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Child labor versus educational attainment
Some evidence from Latin America

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Abstract. The paper addresses the issue of child labor in relation to the educational attainment of working children. The empirical analysis is based on household surveys in Bolivia and Venezuela. It was found that labor force participation is non-trivial among those below the legal working age or supposed to be in school. Working children contribute significantly to total household income. The fact that a child is working reduces his or her educational attainment by about 2 years of schooling relative to the control group of non-working children. Grade repetition, a common phenomenon in Latin America, is closely associated with child labor.

JEL classification: J13, J21, I21

Key words: Child labor, educational attainment, Bolivia, Venezuela

1. Introduction

At least as judged from reports in the daily press, the issue of child labor is receiving increasing attention in recent years. International Organizations, such as the ILO and UNICEF, have repeatedly helped sensitize public

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opinion regarding the working conditions of young children. And the academic literature has been very rich in analyzing the phenomenon of child labor and in proposing measures to deal with it.

The issue of child labor is important on at least two counts: In the first place, it is the immediate, short-term unpalatable human aspect of a very young person having to do manual work beyond his/her physical capability or wishes. Second, it is the longer term aspect that, by virtue of being a laborer today, young person is disinvesting in human capital formation that might hurt him/her in the future. In this paper I address the issue of how early labor force participation might hurt the child's accumulation of human capital in terms of reduced educational attainment.

The theoretical model underpinning most of the empirical work on the subject can be traced to Becker's (1965) seminal paper on the allocation of time and the many extensions of it to household behavior. In such a model, a household makes joint decisions on how many children to have, and how to allocate the time of household members (including the children) to market work, household production, and schooling. The empirical literature has tested various formulations of such a model, most linking child labor to fertility, school attendance and family income.

Two classic papers on the subject are Rosenzweig and Evenson (1977), and Chernikovsky (1985). The first authors analyzed the joint family decision regarding fertility and children's time allocated to schooling and work by fitting a simultaneous equations model to Indian data. They found that the motivation for large families was due to a high return on raw child labor versus investments in skills. Chernikovsky analyzed the activities of youth in Botswana and rejected the hypothesis that there is a tradeoff between child schooling and the number of children in the household.

A plethora of other papers have followed on the subject analyzing parts or the whole of the relationship between child labor, school attendance, fertility and other household characteristics (Ennew 1982; Levy 1985; Patrinos and Psacharopoulos 1995; Psacharopoulos and Arriagada 1989; Psacharopoulos and Yang 1991; Rodgers and Standing 1981 a, b; Rosenzweig 1981; Salazar 1988; Silva 1981; Sinclair and Trah 1991; Singh and Schuh 1986; Tienda 1979). This literature is difficult to summarize as most studies are unique in their findings because of the particular variables the researchers had at their disposal, the nature of the samples, the elusive definition of "child labor" and its non-symmetry to school attendance, and, most of all, the econometric intricacies of separating cause from effect in this quandary.

In this paper I contribute to the empirical literature on this subject by analyzing household survey data from two Latin American countries: Bolivia 1990, which is an urban survey, and Venezuela 1992, which is a survey at the national level. The minimum age of our definition of "child labor" is 6 years old in Bolivia and 10 years in Venezuela, simply because these are the cut off ages that labor market questions were asked in the respective countries. Compulsory schooling in Bolivia is grades 1–8, corresponding to 6 – 13 years of age, whereas in Venezuela it is grades 1–9 or from 6 – 14 years of age. Although the minimum legal working age is 14 in both countries, we have also examined children up to age 18 for purposes of charting the continuity of labor market decisions among young people.

Two countries are used on the expectation that one might learn something in comparing the effect of individual variables on the decision to work. Because of the different nature of the sample and questionnaire between the two countries, the results are presented in sequence.

2. Bolivia

The Bolivian data used come from the "*Encuesta Integrada de Hogares 1990*" carried out by the *Instituto Nacional de Estadistica* during August 1990 in 9 cities with 30,350 respondents in 6,347 households. The cities are Chuquisaca, La Paz, Cochabamba, Oruro, Potosi, Tarija, Santa Cruz, Beni, and Cobija. The survey contains 9,856 children aged 6 to 18, with a mean labor force participation rate of about 10%. As shown in Table 1, the labor force participation rate increases steadily by age. It should be noted that labor force participation is significant not only below the minimum working age, but also among those children who are supposed to be in school.

