

# Child Labor and Schooling Decisions in Urban and Rural Areas: Comparative Evidence from Nepal, Peru, and Zimbabwe

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**Summary.** — This study sheds some light on the causes of child labor using crosscountry empirical data. We find that while poverty is the main cause of child labor in rural areas, there is a general lack of support for the poverty hypothesis in urban areas. Similarly, improving access to credit has a greater potential for alleviating child labor and enhancing school attendance in rural areas. On the other hand, availability of alternative childcare options promises greater impact in urban areas. Finally, the evidence from all countries suggests that efforts to bolster adult educational level and wage will help curb the prevalence and intensity of child labor and improve the likelihood that children stay in school.

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## 1. INTRODUCTION

The rate of economic growth crucially depends on the stock of human capital in a country (Barro, 1991; Lucas, 1988; Mankiw, Romer, & Weil, 1992; Romer, 1987). A low level of human capital development has long been identified as a major impediment to economic growth and elimination of poverty in developing countries. Several studies (e.g., Glick & Sahn, 2000; Vijverberg, 1993) find high returns in the labor markets for investments in education for both men and women. Glick and Sahn (1997), using data from a developing country, show that the earnings of women and men increase with schooling in both self-employment and wage employment. Similarly, other studies have consistently shown that child education has higher returns than other physical assets (e.g., Psacharopoulos, 1994). Despite these apparent benefits, the level of education and educational attainment remain remarkably low in most developing countries, and child labor, considered to be a competing activity to schooling, continues to be a common phenomenon.

Child labor is widespread in developing countries. Estimates by the International Labor Organization (ILO, 1996) of the number of

children under age 15 who work range from 100 to 200 million. UNICEF (1991) estimated that there were 80 million children aged 10–14 who undertook work so long or arduous that it interfered with their normal development. Though many, including parents themselves, agree that childhood is a period of school learning and physical and mental development—and not of primarily income-generating work—

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many young children in low-income countries participate in the labor force, and their chance of receiving even primary education is minimal.

Although child labor is widespread, its causes are debatable. Poverty is considered as the primary reason, but many theoretical and empirical analyses show that other factors, such as access to credit, school quality, and labor market opportunities, play equal or even greater roles in child labor and schooling decisions. That there is a higher geographic concentration of child workers in poor countries (see Basu, 1999) suggests there is an inverse association between child labor and income. For poor households, school investment decisions are associated with a host of decisions regarding use of time and other resources. Changes in household circumstances, such as becoming poor, may elicit important time-use changes, not only of children who are students or potential students, but of parents as well. Basu and Van (1998) argue that the mass phenomenon of child labor does not reflect the selfishness of parents wanting to enjoy more leisure time while their children work, but rather that poverty compels them to send their children to work. In developing countries, often more than one member of a household generates income (e.g., Ersado, 2002 on Zimbabwe; Pradhan & van Soest, 1997 on Bolivia), which often necessitates use of child labor. Several studies that looked at schooling determinants in developing countries find that household wealth figures prominently in child schooling and work decisions (e.g., Basu & Van, 1998). Bhalotra (2000a) finds that in Pakistan child work is caused by poverty.

Studies, citing evidence mainly from Latin America, argue that rates of child labor are higher at times when children have better work opportunities as measured by local labor market conditions (Binder, 1999; Levison, Moe, & Knaul, 2001). Since a seminal paper by Becker (1964), many development researchers have recognized the importance of opportunity costs in schooling decisions. The opportunity costs of schooling increases as market wages for child labor increase. Furthermore, differences in labor market conditions by gender may differentially affect schooling decision for boys and girls.

Still others argue that factors such as credit market imperfection, not poverty, play a greater role in sending children to work or keeping them at home to take care of domestic household responsibilities, even though returns on education (which accrue in the future) are

higher.<sup>1</sup> Cross-sectional data from India and other developing countries show that a higher incidence of poverty is not correlated with a higher incidence of child labor (e.g., Swaminathan, 1998). The Becker model and more recently Ranjan (2001) imply that income does not matter if complete credit markets exist. A study by Jacoby (1994) finds that borrowing constraints negatively affect children's schooling attainment in Peru. Studies also exist which suggest that child labor decision is part of a household's risk-management strategy (Grootaert & Kanbur, 1995; Jacoby & Skoufias, 1997). Lack of access to credit for smoothing income fluctuations over time might, therefore, lead to a higher prevalence of child labor. Jacoby and Skoufias (1997) use a measure of variability of household income in rural India and find that school attendance declined with income variability.

Lack of access to school and low school quality could also affect child schooling and work decisions. For households rationally maximizing welfare, a low demand for schooling might arise because of low school quality or excessive costs. Inaccessible or poor quality schools may thus spur parents to engage their children in more immediate and profitable pursuits (e.g., Grootaert & Patrinos, 1999). Schooling costs—since schooling is the main competing activity for children's time—could also be an important determinant of child labor (e.g., Siddiqi & Patrinos, 1995). Some children may have to work to afford the direct costs of schooling. Even with sufficient access to school, child labor may still continue to be a common phenomenon if the household decision making process gives more weight to income from a child's labor and less weight to a child's schooling because of other factors such as poverty (Grootaert & Kanbur, 1995).

While labor is the poor's greatest asset, child labor raises important concerns. A household's decision to increase the number of family members in the labor market implies that mothers might have to give up vital household and childcare activities, and children might have to sacrifice their education in order to participate in income generating activities. When the poor depend on their children's labor rather than invest in their future by educating them, they risk perpetuating poverty from one generation to the next (Moser, 1996). It is important to understand the tradeoffs that households make between child labor-market participation and other vital time allocation decisions such as

schooling and household work. The empirical evidence briefly summarized above, however, shows a general lack of consensus on the causes of child labor and suggests that its determinants may vary across geographic regions. It also casts doubt on the notion that child labor is primarily caused by poverty.

This paper, using household survey data from three geographic regions (Africa, Asia, and Latin America), investigates the factors driving child labor by analyzing and comparing crosscountry evidence on child labor force participation and education-related decisions. It specifically asks questions such as: Does child labor mainly arise as a response to low income, lack of access to credit, an improved labor market, or poor school quality? Do we see differences in sub-Saharan Africa, Latin America, and Southeast Asia? Are urban–rural differences important in child labor and schooling decisions? Empirical models that simultaneously consider several factors affecting labor participation and schooling decisions are scant. Yet identifying the key determinants of child labor and schooling are of paramount importance to targeted policy and program designs to address current and future poverty.

## 2. DATA AND DESCRIPTIVE ANALYSIS

We use data from Nepal, Peru, and Zimbabwe to examine the key determinants of child labor and schooling decisions. The data are from the 1990–91 Zimbabwe Income Expenditure Consumption Survey (ZICES), the 1994 Peru Living Standards Measurement Survey (PLSS), and the 1995 Nepal Living Standards Survey (NLSS). The surveys are nationally representative, lending themselves for comparison on individual, household, and community-level characteristics. The PLSS covers about 3,623 households, the NPLSS 3,373 households, and the ZICES over 14,000 households. The Nepal and Zimbabwe surveys report child schooling and employment data for 3,617 and 15,467 children aged 10–17, respectively. The Peru sample contains child labor and child schooling information for 5,191 children aged 6–17.<sup>2</sup> These large-scale household surveys provide information on children who work or do not work and those who attend or do not attend school, thus enabling us to model child labor and schooling decisions. We anticipate that the results based on more than one country will help solidify or

weaken the presumption that poverty drives child labor.

Before discussing the descriptive results, it is important to describe how child labor is measured. The measurement of child labor depends on how it is defined, and by ethical and cultural views. For some, all nonschool, nonleisure activities of children constitute child labor. Others define it as only full-time employment in economic activities or as “bad” child labor such as backbreaking work in quarries or mines. This paper defines child labor as hours in both wage and nonwage activities, as reported by these multipurpose and countrywide household surveys. This is in line with the work of Skoufias and Parker (2002), who argue that such a broad measure provides a more accurate estimate of the household preferences toward leisure.

### (a) *Child schooling and employment distribution by age*

Tables 1–3 show child employment and school attendance rates for Nepal, Peru, and Zimbabwe by age, sex, and location. While nearly all children in Peru and Zimbabwe appear to attend school, about a quarter of Nepalese children have never been to school. For all age groups, the current school attendance rates are the lowest in Nepal (61%), followed by Peru (85%), and Zimbabwe (88%). Lower attendance rates for Nepalese children may reflect a lack of access to schools, but those enrolled appear to stay in school more so than both Zimbabwean and Peruvian children.

