DOES GLOBALIZATION INCREASE CHILD LABOR? EVIDENCE FROM VIETNAM

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ABSTRACT

This paper considers the impact of liberalized trade policy on child labor in a developing country. While trade liberalization entails an increase in the relative price of the exported product, trade theory provides ambiguous predictions on how this price change affects the incidence of child labor. In this paper, we exploit regional and intertemporal variation in the real price of rice to examine the relationship between price movements of a primary export and the economic activities of children. Using a panel of Vietnamese households, we find that reductions in child labor are increasing with rice prices. Declines in child labor are largest for girls of secondary school age, and we find a corresponding increase in school attendance for this group. Overall, rice price increases can account for almost half of the decline in child labor that occurs in Vietnam in the 1990s. Greater market integration, at least in this case, appears to be associated with less child labor. Our results suggest that the use of trade sanctions on exports from developing countries to eradicate child labor is unlikely to yield the desired outcome.

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1. Introduction

Much of the recent policy debate and controversy surrounding globalization and the WTO has been focused on the issue of child labor in poor countries. On the one hand, opponents of market integration argue that globalization may increase the wages paid to working children or increase the earnings opportunities of children in poor economies, thereby increasing child labor. Some further suggest that rich countries should restrict the sale of goods from developing countries that lack or do not enforce child labor laws. Yet many doubt the ability of trade sanctions to eliminate child labor (Bhagwati (1995), Maskus (1997)).[1] Theoretical models by Maskus (1997), Melchior (1996), and Ranjan (2001) show that trade sanctions or import tariffs against countries that use child labor do not necessarily reduce the incidence of child labor. Alternatively, increases in household income and increased availability of schooling opportunities in low-income countries could help reduce child labor (Basu 1999). Some argue that liberalized trade and increased access to world markets could help eradicate child labor by raising the standard of living in these poorer economies (Bhagwati (1995), Dixit (2000)).[2]

Given the theoretical ambiguity about the relationship between child labor and trade discussed in detail in section 2, surprisingly little empirical research examines the link between product market integration (or liberalized trade policy specifically) and child time allocation.[3] This paper uses variation in the domestic price of a country's primary staple and export product to consider this relationship. Specifically, we consider the link between changes in the price of rice in Vietnam and changes in child labor. From 1993 to 1998, the average domestic price of rice increased 29% relative to the consumer price index. Part of this rice price increase stems from the relaxation of a rice export quota. Out of concern for domestic food security and a desire to suppress the domestic price of rice, the Vietnamese

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[1] Maskus (1997) provides an overview of the broader literature on international trade and labor standards.
[2] Although the effect of trade on a country's standard of living is ambiguous in theory, Frankel and Romer (1999) provide evidence that more open economies enjoy higher real income.
[3] Hanson and Harrison (1999) provide a survey of the impact of trade liberalization on labor markets in developing countries. A set of studies focuses on the determinants of child labor such as child age, gender, missing markets, parental income, and school availability (Rosenzweig and Evenson (1977), Levy (1985), Patrinos and Psacharopoulos (1997), Psacharopoulos (1997), Edmonds (2001a & b)). Rodrik (1996) examines the link between labor standards (including child labor laws), international prices, and trade flows. Krueger (1996) explores the determinants of the support for the Child Labor Deterrence Act of 1995 in the U.S. House of Representatives. Grootaert and Kanbur (1995), Maskus (1997), and Basu (1999) survey these studies.

government began administering a rice export quota in 1989. Since then, the government has gradually

liberalized its export regime, allowing rice exports to more than double (to about 3 million tons in 1996).

By 1997, Vietnam's export quota was no longer binding, and Vietnam was fully exposed to the

international price of rice (Goletti and Minot 1997).

During this period of liberalization, communities across Vietnam experienced large intertemporal

and regional variation in the relative price of rice. In this study, we relate regional and intertemporal

variation in the relative price of rice to variation in child labor using the Vietnam Living Standards

Survey (VLSS), a 4,000 household panel spanning the period of quota changes. We complement the

household survey with detailed price data from a community (psu) level price survey conducted at the

time of the household interviews. Our empirical approach compares changes in the economic activities of

children across communities that experience different changes in the relative price of rice over time. We

control for unobserved differences across communities and households that may be correlated with

changes in the relative price of rice and child time allocation by exploiting the panel structure of our data.

To the extent that trade liberalization affects the price of a commodity, our analysis illustrates the

potential impact of trade policy even though all of the price variation in our data does not stem directly

from changes in the rice export quota. [4] We are not aware of any other empirical research that relates

change in child labor to changes in product prices.

Vietnam provides an ideal environment to address the relationship between child labor and trade.

First, worldwide child labor is most prevalent in very poor countries such as Vietnam (with a GNP per

capita of $310 in 1997). Using cross-country data, Krueger (1996) shows that most child labor occurs in

countries with extremely low per capita GDPs and that per capita GDP (and its square) explains 80

percent of the worldwide cross-country variation in child labor. Yet, very little research focuses on the

impact of trade policy on well-being in these countries (Winters (2000), Dollar and Kraay (2001)).

Second, a significant portion of the population in developing countries derives its income from

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[4] Ichimura and Taber (2000) argue for using retrospective price changes to study proposed policies. Our approach is consistent with their suggestion as well as many previous trade studies that rely on within-country data to explore a trade-related phenomenon. See Hanson and Slaughter (2001) for an example.

agriculture. In Vietnam, for example, 70% of the population in 1993 works in the agricultural sector, and rural (predominantly agricultural) households are generally much poorer than their urban counterparts. Finally, although much of the public attention focuses on the exploitation of child labor in manufacturing establishments, most child labor occurs in agricultural activities and household production (ILO/UNICEF 1997). In Vietnam in 1993, 26% of children ages 6 through 15 work in agriculture; only 4% work for household run non-agricultural enterprises; and less than 3% work for wages outside of the household. The VLSS enables us to track child participation in activities within households and in formal and informal labor markets.

We find large reductions in child labor associated with the observed increases in the relative price of rice. A 30 percent increase in price of a kg of rice leads to about a 9 percentage point decline in child labor. The effect of rice price increases varies by household exposure to rice prices through production and consumption. Children in households that own land experience especially large reductions in child labor associated with rice increases. An increase in the relative price of rice (potentially stemming from liberalized trade policy) enhances rural household income. Households appear to substitute the extra income captured by household landholdings for income previously earned by children. This extra income appears to particularly benefit older girls who experience the largest declines in child labor and the largest increases in school enrollment. Hence, child labor declines even though globalization also raised the potential earnings of children. In this way, our evidence suggests that greater integration of unskilled labor abundant developing economies into world markets can be associated with less child labor. We discuss the policy implications of our findings in the conclusion to the paper.

2. Theory Motivation

Several theoretical papers address the relationship between product prices, trade policy, and child labor in developing economies that are relatively abundant in unskilled labor. Trade policy affects the prices of a product produced by child labor (or adult labor), thus influencing the allocation of child time. Using different theoretical settings, these studies show that the effect on child labor of a foreign tariff (i.e. a decline in the price of the exported good) depends on the assumptions one makes in modeling. These

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ambiguous theory predictions and the lack of empirical evidence provide the main motivation for our empirical work.

Maskus (1997) models an economy producing an export and import-competing good in a specific-factors framework. Adult labor is mobile across the two sectors. In addition, the export sector subcontracts from the informal sector, which employs children. Maskus shows that the imposition of a foreign tariff on the exported good ambiguously affects the incidence of child labor, depending on the elasticity of substitution between child and adult labor in the production of the export good. Melchior (1996) sets up a specific-factors model in which child labor is a factor specific to the export sector. The foreign tariff on the exported good reduces the good's price, lowers the returns to child labor, and decreases the labor market participation of children.

The above models abstract from the household decision to send children to work. Basu and Van (1998) and Baland and Robinson (2000) explicitly model the household choice of child labor and suggest that the household decision to send children to work (or to educate them) ultimately depends on the price and returns to education, the price of the goods that household consumes and produce, adult wages, child wages, and the household discount rate. Brown (2000) and Dixit (2000) discuss the implications of punitive foreign tariffs on child labor using a simplified version of Basu and Van (1998). Basu and Van (1998) assume that child labor is a bad in parental preferences. Thus, when household income from adult wages surpasses some threshold, families withdraw the children from the labor market. This yields a discontinuity in the labor supply at the threshold wage and multiple labor market equilibria. A ban on child labor can then move an economy from an equilibrium with low wages and child labor to an equilibrium with high wages and no child labor. Brown (2000) and Dixit (2000) argue that foreign tariffs do not necessarily reduce child labor in this set up: the implication of the effect of trade policy on child labor depends on the slope of the labor demand curve and the elasticity of substitution between child and adult labor. For example, when the economy is fully integrated in the world market, wages are completely determined by international product prices (i.e. the labor demand curve is perfectly elastic).

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By lowering the price of a product exported by developing countries, protectionist measures by the industrialized countries might then actually increase the incidence of child labor.

A household model by Ranjan (2001), where child labor stems from credit constraints, also yields an ambiguous relationship between trade policy and child labor. He models an economy that produces a high-skill and low-skill intensive good and is endowed with skilled and unskilled adult labor. Child labor is an imperfect substitute for unskilled adult labor. Household welfare depends on current household consumption and on the discounted future welfare of children. The model implicitly assumes that the present discounted value of education exceeds the present discounted value of child labor. In each period, a parent decides whether to send a child to school or to work. Ranjan shows that trade sanctions might not reduce the incidence of child labor in a long run model of trade based on relative endowment differences across countries (Hecksher-Ohlin). An increased foreign tariff lowers the wages of unskilled workers and increases the returns to educated workers in an economy that is relatively abundant with unskilled labor. While the returns to education increase (making it less likely for parents to send children to work), households endowed with unskilled labor also become poorer and thus more credit constrained (making it more likely for parents to send children to work). This second effect likely dominates the first for a credit-constrained household with unskilled parents.

Although these models differ in the assumptions on the structure of the labor market, the structure of the economy, and the household decision making process, they ultimately encompass similar channels through which product price affects child labor. Let us review these channels for the case of the rice price increase (potentially instigated by the relaxation in rice export quota) studied in this paper. Rice is important in Vietnam in both consumption and production. Prior to liberalization (1993), rice constitutes 44% of all food expenditure and 29% of expenditure overall. 70% of all farmland in Vietnam is devoted to rice and 98% of all communities report growing some rice (authors' calculations from the VLSS). Thus, we expect large and dramatic effects of rice price changes. First, we consider how rice price increases affect the opportunity cost of time in various activities. Agriculture is the most common arena in which children work. Increases, in the price of rice, then, raise the value of a child's time spent in

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agriculture. Hence, we expect to see children work more (this is a main argument of globalization opponents). In addition, increases in the price of rice also raise the value of adult time in agriculture. This might induce adults to shift their time towards rice production, increasing the demand for child labor in other activities. Obviously, the comparative advantage for adults and children in different types of work determines which of these two effects dominates. Moreover, by increasing (reducing) the rewards to schooling or through households becoming more (less) forward looking (with lower discount rates), liberalization might raise (decline) the present value of child time spent in activities such as schooling rather than working.

