105)	(0.124)
Log(Wheat Price)x3rd asset quartile	0.018	-0.000	0.064	-0.317***	0.235*
	(0.124)	(0.121)	(0.105)	(0.102)	(0.121)
Log(Wheat Price)x4th asset quartile	0.172	-0.127	0.402***	-0.463***	0.041
	(0.110)	(0.108)	(0.093)	(0.094)	(0.110)
Number of Observations	7380	5660	5416	5416	5416

Note: The sample in each row includes households with children ages 5-14, children ages 5-9, and children ages 10-14. Regressions are estimated using a household fixed-effect linear probability model, and standard errors are clustered at the household level. The variables included in the regression but not shown are the household head's gender, age, and education level, and the number of female and male household members between 0 and 5 years old, 6 and 15 years old, 16 and 55 years old, and 56 years old or older. The coefficient is significant at the1% level (***), the 5% level (**), and the 10% level.

Table 6. Impact of wheat price changes on probability of school attendance, by gender and urban and rural

	All	Boys	Girls	Urban	Rural
Children ages 5–14					
Log(Wheat Price)	-0.121***	-0.195***	-0.029	-0.048	-0.143***
	(0.043)	(0.060)	(0.062)	(0.145)	(0.049)
Log(Wheat Price)x2nd asset quartile	-0.036	0.034	-0.122*	-0.119	-0.023
	(0.045)	(0.060)	(0.067)	(0.151)	(0.048)
Log(Wheat Price)x3rd asset quartile	-0.005	0.049	-0.074	-0.065	0.021
	(0.048)	(0.066)	(0.067)	(0.146)	(0.055)
Log(Wheat Price)x4th asset quartile	0.064	0.119**	0.017	0.007	0.104*
	(0.042)	(0.058)	(0.074)	(0.140)	(0.060)
Number of Observations	19452	10011	9441	6686	12766
Children ages 5–9					
Log(Wheat Price)	-0.161**	-0.197**	-0.089	-0.052	-0.193***
	(0.063)	(0.088)	(0.091)	(0.203)	(0.074)
Log(Wheat Price)x2nd asset quartile	-0.026	0.031	-0.104	-0.105	-0.024
	(0.068)	(0.091)	(0.102)	(0.210)	(0.074)
Log(Wheat Price)x3rd asset quartile	-0.008	-0.028	-0.032	-0.069	0.007
	(0.068)	(0.101)	(0.095)	(0.204)	(0.079)
Log(Wheat Price)x4th asset quartile	-0.062	0.013	-0.152	-0.121	-0.003
	(0.062)	(0.087)	(0.112)	(0.196)	(0.089)
Number of Observations	10128	5248	4880	3318	6810
Children ages 10–14					
Log(Wheat Price)	-0.104*	-0.240***	0.039	-0.057	-0.112*
	(0.055)	(0.074)	(0.078)	(0.147)	(0.063)
Log(Wheat Price)x2nd asset quartile	-0.033	0.089	-0.148*	-0.138	-0.014
	(0.057)	(0.078)	(0.079)	(0.163)	(0.061)
Log(Wheat Price)x3rd asset quartile	0.035	0.176**	-0.103	0.008	0.050
	(0.062)	(0.083)	(0.088)	(0.149)	(0.073)
Log(Wheat Price)x4th asset quartile	0.219***	0.300***	0.188**	0.137	0.237***
	(0.052)	(0.071)	(0.083)	(0.141)	(0.071)
Number of Observations	9324	4763	4561	3368	5956

Note: Regressions are estimated using an individual fixed-effect linear probability model, and standard errors are clustered at the household level. The variables included in the regression but not shown are the log of district-level education price and its interaction terms with asset quartile dummies, household head's gender, age, and education level, and the number of female and male household members between 0 and 5 years old, 6 and 15 years old, 16 and 55 years old, and 56 years old or older. The coefficient is significant at the1% level (***), the 5% level (**), and the 10% level.