The data from all countries show lower attendance and higher employment rates in rural areas. Disaggregating by age and sex shows that attendance rate difference by gender grows wider with age in Zimbabwe than in either Peru or Nepal. While this is the case for both urban and rural areas in Zimbabwe, rural areas of Peru and Nepal show the biggest disparities in attendance rates between boys and girls. This evidence is suggestive of more favor for schooling of boys than girls in rural areas, while school attendance rates in urban areas do not appear to show a significant gender bias.

On the other hand, child employment rates go in an opposite direction to attendance, possibly suggesting that dropping out of schools is at least partly driven by employment decisions. In all countries, labor force participation increases with age. In urban areas overall, employment rates are higher for boys than for girls in Peru and higher for girls than for boys

Table 1. *Attendance and employment rates among Nepalese children in 1995-96*

Age	Attendance						Employment					
	Urban			Rural			Urban			Rural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
10	85.7	79.2	82.6	77.7	52.8	65.3	7.1	13.2	10.1	20.6	31.6	26.1
11	86.8	87.9	87.3	78.3	64.3	71.0	5.3	0.0	2.8	26.8	34.5	30.8
12	85.9	77.3	82.4	71.4	48.5	61.1	12.5	15.9	13.9	38.5	48.5	43.0
13	85.1	71.8	79.1	75.2	50.3	64.5	17.0	20.5	18.6	40.2	49.7	44.3
14	80.7	69.1	75.0	64.8	46.4	54.8	19.3	18.2	18.8	50.6	53.1	52.0
15	79.6	75.5	77.6	56.1	35.5	46.5	24.5	18.4	21.4	55.6	66.3	60.6
16	54.2	73.3	63.4	49.5	34.3	42.1	33.3	26.7	30.1	58.7	63.2	60.9
17	73.8	65.8	70.0	42.4	33.3	37.9	31.0	18.4	25.0	59.7	66.7	63.2
Total	79.3	74.7	77.1	65.5	46.1	56.1	18.5	16.9	17.7	42.9	50.8	46.7

Table 2. *Attendance and employment rates among Peruvian children in 1994*

Age	Attendance						Employment					
	Urban			Rural			Urban			Rural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
10	96.8	95.7	96.3	94.7	91.2	92.8	9.5	6.0	7.8	55.8	35.4	44.7
11	99.3	96.6	98.1	94.4	90.7	92.4	12.5	8.5	10.7	62.2	37.4	48.7
12	96.9	96.3	96.6	88.6	91.3	90.0	10.9	8.9	9.8	71.4	48.1	59.8
13	97.1	91.0	93.9	89.7	80.4	84.7	14.0	11.1	12.5	61.5	50.0	55.3
14	95.6	91.3	93.3	75.0	78.3	76.5	26.3	14.3	19.8	76.0	62.7	69.9
15	88.8	85.2	87.0	78.2	67.1	72.5	31.3	14.1	22.7	78.2	61.0	69.4
16	84.9	77.1	81.1	71.4	58.1	63.8	29.5	18.6	24.1	89.3	59.5	72.3
17	62.1	59.6	60.8	60.0	37.7	49.0	39.3	16.3	27.0	82.5	44.2	63.7
Total	91.9	88.3	90.1	84.5	82.4	83.4	15.1	9.2	12.1	56.6	40.1	48.0

Table 3. *Attendance and employment rates among Zimbabwean children in 1990-91*

Age	Attendance						Employment					
	Urban			Rural			Urban			Rural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
10	98.4	99.3	98.9	95.7	95.6	95.7	0.4	1.1	0.8	3.0	2.6	2.8
11	98.7	98.6	98.6	95.1	96.4	95.8	0.9	0.0	0.5	3.1	2.7	2.9
12	99.0	96.5	97.8	94.6	93.5	94.0	0.5	1.5	1.0	5.1	4.4	4.8
13	97.5	98.6	98.1	92.1	91.6	91.8	1.0	1.4	1.2	4.9	6.5	5.7
14	94.8	91.0	92.6	89.7	83.3	86.7	1.1	5.6	3.7	7.9	13.5	10.5
15	97.0	78.6	87.5	81.9	67.4	75.1	1.5	14.1	8.0	13.9	24.5	18.8
16	88.9	70.9	78.5	76.0	60.3	68.4	2.4	18.4	11.6	17.4	32.6	24.7
17	75.8	54.1	64.2	64.8	51.3	58.5	3.2	25.5	15.1	27.4	39.7	33.1
Total	93.9	85.4	89.4	87.1	82.0	84.6	1.3	8.8	5.3	9.7	14.1	11.8

in Zimbabwe. In rural areas, female employment rates appear to be higher than they are for boys in Zimbabwe, whereas the opposite

is true in Peru. For all age groups and in both urban and rural areas, child employment rates are highest in Peru, closely followed by Nepal,



Table 5. Means of selected variables

	Nepal			Peru			Zimbabwe		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
Household size	5.59	5.28	5.67	5.38	5.31	5.50	5.03	4.32	5.43
Urban (yes)	0.19	—	—	0.61	—	—	0.25	—	—
Child sex (female)	0.48	0.45	0.49	0.51	0.50	0.52	0.50	0.52	0.49
Child age	13.28	13.33	13.3	13.5	13.62	13.18	13.2	13.40	13.18
Nonwage income per capita	6,902	14,614	5,093	2,358	2,964	1,315	44	51	40
Men's share of total income	0.81	0.72	0.82	0.73	0.69	0.79	0.75	0.84	0.65
Women's share of total income	0.12	0.23	0.10	0.24	0.28	0.17	0.20	0.16	0.25
Child's share of total income	0.06	0.03	0.07	0.04	0.03	0.04	0.02	0.002	0.04
Ratio of child's to men's labor	0.27	0.13	0.31	0.12	0.08	0.19	0.06	0.02	0.08
Ratio of child's to women's labor	0.30	0.26	0.31	0.36	0.26	0.49	0.11	0.05	0.12
Child ever been to school (yes)	0.68	0.86	0.67	0.99	1.00	0.98	0.99	0.99	0.99
Child attending school (yes)	0.61	0.80	0.60	0.85	0.88	0.80	0.88	0.91	0.87
Child employed (yes)	0.40	0.13	0.42	0.26	0.12	0.48	0.08	0.03	0.10
<i>Community level characteristics</i>									
School expenses <sup>a</sup>	82.9	217.2	66.1	106.5	137.5	42.8	28.4	65.19	18.07
Men's wage per hour	15.24	17.04	15.01	2.70	3.33	1.40	0.16	0.40	0.09
Women's wage per hour	15.77	17.32	15.58	2.07	2.49	1.20	0.09	0.27	0.04
Child's wage per hour	9.37	8.56	9.47	0.93	1.05	0.67	0.05	0.10	0.04
Electricity (yes)	0.33	0.89	0.25	0.74	0.97	0.26	0.21	0.87	0.03
Water storage (1 = best, 5 = worst)	3.50	2.98	3.57	2.22	1.49	3.71	3.52	1.49	4.09

<sup>a</sup> Monetary figures are nominal and presented at the year of survey and using the respective currency of each country (i.e., rupees for Nepal, sols for Peru, and Z\$ for Zimbabwe).

nontrivial 7% of the household income, compared to only 3% for their urban counterparts. It should be noted, however, that quantifying the share of child-generated welfare for a household would be difficult and may be easily underestimated since children contribute in several ways that are not reflected in monetary terms. In addition, the data may be deficient due to a high likelihood of underreporting of the incomes generated by even gainfully employed and remunerated children (Basu, 1999).

Table 5 also presents the ratio of children's labor hours to both men's and women's in the household. Child labor participation in all countries is closely related to their relative contribution to household income. Child labor participation is lowest in Zimbabwe, as is their share in overall household income. Urban-rural disparities are interesting: The ratio of child labor hours to both men's and women's is larger in rural areas in all countries, underscoring the abundance of child labor in rural household chores. However, the urban child-labor environment is still alarming, with the ratio of child labor hours to adult labor hours in excess of 1 in 10 in both Peru and Nepal. The descriptive statistics suggest that the rate of incidence of child labor varies from country

to country and by urban and rural areas within countries, but all country evidence confirms that the number of children working is high and worthy of policy concern.