Rice price increases also affect household income. First, child labor might be a bad in parental preferences (as in Basu and Van (1998)). If higher rice prices lead to an increase in household income, child labor should decline. Alternatively, if credit-constrained households were unable to finance child schooling (as in Baland and Robinson (2000) or Ranjan (2001)), the additional income from liberalization allows parents to overcome at least part of their credit constraint. However, most rural households in Vietnam are not only rice producers but rice consumers. Rice is the primary staple of the Vietnamese diet. While increases in rice prices may augment household income, the consumption based income effect of the price change may leave households that are large net consumers of rice worse off. This negative income effect may force households to increase the incidence of child labor.

In view of the ambiguity in the predictions in economic theory, we address the relationship between child labor and liberalized trade empirically. Despite a large empirical literature that studies the determinants of the child labor surveyed in Grootaert and Kanbur (1995), to our knowledge no empirical study relates child labor to changes in product prices (potentially stemming from a trade policy change).

3. Data description

We examine the relationship between product prices in the rice sector and child labor using two rounds of the VLSS that spans the period of quota changes. The first round of the VLSS was conducted between September 1992 and October 1993. The second round of the VLSS revisited 151 communes from the first round between December 1997 and December 1998. In our analysis, we focus on

households with children that appear in the 151 panel communes. 4305 households are revisited in the second round of the survey, and at times, we restrict our source of identifying information to data from these panel households.[5] The household survey includes questions on household composition, the labor activities of adults and children, education, expenditure, land holdings, and agricultural activities. The household survey is accompanied by a community questionnaire that includes a detailed price information as well as information on local employment opportunities and wage rates.[6,7] Table 1 reports basic summary statistics from the data.

The approach of this paper is to relate changes in the price of rice to changes in the economic activities of children. We thus begin with a description of the rice price changes. The first row in table 1 reports the consumer price of a kilogram of ordinary rice in 1993 and 1998 collected in the community price survey.[8] We deflate the price of rice with the monthly consumer price index so that all prices are in 000s of 1998 (January) Dong. One U.S. dollar corresponds to approximately 14,000 Dong in 1998.[9] Throughout this paper, whenever we refer to rice price changes, we mean changes in the real (deflated) prices of a kilogram of rice. The average domestic price of rice increased by 29% relative to the rise in the consumer price index. Benjamin and Brandt (2001) document similar increases in consumer unit

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[5] Glewwe and Nguyen (2000) discuss attrition in the VLSS panel households and conclude that the panel households appear to be nationally representative. 89.6% of the households that appear in the first round of the VLSS reappear in the second round. In panel communes, missing households were replaced with randomly selected households.

[6] We have also compared the prices reported in the commune questionnaire with the average commune price based on unit values of purchased rice from the household survey. They are highly correlated.

[7] We face a choice of using the wage data reported by a commune official in the community survey or wages reported from the household survey. Wages at the household level depend on household labor supply, which is jointly determined with child labor. Aggregating over households in a commune could in principle solve this problem, but in many communes, we observe very few (at times zero) households reporting wage work, so we choose to use wages from the community survey. The wage rates are day wages for agricultural laborers. These are only available for rural communes. Hence, we only report results with wages for rural areas. For adult wages, we focus on the wages paid to male day laborers at harvest time. Child wages are reported irrespective of gender, and because of data availability, we focus on child wages averaged across all agricultural seasons. In Vietnam, wages are often paid in cash and in-kind, and the commune official was instructed to impute a value of in-kind wages in answering the question. In addition, in 36 out of 278 commune-year observations, we are missing wage rates from the community survey. We impute wages for these communes based on commune average expenditure per capita using the same procedure as for rice (below). We follow the same procedure for adult and child wages.

[8] 6 communes do not report the price in at least one of the survey rounds. We impute the rice price in these communes. Based on the unit value of rice purchased by households reported in the VLSS, we calculate the mean unit value of a kg of rice for a commune in a given survey year. We regress the price of rice reported in the price survey on the third order polynomial of the mean unit value of rice in a commune. We replace the missing price data with the predicted value of commune price based on this regression.

[9] The price deflator does not vary by region, because we do not want the deflator to drive the variation in rice prices.

prices.[10] Our analysis in this paper is based on differences across communes in changes in rice prices.

Figure 1 plots the data that underlies our analysis. The horizontal axis is the real price of rice in a

commune in 1993, and the vertical axis is the real price of rice in a commune in 1998. The 45 degree line

is also pictured. 144 out of 151 communes in the VLSS experienced a considerable increase in the real

price of rice. Moreover, the variation in rice price changes across communities is substantial. This across

community variation in the relative rice price change is the source of our identification below.

Vietnam experienced national and international market integration during the time of our sample.

Although it is impossible to disentangle the effects of rice quota on prices from other factors that could

affect prices, some evidence suggests that Vietnam's integration into international markets played an

important role. Absent international integration and unobserved demand and supply shocks, national

market integration would likely lead to convergence of prices across regions with prices in rice surplus

regions increasing and the prices in rice deficit regions declining. However, the prices increase

dramatically in all regions during these two periods. For example, while the rice prices increased by 23

percent in the North, they increased by 35 percent in the South. The South supplies most of the

Vietnamese rice exports. Moreover, figure 1 suggests that these increasing prices do not appear to be

converging to one price level. The standard deviation of rice prices across communes is the same in 1993

and 1998. These two factors (larger increases in the South and a lack of convergence) are suggestive of

the importance of increased exposure of Vietnamese rice sector to international markets.

A more detailed examination of regional patterns of changes in rice prices further indicates that

some of this price variation is plausibly associated with the rice export quota. Goletti and Minot (1997)

describe the rice sector and the sources of rice exports in Vietnam. While almost all of Vietnam produces

rice, the largest source of rice exports is the Mekong River Delta and the Southeast. In figure 2, we plot

real rice prices in 1993 and 1998 by the 8 main administrative regions in Vietnam. In 1993 rice prices are

highest in the most isolated regions of Vietnam (Central Highlands (CH) and the Northern Uplands (NW

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[10] The correlation between consumer prices and unit prices in levels is .68. The correlation between changes in
consumer prices and unit prices (our source of identification below) is .81.

and part of NE).[11] Goletti and Minot suggest that, in these regions, rice is grown primarily by small farmers for their own use, and some additional rice is imported from surrounding areas. The five main rice producing areas all have lower prices in 1993 than the three more remote regions; the largest rice producing area, the Mekong River Delta, has the lowest prices in 1993. In 1998, the remotest regions (CH and NW) still have among the highest rice prices. However, two of the highest priced regions are the main exporting regions, the Mekong River Delta and the Southeast. In fact, the Mekong River Delta has grown from the lowest priced region in 1993 to the fourth highest in 1998. The price changes that take place in the Mekong and in the Southeast are similar to what we would expect with a liberalization of the rice export quota. We obviously cannot claim that the price variation we observe across Vietnam is attributable singularly to the change in the rice export quota. However, to the extent that trade liberalization affects the price of a commodity, our analysis illustrates the potential re-distributive impact of trade policy even if quota changes are not the sole cause of the price increase.

Children in Vietnam engage in a wide range of activities that might be influenced by rice price changes. Table 2 describes the economic activities of children in Vietnam in 1993 and 1998. In this study, we focus on the economic activities of children between the ages of 6 and 15 within the last seven days. We restrict our attention to this age group, because the VLSS do not collect data on the allocation of time for household members below the age of 6. 15 is the upper age limit in many international conventions on child labor. The VLSS data describe child time allocation in a number of activities.[12] In

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[11] Dollar and Glewwe (1998) describe regional differences in poverty and inequality in Vietnam.

[12] The weaknesses inherent in using the VLSS to discuss child labor questions are discussed in Edmonds and Turk (2001), and three issues seem particularly important in our study. First, there may be a sizable, unregistered migrant population in Vietnam that would be missed entirely in the VLSS' sampling frame (Poverty Working Group 1999). Second, the VLSS are household surveys, so children who are not resident within households are missed in the survey. Thus, we miss street children and many of the worst forms of child labor such as prostitution and many forms of slavery. Edmonds and Turk investigate whether children disappear from VLSS panel households between 1993 and 1998. They found that a maximum of 26 out of 6003 children between ages 0 and 10 in VLSS panel households in 1993 could have left their household for work by 1998. This obviously misses children in households that collapsed or otherwise disappeared between rounds of the survey. Nevertheless, for recaptured households, sending (or selling) children away from a sampled household to work is unlikely to be an important source of bias. Third, the VLSS does not provide data on the working conditions of children, and there are problems with the way it records hours of work outside of household work. We think that the quantity of work and work conditions may be more income and price elastic than is participation. Hence, focusing on participation rates alone may miss many interesting dynamics associated with rice price changes.

addition to schooling, we know whether a child works outside of the household for pay or as a domestic

servant, works in agriculture for the household, works in a household business, or performs household

work and chores such as cleaning, cooking, washing, shopping, collecting water or wood, and building or

maintaining the house, its surroundings, or furniture.

While table 2 summarizes participation rates in each of these activities, in this study, we focus on

an aggregation of these categories as a definition of child labor. Namely, a child engages in child labor if

it works for seven or more hours per week in household work and chores or if the child works for one

hour or more per week in agriculture, wage employment, a family business, or as a domestic servant.[13] A

number of characteristics stand out from table 2. First, most children are engaged in child labor in 1993

even though Vietnam officially banned child labor in 1988. By 1998, only 38% of children are working,

which corresponds to a 33% reduction in child labor between 1993 and 1998.[14] Edmonds (2001b) shows

that most of the decline in child labor in rural households can be explained by improvement in living

standards. Our present study can be viewed as an examination of one possible explanation of

improvement in living standards. Second, most working children manage to simultaneously attend

school. While 57% of children in 1993 work, only 18% of children work without attending school. By

1998, only 7% of children work without attending school. However, Edmonds and Turk (2001)

document a strong negative correlation between work and schooling. Secondary school age children that

work in agriculture or businesses are 23% less likely to attend school than children who do not work.

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[13] This definition of child labor matches the definition employed by the International Labor Organization in many of its SIMPOC country studies (ILO n.d.). Moreover, it overcomes three main conceptual problems that would arise from failing to consider the activities performed by children in the production of nontradable goods (home production). First, when a child works outside of its household as a paid domestic servant or a slave that child is classified as a child laborer under the most stringent of definitions. It seems hard to defend reclassifying the child's production activities as something other than work if the child's employer changes (even if it changes to a parent). Second, treating the production of nontradables as something other than child labor makes it difficult to interpret the meaning of the state of "not working." For example, if home production is ignored in the definition of child labor, a child that stops limited work in a family business to take over extensive household responsibilities (say, because of the absence of a parent) would appear to stop working. Third, an assertion that child participation in the production of nontradables is not an economic phenomenon (or of economic interest) implies that including home production in a definition of child labor should attenuate our results. To the extent that participation in the production of nontradables varies with changes in the relative price of a market good, it clearly is of economic importance.

[14] These participation rates imply that 7.86 million children work in Vietnam in 1993 and 5.64 million children work in 1998.