The mean years of schooling completed in the sample is 5.1 years. Table 2 and Fig. 1 compare the number of years of schooling completed among working and non-working children. The difference in educational attainment in favor of non-working children starts at the age of 6, but then builds fast thereafter. A working child has a deficiency of 1.4 years of schooling relative to a non-working child by the legal working age of 14, and 2.5 years by age 18. Although such differences might appear to be "small", they are really very big taking into account two factors. First, the non-working children are likely to continue their education further, whereas for most of the working children this is their educational attainment for life. Second, given late entry and grade repetition, the 4.9 mean years of educational attainment among working 13-year-old children might not be enough for retaining literacy.

Table 1. Labor force participation by age, Bolivia 1990

Age	Participation (%)	N
6	4.0	758
7	1.1	787
8	1.1	825
9	1.9	824
10	4.6	917
11	4.9	692
12	5.4	841
13	8.7	667
14	14.8	756
15	16.7	735
16	19.8	696
17	23.7	634
18	29.7	724
Overall	9.7	956

Source: Based on *Encuesta Integrada de Hogares*, Bolivia 1990.

Table 2. Mean years of schooling by age, Bolivia 1990

Age	Non-working	Working
6	0.5	0.3
7	1.1	0.9
8	1.9	0.8
9	2.8	2.4
10	3.7	2.7
11	4.5	3.9
12	5.4	4.5
13	6.3	4.9
14	7.3	5.8
15	8.1	6.2
16	9.0	7.0
17	9.6	7.0
18	10.4	7.9

Source: Based on *Encuesta Integrada de Hogares*, Bolivia 1990.

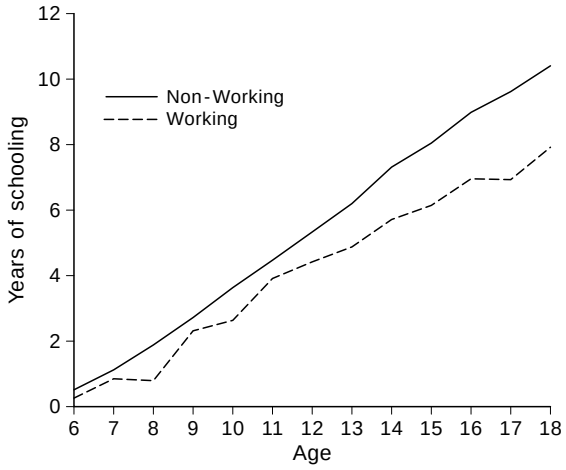

Fig. 1. Years of schooling by age. *Source:* Based on *Encuesta Integrada de Hogares*, Bolivia 1990

Table 3 presents two labor market outcomes among working children: annual earnings and hours worked per week. It should be noted that after age 12 the working children are really employed full-time making study impossible. The earnings of children are not insignificant. For example, the 878 Bolivianos earned by the 13 years old amount to 13% of total household income.

Who are the working children and how do they differ from the non-working ones? Table 4 presents mean characteristics for the two groups of children aged 6–13 (the compulsory schooling age). As expected, working children come from poorer households, especially with a female head and are mostly male and indigenous (children have been classified as "indigenous" if Spanish is not the main language spoken in the household). Household size is not associated with the decision to work. But of particular importance is the fact that working children have three times the chance

Table 3. Annual earnings and weekly hours worked by age, Bolivia 1990

Age	Earnings (Bolivianos/year)	Weekly hours worked
6	0[a]	4.3
7	475	18.3
8	523	31.3
9	298	22.8
10	693	28.0
11	400	28.1
12	786	35.6
13	878	41.2
14	974	45.1
15	1394	45.9
16	1436	44.4
17	1319	53.5
18	1759	48.4
Overall	1255	44.1

Source: Based on *Encuesta Integrada de Hogares*, Bolivia 1990.
Note: [a] Refers to unpaid family work.

Table 4. Descriptive statistics for working and non-working children, Bolivia 1990

Characteristic	Non-working	Working
Total income of household head (Bolivianos/year)	6909	6061
Failed a course	0.12	0.35
Indigenous	0.12	0.17
Number of children in household	3.9	3.9
Male	0.51	0.55
Female head	0.13	0.20

Source: Based on *Encuesta Integrada de Hogares*, Bolivia 1990.

to have failed a grade in school. Thus child labor is negatively associated with school performance, an issue to be amplified below.

In order to isolate the factors determining the decision to work, the fact that one failed a grade, and the eventual years of schooling of the child, three regressions were fitted to the data set. Because of the 0–1 nature of the WORKING and FAIL variables, these regressions were fitted in Logit. The pseudo-R^2's have been computed according to the modified Aldrich and Nelson (1989) procedure by Veall and Zimmermann (1992).