### 3. EMPIRICAL FRAMEWORK

The conventional welfare economics approach provides a useful framework for integrating determinants of child labor and schooling decisions. The decision is guided by utility maximization determined by consumption and leisure of household members, under household budgetary and time constraints (see the theoretical model in Appendix A). A parent's decision to send a child to school, work, or both is a time allocation decision. The decision whether a child works or goes to school is a simultaneous one as households may be choosing among child labor, schooling, or both decisions at the same time. Moreover, the fact that an important fraction of children are both working and going to school at the same time underscores the simultaneity of the decision. Therefore, we use a multinomial logit framework to examine child labor and schooling decisions (see Appendix A). In this section, we



describe the explanatory variables and address econometric issues pertinent to child labor and schooling choices.

(a) *Explanatory variables and endogeneity issues*

In line with the main objective of the paper and the conceptual model presented in [Appendix A](#), an extensive list of explanatory variables are used to examine the relative role of several individual, household, and community variables on child schooling and work decisions. The explanatory variables include measures of labor market conditions, poverty, credit access, school availability and cost, and variables accounting for household domestic responsibilities. These variables are considered as determinants of child labor in the literature, but there is a general lack of consensus as to which is most important. We anticipate that the role of these variables varies significantly between rural and urban areas. In the following, we briefly discuss the measurement and rationale for selection of the main explanatory variables.

Child- and adult-labor market conditions are measured by average wage paid per hour at the community level,<sup>3</sup> not wage rates derived at the individual level. Community-level average wages provide a better description of prevailing labor market conditions than individual-level wages, and they are based on wages reported by individuals who actually work. Furthermore, being community-level averages, they are less prone to endogeneity problems. Since incomplete pooling of resources among household members appears to be the norm in many countries ([Strauss & Thomas, 1995](#)), we include adult female and male wage variables separately. Explicit inclusion of separate wage and educational level variables would allow us to capture the differential impacts of men's and women's income, preferences and bargaining power on work and schooling decisions for their children.

Access to credit is found to be very difficult to measure from Living Standard Measurement Surveys (LSMS), which usually ask if a given household had a loan and bank account. Having a loan alone is not a good measure of access to credit since households that did not report receiving a loan might have access to credit but no need to borrow. Note also that credit constraints are more likely to bind for the poor since their incomes are lower and riskier, thus making access to credit potentially endogenous to schooling and work decisions. As a result,

only access to a commercial branch bank at the community level is used as a measure of access to the credit market. Since this still is not a significant measure of access to credit, the results should be interpreted with caution.

Other common determinants that figure prominently in child labor empirical work, such as parent's educational level, head age, and sex are among the explanatory variables. We also include a measure of "domestic responsibilities" in terms of the number of very young children in the household. This may adversely affect child schooling decisions and may be even more detrimental to schooling of girls. It is widely accepted that girls are more likely than boys to help their mothers with housework and childcare. Gender disparities in education could also arise due to differences in expected earnings or remittance propensities among boys and girls. The inclusion of a child gender dummy will address these and other possibilities that lead to differential employment and attendance rates among boys and girls. Another variable of interest is whether the mother works outside the home, which may be correlated with child working decisions; a dummy variable that indicates whether a mother works outside the home is used to capture this effect.

Some school-related variables at the community level—the number of schools available and the cost of schooling per pupil—are included among explanatory variables. Availability of school can affect schooling decisions to the extent that child-time spent going to and from school entails a significant opportunity cost to the parent. Educational expenses per pupil could be a good measure of educational resources available to students as well as their teachers in terms of facilities, tuition, books, and other school related expenses. Thus, the cost of schooling is included because it could be an important determinant of the likelihood that children work. The inclusion of regional dummies and community-level characteristics variables helps capture variation in productivity, labor demand, and differences in other aspects such as culture and attitude. All right-hand side variables are carefully selected in such a way that consistent reduced-form estimation is achieved by excluding potential endogenous variables.<sup>4</sup>

Finally, in accordance with the conceptual model in [Appendix A](#), the household-level poverty measure is based on nonwage income from various sources such as profits from

Table 6. *Simultaneous estimation of child labor and schooling decisions in rural areas*

Explanatory variables	Nepal			Peru			Zimbabwe		
	(1) Schooling	(2) Employment	(3) Both	(4) Schooling	(5) Employment	(6) Both	(7) Schooling	(8) Employment	(9) Both
Sex (female)	-1.61 (9.1)***	0.71 (4.0)***	1.84 (9.3)***	-0.66 (2.6)***	-1.40 (4.6)***	1.64 (6.3)***	-0.29 (2.2)**	0.48 (3.3)***	0.34 (0.8)
Age	-0.18 (4.3)***	0.25 (5.9)***	0.10 (2.2)**	-0.42 (6.0)***	0.17 (2.0)*	0.29 (4.1)***	-0.48 (13.7)***	0.10 (2.4)**	-0.38 (3.8)***
Child wage	0.05 (0.9)	0.05 (0.8)	0.01 (0.2)	0.23 (0.3)	0.93 (1.1)	0.69 (1.0)	3.13 (1.0)	2.69 (1.5)	9.88 (1.5)
Men's wage	0.01 (3.3)***	-0.01 (1.9)**	0.01 (1.3)	0.80 (3.0)***	-1.71 (2.4)**	-0.50 (1.6)	0.80 (2.5)**	-1.84 (4.1)***	-2.77 (0.5)
Women's wage	0.01 (2.7)***	-0.02 (2.5)**	0.01 (0.6)	0.07 (2.2)**	-0.29 (3.4)***	-0.20 (0.4)	0.11 (3.1)***	-3.84 (1.8)*	4.71 (0.7)
Nonwage income (pred.)	0.62 (3.5)***	-1.01 (4.3)***	2.65 (3.5)***	0.10 (2.1)**	0.64 (0.8)	0.18 (0.2)	0.70 (3.1)	-0.40 (3.1)***	2.54 (2.7)***
# Young children (age les 5)	-0.05 (0.7)	0.05 (0.7)	0.12 (1.6)	-0.22 (1.7)	-0.14 (0.4)	-0.20 (0.6)	-0.31 (3.7)***	0.19 (2.1)**	0.53 (2.2)**
Head sex (female)	-0.60 (2.0)**	-0.42 (1.4)	-0.90 (2.8)***	0.56 (0.6)	1.40 (1.3)	1.07 (1.1)	-0.11 (0.6)	-0.13 (0.7)	-0.14 (0.2)
Head age	0.08 (3.3)***	-0.06 (2.8)***	0.16 (2.1)**	-0.05 (0.4)	0.02 (0.1)	-0.05 (0.3)	0.05 (2.0)**	-0.07 (1.8)*	0.27 (1.7)*
Men's education	0.06 (1.9)*	-0.01 (0.4)	0.04 (1.2)	0.37 (2.5)***	-0.18 (0.6)	0.09 (0.4)	0.15 (3.6)***	-0.01 (0.2)	-0.07 (0.5)
Women's education	0.06 (1.8)*	-0.10 (2.5)**	0.04 (1.0)	0.12 (0.4)	0.76 (2.0)**	-0.06 (0.2)	0.27 (5.7)***	-0.07 (2.4)**	0.57 (3.7)***
Mother works outside home (yes)	1.10 (5.4)***	1.24 (5.9)***	1.66 (5.9)***	0.41 (0.8)	1.37 (2.3)**	1.73 (3.2)***	0.27 (1.0)	0.94 (2.5)**	-0.72 (0.6)
Educational expenses	0.08 (3.7)***	-0.01 (0.3)	0.05 (2.2)**	3.60 (1.0)	1.82 (2.4)**	3.68 (1.0)	-5.85 (3.9)***	6.11 (3.6)***	-14.98 (2.9)***
Access to a bank (yes)	0.19 (1.9)	-0.12 (0.5)	-0.61 (2.2)**	-3.12 (0.8)	6.88 (3.3)**	2.15 (0.5)	0.74 (1.9)*	-1.57 (3.5)***	0.02 (0.0)
Number of schools	0.15 (5.4)***	0.02 (0.8)	0.13 (4.0)***						
Water storage (1 = best, 5 = worst)	-0.12 (1.0)	0.28 (2.3)**	-0.08 (0.6)	0.49 (1.0)	-0.41 (0.6)	0.14 (0.3)	0.93 (5.7)***	0.47 (2.5)**	2.49 (3.2)***