Third, children predominantly perform household work and chores and work within the household in agriculture. Rice price changes affect both of these types of work. The relationship between rice prices changes and agricultural work is obvious. Household work may be associated with rice price increases if parents are more active in agriculture or formal labor market activities. We observe a 15% decline in agricultural work and actually an increase in household work. However, this increase in household work is not statistically significant and appears to be associated with less time in household work on average (mean hours in household work decline from 6.0 to 4.4 hours, a statistically significant decrease). Fourth, work outside of the household is extremely rare for children in Vietnam. Only 4.4% of children ages 6-15 in 1993 report any work outside of the household in the last week. In the 1998 data, the fraction of children working outside of their household declines to 2.7%. Hence, the typical newspaper image of overworked children spending long hours in factories is simply not typical of child laborers in Vietnam. By far, most children either work in agriculture or participate in household work and chores.

4. Results

4.1 Rice Prices and Child Labor: Basic Results

Our analysis is based on comparing changes in the probability a child works across communities that experience different price changes over time. We begin by considering this relationship nonparametrically. For each commune, we compute the fraction of children working in 1993 and 1998 and subtract the 1998 mean from the 1993 mean to obtain the decline in the share of children working in the commune. We plot the decline in child labor in a commune against the increase in the commune real rice prices in figure 3. The regression line pictured in figure 3 is the result of a nonparametric regression of the decline in child labor against the increase in rice prices where we have weighted observations by the number of children in each commune in 1993.[15] The vertical line in figure 3 is at the mean rice price increase.

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[15] We use a local linear regression procedure with a Gaussian kernel and a bandwidth of .38 chosen by visual inspection. Regressions are weighted by the number of children in sampled households in the commune in order to be consistent with the linear regression work below. The 1993 sample is self-weighting so there is no additional correction for sample design necessary.

Two characteristics stand out in Figure 3. First, for most of the distribution of increases in the relative price of rice, the larger the increase in rice prices, the larger the decline in child labor.[16] Thus, an extreme outlier is not driving our results. Moreover, when we turn to a parametric regression framework, we expect that small increases in rice prices are associated with declines in child labor. Second, we do not observe a decline in child labor with increases in the relative price of rice in the few communities that experience declines in the relative price of rice and communities with extremely large (twice the mean) increases in the price of rice. Thus, these communes attenuate the apparent positive relationship between rice price increases and the decline in child labor.

In the remainder of this paper, we consider the relationship between child labor and rice prices using a linear probability model.[17] For a child j in commune i at time t, we estimate:

$$(1) \qquad y_{ijt} = \beta_1 RP_{it} + \alpha_1 X_{jt} + \alpha_2 T_t + \lambda_i + \varepsilon_{ijt}.$$

y is the indicator for whether the child engages in child labor and RP is the natural logarithm of the real price of a kilogram of ordinary rice.[18] Several features of this framework should be highlighted. First, the probability a child labors might differ across households because of differences in the gender and age composition of children. We control for gender and age differences using a third order polynomial in child's gender and age and all of their interactions. We also control for seasonal variation in rice prices by including season indicators. X is the vector of age, gender, and season controls. Second, we control for economy-wide time differences in the probability a child works with a year indicator T that is one if the survey year is 1997/98 (1992/93 is the omitted year). Third, (1) also includes commune fixed effects λ. Communes vary in the availability of schooling, labor market conditions, land and resource endowments, and integration into the Vietnamese economy. These commune characteristics might also affect the relative price of rice and bias any estimate of the relationship between child labor and rice prices. To the

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[16] The correlation between rice prices and the probability of child labor is also negative when we consider the 1993 and 1998 cross section separately.
[17] Alternatively, we could use a probit model. Neither the flavor of our results nor our elasticity estimates are heavily influenced by our choice of assumption about the regression error distribution.
[18] The findings in this paper are not sensitive to the choice of including prices (or land area below) in logs or levels.

extent these commune characteristics are time-invariant, we can control for them using commune fixed effects (we consider time-varying commune characteristics in the next section). Finally, in all regressions in this paper, the standard errors are corrected for heteroskedasticity and clustering at the commune (psu)/survey round level.

Table 3 provides the basic results. Column 1 presents estimates of β_1 and α_2 from (1). We find a positive and significant association between increases in rice prices and declines in child labor. A 30 percent increase in price of rice is associated with a 10 percentage point decline in child labor. Of course, households vary in their exposure to rice prices increases. Households that produce rice may capture additional income from rice price increases, but rice consumers have to pay more for the rice they consume. Households that do not produce rice directly from their own land but work in rice production related activities or in communities that produce or process rice may also benefit from rice price increases. Thus, we divide households into three groups: rural households (A), households in urban areas that do not participate in agriculture (U), and households in smaller towns that have some agriculture or related activities (M). We allow the relationship between rice prices and child labor to vary across these areas by interacting an indicator for the area where a child lives with rice prices. Thus, for a child j in commune i at time t, we modify (1) and estimate the following:

$$y_{ijt} = \beta_1 RP_{it} + \beta_2 RP_{it} * U_i + \beta_3 RP_{it} * M_i + \alpha_1 X_{jt} + \alpha_2 T_t + \lambda_i + \varepsilon_{ijt}.$$

β_1 is the change in the probability a child works for a 1 percentage point change in rice prices in rural areas, β_2 is the extra increment in the probability a child works in non-agricultural urban areas ($\beta_1 + \beta_2$ is the total effect), and β_3 is the extra increment for mixed areas ($\beta_1 + \beta_3$ is the total effect). Column 2 of table 3 presents estimates of β_1, β_2, β_3, and α_2 for the entire sample. In rural areas, higher rice prices are associated with declines in child labor. In mixed areas, we observe a slightly smaller (albeit not statistically different) decline in child labor with rice price increases than in rural areas. However, rice price increases are associated with more child labor in urban areas that cannot take advantage directly of

these rice price increases. A 30% increase in rice prices is associated with almost 5 point increase in child labor for urban households.

Since the three areas differ in the impact of rice price changes on child labor, it makes sense to stratify our subsequent analysis by the area type. However, the urban and mixed community sample sizes are too small to be considered separately, and most of the community level data that we use subsequently are not available in urban areas. Moreover, in the present context, the ambiguity in the relationship between globalization and child labor discussed in section 2 is concentrated in rural households that must weigh increased household income against increased earnings opportunities for children and adults and the negative income effect (through consumption) of price increases. Hence, in the remainder of this paper, we restrict our attention to children that reside in rural households. In column 3 of table 3, we re-estimate (1) for the rural sample. A 30 percent increase in rice prices is associated with a 9 percentage point decline in the probability that a child works. Given that rural areas experience a 20 point drop in the probability that a child works between 1993 and 1998, rice price increases can account for 45% of the decline in child labor in rural areas.

So far, we have focused on how rice price increases affect the probability that an individual child works. At the same time, households might also transition between states of having child labor to a state without child labor. We examine how these transitions are related to rice price increases in household level regressions. Column 4 considers whether all children in the household work. Increases in rice price reduce the probability that all children in a household work. A 30 percent increase in the price of rice reduces the probability that all children in a household work by 11 percentage points. In column 5, we consider whether no children in the household work. The results suggest that a 30 percent increase in the price of rice is associated with an 12 point increase in probability that no children within a household work. In sum, rice price increases are not only associated with declines in probability that a child works, but also in declines in probability that all children in a household work, and increases in probability that no children in a household work.

4.2 Rice Prices, Child Labor, and Other Time-Varying Factors

The results in section 4.1 suggest that increased rice prices are associated with less child labor. The concern obviously arises whether we can interpret this positive correlation as a causal effect of rice price changes on child labor. The positive relationship could simply reflect unobserved, time-varying, commune-specific shocks that affect both rice prices and child labor but have nothing to do with the link between the two. In this section, we consider several time-varying factors that may yield such a spurious correlation.

Let us first clarify the nature of the time-varying factors that concern us. Differential changes in the price of rice across communes might be driven by supply or demand shocks to local rice markets. If there is a causal effect of rice prices on child labor, these supply and demand shocks will be associated with a change in child labor. This is the type of variation that we wish to exploit. For example, some communities improve their roads between 1993 and 1998. Setting aside the concern that these road improvements may be financed by additional rice income, improved roads facilitate a community's integration into rice markets and thereby increase rice prices. We wish to capture the effect of these increased prices on child labor. However, we do not want our measure of the effect of rice prices on child labor to reflect the effect of improved roads on child labor that have nothing to do with the rice price increases. The latter is the spurious correlation that we are concerned about.

We expect four general sources of a spurious correlation between rice prices and child labor. First, within communities, there may be heterogeneity in households that is correlated with both rice price increases and child labor. Since we identify the effect of rice prices on child labor with community*time variation in rice prices, we do not believe that this household heterogeneity generates bias. Nonetheless, we re-estimate (1) with household rather than commune fixed effects. The relationship between rice prices and child labor is identified by averaging within household variation in child labor across

commues with variation in commune changes in real rice prices. The results are reported in column 1 of

table 4 and suggest that the inclusion of household fixed effects does not alter the results substantively.[19]

Second, section 3 shows that rice price increases vary across regions in Vietnam. Likewise,

regions differ in both the types and scope of the reforms experienced in Vietnam in the 1990s. Further,

regions may be segmented somewhat so that it is difficult for labor to move easily between them. Hence,

changes in the returns to schooling may vary across regions.[20] These unobserved, region-specific, time-

varying shocks could potentially bias the link between child labor and rice prices. As a result, we allow

for region-specific time-varying unobserved factors in (1) by including the interactions of each region

indicator with a year indicator.[21] The results are reported in columns 2 (commune fixed effects) and 3

(household fixed effects) of table 4. Controlling for regional variation in how child labor declines

through time, does not alter our estimates of the relationship between rice prices and child labor in

statistically significant way.

Third, rice price increases vary with a community's accessibility. More accessible communities

might experience larger rice price changes, because they are more integrated into regional and

international markets. Likewise, children in more accessible communities might have better access to

schools or employment opportunities. In the VLSS, we can measure accessibility by an indicator for

whether regular transportation is available to a commune and an indicator for whether the road to a

commune is paved.[22] We interact these accessibility measures with year indicators to allow for a different

change in child labor in accessible communities. Estimates of (1) with additional controls that allow

trends in child labor to vary with accessibility or regions conditional on rice price changes are reported in

columns 4 (commune fixed effects) and 5 (household fixed effect). Note that heterogeneity in rice price

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[19] The 9,545 child-year observations in the rural sample are drawn from 4,630 household-year observations. With household fixed effects we identify off of the 1,675 rural households that have children between the ages of 6 and 15 in both rounds of the panel. These households have on average 2.24 children between ages 6-15 in each round.
[20] Foster and Rosenzweig (1996) find changes in the return to education to be a primary determinant of changes in educational enrollment in Green Revolution India. Glewwe and Jacoby (2001) rule out differential changes in the return to education as an explanation for increases in school enrollment in Vietnam. Instead, they find that increases in household income drive Vietnam's increases in secondary school enrollment.
[21] There are between 4 to 35 sampled communes per region (the mean and median are both 25 communes per region).
[22] Data on accessibility (and infrastructure in general) is only available in the 1998 survey.

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changes within regions or across accessible communities still allows us to identify an effect of rice prices on child labor. If there is spurious correlation between rice price changes and child labor associated with accessibility or regional differences, we should observe a significant change in our estimates of the effect of rice prices on child labor. However, our commune fixed effects estimates of the relationship between child labor and rice prices are virtually identical to what we found without controlling for regional or accessibility differences (compare column 4 of table 4 to column 3 of table 3).

