EDUCATIONAL RESEARCH

URBAN CHILD LABOR AND MATHEMATICS ACHIEVEMENT IN BASIC EDUCATION
A Two-level Model

RUBÉN CERVINI

Rubén Cervini is a full-time professor and researcher of the Department of Social Sciences of Universidad Nacional de Quilmes. Roque Saenz Peña 180 Bernal, Provincia de Buenos Aires, Argentina. E-MAIL: racervini@arnet.com.ar

Abstract:
This study investigates the relationships between child labor and the mathematics achievement of seventh graders in urban areas. An analysis is made of data from the national evaluation of educational quality (Operativo Nacional de Evaluación de la Calidad de la Educación) carried out in 1997 by Argentina's Ministry of Culture and Education, concerning students enrolled in the seventh year of basic general education. The file includes 1,283 schools and 30,630 students. A specific indicator of the intensity of child labor is constructed, based on the place and amount of daily work. The statistical technique of "linear hierarchical models" with two levels (students and school) is used. The effect of child labor on scholastic achievement is estimated, after controlling the socioeconomic level, family culture and context. Conclusions are established and discussed.

Key words: scholastic achievement, child labor, basic education, mathematics, equal opportunities, Argentina.

Introduction

Child labor has repeatedly been considered an indicator of poverty and extreme social injustice. Moreover, it is recurrently identified as one of the factors of greatest negative influence on children's education. As such, child labor operates as one of the principal mechanisms in the reproduction of poverty. The relation between education and child labor is located at the center of constructing a more fair and equal society.

The objective of this article is to explore the effect of child labor on the level of learning in mathematics. For this purpose, an analysis is made of data from the national evaluation of educational quality (Operativo Nacional de Evaluación de la Calidad de la Educación), which was carried out in 1997 (ONE/97) by Argentina's Ministry of Culture and Education. This study concentrates on students in the seventh grade of basic general education (EGB).

One way of evaluating the damaging effect of child labor on education is to adopt school enrollment and/or school attendance as criteria variables. With this focus, many countries have attempted to determine, based on surveys of households or specific populations, how many children work and attend (or do not attend) school.[1] The same focus has been used for diverse analyses, generally with traditional regression methods (OLS). Some analyses have detected that increased enrollment is not necessarily associated with a decrease in child labor, a finding that would support the hypothesis that child labor has few detrimental effects on education (Ravallion and Wodon, 2000). Other analyses, in contrast, have shown that factors conducive to child labor generally discourage enrollment (Tanzania: Akabayashi and Psacharopoulos, 1999; Zambia: Nielsen, 1998). According to Edmonds (2002), expectations of immediate income from aid programs lead to decreases in child labor and increases in school attendance, in populations of extreme poverty.

Boozer and Suri (2001) show that damage to education is detected by observing changes in school attendance and not in simple enrollment. In the case of Ghana, Heady (2000) finds a positive correlation between employment and school attendance, yet discovers that the correlation is negative when the extent (amount of time) of child labor is considered. Therefore, the time variable truly detects the damage of child labor in relation to school attendance.

In general, the more hours the child works, the lower the probability he will attend school, even after controlling the effect of variables like age, family size, per capita consumption, and so on. The author identifies some differences, however, by gender: for example, in Ghana, participation in family businesses (not agricultural) reduces enrollment among females, while increasing enrollment among males; in contrast, in Pakistana – nation with enrollment rates much lower than those of Ghana, especially among females, along with a smaller proportion of children who work and go to school, and a greater proportion of paid working children who are not family members– he author finds a negative correlation between school attendance and both measurements of child labor; i.e., employment and amount of time worked. In general terms, the statistics (IPEC/ILO, 2002) and literature indicate that an important proportion of the children who work also attend school. The profile of this combination varies among nations, depending primarily on the level of enrollment and the type of work done by children. Latin America has higher enrollment rates and lower rates of child labor than other continents, due in part to greater income and urbanization. Most of its working children attend school. In that context, school attendance is not an appropriate indicator to reflect the damage caused by child labor. The working child attends school, but his increased fatigue at school and less available time at home for doing homework, in comparison with his classmates, will undoubtedly reduce his probabilities of scholastic learning.

Given these limitations of the "school attendance" indicator, it has been considered useful to use another type of measurements closer to scholastic performance. In that perspective, Psacharopoulos (1997) finds that child labor causes a decrease in the years of schooling completed (Venezuela and Bolivia), while Patrinos and Psacharopoulos (1995) confirm that certain factors that produce child labor increase the probability of grade repetition, although they have been unable to prove a statistically significant relationship between child labor and age-grade distortion (Patrinos and Psacharopoulos, 1997). Rosati and Rossi (2001) work with the hypothesis that decisions about working and attending school are simultaneous and "endogenous". Based on that fact, they estimate the number of hours of work offered through a model of maximum likelihood. The criteria variable to evaluate the damaging effect is age-grade distortion ("dummy": if the child is not in the grade where he should be). The authors find that an increase in hours worked significantly increases the probability of grade repetition in Nicaragua, and that this effect is greater during the initial hours worked (nonlinear relationship); therefore, it is not true that few hours of employment have an insignificant impact.