Electricity (yes)	−0.34 (1.6)	−0.46 (2.1)**	−0.35 (1.4)	2.30 (1.3)	−1.12 (0.5)	0.52 (0.3)			
Sewage (1 = best, 5 = worst)				0.59 (1.1)	0.46 (0.7)	0.59 (1.1)			
Rural West-Hill	1.46 (5.2)***	1.04 (3.6)***	1.61 (5.1)***						
Rural East-Hill	1.44 (5.4)***	0.94 (3.5)***	1.89 (6.3)***						
Rural-West Tera	0.42 (1.7)	0.49 (1.9)	0.97 (3.2)						
Siera North				−0.30 (0.9)	0.26 (0.6)	−0.79 (2.1)**			
Siera Central				0.06 (0.1)	−0.65 (1.0)	0.54 (1.0)			
Selva Alta North				−0.56 (1.1)	0.51 (0.8)	−1.43 (2.6)**			
Selva Alta South				0.72 (0.7)	−1.44 (1.0)	0.04 (0.0)			
Selva Baja				−1.29 (0.9)	−0.27 (0.2)	−0.85 (0.6)			
Coastal North				−0.23 (0.5)	−0.20 (0.3)	−0.81 (1.8)*			
Coastal South				−1.16 (0.6)	−32.10 (0.0)	−2.00 (1.0)			
Mashonaland N							−0.01 (0.0)	0.45 (1.5)	−0.60 (0.7)
Mashonaland E							−0.67 (1.9)*	−0.18 (0.5)	−2.15 (1.5)
Mashonaland W							−1.06 (3.7)***	−1.23 (3.6)***	−1.85 (1.9)*
Matabeleland N							−0.59 (1.6)*	−0.11 (0.3)	−0.92 (0.9)
Matabeleland S							0.02 (0.1)	0.86 (2.5)**	0.57 (0.6)
Midlands							−0.08 (0.3)	0.09 (0.3)	−1.15 (1.4)
Masvingo							−0.31 (0.9)	0.51 (1.4)	−2.42 (2.0)*

Table 6—continued

Explanatory variables	Nepal			Peru			Zimbabwe		
	(1) Schooling	(2) Employment	(3) Both	(4) Schooling	(5) Employment	(6) Both	(7) Schooling	(8) Employment	(9) Both
Constant	0.07 (0.1)	−4.37 (4.3)***	−4.82 (4.3)***	0.52 (0.1)	−4.80 (0.9)	0.53 (0.1)	5.87 (6.1)***	−2.29 (2.0)**	−8.18 (2.0)**
Wald test	$\chi^2(40) = 907.0^{***}$			$\chi^2(48) = 457.5^{***}$			$\chi^2(44) = 1548.6^{***}$		
Exogeneity test for nonwage income ( <i>F</i> -test)	<i>F</i> -statistic = 13.2 <i>P</i> -value < 0.01			<i>F</i> -statistic = 19.24 <i>P</i> -value < 0.001			<i>F</i> -statistic = 36.60 <i>P</i> -value < 0.001		
Test for relevance of instruments ( <i>F</i> -test)	<i>F</i> -statistic = 13.99 <i>P</i> -value < 0.01			<i>F</i> -statistic = 17.90 <i>P</i> -value < 0.01			<i>F</i> -statistic = 22.17 <i>P</i> -value < 0.001		
Observations	2,884	2,884	2,884	1,387	1,387	1,387	8,654	8,654	8,654

Absolute value of *z* statistics in parentheses.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

self-employment in farming and nonfarming activities, interest from household assets, and other nonlabor income sources. This measure takes into account the intertemporal nature of child schooling and work decisions as shown in Eqns. (A.2) and (A.3) in Appendix A. However, nonwage income may be endogenous to child labor and schooling decisions, primarily due to the fact that children may contribute to nonwage income through involvement in family farming and nonfarming activities that do not pay wages.<sup>5</sup> But our measure is an improvement over most previous studies on child labor and schooling decisions that use total household income to measure poverty.

Although we anticipate that nonwage income suffers less from endogeneity problems compared to total household income, our empirical strategy addresses the potential endogeneity of nonwage income. Following the work of Smith and Blundell (1986), we test whether nonwage income is endogenous. The test involves testing the significance of the coefficient on the residual from the first-stage regression of nonwage income on all instruments and exogenous explanatory variables. Under the null hypothesis, the residuals should have little or no explanatory power.

#### 4. RESULTS

Child schooling and employment decisions are estimated using a multinomial logit framework with and without instrumenting for nonwage income. In order to save space, only the IV estimates are reported in Tables 6 and 8 for rural and urban areas, respectively. In general, the coefficients on nonwage income appreciably increases in its magnitude after instrumenting, thus indicating a downward bias in the noninstrumented coefficient of household income.<sup>6</sup> The relevance test lends strong credence to our use of household asset holding as instrument for nonwage income in both rural and urban areas (with a  $P$ -value  $< 0.0001$ ).<sup>7</sup> The Smith and Blundell exogeneity test indicates that nonwage income is endogenous in the child labor and schooling decisions in both rural and urban areas, although the evidence is weaker in the latter.

The intensity of work also merits attention since the hours of work could exhibit substantial variability among the children who are reported to be in the labor force. The intensity of work—hours of work per week—is esti-

mated as a function of the same set of variables employed in modeling of schooling and work decisions. It is estimated using tobit and instrumental variables (IV) tobit. The estimates of child labor supply are presented in Tables 7 and 9 for rural and urban areas, respectively. Factors that significantly affect child employment decisions affect the number of hours children actually work in the same direction. As such, intensity of work results are discussed concurrently with the joint schooling and work estimation. In the next subsections, child labor and schooling estimates are discussed focusing on the similarities and differences between crosscountry results and separately for rural and urban areas.

##### (a) Rural child labor and schooling decisions

All country results indicate that child schooling is negatively associated with age and female gender, as girls' and older children's school attendance rates are significantly lower than those for boys and younger children. Correspondingly, the probability of being employed rises significantly with age in all three countries. The likelihood of employment only increases with girls in Zimbabwe, but in Nepal and Peru, boys tend to have higher propensities for employment only.

The impact of rural child labor market conditions on schooling and work, as measured by child labor wages at the community level, is effectively zero for all countries, casting doubt on the hypothesis that improved labor market conditions drive child labor in rural areas. On the other hand, evidence exists that improved labor market conditions for adult household members lead to higher school attendance rates and less employment for Nepalese children, and lower employment rates for Peruvian children. Also, higher wages for adult women in rural Zimbabwe are associated with a low prevalence of child labor.

In rural Nepal and Zimbabwe, we find supportive evidence for Basu and Van's (1998) luxury axiom that states, "A family will send the children to the labor market only if the family's income from non-child labor sources drops very low." Although poverty reduces the probability of child schooling, it significantly increases the prevalence of child labor and intensity of work. The labor supply estimates in Table 7 show that if a Nepalese household had its nonlabor assets increased by Rs. 100, it would decrease child labor hours by about 5.76 hours per week.

Table 7. *Child labor supply in rural areas*

Explanatory variables	Nepal		Peru		Zimbabwe	
	(1) Tobit	(2) IV Tobit	(3)	(4) IV	(5)	(6) IV
Sex (female)	3.52 (3.3)***	3.52 (3.3)***	-12.60 (8.2)***	-12.60 (8.1)***	11.24 (4.7)***	11.39 (4.7)***
Age	3.97 (15.6)***	3.97 (15.5)***	2.81 (8.2)***	2.76 (7.9)***	14.55 (18.8)***	14.54 (18.7)***
Child wage	-0.39 (1.1)	-0.39 (1.1)	4.98 (1.5)	6.14 (1.7)*	-5.57 (0.2)	-2.72 (0.1)
Man's wage	-0.13 (2.5)**	-0.13 (2.5)**	-16.51 (3.3)***	-17.12 (3.3)***	32.39 (1.2)	33.07 (1.3)
Woman's wage	0.10 (1.5)	0.10 (1.5)	-3.80 (1.2)	-2.90 (0.9)	-134.03 (3.3)***	-130.08 (3.1)***
Nonwage income	-6.37 (4.9)***		-2.75 (2.1)**		-4.58 (1.9)*	
Nonwage income (predicted)		-5.76 (1.7)*		2.59 (0.2)		0.54 (0.1)
Residue		-6.46 (4.7)***		-2.74 (2.1)**		-4.91 (2.0)**
# Young children	0.45 (1.0)	0.47 (1.0)	-1.23 (1.7)*	-1.01 (1.1)	1.64 (1.7)*	1.82 (1.8)*
Head sex (female)	0.42 (0.2)	0.48 (0.3)	0.62 (0.2)	1.26 (0.4)	-4.14 (1.5)	-4.69 (1.6)
Head age	-0.78 (1.8)*	-0.79 (1.8)*	1.37 (1.9)*	1.46 (2.0)**	1.20 (1.3)	1.11 (1.2)
Man's education	-0.76 (5.2)***	-0.77 (4.9)***	-2.66 (2.3)**	-2.26 (1.8)*	-2.63 (3.7)***	-2.52 (3.4)***
Woman's education	-1.16 (4.8)***	-1.17 (4.7)***	-1.94 (1.7)*	-2.56 (1.5)	-4.80 (6.0)***	-4.78 (6.0)***
Mother works outside home	3.37 (1.8)*	3.40 (1.8)*	11.22 (4.6)***	12.83 (3.6)***	10.86 (1.4)	10.01 (1.3)
Educational expenses	-0.49 (4.2)***	-0.50 (3.9)***	-12.88 (0.9)	-18.22 (1.1)	-59.99 (2.6)***	-62.87 (2.7)***
Access to a bank (yes)	-3.26 (2.0)**	-3.30 (2.0)**	70.52 (3.0)***	73.56 (3.0)***	-25.11 (3.6)***	-25.69 (3.6)***
Number of school	-0.72 (3.9)***	-0.72 (3.9)***				