A fourth likely source of omitted heterogeneity that may drive our relationship between child labor and rice prices may be infrastructure improvements. Van de Walle (1998) finds that public infrastructure (and in particular, irrigation) improvements could dramatically improve living standards in Vietnam. The 1998 community survey asks whether the commune has experienced any infrastructure improvements since the 1993 survey. An infrastructure improvement is defined as improvements in roads, irrigation, health facilities, electricity, schools, and "other" public infrastructure.[23] In table 5, we allow communities to experience differences in child labor through time with infrastructure improvements. We do this by including an interaction of whether the community experiences an infrastructure improvement between 1993 and 1998 with the year effect. In column 1, our infrastructure measure is an indicator that is 1 if the community experiences any type of infrastructure improvement. In the remaining columns, we consider each of the infrastructure improvement separately. With every infrastructure control, our estimates of the relationship between child labor and rice prices are well within a 95% confidence interval of our estimate in column 3 of table 3.

Of course, a conceptual problem arises in interpreting these infrastructure changes, because during the 1990s, the government of Vietnam had little revenue for large-scale infrastructure improvements. Hence, these community improvements may stem from within community demand; in that manner, additional rice income could cause improvements in infrastructure. This is particularly likely with schooling. Vietnam entered the 1990s with high primary school enrolment rates (86%), and

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[23] The 1998 questionnaire asks whether there have been improvements in any of the listed types of infrastructure. It does not distinguish between new infrastructure and physical or quality improvements in existing infrastructure.

nearly universal access to primary schooling. The government made primary school free and compulsory in 1991 by the introduction of the Law on the Universalization of Education, but subsequent to this, there were no major government initiated school construction or improvement projects between 1993 and 1998 (Nga, forthcoming, surveys the education sector in Vietnam in the 1990s). However, increases in community income (through rice price increases, for example) may lead to private demand for educational improvements. Using the 1993 VLSS, Behrman and Knowles (1999) show that educational expenditure in Vietnam is highly income elastic. Glewwe and Jacoby (2001) consider school attendance in the VLSS panel. They observe large increases in (especially secondary) school enrollments, and they find a strong association between increases in household income and school attendance. Hence, the school infrastructure improvements that we observe in the data may stem in part from rice price driven improvements in household income.

Overall, we do not find any evidence in table 4 to suggest that spurious correlation drives the relationship between rice prices and child labor. Nevertheless, one could still argue that idiosyncratic shocks to either rice prices or child labor and associated with both, that have nothing to do with infrastructure, regional heterogeneity, or commune accessibility could drive the link between prices and child labor. If rice price levels in 1993 are independent of declines in child labor other than through the association between rice price levels in 1993 and the increase in rice prices between 1993 and 1998, we can approach the idiosyncratic shocks problem in an instrumental variables setting. Consider the following commune-level first-difference regression framework for commune i:

(2) $$\Delta cy_i = \alpha + \eta * \Delta p_i + u_i.$$

Δcy denotes the decline in fraction of children working in a commune between 1998 and 1993 and Δp denotes the change in rice price in a commune between 1998 and 1993.[24] u represents the specification error that might include an omitted variable that drives changes in prices and changes in child labor in a commune. If this source of bias is idiosyncratic in the sense that it is independent of the

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[24] This regression is equivalent to the commune fixed effects regressions in equation (1) without the child specific controls.

level of rice prices in 1993, we can instrument for changes in commune prices in (2) with the level of rice prices in 1993 using two-stage least squares (2SLS).

For the price level in 1993 to be a valid instrument, it must be correlated with changes in rice prices in rural communes. Figure 4 pictures the relationship between increases in rice prices between 1998 and 1993 and the 1993 price level. The depicted regression line is the result of a nonparametric regression of the decline in rice prices against the rice price level in 1993.[25] Figure 4 illustrates a strong correlation between changes in prices and the 1993 level. As we would expect from our discussion of rice prices in section 3, price increases are the largest in areas with the lowest prices in 1993. This is also confirmed in the first stage of the 2SLS, where changes in rice prices are regressed on 1993 price levels and a constant. The coefficient on 1993 rice price level is -.87 with a t-statistic of -8.3, and the rice price levels in 1993 account for 45 percent of the variation in rice price changes across communes.

Table 6 contains the estimates of equation (2). The dependent variable is a decline in child labor, so a positive coefficient on the change in rice price implies a decline in child labor. Column 1 is the linear regression on the data pictured in figure 3. It reports the results without instrumenting for changes in prices, and we find a positive relationship between rice price increases and declines in child labor. Columns 2-7 report 2SLS results, and our estimates of the positive relationship between increases in rice prices and declines in child labor increase rather disappear. The coefficient in column 2 suggests that the average increase in the price of rice in rural areas (.765) would reduce child labor by 15 points. Given that the coefficient is imprecisely estimated, this estimate is not very different from the estimates in section 4.1. The relationship is also robust to inclusion (in first and second stages) of region indicators (column 3), commune accessibility (column 4), and accounting for improvements in schooling (column 5), any infrastructure (column 6), or inclusion of indicators for all infrastructure improvements individually (column 7). Hence, idiosyncratic shocks (unrelated to the local rice market characteristics

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[25]We use local linear regression procedure with Gaussian kernel and the bandwidth of .45 chosen by visual inspection.

captured by the 1993 rice price) do not appear to be behind the relationship between child labor declines and rice price increases.

In sum, our results suggest a negative relationship between product price increases and child labor in rural areas. We find little evidence that our results are driven by likely sources of spurious correlation between child labor declines and rice price increases or idiosyncratic shocks. The estimates are economically significant: a 10 percent increase in the relative price of rice is associated with a 3 percentage point decline in the probability that a child works. Given that the price of rice increased on average by almost 30 percent during our sample, our estimates suggest that this price hike leads to almost 9 percentage point decline in the probability that the child works. Thus, increases in rice prices explain 45 percent of the 20 percentage point decline in child labor that rural areas of Vietnam experienced between 1993 and 1998. Greater integration into international markets, at least in this case, is associated with less child labor.

5. Understanding the Link Between Rice Price Increases and Declines in Child Labor

5.1 Rice Prices, Land Holdings, and Child Labor

In this section we further explore the mechanism through which rice prices affect child labor. As we discussed in section 2 and saw in section 4.1, because households differ in their consumption and production of rice, the impact of increases in product prices will vary across households. For example, while 70% of households produce rice, only 35% sell rice in 1993, and 7% of households never buy or sell rice (authors' calculations from the VLSS). Accounting for household landholdings provides one way to capture household heterogeneity in exposure to any costs or benefits of rice price increases.[26] Land is an important input into rice production, and households with greater production capacity should benefit more from rice price increases. Most rural households own agricultural land, but 16% of the rural children in our sample live in households that do not own any agricultural land. In our analysis, we treat

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[26] We have considered two other measures of a household's exposure to rice price changes: net rice production and the benefit – expenditure ratio (Deaton 1989, Benjamin and Deaton 1993, Minot and Goletti 1998). As with landholdings, we find that child labor reductions are largest in households that theoretically should benefit most from increases in rice prices. We choose to present the landholdings results, because we feel that the assumptions necessary for identification are weaker with landholdings.

land holdings in 1993 as an endowment, and this is obviously a strong assumption. However, land

markets in Vietnam had yet to develop by 1993, and in general, commune officials had allocated land to

households for long-term contracts (Ravallion and van de Walle 2001). In this section, we assume that

the reduction in child labor experienced by a household between 1993 and 1998 does not effect land

allocation in 1993, and we consider how the 1993 land holdings co-vary with the amount by which the

household reduces its child labor in reaction to rice price increases.

We modify our methodology in the previous section by including the natural logarithm of

household land holdings, *L*, and an indicator for whether the household owns any agricultural land, *ANY*.

In addition, we interact the price of rice with the household's land holdings (both in logs) and the indicator

for whether the household owns any agricultural land. Thus, for a child *j* in household *h* resident in

commune *i* at time *t*, (1) becomes:

$$y_{ijht} = \beta_1 RP_{it} + \beta_2 RP_{it} * L_{h93} + \beta_3 RP_{it} * ANY_{h93} + \alpha_1 X_{jt} + \alpha_2 T_t + \alpha_3 L_{h93} + \alpha_4 ANY_{h93} + \lambda_i + \varepsilon_{ijht}$$

Our results are in the first two columns of table 7.

Several patterns emerge in the commune fixed effects results of column 1. First, children in

households that hold small amounts of land are slightly more likely to work relative to children in

households with no landholdings. The coefficient on whether the household owns any land captures the

effect of landholdings for households that own negligible amounts of land. Conditional on rice prices, a

child in a household with a negligible amount of land is .1 more likely to work than a child in household

with no land (evaluated at the mean of log price in rural areas 1.06). Conditional on rice prices and on

holding some land, a 10 percent increase in landholdings leads to a .1 point decrease in child labor. Thus,

in the absence of rice price changes, the probability that a child works decreases in landholdings, but

simply holding any land is associated with greater child labor. Second, the response of child labor to rice

price changes varies across households with different landholdings. A 30 percent increase in the price of

rice decreases the probability that a child works by 6.7 percentage points for households with no

agricultural land. This suggests that factors other than land might influence how a household benefits

from rice price increases. In the next section, we find that part of the effect of the rice prices on child labor appears to be related to increases in local wages. Small agricultural landholders appear to benefit the least from rice price increases. A 30 percent increase in rice prices is associated with a 19 percentage point increase in child labor in households with negligible amount of agricultural land. Children in households that hold larger quantities of land are the main beneficiaries of the rice prices increase. Agricultural households above the 13th percentile in landholdings experience a larger reduction in child labor than households with no landholdings.[27] At the mean land holdings, a 30 percent increase in rice prices is associated with a 9.5 percentage point decline in child labor for households that hold agricultural land. Thus, higher rice prices seem particularly beneficial for large landholders, and conditioning on land holdings produces results that are consistent with the rice price elasticity of child labor found in the previous section.[28]

Inclusion of household fixed effects (column 2), does not alter our results for households with greater landholdings.[29] For households with the mean landholdings, the change in child labor associated with respect to a change in rice prices is well within the range of estimates reported in the previous section (table 3). Our estimate of the landholdings necessary for a landed household to observe a greater decline in child labor with an increase in rice prices than a non-landholding household declines from the

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[27] The median and mean log landholding in 1993 for a rural household that holds land are both 8.24 (Ravallion and van de Walle 2001 document the relative equity in the distribution of land after 1988 in Vietnam). The 13th percentile is 7.44. The 3rd percentile (below) is 6.21 and the 2nd is 5.74.

[28] In section 4.2, we have shown that community-specific time varying unobserved shocks are unlikely driving our results. The results on the landholdings in this section are based on within commune variation and they further confirm this claim. The omitted variables would need to be correlated with prices, and would need to vary by commune, time, and the level of landholdings within the commune. One possibility would be that communes experience commune-specific improvements in the returns to education (that are correlated with price changes) and that credit constraints are less severe for landholders, so that child labor declines by more in households with more landholdings because they now send kids to school. However, this is unlikely to be the case. First, the existing evidence on the returns to education in Vietnam does not find support for the existence of substantive commune-level variation in changes in the return to education (Glewwe and Jacoby 2001, Nga forthcoming). Second, we expect that variation in the returns to education (if they exist) should be more important at the regional level than the commune level, because regions are more segmented than are communes within regions. However, controlling for unobservable, time-varying regional factors did not alter our estimates of how rice prices relate to child labor in section 4.2.