Table 7. Impact of wheat price changes on probability of working and being idle for children ages 10-14

	All	Boys	Girls	Urban	Rural
Working					
Log(Wheat Price)	0.156***	0.059	0.255***	0.238	0.145**
	(0.057)	(0.080)	(0.080)	(0.150)	(0.064)
Log(Wheat Price)x2nd asset quartile	-0.148**	-0.044	-0.258***	-0.212	-0.140**
	(0.060)	(0.082)	(0.086)	(0.155)	(0.064)
Log(Wheat Price)x3rd asset quartile	-0.201***	-0.103	-0.293***	-0.172	-0.262***
	(0.058)	(0.084)	(0.077)	(0.152)	(0.063)
Log(Wheat Price)x4th asset quartile	-0.280***	-0.195**	-0.368***	-0.305**	-0.311***
	(0.053)	(0.077)	(0.072)	(0.146)	(0.066)
Number of Observations	9324	4763	4561	3368	5956
Idle					
Log(Wheat Price)	-0.047	0.181**	-0.289***	-0.104	-0.026
	(0.068)	(0.081)	(0.109)	(0.189)	(0.077)
Log(Wheat Price)x2nd asset quartile	0.182***	-0.055	0.426***	0.245	0.166**
	(0.070)	(0.085)	(0.111)	(0.200)	(0.075)
Log(Wheat Price)x3rd asset quartile	0.149**	-0.118	0.413***	0.096	0.178**
	(0.072)	(0.088)	(0.111)	(0.187)	(0.082)
Log(Wheat Price)x4th asset quartile	0.047	-0.101	0.151	0.077	0.075
	(0.063)	(0.077)	(0.105)	(0.182)	(0.079)
Number of Observations	9324	4763	4561	3368	5956

Note: Regressions are estimated using an individual fixed-effect linear probability model and standard errors are clustered at household level. The variables included in the regression but not shown are the log of district-level education price and its interaction terms with asset quartile dummies, household head's gender, age, and education level, and the number of female and male household members between 0 and 5 years old, 6 and 15 years old, 16 and 55 years old, and 56 years old or older. The coefficient is significant at the1% level (***), the 5% level (**), and the 10% level.

Table 8. Impact of wheat price changes on the probability that children will be in school, working, or idle, by accessibility to land

	Schooling		Working		Idle	
	Landless	Landed	Landless	Landed	Landless	Landed
Log(Wheat Price)	-0.231***	-0.023	0.244***	0.065	0.000	-0.061
	(0.074)	(0.078)	(0.092)	(0.096)	(0.105)	(0.103)
Log(Wheat Price)x2nd asset quartile	-0.001	0.099	-0.192**	-0.157	0.203*	0.044
	(0.076)	(0.085)	(0.085)	(0.108)	(0.103)	(0.124)
Log(Wheat Price)x3rd asset quartile	0.172**	-0.122	-0.261***	-0.166	0.080	0.222**
	(0.070)	(0.076)	(0.085)	(0.117)	(0.099)	(0.100)
Log(Wheat Price)x4th asset quartile	0.311***	0.210	-0.365***	-0.044	0.027	-0.016
	(0.060)	(0.177)	(0.078)	(0.164)	(0.090)	(0.182)
Number of Observations	7159	2165	7159	2165	7159	2165
Boys						
Log(Wheat Price)	-0.406***	-0.149	0.234**	-0.049	0.195	0.150
	(0.079)	(0.117)	(0.116)	(0.152)	(0.126)	(0.121)
Log(Wheat Price)x2nd asset quartile	0.191**	0.137	-0.166	-0.008	-0.027	-0.136
	(0.088)	(0.110)	(0.123)	(0.145)	(0.135)	(0.112)
Log(Wheat Price)x3rd asset quartile	0.375***	-0.080	-0.270**	0.016	-0.144	-0.047
	(0.090)	(0.124)	(0.115)	(0.223)	(0.123)	(0.130)
Log(Wheat Price)x4th asset quartile	0.432***	0.403*	-0.373***	0.294	-0.083	-0.430**
	(0.074)	(0.216)	(0.108)	(0.256)	(0.115)	(0.212)
Number of Observations	3610	1153	3610	1153	3610	1153
Girls						
Log(Wheat Price)	-0.066	0.123	0.252**	0.188	-0.187	-0.314
	(0.126)	(0.118)	(0.110)	(0.195)	(0.161)	(0.215)
Log(Wheat Price)x2nd asset quartile	-0.169	0.087	-0.221**	-0.291	0.425***	0.218
	(0.111)	(0.160)	(0.103)	(0.231)	(0.135)	(0.267)
Log(Wheat Price)x3rd asset quartile	-0.003	-0.114	-0.235**	-0.427*	0.272*	0.521**
	(0.101)	(0.124)	(0.094)	(0.231)	(0.140)	(0.205)
Log(Wheat Price)x4th asset quartile	0.243**	0.093	-0.366***	-0.306	0.093	0.300
	(0.102)	(0.254)	(0.087)	(0.238)	(0.132)	(0.339)
Number of Observations	3549	1012	3549	1012	3549	1012