I consider work status to be a major determinant of educational attainment in the sense that every hour allocated to work diminishes the time available for schooling. A full-time working child is unlikely to be enrolled in school. Of course an alternative view would be that both work status and educational attainment are jointly determined by parental characteristics, such as parental education. Also, household income may well be endogenous in the work status and educational attainment specifications. Or, the same issue could be analyzed more rigorously if panel data were available, permitting the estimation of a recursive model of the joint household deci-

Table 5. Explaining the work status, school failure, and educational attainment, Bolivia 1990

Independent variable	Dependent variable				
	Working		School failure		Years of schooling (OLS)
	Logit coefficient	Marginal effect	Logit coefficient	Marginal effect	
Age	0.33	0.57	0.13	1.67	0.87
	(24.85)		(13.89)		(218.09)
Male	0.26	0.45	0.21	2.70	–0.01
	(3.41)		(3.33)		(0.18)
Indigenous	0.47	0.81	0.21	2.70	–0.25
	(4.96)		(2.32)		(6.00)
Female household head	0.31	0.53	0.36	4.63	–0.14
	(3.20)		(4.41)		(3.61)
Household income	0.006	0.01	0.003	0.04	0.002
0000 Bolivianos/year)	(1.48)		(1.01)		(2.26)
Working child	–		0.73	9.38	–0.80
			(6.75)		(13.28)
Constant	–6.95		–3.50		–4.93
Pseudo R^2/R^2	0.245		0.093		0.860
– 2 Log likelihood	5618		6892		–
Mean dependent variable	5.7		15.7		4.93
N[a]	8970		7936		7934

Source: Based on *Encuesta Integrada de Hogares*, Bolivia 1990.
Notes: The mean dependent variable and marginal effects of the Logit models are in percentages points. Numbers in parentheses are *t*-ratios.
[a] The difference in N's across regressions is due to missing values

sion regarding educational attainment, income, and work status – information we do not have at our disposal.

With the above caveats in mind, Table 5 reports the regression results along with marginal effects of the logit models. These are partial derivatives indicating the change in the probability of having failed a grade relative to a unit change in one of the independent variables (calculated as $\frac{\partial P}{\partial X} = \beta_i P(1 - P)$, where P refers to the dependent variable probability of the event, β to the logit coefficient, and X to the independent variable used). The association between household income and the decision to work loses its significance in the presence of the other variables, meaning that child labor is spread across all income classes. But being older, male, indigenous and having a female household head, all are factors significantly contributing to the decision to work as a child.

School failure is associated with the same factors as the decision to work, but in addition a working child increases the probability of failing a grade nearly 10 percentage points, or almost doubles the probability. In addition, living in a household with a female head increases the failure probability by nearly 5%. Regarding educational attainment, of course the dominant factor is age. But it should be noted that, controlling for age and the other factors in the regression, the fact that a child works reduces his/her educational attainment by nearly one year.

3. Venezuela

The Venezuelan data used in this paper come from the national "*Encuesta de Hogares Por Muestreo*" carried out by the *Oficina Central de Estadística e Informática* with 315,660 respondents in 62,775 households. As shown in Table 6, the overall labor force participation rate is nearly 12% among those aged 10–18. Venezuela being a richer country relative to Bolivia, the labor force participation rates for those under the legal working age of 14 are nearly half than those in Bolivia (the per capita incomes at the time of the surveys were $630 in Bolivia and $2910 in Venezuela).

The difference in educational attainment between working and non-working children builds up over the ages and reaches about 2 years by the legal working age (Table 7 and Fig. 2). But the 4.7 years of schooling among the working 14 years old might not be sufficient for them to retain literacy over their lifetime. Table 8 shows that working children in Venezuela fall a little short of working the full 40-hour week for all ages,

Table 6. Labor force participation by age, Venezuela 1992

Age	Participation (%)	N
10	0.5	8650
11	0.6	8546
12	2.0	8659
13	3.5	8328
14	6.5	7784
15	12.4	7682
16	21.4	7439
17	29.2	7513
18	39.6	6474
Overall	11.8	71075

Based on *Encuesta de Hogares Por Muestreo*, Venezuela 1992

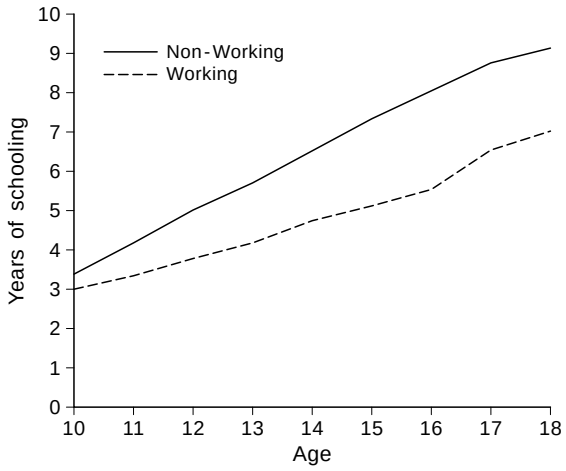

Fig. 2. Years of schooling by age. *Source:* Based on *Encuesta de Hogares Por Muestreo*, Venezuela 1992