[29] Because we allow the effect of rice prices to depend on landholdings from 1993 (we do not want to identify off changes in landholdings as a result of rice price increases), we cannot include both the level of land holdings and the household fixed effect. Also, if we restrict our sample to only households that have landholdings, we obtain virtually identical results (as one would expect: with the inclusion of the 'own any land' dummy variable in the table 4 regressions, we identify the interaction of landholdings and rice prices only on households that have landholdings).

13th percentile in column 1 of table 4 to the 3rd percentile of landholdings in column 2. This slight difference is not statistically significant, but may reflect the fact that smaller landholders are generally poorer and perhaps less likely to move children in and out of work with rice price changes. This might introduce an upward bias on the coefficient on the indicator for whether a household owns any land. The household fixed effect controls for this type of variation and thereby makes it more likely to observe declines in child labor associated with price increases in even smaller landholders. The most substantive change related to household fixed effects, is that we cannot reject the hypothesis that rice price increases only reduce child labor in landholding households with greater than the 3rd percentile of land. At first glance, this result seems inconsistent with the results from within community variation in column 1. However, rural households without land often work for wages. In the next section, we find that wage increases, while associated with rice price increases, are strongly correlated with the year effect (e.g. wages increases are less variable across communities than are rice price increases). Hence, conditioning on the household fixed effect captures the difference between households with and without agricultural land, the interaction of landholding with rice prices describes how child labor varies across landholders, and the year effect absorbs the decline in child labor in wage households.[30]

In columns 1 and 2 of table 7, most of the heterogeneity in the relationship between rice price increases and child labor appears to be associated with landholdings. One possible source of bias in our findings is that between 1993 and 1998 some communities in the VLSS redistribute land. Ravallion and van de Walle (2001) describe Vietnam's massive land reform in 1988. It was complete by 1993, but several communes in the VLSS report additional redistribution between 1993 and 1998. If this land reform affects the allocation of child time in a manner associated with household landholdings before redistribution and is likewise associated with rice price increases, our results in columns 1 and 2 may confound the impact of redistribution with that of rice prices. Hence, we bifurcate our sample into children in communities that redistribute land between 1993 and 1998 and children in communities that

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[30] This implies that, without the year effect, we should observe a negative correlation between rice prices and child labor even for households that do not own agricultural land. In supplementary regressions, we have found this.

do not. In the remaining columns of table 7, we reproduce the main findings of this paper for children in rural communities that did not redistribute land between 1993 and 1998. Our findings in columns 3-7 of table 7 are generally consistent with our results for the full rural sample. Estimates of the magnitude of the reduction in child labor associated with rice price increases are slightly larger (compare column 3 with column 3 of table 3), but they are well within a statistical confidence band of the full sample results. Likewise, the variation in the relationship between child labor and rice prices associated with landholdings is of a similar magnitude in the full sample (columns 1 and 2) and the non-reforming sub-sample (columns 5 and 6).

The previous section found a robust negative relationship between rice price increases after the market integration and the incidence of child labor. The evidence in this section suggests that these average effects vary across households principally based on household landholdings. Rice price increases reduce child labor especially in households with larger landholdings. A 30 percent increase in the price of rice reduces child labor for the mean (median) landholding household by approximately 9 percentage points. This is the same average effect we obtain in the previous section when we do not condition on landholdings. Thus, differences in landholdings seem to account for most of the variation in the effect of rice prices on child labor across households. The results for households with negligible landholdings or no landholdings are mixed. Some of these results suggest that rice prices might affect household time allocations through channels other than land.

5.2 Rice Price, Local Labor Markets, and Child Labor

Because rice is the primary agricultural commodity in Vietnam, increases in the price of rice should raise both adult and child wages by raising the value of labor's marginal product. Conditional on endowments of labor, land, and technology, an increase in the price of rice raises the value of labor's marginal product and, in competitive labor markets, increases wages in agriculture. As we discussed in section 2, this raises the opportunity cost of not working and could increase child labor. Some specifications in the previous section suggest that increases in rice prices are associated with declines in

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child labor even in households that do not produce rice. In this section, we consider the relationship between changes in wages, changes in rice prices, and child labor.

We expect the price of rice to drive wage changes so we explore how the inclusion of wage variables as controls affects the sensitivity of child labor to rice prices. These results are in table 8. First, conditional on commune fixed effects (column 1), child labor is positively correlated with child wages. Thus, higher wages are associated with more child labor (as one would expect). Likewise, without controlling for child wages (column 2), higher adult wages are associated with more child labor (albeit not in a statistically significant way). This is consistent with the theoretical literature on child labor where children are substitutes for adult labor (Basu 1999).

Second, the adult wage elasticity of child labor in column 2 is substantially lower than that of child wages in column 1. Thus, while adult wages and child wages are positively correlated, adult wages might have an additional impact on child labor that is associated with a reduction in child labor. This is confirmed in column 3. Conditional on rice prices and child wages, higher adult wages are negatively correlated (although not in a statistically significant way) with child labor. Higher child wages are positively correlated with child labor conditional on adult wages and rice price increases. Hence, to the extent that rice prices increase child wages, this increases child labor. However, the overall effect of rice price increases is to decrease child labor. Household fixed effects regression (column 4) yields similar results as within commune regression in column 3.

Part of the reason that the correlations between changes in wages and child labor are statistically insignificant is that the year effect absorbs much of the year-to-year variation in wages. When we do not condition on the year indicator, we observe a significant negative effect of adult wages on child labor (column 5). A 10 percent increase in adult wages is associated with a 1.5 point decline in child labor. Exclusion of the year indicator radically inflates the association between rice price changes and child labor. Consequently, while adult wage increases seem to lead to less child labor, this is not the dominant effect. The evidence of the previous section suggests that increased income to rice producers is the dominant mechanism driving the effect of rice prices on child labor. In order to check the robustness of

this finding, we include the wage controls in the regressions with landholdings from the previous section (column 6). The results are basically the same as in column 2 of table 7 in previous section. Hence, conditional on adult and child wages, most of the variation in how rice prices relate to child labor appears to be associated with differences in landholdings.

However, even conditional on wages, we still observe a negative association between child work and rice prices, albeit a statistically insignificant one. In section 4.2, we found that controlling for infrastructure improvements such as school improvements did not substantively affect our estimated rice price elasticity of child labor. However, school improvements, to the extent that they are associated with rice price increases and child labor, may be an important explanation for the relationship between rice price increases and child labor declines in households that do not hold any land after controlling for wages and allowing the effect of rice prices to vary across landholdings. In column 7, we include an indicator for whether the community reports any improvements in schools (construction or other physical improvements) between the two rounds of the VLSS interacted with the year effect. The most substantive impact of conditioning on schooling improvements is to further attenuate the coefficient on rice prices for households that do not own land once we condition on wage increases. The coefficient drops from -.04 to .00.

In sum, we find some suggestive evidence that increases in child wages encourage child labor (given rice price changes and adult wages) and higher adult wages (given child wages and rice prices) lower child labor. Even conditional on wage changes, there is still a negative association between rice price increases and child labor in household that do not hold land. These households appear to be benefiting primarily through school improvements. Overall, the extra return captured by landholders appears to be the primary mechanism through which rice price changes relate to child labor.

5.3 Age, Gender, Rice Prices, and Child Labor

The economic activities of children might vary with a child's age and gender.[31] These gender and age differences may be purely economic: a child age 6 is a less capable worker in most activities than is a child age 15; a female may have comparative advantage in certain types of activities. In addition, gender-typing of economic and household activities may contribute to different age/gender distributions of the activities of children. If boys and girls perform different activities, they may be differentially affected by changes in rice prices. In this section, we explore age and gender differences in the relationship between rice prices and child labor and consider how rice prices are associated with changes in various components of our definition of child labor.

Table 9 documents participation rates by gender and age group in various economic activities in 1993 and 1998. We split children into 3 age groups: 6-11, 12-13,14-15.[32] Column 1 presents the fraction of children reporting ever attending school. Column 2 indicates school attendance at the time of the household survey for children who report having ever attended school (children who report that they are on summer break from school are coded as currently attending). Column 3 is the measure of child labor used throughout this study. Columns 4-8 are the components of child labor described in the context of table 2. Column 9 documents the number of hours spent by a child in home production conditional on engaging in home production.

Table 9 reveals four important gender and age differences in child labor. First, girls work more than boys, and the gap between genders in child labor participation rates increases with age. In 1993, the participation rates in child labor for primary school age girls are 6.3 points higher than they are for boys. The difference is 8.6 points for ages 14-15. Second, most of the gender differences in work occur in time spent in home production (especially in more than 7 hours of home production). Third, in tandem with the increasing child labor participation rates, school attendance is declining in age, and the gap in

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[31] See Edmonds and Turk (2001) for a full account of gender and age differences in the economic activities of children in Vietnam.
[32] Children ages 6-11 in Vietnam normally attend primary school. Ages 12-13 are a natural transition period in Vietnam. Children who began schooling late are still in primary school. Students that have completed primary school either end their schooling or begin lower secondary education. By ages 14-15, students that attend school are enrolled in secondary school, while many others work.

schooling between boys and girls is increasing in age. Fourth, between 1993 and 1998 older girls experience the largest increase in school attendance (over 100%). This increase in attendance is accompanied by a 25% decline in child labor that stems in part from large declines in the fraction of older girls working excess hours in home production.

We next relate these age and gender difference to changes in rice prices, by allowing the effect of rice prices to differ with child's gender and age group in equation (1):

(3)
$$y_{ijt} = \beta_1 RP_{it} + \beta_2 RP_{it} * G_{12-13,jt} + \beta_3 RP_{it} * G_{14-15,jt}$$
$$+ \beta_4 RP_{it} * S_j + \beta_5 RP_{it} * G_{12-13,jt} * S_j + \beta_6 RP_{it} * G_{14-15,jt} * S_j$$
$$+ \alpha_1 X_{jt} + \alpha_2 T_t + \lambda_i + \varepsilon_{ijt}.$$

S is an indicator that is 1 if the child is a boy (girl is the omitted category). G_{age} is an indicator that is 1 of the child is in the indicated age group (primary school age is the omitted category. Thus, the coefficient on the price of rice β_1 gives the change in the dependent variable (eg child labor participation) with a change in rice prices for primary school age girls. The extra change associated with being a 12-13 year-old girl is the coefficient on G_{12-13}, β_2. The extra change associated with being a boy 12-13 is the coefficient on the male*RP interaction β_4 plus the additional increment associated with being a boy age 12-13 β_5 (i.e. the total change in child labor for a boy age 12-13 with a change in rice prices is $\beta_1 + \beta_2 + \beta_4 + \beta_5$).