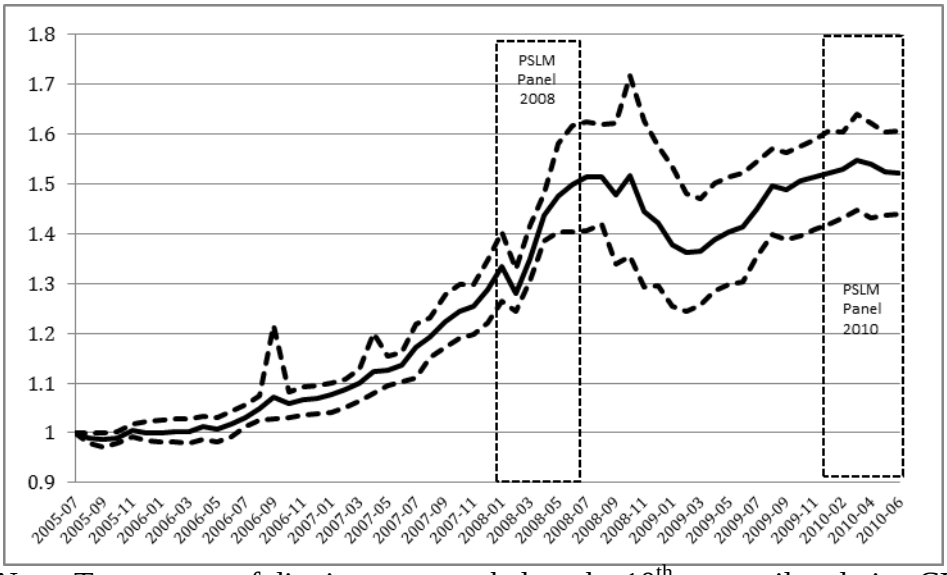
Note: Regressions are estimated using an individual fixed-effect linear probability model, and standard errors are clustered at the household level. The variables included in the regression but not shown are the log of district-level education price and its interaction terms with asset quartile dummies, household head's gender, age, and education level, and the number of female and male household members between 0 and 5 years old, 6 and 15 years old, 16 and 55 years old, and 56 years old or older. The coefficient is significant at the1% level (***), the 5% level (**), and the 10% level.