Water storage (1 = best, 5 = worst)	2.79 (3.4) <sup>***</sup>	2.77 (3.4) <sup>***</sup>	-3.40 (1.1)	-3.79 (1.2)	3.77 (1.1)	3.67 (1.1)
Electricity	-3.81 (2.5) <sup>**</sup>	-3.83 (2.5) <sup>**</sup>	-29.82 (3.1) <sup>***</sup>	-29.63 (3.0) <sup>***</sup>		
Sewage disposal (1 = best, 5 = worst)			2.50 (3.8) <sup>***</sup>	2.39 (3.6) <sup>***</sup>		
Rural West-Hill	5.31 (3.3) <sup>***</sup>	5.32 (3.3) <sup>***</sup>				
Rural East-Hill	4.98 (2.8) <sup>***</sup>	4.86 (2.6) <sup>***</sup>				
Rural-West Tera	5.05 (2.6) <sup>***</sup>	5.07 (2.6) <sup>***</sup>				
Siera North	-1.75 (0.7)	0.64 (0.1)				
Siera Central	7.04 (3.1) <sup>***</sup>	6.87 (3.0) <sup>***</sup>				
Selva Alta North	-6.45 (1.8) <sup>*</sup>	-6.51 (1.8) <sup>*</sup>				
Selva Alta South	-12.38 (2.1) <sup>**</sup>	-9.38 (1.0)				
Selva Baja	6.39 (2.6) <sup>**</sup>	6.58 (2.6) <sup>***</sup>				
Coastal North	-8.18 (2.4) <sup>**</sup>	-5.44 (0.9)				
Coastal South	-20.40 (2.0) <sup>**</sup>	-22.80 (2.0) <sup>**</sup>				
Mashonaland N					6.34 (1.3)	5.98 (1.3)
Mashonaland E					-1.51 (0.3)	-1.59 (0.3)
Mashonaland W					-24.12 (4.1) <sup>***</sup>	-24.75 (4.1) <sup>***</sup>
Matabeleland N					8.53 (1.4)	8.57 (1.4)
Matabeleland S					16.15 (3.0) <sup>***</sup>	16.62 (3.1) <sup>***</sup>

Table 7—continued

Explanatory variables	Nepal		Peru		Zimbabwe	
	(1) Tobit	(2) IV Tobit	(3)	(4) IV	(5)	(6) IV
Midlands					−2.89 (0.7)	−3.29 (0.8)
Masvingo					9.21 (2.1)**	9.42 (2.1)**
Constant	−51.61 (7.7)***	−51.67 (7.7)***	−18.78 (1.0)	−20.55 (1.1)	−286.28 (12.9)***	−286.16 (12.9)***
Likelihood ratio test	$\chi^2(21) = 545.6^{***}$	$\chi^2(20) = 527^{***}$	$\chi^2(24) = 290.8^{***}$	$\chi^2(25) = 287.9^{***}$	$\chi^2(22) = 877.0^{***}$	$\chi^2(23) = 877.3^{***}$
Observations	2,876	2,876	1,395	1,387	8,654	8,654

Absolute value of *t* statistics in parentheses.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

Zimbabwean households would decrease child work hours by about 4.90 hours per week if there were a temporary positive shock (an increase of 100 Zimbabwe dollars) that would make liquidity constraints less binding. In annual terms, these are significant reductions in child labor hours, as would be predicted by Basu and Van's (1998) model. If the household's decision to send children to work stems from survival concerns, as the evidence from rural Nepal and Zimbabwe indicates, the results suggest that parents would not send their children to work if their own wages were higher or employment opportunities wide enough to enable their incomes to surpass the subsistence threshold. In rural Peru, nonwage wealth appears to have no impact on child labor and schooling decisions and thus provides neither support for nor evidence against the notion that poverty drives child labor.

Other household-level variables, such as the educational levels of both the highest educated man and woman in the family, significantly improve child education and decrease the likelihood of child labor and intensity of work in all three countries. This finding reinforces the widely accepted notion that parental education is the most consistent determinant of child education and employment decisions. Higher domestic responsibilities in terms of the number of young children under age 5 do not lead to a significant increase in the likelihood that their older siblings work. However, the mother working outside the home means a higher probability of child work in Nepal and Peru, although it also appears to improve child schooling in Nepal. The positive effect on child schooling of the mother working outside the home in rural Nepal may be explained by the higher income effect, which makes it possible to pay for daycare and domestic help, so children are not necessarily taken out of school when their mothers work. But for lower income families, it is likely the case that a mother working outside the home means less schooling and more work for children.

Rural infrastructure and school-related community-level variables significantly affect schooling and work decisions in all countries. Higher average educational expenses at the community level appear to improve school attendance rates and correspondingly decrease child employment and intensity of work in rural Nepal and Zimbabwe. Similarly, a higher number of schools in a given community leads to higher attendance and lower employment rates and work hours per week in Nepal. Thus,

to the extent that the number of schools and school-related expenditures in terms of tuition, books, teacher salaries, fewer students per teacher, etc. are indicators of access to school and school quality, improving the availability of good schools could lead to less child labor and more schooling.

In rural Nepal and Zimbabwe, access to a commercial bank has a positive effect on child schooling and a negative impact on child labor. Access to credit appears to have a higher negative effect on employment than its corresponding positive effect on schooling. This may imply that credits are sought more to smooth consumption and other household needs than for child schooling purposes. Rural credit needs are driven by incidental risks and for temporary shocks, more so than a long term goal of child schooling. This may imply that in the absence of such credit schemes, child labor may become part of a strategy to minimize the risk of interruption of income stream. This finding is in concurrence with Jacoby and Skoufias's (1997) and Sawada's (1999) empirical evidence that children are taken out of school in response to household income shocks in rural India and Pakistan, respectively. In both rural Nepal and Zimbabwe, we find evidence that access to credit reduces child labor and improves child school attendance, thus supporting Ranjan's (1999) and Lahiri and Jaffrey (1999) argument that incomplete credit market could be driving child labor. In rural Peru, on the other hand, access to loan and banking services actually increases child employment and decreases schooling.

#### (b) *Urban child labor and schooling decisions*

Similar to rural cases, in urban areas, older children are less likely to go to school, and girls are less likely to stay in school than boys in all three countries (see Tables 8 and 9). Child age continues to be positively correlated with the likelihood of employment and the number of hours worked. However, the impact of gender on employment is mixed in urban areas: Boys (girls) are more likely to be employed in Peru (Zimbabwe), and gender is insignificant in urban Nepal. Improved child labor markets provide strong incentives for child employment in urban Peru. The Peruvian result is comparable with findings in other Latin American countries that suggest improved market conditions drive child labor (see, for instance, Binder, 1999; Levison *et al.*, 2001). Peru has the largest



Table 8. *Simultaneous estimation of child labor and schooling decisions in urban areas*