The results are reported in table 10. Columns 1, 3, and 5 condition on commune fixed effects. Columns 2, 4, and 6 are household fixed effects results. Three main results appear in table 10. First, column 2 suggests that girls experience the largest decline in child labor, and the magnitude of the decline is increasing in age.[33] This suggests that groups with the largest participation rates in 1993 experience the largest declines in child labor. Second, boys (especially the primary school aged) experience the largest

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[33]Based on column 2, a primary school age girl lowers her child labor participation by 2.5 points with a 10% increase in prices. A 12-13 year old girl lowers participation by 3.1 points, and a 14-15 year old girl lowers her participation by 3.2 points. A primary school age boy lowers his participation by 2.4 points, a 12-13 year old boy lowers by 2.6 points, and a boy age 14-15 lowers his participation by 3.1 points.

increase in having ever attended school with rice price increases (columns 3 and 4). This is consistent with a recent improvement in living standards. Of course, current school attendance provides a much better measure of schooling. The third main result apparent in columns 5 and 6 of table 8 is that conditional on having ever attended school, girls and the oldest boys experience the largest increases in attendance with rice price increases (both groups had the lowest attendance rates in 1993). The increase in school enrollment for girls associated with rice prices is increasing in age. Based on column 6, a 30 percent increase in rice prices raises the probability that a girl ages 12-13 attends school by 3.3 points and by 7.5 points for girls ages 14-15. Boys experience smaller increases in schooling with rice prices and actually declines in schooling for ages 6-13. Boys aged 14-15 appear to increase schooling by 3.5 points with a 30 percent change in rice prices. Overall, rice price increases are associated with the largest declines in child labor for the age and gender groups that have the highest participation rates. These declines in child labor are accompanied with the largest increases in schooling for these same groups.

Our results have so far focused on the overall measure of child labor. The question also arises how rice prices affect different components of this variable. We estimate equation (3) with participation in the individual components of child labor as the dependent variable. Table 11 presents the results (we report only household fixed effects results). Three main results appear. First, young boys and girls experience an increase in agricultural work, while older girls and boys experience declines in agricultural work. Second, rice price increases do not affect child participation in home production, but are associated with declines in excessive time spent (more than 7 hours a week) in home production. This decline is larger for girls than for boys, and the decline increases with age for girls. Third, the overall changes in hours spent in home production are not small. A 30% increase in rice prices is associated with a 34% decline in hours worked in home production for primary school age girls and a 38% decline for girls ages 14-15.

Declines in child time devoted to household production raises the question whether households substitute away from home production or if adult household members spend more time in household production with rice price increases. Increases in rice prices might lead to a decline in home production if

additional income allows households to buy market substitutes for goods or services previously produced in the household. Parents increase their time spent in home production if the additional income associated with rice prices encourages them to cut back their formal labor supply or if rice prices somehow increases the return to home production (although the latter is hard to imagine). Thus, we consider whether rice price increases are associated with an overall decline in household time spent in home production and whether rice price increases are associated with changes in the total fraction of hours in home production performed by children. These results are in table 12.

The first three columns consider the logarithm of total hours spent in household work as a dependent variable.[34] Column 1 includes commune fixed effects, column 2 includes household fixed effects, and column three includes household fixed effects, landholding interactions, wages, and school improvement information. Two main results appear in the first three columns of table 12. First, rice price increases are associated with declines in total hours spent in household production by the household. This decline exceeds the drop in hours spent in household work by children. This suggests that adults also spend less time doing household work. Of course, differences in the time required to perform a given household task across household members make it difficult to interpret these results. For example, the decline in hours worked in home production may still exceed the decline in hours worked by children if parents take over tasks previously performed by children (such as wood or water collection). Second, the decline in home production associated with rice price increases is increasing in landholdings. Households above the 2nd percentile in landholdings experience a net decline in home production with rice price increases. At the mean landholdings, a 30% increase in rice prices is associated with an 18% decline in total household time devoted to home production.

Despite the overall decline in home production, the fraction of household production time performed by children also declines. This is evident in columns 4-6 of table 12. Focusing on column 6 with household fixed effects, landholdings, wages, and school improvements, we find that increases in rice prices are not associated with any change in the mix between child time and adult time in home

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[34] All but three households report more than 1 hour a week in household production.

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production for households with no landholdings. However, the fraction of home production time

attributable to children decreases in landholdings with rice price increases for households above the 13th

percentile in landholdings (i.e. households with small landholdings experience an increase in the fraction

of home production time performed by children). Thus, children in households with larger landholdings

appear to reduce their hours disproportionately more than adults. Hence, adults with relatively large

landholdings are bearing a larger share of the home production burden as rice prices increase. We cannot

identify whether adults take over tasks previously performed by children (perhaps as a result of a decline

in other types of work with the additional income captured by landholdings) or if adults use additional

income from land to buy market substitutes for the goods and services previously produced by their

children.

In sum, older girls that were bearing most of the work burden within households in 1993, appear

to benefit the most from rice price increases. Our results suggest a large reallocation of older girls out of

work, accompanied by large increases in their school attendance. Much of their decline in child labor

occurs through reductions in home production, where parents take over a large share of the home

production time as the agricultural land provides additional income from rice price increases.

6. Conclusions

This paper provides some empirical evidence on the relationship between market integration (or

globalization) and the incidence of child labor in poor, relatively unskilled-labor abundant economies

through exploiting regional and intertemporal variation in the relative price of an agricultural staple. We

find that in the present case, increases in the relative price of rice result in declines in child labor. A thirty

percent rise in the relative price of rice (as experienced in Vietnam) is associated on average with a 9

percentage point decrease in child labor. Thus, rice price increases can account for 45 percent of the

decline in child labor experienced in rural Vietnam between 1993 and 1998 and 47 percent of the overall

decline in Vietnam.[35] However, child labor actually somewhat increases in urban areas where households

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[35] 2.2 million less children are working in 1998 than in 1993. Thus, our regression estimates suggest that rice price increases have moved 1 million children out of work.

are exposed to rice prices as consumers, but cannot take advantage of rice price increases as producers or agricultural day laborers.

In considering the mechanisms through which rice prices affect child labor, our results suggest the households better endowed with land experience larger reductions in child labor when rice prices increase. We provide some suggestive evidence that the incidence of child labor might also decline in households who do not own agricultural land, because higher rice prices are associated with higher (adult) agricultural wages, but additional income to land appears to be the dominant driving force behind the reductions in child labor that we observe. This additional household income to land benefits secondary school aged girls the most. Their child labor participation rates decline substantively and a dramatic increase in school attendance accompanies the decline in child labor for these girls.

This study has several implications for the policy debate on globalization and child labor. First, the increased earnings opportunities associated with globalization for children working in export-oriented sectors do not necessarily lead to more child labor. In the present case, households appear to have taken advantage of higher income after the rice price increase to reduce child labor despite increased earnings opportunities for children. Second, many globalization opponents and trade policy-makers advocate that higher income countries employ trade sanctions to force domestic policies in poor countries to eradicate child labor. These trade measures likely lower the price of the exported good, so our results suggest that sanctions could instigate more rather than less child labor.[36] These results are in line with a model by Ranjan (2001), where trade measures not only lower the returns to child labor, but also adversely affect adult income (or how credit constrained households are), and hence increase the incidence of child labor. Third, the impact on child labor of punitive trade sanctions against a country's exports depends on the distribution of the resources used in production of the exported good. In the present case, rice production is so widespread in Vietnam (most household produce rice directly or as hired labor) that the lower prices

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[36] It is possible, of course, that punitive sanctions may induce countries to adopt reforms that benefit children in the long run. Opponents of globalization often advocate sanctions to induce official bans on child labor. Whether or not these benefit children is an open question. Vietnam was one of the first countries (in the late 1980s) to officially ban all forms of child labor.

of the exported good associated with trade sanctions would affect most households. It is possible to imagine a world where production was so concentrated that the "costs" of any such sanctions were restricted to a relative minority. Finally, the sign of the effect of international market integration on local prices is obviously of great importance. Integration lowers prices of import-competing goods and might have different implications for child labor in households associated with the production of an import-competing product. However, as in the present case, most child (and adult) labor in poor, relatively unskilled labor abundant economies occurs in either nontraded sectors or export-oriented sectors. Integration leads to higher prices in the export sectors. The additional income from these price increases for Vietnamese households appears to be associated with a substantial reduction in child labor.