Table 7. Mean years of schooling by age, Venezuela 1992

Age	Non-working	Working
10	3.4	3.0
11	4.2	3.4
12	5.0	3.8
13	5.7	4.2
14	6.5	4.7
15	7.3	5.1
16	8.0	5.5
17	8.7	6.5
18	9.1	7.0

Based on *Encuesta de Hogares Por Muestreo,* Venezuela 1992

Table 8. Monthly earnings and weekly hours worked by age, Venezuela 1992

Age	Earnings (Bolivianos/month)	Weekly hours worked
10	2029	25.3
11	2600	28.8
12	3040	32.0
13	3430	34.4
14	4282	34.0
15	5243	33.0
16	6471	33.2
17	7511	32.9
18	8310	32.6
Overall	6811	32.9

Source: Based on *Encuesta de Hogares Por Muestreo*, Venezuela 1992

Table 9. Descriptive statistics for working and non-working children, Venezuela 1992

Variable	Non-working	Working
Years of schooling	4.9	4.3
Family size	6.7	7.1
Male	0.50	0.71
Total household income (Bolivarianos/Month)	25190	26580
Urban	0.86	0.57
Female head	0.25	0.23

Source: Based on *Encuesta de Hogares Por Muestreo*, Venezuela 1992.
Note: Refers to children aged 10 to 14

although by age 14 and 15 they work 34 h. In terms of their earnings, working children contribute about 27% to total household income – a significant amount.

Table 9 gives descriptive statistics on the different characteristics of the two groups of children aged 10–14. Contrary to Bolivia, perhaps because of the national rather than urban nature of the survey in Venezuela, a larger

Table 10. Explaining the work status, and educational attainment, Venezuela 1992

Independent variable	Dependent variable		
	Working		Years of schooling (OLS)
	Logit coefficient	Marginal effect	
Age	0.61	0.01	0.71
	(26.85)		(238.38)
Male	1.18	0.02	–0.31
	(13.48)		(21.82)
Female household head	0.30	0.01	–0.004
	(3.20)		(0.25)
Household income	0.07	0.001	0.10
(000 Bolivianos/month)	(3.57)		(39.95)
Family size	0.04	0.001	–0.13
	(2.48)		(50.11)
Urban	–1.24	0.03	0.98
	(11.62)		(47.46)
Working child	–		–1.87
			(78.17)
Constant	–11.334		–3.66
Pseudo R^2/R^2	0.441		0.490
–2 Log likelihood	3884		–
Mean dependent variable	11.8		6.02
N	7104		71031

Source: Based on *Encuesta de Hogares Por Muestreo*, Venezuela 1992
Notes: The mean dependent variable and marginal effects of the Logit model are in percentage points. Numbers in parentheses are *t*-ratios.

family size is associated with the decision to work. But working children belong to slightly higher income households.

Table 10 presents the results of a logit model explaining the (0–1) decision to work or not, and an ordinary least squares explaining educational attainment. Beyond age, being male, having a female head and a higher household income are factors significantly contributing to the decision to work. Being an urban resident reduces the probability to work. Regarding educational attainment, being female, having a higher household income, small family size and residing in an urban area, all are factors contributing to a higher number of years of schooling completed.

4. Conclusion

Analysis of the data for two Latin American countries regarding child labor shows a non-trivial labor force participation among those below the legal working age or supposed to be in school. The fact that a child is working reduces his or her educational attainment by about 2 years of schooling relative to the control group of non-working children. Grade repetition, a common phenomenon in Latin America, is closely associated with child labor. Working children contribute significantly to total household income.

Thus, beyond the issue of child labor having an adverse effect on the child's physical development, the fact that a child is obliged to work has detrimental effect on the accumulation of human capital, and of course on the subsequent private and social returns from it.

This is a sufficient reason for adopting anti-child labor policies. It is well known that simple legislation might be ineffective in controlling child labor if the underlying household incentives are not in place to keep children out of the labor market. Complementary policies are needed encouraging school participation, such as targeted subsidies to poor families to keep children in school. This will ensure that the country's human capital stock will not diminish and that future generations would be less impoverished than the present ones.

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