Explanatory variables	Nepal			Peru			Zimbabwe		
	(1) Schooling	(2) Employment	(3) Both	(4) Schooling	(5) Employment	(6) Both	(7) Schooling	(8) Employment	(9) Both
Sex (female)	-1.03 (3.2)***	1.04 (2.5)**	-1.65 (3.2)***	-0.87 (4.2)***	-1.95 (3.5)***	-1.55 (5.7)***	-0.36 (2.1)**	1.61 (4.2)***	0.14 (0.2)
Age	-0.17 (2.3)**	0.33 (3.2)***	0.28 (2.1)**	-0.37 (6.7)***	0.41 (1.6)	-0.06 (0.7)	-0.70 (11.9)***	0.16 (1.4)	-0.61 (4.5)***
Child wage	0.27 (1.6)	0.23 (1.2)	0.91 (3.0)***	-0.01 (0.1)	0.45 (3.1)***	0.43 (2.1)**	-0.54 (0.5)	1.74 (1.1)	2.40 (0.6)
Men's wage	0.12 (3.0)***	-0.08 (1.8)*	0.19 (3.3)***	0.09 (2.3)**	-0.14 (2.4)**	-0.06 (0.3)	1.95 (1.2)	-5.56 (1.6)	9.50 (0.0)
Women's wage	0.03 (1.9)*	0.00 (0.1)	-0.03 (0.5)	0.40 (2.5)**	0.21 (0.3)	0.39 (1.3)	3.68 (2.0)**	-10.61 (1.9)*	-101.08 (0.0)
Nonwage income (pred.)	0.05 (0.4)	-0.29 (1.2)	0.19 (1.0)	-0.50 (1.1)	-0.04 (1.6)	-0.15 (1.5)**	-0.00 (0.6)	-0.04 (0.5)	-0.04 (1.4)
# Young children	-0.19 (2.3)**	0.17 (1.9)***	-0.00 (0.0)	-0.39 (3.3)***	-0.51 (1.1)	0.46 (2.6)**	-0.05 (0.5)	0.16 (1.9)*	0.25 (0.8)
Head sex (female)	0.06 (0.1)	0.87 (1.1)	-0.44 (0.6)	-0.33 (1.2)	-1.43 (1.5)	-0.60 (1.5)	-0.86 (3.3)***	-1.05 (2.2)**	-1.69 (1.3)
Head age	-0.31 (2.5)**	-0.04 (0.2)	-0.60 (2.5)**	0.22 (2.0)**	0.82 (1.2)	0.25 (1.2)	0.06 (0.6)	-0.53 (3.2)***	0.36 (1.2)
Men's education	0.07 (2.0)**	-0.09 (1.8)*	0.08 (1.3)	0.32 (2.5)**	-0.83 (2.9)***	-0.24 (1.5)	-0.05 (0.7)	-0.18 (1.5)	-0.10 (0.4)
Women's education	0.09 (2.2)**	-0.10 (1.3)	0.00 (0.1)	0.27 (1.8)*	0.61 (0.8)	0.03 (0.1)	0.10 (1.7)*	-0.32 (3.2)***	0.19 (0.8)
Mother works outside home (yes)	0.12 (0.4)	0.17 (0.4)	2.17 (2.9)***	-0.47 (2.0)**	-0.91 (1.2)	0.92 (2.5)**	-0.71 (2.5)**	2.59 (3.2)***	18.67 (0.0)
Educational expenses	0.02 (0.8)	-0.04 (1.6)	0.01 (0.2)	0.05 (12.0)***	-0.01 (1.0)	0.05 (10.2)***	0.44 (1.0)	-0.50 (0.7)	9.44 (9.5)***
Access to a bank (yes)	0.24 (0.5)	-1.87 (1.9)*	-1.62 (2.1)**	-0.17 (0.1)	0.46 (2.1)	-5.23 (2.0)**	0.85 (0.8)	3.23 (1.8)*	9.34 (0.0)
Water storage (1 = best, 5 = worst)	0.38 (2.1)**	-0.23 (0.9)	0.19 (0.7)	-0.30 (0.6)	1.36 (1.1)	-1.65 (2.4)**	-0.64 (1.0)	0.82 (0.9)	-1.54 (0.8)
Electricity (yes)	-1.17 (0.9)	-1.69 (1.2)	-3.86 (2.3)**	3.81 (2.3)**	-1.93 (0.4)	1.20 (0.5)			

Sewage (1 = best, 5 = worst)				0.87 (2.3)**	-1.54 (1.0)	1.37 (2.4)**			
Other Urban-Hill	0.63 (0.9)	-0.17 (0.2)	0.76 (0.9)						
Other Urban-Tera	-0.45 (0.50)	-0.91 (0.83)	-1.4 (1.1)						
Lima North				0.16 (0.4)	-0.87 (0.9)	-1.01 (1.4)			
Siera North				0.79 (1.1)	0.87 (0.7)	1.58 (1.7)*			
Siera Central				0.57 (1.0)	-1.93 (1.2)	1.04 (1.3)			
Selva Alta North				0.69 (1.2)	-0.44 (0.4)	2.00 (2.7)***			
Siera South				-0.27 (0.4)	-0.33 (0.2)	0.02 (0.0)			
Selva Alta North				0.94 (1.0)	1.43 (1.0)	1.67 (1.5)			
Selva Alta Central				-0.63 (1.0)	-0.52 (0.4)	0.33 (0.4)			
Selva Alta South				-0.41 (0.8)	1.54 (1.7)*	1.17 (1.7)*			
Selva Baja				0.51 (1.0)	-0.02 (0.0)	0.79 (1.1)			
Coastal North				-0.59 (0.9)	0.34 (0.3)	0.66 (0.8)			
Coastal Central				1.22 (1.7)*	0.87 (0.4)	2.73 (2.5)**			
Coastal South				0.16 (0.4)	-0.87 (0.9)	-1.01 (1.4)			
Bulawayo							0.08 (0.2)	0.41 (0.5)	-48.49 (0.0)
Mashonaland N							-0.77 (1.3)	-1.37 (1.4)	-7.80 (6.3)***
Mashonaland E							0.61 (1.3)	-0.78 (0.8)	-45.98 (0.0)
Mashonaland W							-0.57 (0.8)	0.26 (0.2)	-24.10 (0.0)

Table 8—continued

Explanatory variables	Nepal			Peru			Zimbabwe		
	(1) Schooling	(2) Employment	(3) Both	(4) Schooling	(5) Employment	(6) Both	(7) Schooling	(8) Employment	(9) Both
Matabeleland N							−0.65 (0.7)	−2.27 (1.5)	−55.70 (0.0)
Matabeleland S							0.56 (0.9)	1.10 (1.2)	−63.34 (0.0)
Midlands							−1.21 (1.3)	−3.76 (2.1)**	−27.19 (18.5)***
Masvingo							0.13 (0.1)	−0.86 (0.4)	−6.11 (1.9)*
Constant	1.42 (0.6)	−5.23 (1.8)*	−9.72 (2.3)**	2.82 (1.0)	−2.75 (0.2)	−0.50 (0.1)	14.58 (7.1)***	−4.61 (1.3)	−26.80 (0.0)
Wald test	$\chi^2(38) = 175.1^{***}$			$\chi^2(58) = 562.9^{***}$			$\chi^2(48) = 345.7^{***}$		
Exogeneity test for nonwage income ( <i>F</i> -test)	<i>F</i> -statistic = 8.45 <i>P</i> -value < 0.1			<i>F</i> -statistic = 35.77 <i>P</i> -value < 0.001			<i>F</i> -statistic = 19.30 <i>P</i> -value < 0.01		
Test for relevance of instruments ( <i>F</i> -test)	<i>F</i> -statistic = 21.16 <i>P</i> -value < 0.001			<i>F</i> -statistic = 9.36 <i>P</i> -value < 0.01			<i>F</i> -statistic = 11.59 <i>P</i> -value < 0.01		
Observations	701	701	701	2,170	2,170	2,170	3,218	3,218	3,218

Absolute value of *z* statistics in parentheses.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