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Figure 1—Commune Rice Prices
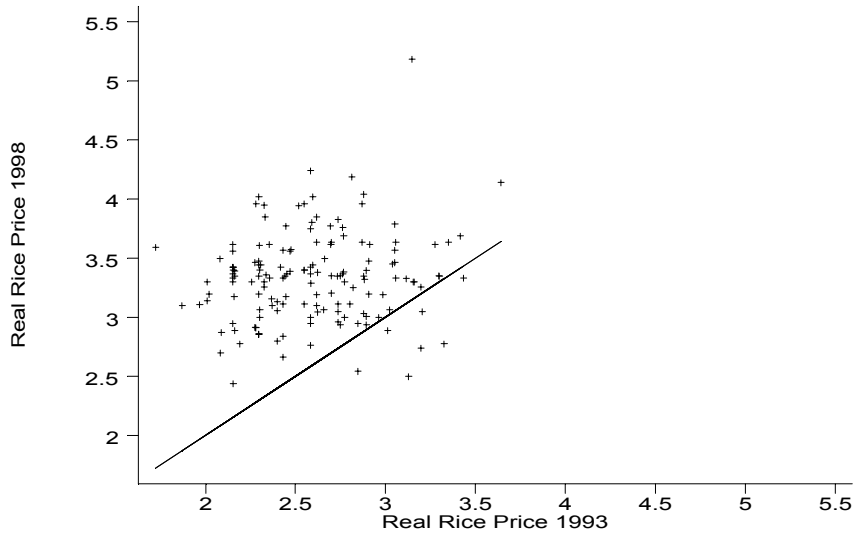
Figure 2—Average Commune Rice Prices by Regions
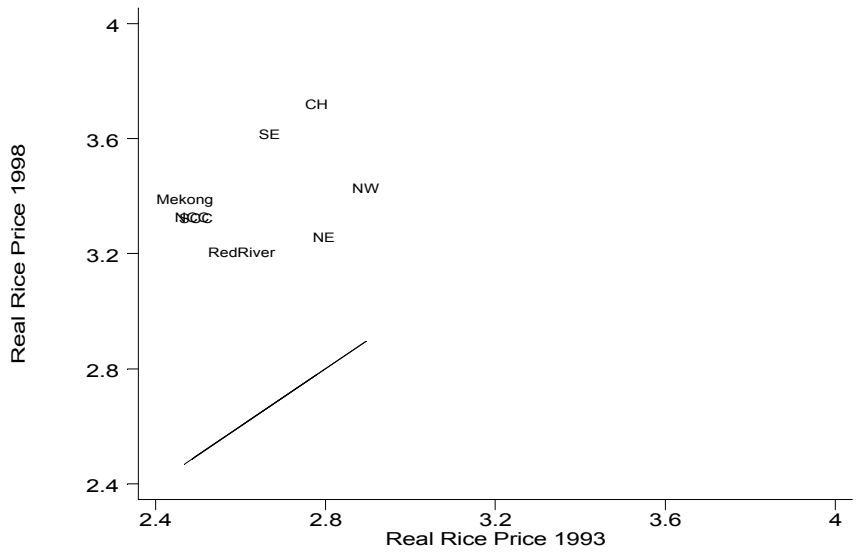
Figure 3 –Price Changes and the Decline in Child Labor
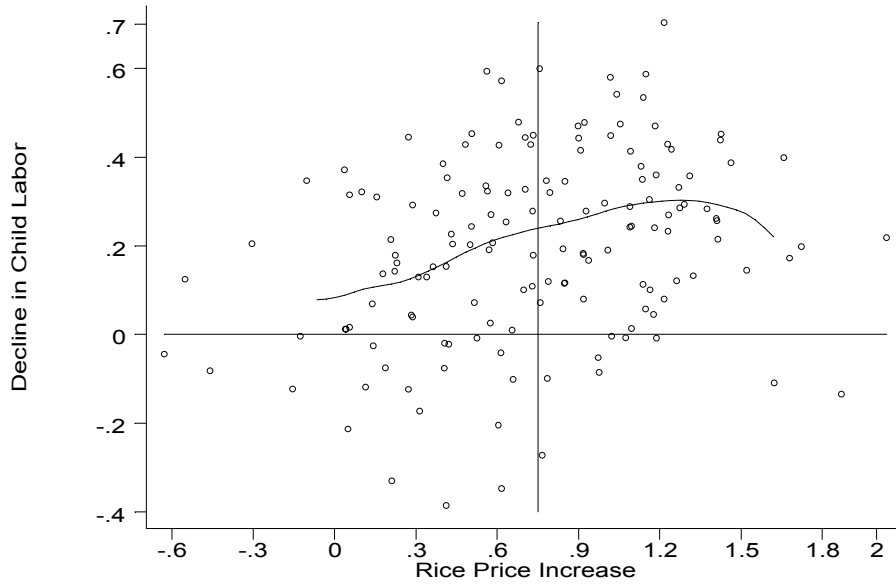
Figure 4 – Changes in Rice Prices and Rice Prices in 1993 for Rural Communities
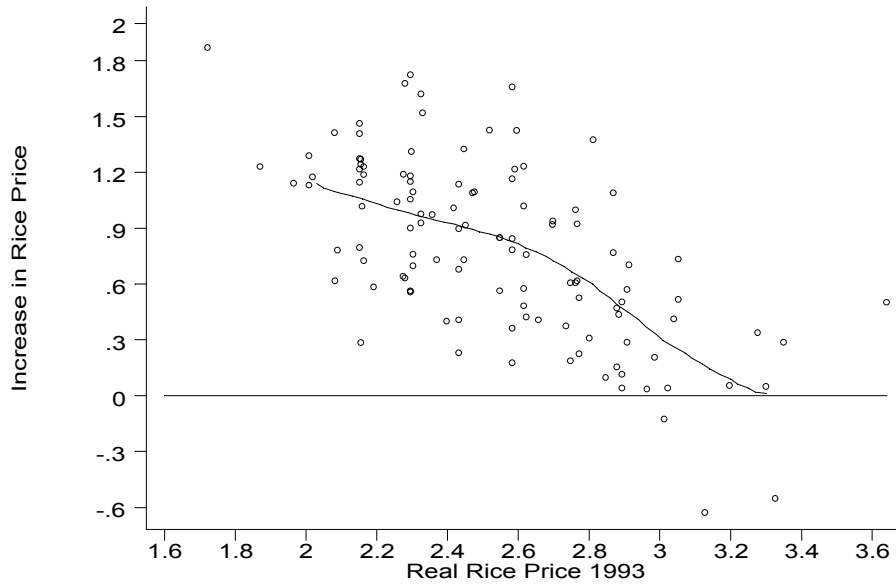
Table 1: Descriptive Statistics

	1993		1998	
	mean	s.e.	mean	s.e.
Rice Prices				
Number of Communes	151		151	
Rice Price (000 of 98 Dong) per Kg	2.60	0.03	3.34	0.03
Household Characteristics				
# of Sampled Households	4,693		4,710	
% Urban	0.22	0.03	0.16	0.03
Rice Expenditure (000 98 Dong)	2,355	57	2,575	45
Total Expenditure	11,191	571	12,929	483
Household Size	5.93	0.09	5.47	0.07
# of Children 6-15	1.62	0.04	1.51	0.04
% Producing Rice	0.70	0.03	0.72	0.03
Rural Commune Characteristics*				
Male Adult Agricultural Day Wages	14.75	0.75	19.25	0.66
Child Agricultural Day Wages	8.00	0.31	9.03	0.29

All means are weighted to reflect sampling probabilitiy and standard errors are corrected for sample design. All nominal variables are deflated by the monthly price index and expressed in January 1998 000s dong. Because of a change in sample design between 1993 and 1998, some additional rural households were added within panel communes (*Basic Information* 2000). Hence, the number of rural households increases. Household means are over all survey households. Some of these househould do not have any children ages 6-15. *Commune characteristics, adult wages, and child wages are for rural communes only, and for each of these three groupings there are many communes missing data. For each row (considered separetely), we have kept only the commune information for communes where we have both 1993 and 1998 data. Hence, while 1993 is comparable to 1998, none of the rows of commune information are nationally representative.

Table 2: Child Labor Characteristics

	1993		1998	
	mean	s.e.	mean	s.e.
Basic Child Characteristics				
Sample Size	5963		5682	
Age	10.46	0.04	10.75	0.04
Female	.505	.006	.507	.006
Child Labor (ILO definition)	.568	.015	.382	.019
School attendance	.743	.014	.872	.012
Work and not attend school (ILO Definition)	.181	.009	.071	.007
Work Characteristics				
Outside of Household	.023	.003	.014	.002
Within household in Agriculture	.260	.017	.220	.021
Within household in Business	.044	.006	.027	.006
In home production	.517	.014	.529	.018
>=7 hours in home production	.434	.013	.358	.020
Any Work (all categories)	.616	.015	.575	.018

All means are weighted to reflecting sampling probabilities. Standard errors are corrected for sample design. A child engages in "child labor" if a child works an hour or more per week in agriculture, a household business, outside of the household for pay or as a domestic servant, or works 7 or more hours per week in household work or chores. We are missing information on household work for 59 children.

Table 3: Child Labor and Rice Prices in Vietnam, Urban vs. Rural Results
(dependent variable is denoted in the header of each column)

Dependent Variable:	Individual Child j Works			All Children in HH work	No Children in HH work
	(1)	(2)	(3)	(4)	(5)
ln(Price of rice)	-.329 **	-.340 **	-.309 **	-.365 **	.393 **
	(.069)	(.072)	(.076)	(.097)	(.087)
ln(Price of rice)*Urban		.497 **			
		(.166)			
ln(Price of rice)*Mixed		.029			
		(.085)			
Year Indicator	-.165 **	-.166 **	-.178 **	-.059 **	.182 **
	(.019)	(.019)	(.021)	(.028)	(.025)
Child Age and Gender Polynomial	yes	yes	yes	no	no
Head Age and Gender Polynomial	no	no	no	yes	yes
Season Indicators	yes	yes	yes	yes	yes
Community Fixed Effects	yes	yes	yes	yes	yes
Adjusted R2	.336	.337	.339	0.153	0.096
Commune/Year Observations	302	302	230	230	230
Individual Observations	11586	11586	9545	4627	4627

Note: Robust standard errors, corrected for the clustered sample design, are in parenthesis. ** and * indicate significance at 5 and 10% level, respectively. Regressions in columns 1-3 include a constant, season indicators, and a 3rd order polynomial in age and gender and all their interactions. Column 3-5 are limited to communes that are classified as rural by the 1998 survey. Columns 4 and 5 are estimated using household level data, so they include the age-gender polynomial for head of the household rather than for children.

Table 4: Child Labor and Rice Prices with Time-Varying Region and Accessibility Controls

	(1)	(2)	(3)	(4)	(5)
ln(Price of rice)	-.269 **	-.291 **	-.293 **	-.310 **	-.307 **
	(.098)	(.083)	(.109)	(.091)	(.119)
Year Indicator	-.260 **	-.267 **	-.318 **	-.338 **	-.365 **
	(.027)	(.031)	(.041)	(.035)	(.048)
Region *Year	no	yes	yes	yes	yes
Accesibility*Year	no	no	no	yes	yes
Age and Gender Polynomial	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes
Community Fixed Effects	no	yes	no	yes	no
Household Fixed Effects	yes	no	yes	no	yes
Adjusted R2	.422	.342	.424	.343	.425
Commune/Year Observations	230	230	230	230	230
Individual Observations	9545	9545	9545	9545	9545

Note: Robust standard errors, corrected for the clustered sample design, are in parenthesis. ** and * indicate significance at 5 and 10% level, respectively. Regressions in all columns include a constant, season indicators, and a 3rd order polynomial in age and gender and and all their interactions. In columns 2-5, a region indicator interacted with a year effect is included in the regression. Accesibility is measured by whether regular transport is available to a commune and whether the road to commune is paved. In columns 4 and 5, an accessibility indicator interacted with a year effect is included in the regression.

Table 5: Child Labor, Rice Prices, and Changes in Infrastructure
(dependent variable is an indicator whether child works)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln(Price of rice)	-.278 **	-.310 **	-.300 **	-.310 **	-.277 **	-.308 **	-.309 **
	(.082)	(.076)	(.077)	(.077)	(.077)	(.075)	(.076)
Year Indicator	-.132 **	-.181 **	-.170 **	-.180 **	-.161 **	-.161 **	-.183 **
	(.044)	(.024)	(.021)	(.023)	(.024)	(.022)	(.021)
Infrastructure Improvement:	Any	Roads	Electricity	Irrigation	Schools	Health	Other
Age and Gender Polynomial	yes	yes	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes	yes	yes
Community Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Adjusted R2	.339	.339	.339	.339	.339	.339	.340
Commune/Year Observation	230	230	230	230	230	230	230
Individual Observations	9545	9545	9545	9545	9545	9545	9545

All regressions allow for different time trends in communities with the indicated type of infrastructure improvement (a infrastructure improvement * year indicator is included in each regression). Regressions in all columns include a constant, season indicators, and a 3rd order polynomial in age and gender and and all their interactions. Robust standard errors, corrected for the clustered sample design, are in parenthesis. ** and * indicate significance at 5 and 10% level, respectively.

Table 6: Child Labor and Rice Prices, Instrumental Variable Results

(dependent variable is decline in fraction of children working in a commune)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Change in Price of Rice	.122 **	.206 **	.219 **	.231 **	.216 **	.241 **	.242 **
	(.037)	(.062)	(.071)	(.076)	(.080)	(.084)	(.082)
Region Indicators	no	no	yes	yes	yes	yes	yes
Accesibility Indicators	no	no	no	yes	yes	yes	yes
Infrastructure Indicators	no	no	no	no	school	any	all
R2	.085	.045	.127	.131	.150	.122	.148
Commune Observations	115	115	115	115	115	115	115

Note: Column 1 is an OLS regression. Columns 2-7 are 2SLS where the change in rice prices is instrumented with the rice price level in 1993. Robust standard errors are reported. All regressions include a constant and are weighted by the number of children living in a commune. The mean change in price of rice is .765. The mean decline in the fraction of children working in a commune is .23.