Table 9. Impact of wheat price changes on school enrollment and the interaction with having older siblings

	All	1st asset quartile	2nd asset quartile	3rd asset quartile	4th asset quartile
Log(Wheat Price)	-0.169***	-0.200	-0.232**	-0.241**	-0.066
	(0.054)	(0.130)	(0.109)	(0.110)	(0.108)
Log(Wheat Price)x have older sister(age <=17)	0.053	0.187*	-0.001	0.089	-0.024
	(0.040)	(0.104)	(0.083)	(0.089)	(0.085)
Log(Wheat Price)x have older brother(age <=17)	-0.059	-0.170*	0.006	-0.058	0.001
	(0.040)	(0.095)	(0.094)	(0.085)	(0.070)
Number of Observations	9921	2896	2741	2412	1872

Note: Regressions are estimated using an individual fixed-effect linear probability model, and standard errors are clustered at the household level. The variables included in the regression but not shown are the log of district-level education price and its interaction terms with sibling dummies, household head's gender, age, and education level, and the number of female and male household members between 0 and 5 years old, 6 and 15 years old, 16 and 55 years old, and 56 years old or older. The coefficient is significant at the1% level (***), the 5% level (**), and the 10% level.

Appendix 1. Food Consumer Price Index relative to Non-food Consumer Price Index(June 2005–June 2010)



Note: Ten percent of districts are at or below the 10th percentile relative CPI level, and 90 percent of districts are at or below the 90th percentile relative CPI.

Appendix 2.

The theoretical model below is just to illustrate the potential impact of food price increase on child's time allocation. A child allocates the total available time (T) across three different activities: attending school (S), working (H), and leisure or idle (I) as follow.

$$T - H = I + S$$

For simplicity, we assume that a household derives utility from consumption of food (C), children's education (S) and children's idle time (I)[2] only.

$$U = U(C, S, I)$$

A household faces the budget constraint that total expenditure is smaller or equal to the income from the sources other than child labor (I) plus total working hours of a child (H) times the wage of a child (w).

$$wH + Y \geq CP + SP_s,$$

that is,

$wT + Y \geq CP + SP_s + w(I + S)$, where P indexes price of food, P_s indexes price of education, and Y denotes household's disposable income excluding income from children working.

In order to be consistent with the notation used in empirical strategy described in the main session, hereafter, we use the wheat consumption and the price of wheat (P_w) to represent the food consumption and food price. We chose to use wheat price because on average wheat consumption accounts for more than 50 percent of total caloric availability and 11 percent of total budget share.

[2] Since the focus is on the child labor supply and education, we assume the adult's labor supply given and consider the income from adult's labor in the budget constraint.
We can separate the utility of the child's schooling from the utility of current consumption of other goods, but for the simplicity, we assume education is another good that the household consume and derive utility from it.

Given the main interest is to understand how the wheat price change affect child activities (schooling, working, and leisure), we derive the following Slutsky decomposition of the own price effect on food consumption (S.1) and the Slutsky decompositions of the cross-price effect on schooling and leisure (idle time) (S.2 and S.3) through the expenditure minimization (E indexes minimum expenditure at the optimal level) and the indirect utility function.

$$\frac{\partial C}{\partial P_w} = \frac{\partial C}{\partial P_w}\bigg|\overline{U} - \frac{\partial C}{\partial E}C \quad \text{--- (S.1),}$$

$$\frac{\partial S}{\partial P_w} = \frac{\partial S}{\partial P_w}\bigg|\overline{U} - \frac{\partial S}{\partial E}C \quad \text{--- (S.2), and}$$

$$\frac{\partial I}{\partial P_w} = \frac{\partial I}{\partial P_w}\bigg|\overline{U} - \frac{\partial I}{\partial E}C \quad \text{--- (S.3)}$$

In the right hand of the equation S.1 to S.3, the first term indicates the substitution effect and the second term indicates the income effect. The substitution between the wheat price and schooling /idle ($\frac{\partial S}{\partial P_w}\bigg|\overline{U} > 0$; $\frac{\partial I}{\partial P_w}\bigg|\overline{U} > 0$) are positive , but the size could be relatively small because these two goods, wheat and schooling/idle are not really substitutable. The income effect of schooling and idle would be either positive or negative, depending on whether the goods are normal or inferior. Therefore, the sign and the size of the entire equation could be either positive or negative. Since schooling is normal goods ($\frac{\partial S}{\partial E} > 0$), given the relative small size of $\frac{\partial S}{\partial P_w}\bigg|\overline{U} > 0$, the overall effect could be negative; however, idle could be either normal goods (as leisure) or inferior goods (as opportunity cost for working or schooling), $\frac{\partial I}{\partial E}$ could be either positive or negative, thus make the overall wheat price effects on being idle inconclusive.