Table 9. *Child labor supply in urban areas*

Explanatory variables	Nepal		Peru		Zimbabwe	
	(1) Tobit	(2) IV Tobit	(3) Tobit	(4) IV Tobit	(5) Tobit	(6) IV Tobit
Sex (female)	-4.99 (1.0)	-5.07 (1.0)	-14.28 (5.0)***	-17.75 (5.0)***	30.49 (1.7)*	30.96 (1.8)*
Age	7.43 (5.5)***	7.45 (5.5)***	5.73 (8.4)***	7.18 (5.4)***	22.87 (3.6)***	22.91 (3.6)***
Child's wage	-0.48 (0.2)	-0.50 (0.2)	4.80 (2.2)**	6.89 (2.7)***	156.90 (2.0)**	153.63 (2.0)**
Man's wage	-0.19 (0.4)	-0.19 (0.4)	-2.85 (1.5)	-0.70 (0.3)	-79.34 (0.4)	-147.22 (0.7)
Woman's wage	-0.32 (1.2)	-0.32 (1.2)	1.98 (0.6)	5.83 (1.5)	-133.83 (0.4)	-126.99 (0.4)
Nonwage income	-0.32 (0.2)		-0.49 (0.6)		-6.13 (1.5)	
Nonwage income (predicted)		0.19 (0.1)		-28.67 (1.5)		-45.27 (1.2)
Nonwage income (residue)		-0.46 (0.2)		-0.30 (0.3)		-5.25 (1.2)
# Young children	2.89 (1.1)	2.93 (1.1)	0.19 (0.1)	-2.75 (1.0)	8.11 (0.9)	13.00 (1.3)
Head sex (female)	10.47 (1.3)	10.69 (1.3)	-2.23 (0.6)	-8.73 (1.6)	13.60 (0.6)	38.70 (1.2)
Head age	-0.04 (0.0)	-0.10 (0.0)	-2.10 (1.5)	2.69 (0.8)	-8.34 (1.1)	-4.55 (0.5)
Man's education	-1.66 (2.7)***	-1.68 (2.7)***	-0.94 (0.5)	-1.82 (0.9)	-6.87 (1.3)	-12.43 (1.7)*
Woman's education	-1.97 (2.9)***	-2.00 (2.8)***	-8.49 (4.8)***	-2.51 (0.6)	-12.31 (2.1)**	-15.97 (2.3)**
Mother works outside home (yes)	10.11 (1.7)*	10.23 (1.7)*	18.15 (4.9)***	12.20 (2.6)***	87.49 (2.1)**	82.59 (2.1)**
Educational expenses	-0.27 (1.1)	-0.29 (1.1)	-0.06 (3.1)***	0.01 (0.2)	76.69 (1.4)	84.99 (1.5)
Access to a bank (yes)	-0.39 (0.0)	-0.13 (0.0)	-54.75 (1.9)*	-64.25 (2.1)**	105.57 (1.2)	99.32 (1.2)
Water storage (1 = best, 5 = worst)	-4.57 (1.6)	-4.59 (1.6)	-12.42 (1.5)	-16.52 (1.9)*	35.92 (0.7)	22.85 (0.4)

Table 9—*continued*

Explanatory variables	Nepal		Peru		Zimbabwe	
	(1) Tobit	(2) IV Tobit	(3) Tobit	(4) IV Tobit	(5) Tobit	(6) IV Tobit
Electricity (yes)	−18.57 (1.4)	−18.21 (1.4)	−59.92 (2.2)**	−49.81 (1.7)*		
Sewage (1 = best, 5 = worst)			−6.30 (1.0)	0.38 (0.0)		
Other Urban-Hill	−2.91 (0.4)	−3.15 (0.4)				
Other Urban-Tera	−5.87 (0.6)	−6.06 (0.6)				
Lima North			−15.10 (2.0)**	−22.02 (2.7)***		
Siera North			14.33 (1.4)	8.41 (0.8)		
Siera Central			7.42 (0.9)	−1.23 (0.1)		
Siera South			14.30 (1.7)*	13.02 (1.6)		
Selva Alta North			6.83 (0.7)	−0.01 (0.0)		
Selva Alta Central			9.88 (0.9)	8.78 (0.8)		
Selva Alta South			12.89 (1.2)	7.70 (0.7)		
Selva Baja			20.91 (2.6)***	21.73 (2.7)***		
Coastal North			7.52 (0.9)	3.07 (0.4)		
Coastal Central			21.08 (2.4)**	15.26 (1.6)*		
Coastal South			4.51 (0.4)	16.10 (1.1)		
Bulawayo					2.98 (0.1)	−7.28 (0.2)
Mashonaland N					30.47 (0.6)	11.93 (0.2)
Mashonaland E					−12.52 (0.3)	−18.83 (0.5)

Mashonaland W					−89.90 (1.1)	−90.87 (1.1)
Matabeleland N					−47.86 (0.9)	−62.25 (1.2)
Matabeleland S					42.77 (1.0)	11.44 (0.2)
Midlands					−36.93 (0.6)	−52.83 (0.9)
Masvingo					−113.55 (1.6)	−137.79 (1.9)*
Constant	−85.25 (2.5)**	−85.40 (2.5)**	−5.01 (0.1)	−58.15 (0.9)	−677.16 (3.3)***	−607.67 (2.9)***
Likelihood ratio test	$\chi^2(18) = 115.8^{***}$	$\chi^2(19) = 115.4^{***}$	$\chi^2(28) = 263.3^{***}$	$\chi^2(29) = 261.2^{***}$	$\chi^2(23) = 67.2^{***}$	$\chi^2(24) = 74.1^{***}$
Observations	692	692	2,203	2,170	3,218	3,218

Absolute value of  $z$  statistics in parentheses.

\*Significant at the 10% level.

\*\*Significant at the 5% level.

\*\*\*Significant at the 1% level.

proportion of children who are both working and going to school at the same time (see Table 4). The fact that child wage is positively associated with the employment decision may imply that some children work for the purpose of financing their education. The number of hours children work also increases significantly with child labor wages in urban Peru and Zimbabwe.

We do not find sufficient evidence from urban areas of all three countries for Basu and Van's (1998) luxury axiom that poverty drives child labor. A similar analysis done separately for boys and girls by Ray (2000a, 2000b) also shows no evidence for the poverty hypothesis in Peru. Although the theoretical literature on child labor, including Basu and Van's (1998), tends to lead many to believe that poverty is the primary cause of child employment, our result shows that poverty does not appear to be the main culprit of the prevalence of child labor in urban areas. While studies that lump together urban and rural areas obscure these differences, examining urban and rural child labor responses separately could help shed a brighter light on the causes of child labor. We find more evidence for the poverty hypothesis in rural areas and less or no evidence for it in urban areas, as do Canagarajah and Coulombe (1998) in Ghana.

Household educational level variables, especially women's education, continue to significantly reduce the probability of child labor and improve the likelihood of children staying in school. Parental educational level has been critical in improving household livelihood and food and nutritional status of children (Ruel *et al.*, 1999; Strauss & Thomas, 1995). The urban result is similar to the results from other studies that underline the importance that parental, especially the mother's, education has on children's human capital development.

A measure of domestic responsibilities, number of young children under age 5, plays a critical role in urban areas by keeping children away from school and forcing them into work. This result is in contrast to the rural result that showed its impact is insignificant. The urban result is consistent with the findings of Cochrane, Kozel, and Alderman (1990) who report the presence of children under five significantly reduces the educational participation of girls. Similarly, a positive likelihood that a mother works outside the home leads to more child labor in all countries. This urban-rural differential in the impact of domestic responsibilities and a mother's work decision could be due to the availability of extended family and kin net-

works to help in childcare activities in rural areas, as opposed to urban ones. Rural mothers might also have greater control over their time allocation for childcare and work due to the nature of their jobs such as working on their own agricultural fields, while the urban women could be working in factories and under supervision of employers. The availability of alternative childcare options such as providing working mothers with firm-level childcare will likely have more impact in urban areas in terms of lessening the responsibilities borne by school-age children in taking care of their younger siblings. It has been observed that the presence of a daycare center decreases the likelihood that children engage in work at home (DeGraff, Bilsborrow, & Herrin, 1993; Goonesekere, 1993). Also note that having a working mother leads to significantly more hours of child work in urban areas of all countries (see Table 9).

In Nepal and Zimbabwe, urban infrastructure and school-related community level variables do not factor in schooling and work decisions, unlike in the rural areas. However, in urban Peru, educational expenses at the community level appear to improve child attendance rates. Similar observations were made for another Latin American country by Brown (2001) who states that "... an increased cost of schooling is associated with a lower probability of work by Colombian children." Brown also suggests that, at least in the Colombian case, the cost of schooling is a proxy for school quality. The deficiencies in facilities, teacher salaries, and other educational supplies are reported to be pervasive in both rural and urban Peru (Brown, 2001). For instance, Brown points out that even in metropolitan Lima, only 60% of schools have electricity. If school-related expenditures in terms of tuition, books, teacher salaries, etc. are plausible indicators of school quality in Peru, our empirical results suggest that improving school quality would likely keep more children in school.

## 5. SUMMARY AND CONCLUSIONS

The literature on child labor and schooling is voluminous and continually growing. However, studies are scant that simultaneously examine the various factors impacting child labor and schooling such as poverty, access to credit, labor market conditions, household domestic responsibilities, school expenditures, and parental educational levels, along with community



characteristics important for such decisions. This paper looked at the impact of each of these factors while controlling for others at the same time. It examined urban and rural decisions separately, with the anticipation that urban–rural differentials in livelihood strategies and opportunities could be reflected in child employment and schooling decisions. The simultaneous examination of a list of determinants of child schooling and employment decisions, while investigating their pertinence across countries and urban and rural areas within a given country, enabled us to identify the factors that are more important than others.