Table 7: Child labor, Rice Prices, and Landholdings

(dependent variable is an indicator whether child works)

	All Rural Communes		Rural Communes without Land Redistribution Between 1993 and 1998				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln(Price of Rice)	-.223 **	-.023	-.396 **	-.401 **	-.230 **	-.071	.360
	(.094)	(.121)	(.093)	(.122)	(.111)	(.142)	(.461)
ln(Price of Rice)*ln(HH Land Holdings)	-.116 **	-.122 **			-.103 **	-.104 **	-.103 **
	(.033)	(.041)			(.038)	(.050)	(.050)
ln(Price of rice) * Holds Any Land	.863 **	.731 **			.647 **	.463	
	(.303)	(.374)			(.344)	(.443)	
ln(HH Land Holdings)	.108 **				.096 **		
	(.037)				(.043)		
Own Any Land	-0.809 **				-.608		
	(.339)				(.380)		
Year Indicator	-.179 **	-.258 **	-.175 **	-.241 **	-.175 **	-.236 **	-.226 **
	(.021)	(.027)	(.028)	(.037)	(.028)	(.036)	(.038)
Age and Gender Polynomial	yes	yes	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes	yes	yes
Community Fixed Effects	yes	no	yes	no	yes	no	no
Household Fixed Effects	no	yes	no	yes	no	yes	yes
Adjusted R2	.341	.424	.343	.429	.345	.432	.428
Commune/Year Observations	230	230	154	154	154	154	154
Individual Observations	9545	9545	6318	6318	6318	6318	5219

Note: Sample in columns 3-7 restricted to children in communities that did not redistribute land between 1993 and 1998. In addition, 7 rural communes have been dropped because of missing information on land redistribution. In column 7, the sample is additionally restricted to children in households that own agricultural land. Robust standard errors, corrected for the clustered sample design, are in parenthesis. ** and * indicate significance at 5 and 10% level, respectively. Regressions in all columns include a constant, season indicators, and a 3rd order polynomial in age and gender and and all their interactions. The mean and median of the logarithm of 1993 landholdings for households in columns 1-2 is 8.24. The mean of the logarithm of 1993 landholdings for households in columns 3-7 is 8.39 (the median is 8.28).

Table 8: Child Labor, Rice Prices, and Local Labor Markets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln(Price of Rice)			-.292 **	-.258 **	-.800 **	-.040	.002
			(.077)	(.100)	(.071)	(.120)	(.119)
ln(Price of Rice)*ln(HH Land Holdings)						-.123 **	-.132 **
						(.041)	(.041)
ln(Price of Rice) * Holds Any Land						.762 *	.836 **
						(.371)	(.367)
ln(Child Agr Day Wages)	.094 **		.076 *	.078	.004	.058	.041
	(.038)		(.042)	(.057)	(.060)	(.057)	(.061)
ln(Adult Agr Day Wages)		.042	-.003	-.023	-.150 **	-.032	-.041
		(.030)	(.034)	(.045)	(.047)	(.046)	(.045)
School Improvements * Year							-.059 *
							(.033)
Year	-.283 **	-.279 **	-.199 **	-.271 **		-.259 **	-.226 **
	(.016)	(.017)	(.027)	(.037)		(.037)	(.043)
Age and Gender Polynomial	yes	yes	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes	yes	yes
Community Fixed Effects	yes	yes	yes	no	no	no	no
Household Fixed Effects	no	no	no	yes	yes	yes	yes
Adjusted R2	0.338	0.337	0.339	0.422	0.409	0.424	0.424
Commune/Year Observations	230	230	230	230	230	230	230
Individual Observations	9545	9545	9545	9545	9545	9545	9545

Note: Robust standard errors, corrected for the clustered sample design, are in parenthesis.

** and * indicate significance at 5 and 10% level, respectively.

School improvements is an indicator variable that is 1 if the community survey reports any improvements in schooling infrastructure (the mean of this variable is .61) interacted with the year indicator. Hence it allows a different 1998 mean of child labor in communities that have school improvements.

Table 9: Participation in Various Economic Activities by Age, Gender, and Year

	Child Labor	Ever Schooled	Currently Attending School	Wage Work	Agr. In HH	HH Business	Home Prod.	Home Prod (>=7 hrs)	Hours in Home Prod
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Girls									
1993 Ages 6-11	0.474	0.853	0.964	0.003	0.179	0.020	0.475	0.382	10.93
Ages 12-13	0.827	0.938	0.698	0.036	0.406	0.076	0.795	0.690	13.20
Ages 14-15	0.936	0.900	0.305	0.084	0.628	0.111	0.894	0.799	12.78
1998 Ages 6-11	0.304	0.943	0.988	0.001	0.104	0.006	0.442	0.300	8.43
Ages 12-13	0.615	0.959	0.864	0.013	0.376	0.043	0.837	0.600	9.27
Ages 14-15	0.703	0.943	0.637	0.051	0.498	0.068	0.854	0.655	9.54
Boys									
1993 Ages 6-11	0.411	0.839	0.985	0.004	0.172	0.013	0.370	0.299	10.16
Ages 12-13	0.757	0.932	0.814	0.033	0.429	0.045	0.620	0.496	10.01
Ages 14-15	0.850	0.921	0.538	0.061	0.572	0.100	0.598	0.464	9.32
1998 Ages 6-11	0.217	0.954	0.990	0.000	0.125	0.008	0.339	0.210	7.42
Ages 12-13	0.443	0.981	0.913	0.012	0.343	0.020	0.669	0.418	7.89
Ages 14-15	0.521	0.970	0.763	0.044	0.453	0.094	0.697	0.425	7.36

All means are weighted to reflect sampling probabilities.

Schooling participation rates are conditional on ever having attended school.

Hours in home production is conditional on working in home production.

Table 10: Child Labor, Rice Prices, and Schooling by Age and Gender

Dependent Variable:	Child Labor		Ever School		In School	
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Price of rice)	-.288 **	-.254 **	-.054	-.025	.040	.051
	(.084)	(.102)	(.048)	(.062)	(.033)	(.049)
*Age 12 - 13	-.019	-.053	.013	.027 *	.064 **	.059 **
	(.028)	(.036)	(.012)	(.015)	(.021)	(.026)
*Age 14 - 15	-.012	-.065	.000	.009	.148 **	.142 **
	(.044)	(.059)	(.024)	(.027)	(.046)	(.054)
*Male	-.008	.010	.073 **	.087 **	-.109 **	-.137 **
	(.053)	(.060)	(.037)	(.038)	(.031)	(.043)
*Male Age 12 - 13	-.025	.037	-.012	-.031	.007	.010
	(.036)	(.047)	(.018)	(.022)	(.026)	(.037)
*Male Age 14 - 15	-.066	-.011	-.019	-.034	.056	.062
	(.061)	(.076)	(.032)	(.035)	(.061)	(.069)
Year Indicator	-.178 **	-.259 **	.070 **	.049 **	.081 **	.093 **
	(.021)	(.027)	(.013)	(.018)	(.010)	(.014)
Age and Gender Polynomial	yes	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes	yes
Community Fixed Effects	yes	no	yes	no	yes	no
Household Fixed Effects	no	yes	no	yes	no	yes
Adjusted R2	.339	.422	.247	.397	.303	.368
Commune/Year Observations	230	230	230	230	230	230
Individual Observations	9545	9545	9545	9589	8818	8818

Note: Robust standard errors, corrected for the clustered sample design, are in parenthesis. ** and * indicate significance at 5 and 10% level, respectively. "In school" currently (columns 3 and 6) is conditioned on having ever attended school.

Table 11: Types of Economic Activities and Rice Prices by Age and Gender

Dependent Variable:	(1) Wage Work	(2) Works for HH in Agr	(3) Works for HH in Bus	(4) Works in Home Prod.	(5) Works in Home Prod (>=7 hrs)	(6) Ln(Hours in Home Prod)
ln(Price of rice)	.015	.061	-.048	-.016	-.352 **	-1.148 **
	(.020)	(.090)	(.031)	(.115)	(.121)	(.270)
*Age 12 - 13	-.011	-.055 *	-.012	-.001	-.058 *	.001
	(.010)	(.034)	(.015)	(.036)	(.036)	(.072)
*Age 14 - 15	-.025	-.078	-.009	-.035	-.133 **	-.124
	(.028)	(.063)	(.033)	(.061)	(.063)	(.124)
*Male	.011	.018	.046 *	.081	.107 *	.078
	(.021)	(.052)	(.028)	(.064)	(.063)	(.160)
*Male Age 12 - 13	-.001	.007	.006	.004	.092 **	.192 **
	(.014)	(.049)	(.019)	(.053)	(.048)	(.089)
*Male Age 14 - 15	-.014	-.074	.001	.048	.173 **	.388 **
	(.034)	(.084)	(.044)	(.091)	(.085)	(.159)
Year Indicator	-.016 **	-.138 **	-.013 *	-.123 **	-.115 **	-.164 *
	(.006)	(.030)	(.008)	(.029)	(.030)	(.088)
Age and Gender Polynomial	yes	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes	yes
Household Fixed Effects	yes	yes	yes	yes	yes	yes
Adjusted R2	.174	.406	.199	.358	.346	.390
Commune/Year Observations	230	230	230	230	230	230
Individual Observations	9589	9589	9589	9542	9542	5262

Notes:
Robust standard errors, corrected for the clustered sample design, are in parenthesis.
** and * indicate significance at 5 and 10% level, respectively. We are missing household production information for 47 children.
In Columns 1-5 the dependent variable is an indicator for whether a child works in the indicated category.
In Column 6, the dependent variable is the log of hours worked in home production.

Table 12: Rice Prices and the Division of Household Work
Household Level Regression

Dependent Variable:	Total Hours of Household Work in the Household			Fraction of Hours of Household Work Performed by Children 6-15		
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Price of Rice)	-.553 **	-.619 **	-.536 **	-.123 **	-.094	-.028
	(.136)	(.239)	(.300)	(.035)	(.060)	(.083)
ln(Price of Rice)*ln(HH Land Holdings)			-.235 **			-.104 **
			(.083)			(.039)
ln(Price of Rice) * Holds Any Land			1.887 **			.798 **
			(.723)			(.338)
ln(Child Agr Day Wages)			.154			-.042
			(.147)			(.037)
ln(Adult Agr Day Wages)			-.134			.058 **
			(.112)			(.028)
School Improvements * Year			-.053			-.010
			(.088)			(.024)
Year	-.142 **	-.090	-.053	-.009	-.005	-.013
	(.047)	(.089)	(.088)	(.012)	(.021)	(.029)
Head Age and Gender Polynomial	yes	yes	yes	yes	yes	yes
Season Indicators	yes	yes	yes	yes	yes	yes
Community Fixed Effects	yes	no	no	yes	no	no
Household Fixed Effects	no	yes	yes	no	yes	yes
Adjusted R2	0.257	0.221	0.231	0.096	0.115	0.127
Commune/Year Observations	230	230	230	230	230	230
Household Observations	4622	4622	4622	4622	4622	4622

Note: Robust standard errors, corrected for the clustered sample design, are in parenthesis.

** and * indicate significance at 5 and 10% level, respectively. 5 households do not report any home production.

Mean log total hours in household work in 1993: 3.76

Mean log total hours in household work in 1998: 3.48

Mean fraction of total hours in household work performed by children in 1993: .266

Mean fraction of total hours in household work performed by children in 1998: .238