Appendix 3. Children's employment status

Employment Status	Boys	Girls	Total
Employer	0	0	0
Self-employed	3	0	2
Paid Employee	40	23	34
Unpaid family worker	52	77	61
Owner cultivator	2	0	1
Caring for Livestock only	2	0	1
Sample size	665	357	1,022

Note: Sample includes children age 10-14 at baseline.

Appendix 4. Impact of relative food prices on children's activities using food CPI

A T4-1. Impact of relative food price on children's schooling using food CPI

	All	Boys	Girls	Urban	Rural
Children ages 5–14					
relative food CPI	-0.177**	-0.273**	-0.063	-0.112	-0.216**
	(0.077)	(0.111)	(0.104)	(0.225)	(0.088)
relative food CPI x2nd asset quartile	0.048	0.052	0.045	0.098	0.038
	(0.091)	(0.122)	(0.128)	(0.251)	(0.100)
relative food CPI x3rd asset quartile	0.033	0.105	-0.053	-0.045	0.071
	(0.087)	(0.122)	(0.118)	(0.241)	(0.094)
relative food CPI x4th asset quartile	0.126	0.142	0.094	0.104	0.159
	(0.078)	(0.111)	(0.108)	(0.223)	(0.125)
Number of Observations	19638	10107	9531	6731	12907
Children ages 5–9					
relative food CPI	-0.209*	-0.183	-0.194	0.034	-0.302**
	(0.108)	(0.159)	(0.145)	(0.319)	(0.125)
relative food CPI x2nd asset quartile	0.061	-0.110	0.228	0.051	0.048
	(0.128)	(0.172)	(0.182)	(0.350)	(0.141)
relative food CPI x3rd asset quartile	0.004	-0.041	0.006	-0.092	0.003
	(0.123)	(0.173)	(0.167)	(0.343)	(0.137)
relative food CPI x4th asset quartile	-0.093	-0.208	-0.037	-0.261	0.044
	(0.108)	(0.159)	(0.146)	(0.317)	(0.168)
Number of Observations	10225	5298	4927	3342	6883
Children ages 10–14					
relative food CPI	-0.164*	-0.407***	0.101	-0.305	-0.132
	(0.097)	(0.139)	(0.132)	(0.222)	(0.112)
relative food CPI x2nd asset quartile	0.026	0.224	-0.171	0.160	0.015
	(0.112)	(0.157)	(0.152)	(0.269)	(0.122)
relative food CPI x3rd asset quartile	0.133	0.346**	-0.075	0.160	0.184
	(0.110)	(0.160)	(0.148)	(0.245)	(0.122)
relative food CPI x4th asset quartile	0.392***	0.580***	0.212	0.524**	0.321**
	(0.100)	(0.140)	(0.142)	(0.218)	(0.157)
Number of Observations	9413	4809	4604	3389	6024

A T4-2. Impact of relative food prices on children working and being idle using food CPI