In all three countries and urban and rural areas alike, parental educational levels are essential factors in child employment and education, with a significant contribution to reduction of child labor and improvement in the likelihood that children stay in school. In concurrence with empirical evidence from other Latin American countries, improved child labor market conditions in terms of higher wages per hour increases both the probability and intensity of work in urban Peru and Zimbabwe, with no appreciable effect in rural areas. Improvement in labor market conditions for adult labor leads to a lower probability of child labor and a higher probability of schooling. Bolstering adult wages may thus help curb child labor participation and increase the probability that children stay in school. Household domestic responsibilities and the likelihood that the mother works away from her home have more significant impact on urban child labor and schooling decisions than on those of rural areas. This suggests that the availability of alternative childcare options would be more important in child labor decisions in urban than in rural areas.

Although poverty drives child work and schooling decisions in rural areas, it does not appear to significantly influence schooling and

work participation rates in urban areas. In rural areas, policies such as a ban on child labor could thus have an adverse effect on both the household and the children because child labor decisions are more likely made in response to poverty and subsistence requirements. The rural evidence is thus in line with the seminal paper on the economics of child labor by *Basu and Van (1998)*.

Access to credit is likely to improve attendance rates and decrease employment rates in rural areas of Nepal and Zimbabwe, in convergence with the theoretical results, for instance, by *Ranjan (1999)* and *Lahiri and Jaffrey (1999)*. Credit constraints are more likely to be binding for the rural poor since their incomes are lower and riskier. Thus, with better access to credit, the rural poor in Nepal and Zimbabwe may find it possible to borrow and send children to school. However, access to credit does not play a similar role in urban areas. Access to credit may have actually enabled rural Peruvian parents to overcome entry barrier and venture into own business activities in which child labor may be utilized when there are incomplete labor markets.

In sum, the evidence from Nepal, Peru, and Zimbabwe indicates that the impact of poverty on a child depends on the location. While there is strong evidence that poverty drives child labor in rural areas, there is a general lack of support for the poverty hypothesis in urban areas. Similarly, improving credit access has greater potential for alleviating child labor and enhancing school attendance in rural than in urban areas particularly in Nepal and Zimbabwe. Finally, the evidence from all three countries indicates that the availability of good schools and efforts to bolster adult educational levels and wages will help curb the prevalence and intensity of child labor and improve the likelihood that children stay in school.

## NOTES

1. *Ranjan (1999)*, using a two-period overlapping generation model, shows that credit constraints, not poverty, play a role in a household's decision to use child labor instead of sending their children to school.

2. To facilitate comparison among countries, only Peruvian children aged 10–17 (about 3 599 children) are considered in this paper.

3. Communities are defined as primary sampling units (PSUs) as provided in the household survey design. As PSUs are levels at which random samples of households are drawn for the surveys, community level averages are assumed as good representatives of prevailing conditions in their communities.

4. Specific household- or school-level variables are likely to suffer from endogeneity. For instance, household expenses on education are incurred only for

children for whom the decision was made to enroll in school. Such variables are endogenous to child labor decisions. We circumvent this problem by averaging household-level, school-related variables over relevant geographic units in the survey or by using community level variables whenever possible.

5. One might also argue that nonwage income represents the accumulation of assets related to labor income over the life cycle. However, this presents less of a problem when dealing with child labor income.

6. See Psacharopoulos (1997), Patrinos and Psacharopoulos (1997), Grootaert (1999), Grootaert and Patrinos (1999), Canagarajah and Coulombe (1998), and others for a discussion on endogeneity of household income and potential upward bias in its coefficient. The upward bias may be due to the entanglement of substitution effects with income effects when some productive assets are used to proxy income (Bhalotra, 2000b).

7. Bound, Jaeger, and Baker (1995) suggest an  $F$  statistic for identifying instruments in the first-stage regression as useful indicators of the quality of the IV estimates.

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## APPENDIX A. CHILD LABOR AND SCHOOLING DECISION: A CONCEPTUAL FRAMEWORK

Assume that a household is composed of one parent and one child. Assume also that a representative household lives for two periods and maximizes its utility function at time  $t$ :

$$U_t = U(C_t, C_{t+1}, L_{p,t}, L_{c,t}, S_{c,t}, \Phi_t), \quad (\text{A.1})$$

where  $U$  is a concave utility function over joint consumption ( $C$ ), child schooling ( $S_c$ ), parent and child leisure times ( $L_p, L_c$ ), and a vector of individual, household and community characteristics ( $\Phi$ ). Including child schooling in the parent's utility function assumes that education is both an investment and consumption good for parents (Becker & Lewis, 1973).

In period  $t$ , the parent decides whether to send his child to school or work. If work decision is made, the child earns wage  $W_c$  (a child wage) at period  $t$  and  $W_u$  (unskilled adult wage) at period  $t + 1$ . If the parent instead decides to send his child to school, the child earns wage  $W_s$  (a skilled adult wage) in period  $t + 1$ . The household's total resources thus depend on the parent's decision to send the child to work or to school in period  $t$ . Since child schooling and work decisions have intertemporal implications for the household, consider an intertemporal budget constraint:

$$A_{t+1} = A_t - \{\delta A_t + \Pi_t + Y_t + W_t E_{c,t} + W_t (T_p - L_{p,t}) - C_t\}, \quad (\text{A.2})$$

where  $A_t$  is the total asset holding at the initial period;  $\delta$  is the interest rate. ( $\Pi_t + \delta A_t + Y_t$ ) comprises nonwage income, which includes profits from self-employment in farm and non-farm activities ( $\Pi$ ), interest income from household assets ( $A_t$ ), and transfers and other income

from nonlabor sources ( $Y_t$ ).  $W_t$  is a vector of wage rates for parent and child;  $T_p$  is the total parent time; and  $E_c$  is the child paid labor time. By denoting nonwage income by  $\Omega_t$  and solving for it using (A.2):

$$\Omega_t = (A_{t+1} - A_t) + \{C_t - (W_t E_{c,t} + W_t(T_p - L_{p,t}))\}. \quad (\text{A.3})$$

Eqn. (A.3) implies that an intertemporally consistent measure of nonwage income amounts to asset accumulation or decumulation, which allows agents to save (when  $\Omega_t$  is positive) or dissave (when  $\Omega_t$  is negative). This measure of nonwage income, which excludes earnings from child labor, could be used as an exogenous poverty measure in the estimation of child schooling and work decisions.

Finally, the household is subject to a child-time constraint. In a typical developing country, child time may be allocated to three broad activities—schooling, leisure, and paid and unpaid labor:

$$T_c = L_{c,t} + S_{c,t} + E_{c,t}. \quad (\text{A.4})$$

Maximizing (A.1) subject to (A.2) and (A.4) would lead to a vector of optimal choices that are functions of prices, wages, household characteristics, income, and other factors:

$$\Gamma^*(W_t, \Pi_t, A_t, Y_t, \Phi_t), \quad (\text{A.5})$$

where  $\Phi_t$  includes all community-level observed and unobserved characteristics that likely affect

the parents' decision such as credit opportunities, accessibility to school, school fees, and other factors.

An indirect utility function that represents the maximum utility a household receives, under schooling alone, schooling and work, and work alone decisions, can be obtained by substituting the vector of choices in (A.5) into the utility function in (A.1) (suppressing time subscript):

$$V_j = V_j(\Gamma^*(W_j, \Pi, A, Y, \Phi)), \quad (\text{A.6})$$

where  $V_j$  is the utility under different child schooling and work decision: schooling only, work only, both schooling and work at the same time, or none. Parents will decide to send children to school instead of work at time  $t$  if they are better off with the enhanced human capital.

Parents' decision whether a child works or goes to school is a time allocation as both activities are competing for their child's time. We therefore use a multinomial logit framework to model child labor and schooling as simultaneous decisions. Parents have four alternative choices: schooling, work, both schooling and work at the same, or none. Assuming independently and identically distributed error terms with an extreme value distribution, the probability that alternative  $j$  is chosen from the  $n$  alternatives can be represented as (see McFadden, 1981)

$$\text{Prob}(\text{choice } j) = \frac{\exp(V_j)}{\sum_j^n \exp(V_j)}. \quad (\text{A.7})$$