	All	Boys	Girls	Urban	Rural
Working					
relative food CPI	0.257**	0.076	0.448***	0.306	0.186
	(0.108)	(0.149)	(0.146)	(0.244)	(0.125)
relative food CPI x2nd asset quartile	-0.279**	-0.065	-0.502***	-0.197	-0.292**
	(0.118)	(0.165)	(0.163)	(0.283)	(0.128)
relative food CPI x3rd asset quartile	-0.442***	-0.301*	-0.578***	-0.224	-0.588***
	(0.111)	(0.159)	(0.146)	(0.255)	(0.127)
relative food CPI x4th asset quartile	-0.565***	-0.458***	-0.672***	-0.501**	-0.582***
	(0.109)	(0.166)	(0.139)	(0.250)	(0.134)
Number of Observations	9413	4809	4604	3389	6024
Idle					
relative food CPI	-0.098	0.368**	-0.606***	0.084	-0.063
	(0.121)	(0.144)	(0.194)	(0.291)	(0.138)
relative food CPI x2nd asset quartile	0.244*	-0.216	0.730***	-0.106	0.287*
	(0.136)	(0.168)	(0.215)	(0.340)	(0.148)
relative food CPI x3rd asset quartile	0.288**	-0.130	0.709***	-0.011	0.353**
	(0.129)	(0.165)	(0.198)	(0.308)	(0.140)
relative food CPI x4th asset quartile	0.165	-0.130	0.471**	-0.128	0.290*
	(0.123)	(0.152)	(0.193)	(0.290)	(0.168)
Number of Observations	9413	4809	4604	3389	6024

A T4-3. Accessbility to land

	In School		Working		Idle	
	Landless	Landed	Landless	Landed	Landless	Landed
relative food CPI	-0.272**	-0.171	0.328**	0.168	-0.074	-0.001
	(0.120)	(0.187)	(0.158)	(0.221)	(0.180)	(0.256)
relative food CPI x2nd asset quartile	0.103	0.063	-0.323*	-0.275	0.257	0.138
	(0.137)	(0.164)	(0.163)	(0.203)	(0.195)	(0.220)
relative food CPI x3rd asset quartile	0.267**	-0.000	-0.509***	-0.382	0.229	0.366*
	(0.132)	(0.159)	(0.156)	(0.239)	(0.186)	(0.198)
relative food CPI x4th asset quartile	0.550***	-0.011	-0.661***	-0.229	0.101	0.415
	(0.109)	(0.304)	(0.152)	(0.328)	(0.161)	(0.346)
Number of Observations	7217	2196	7217	2196	7217	2196
Boys						
relative food CPI	-0.613***	-0.211	0.339*	-0.233	0.294	0.521*
	(0.166)	(0.269)	(0.200)	(0.356)	(0.197)	(0.285)
relative food CPI x2nd asset quartile	0.344**	0.255	-0.259	0.116	-0.099	-0.437*
	(0.156)	(0.217)	(0.250)	(0.308)	(0.245)	(0.241)
relative food CPI x3rd asset quartile	0.595***	-0.000	-0.587***	0.038	-0.104	-0.039
	(0.188)	(0.258)	(0.206)	(0.460)	(0.225)	(0.259)
relative food CPI x4th asset quartile	0.759***	0.518	-0.750***	0.364	-0.035	-0.589*
	(0.146)	(0.333)	(0.210)	(0.486)	(0.189)	(0.340)
Number of Observations	3642	1167	3642	1167	3642	1167
Girls						
relative food CPI	0.079	-0.110	0.314*	0.593	-0.465*	-0.568
	(0.179)	(0.236)	(0.186)	(0.536)	(0.260)	(0.533)
relative food CPI x2nd asset quartile	-0.129	-0.146	-0.382*	-0.656	0.624**	0.753
	(0.217)	(0.259)	(0.194)	(0.443)	(0.272)	(0.489)
relative food CPI x3rd asset quartile	-0.052	-0.006	-0.417**	-0.860*	0.566**	0.836**
	(0.186)	(0.225)	(0.173)	(0.487)	(0.250)	(0.419)
relative food CPI x4th asset quartile	0.348*	-0.636	-0.572***	-0.837*	0.253	1.519**
	(0.177)	(0.423)	(0.166)	(0.439)	(0.222)	(0.582)
Number of Observations	3575	1029	3575	1029	3575	1029