In their recent study, Beegle, Dehejia and Gatti (2004) indicate that the correlation of hours worked and education cannot be interpreted as causality, mainly because the family decision to enroll the child and send him to work is simultaneous. To overcome this obstacle, the authors analyze longitudinal data (two measurements in a five-year period) on rural families with children between 8 and 13 years old in Vietnam. The study concludes that the more hours the child has worked, and the younger his age when he worked, the lower the probability of his regular attendance at school, the lower his educational level, and the farther behind he will be at school (age-grade distortion).

To deal with a possible slant of selection in the family's decision to send a child to work, the study "controls" the parents' education and household spending, and applies the strategy of "instrument" variables that are plausibly "exogenous" to the family's decision.

Most of the above studies, however, do not have a direct measurement of scholastic learning. Although learning is closely associated with grade repetition or age grade distortion, it is not totally exchangeable with them. For this reason, some analyses have been based on measurements of learning obtained from samples of households or specific populations, as well as on the declarations of the family member who responds to the questionnaire.

Such is the case of Akabayashi and Psacharopoulos (1999), who conclude that the child's reading skill decreases the more hours he works. Ray and Lancaster (2003) analyze indicators of "learning opportunity" (school attendance and time dedicated to studying at home) as well as "learning results" (years of schooling completed, adjusted by the child's current age and his age upon starting school, history of school failures and reading and writing abilities). The authors find strong evidence of the negative impact of the hours of child labor on educational variables, including reading and writing skills (Camboya and Namibia) and the school failure rate (Portugal). The possible problem of the "endogeneity" of the effect of hours worked, with respect to the educational results variable (Orazem and Gunnarsson, 2003), is addressed, along with income and family services and assets, as "instrument" variables, under the assumption that these variables affect education through their impact on the hours of child labor.[2] The authors conclude that the control of "endogeneity" increases the impact of the hours of child labor on learning.

Without doubt, the learning indicators based on the interviewees' declarations are unreliable. The work by Heady (2000) is free of such criticism. The author analyzes the results of the tests (mathematics and reading) given to one-half of a sample of individuals, ages 9 to 55, from a Living Standard Survey (1988-1989) in Ghana, a country where most children work a few hours each week and can combine school with work. The data show that workers have worse results in mathematics and reading than non-workers. Regression models are used to measure the direct and indirect effects, through enrollment, of child labor and hours worked on the level of test results. To estimate the "direct" effects of hours of work, the author "controls" the years of schooling and real school attendance. According to the results of the advanced mathematics test, "hours worked" and not simply "working" is the factor that has significant effects; working for the family does not reduce the damaging effect of employment; this effect influences mathematics much more than language; greatest consequences occur when more hours than the average number are worked; an important part of the effect is indirect, through years of schooling and real attendance at school; and lastly, it is not possible to determine if the direct effect is due to innate characteristics or to fatigue, motivation or less available time for student learning. The authors evaluate the slant produced in estimates when the variables of "child labor" are not included, and reach the conclusion that child labor has little influence on the estimates of "return on schooling".

The studies mentioned up to this point have not produced knowledge regarding the effect of child labor *within the educational system.* Such knowledge is particularly relevant when child labor is not a synonym of exclusion from school. This perspective requires that achievement tests and questionnaires to obtain information on the student, his family and the school, be completed simultaneously at school. In addition, the omission of "place of work" (at or away from home) from analyses possibly

underestimates the effect of child labor. A recent revision (Orazem and Gunnarsson, 2003) of analyses carried out with data from Laboratorio Latinoamericano de la Evaluación de la Calidad de la Educación (LLECE, 2001) on third graders and fourth graders in ten countries of Latin America (Sánchez *et al.*, 2003), and from the Third International Mathematics and Science Study (TIMSS) 1995, on seventh graders and eighth graders in the poorest countries of the sample (Orazem and Gunnarsson, 2003), reaches the conclusion that child labor has adverse consequences on test scores, even after "controlling" the characteristics of the home, community and school. This effect increases with the hours worked and when the child works outside of the home. On the other hand, if child labor is treated as an "endogenous" variable, the estimation of its effect increases considerably. Therefore, treating it as an "exogenous" variable would underestimate its total effect. Lastly, the authors observe that the damaging repercussions of child labor increase the lower the grade in school. Its effect on the achievement of seventh graders and eighth graders, although statistically significant, is less important than the effect on third graders and fourth graders.

Another recent study (Post and Pong, 2000) reaches similar conclusions. The authors analyze the results of standardized tests of mathematics and science taken by students in the National Educational Longitudinal Study (NELS) in the United States. The students were evaluated twice, once in 1988, as eighth graders, and the second in 1990, when they were in the tenth grade. Through multiple regression analysis, the authors find "a negative effect of work in the eighth grade" (p. 292), a confirmative conclusion since the study's longitudinal design permits "controlling" preceding achievement. Therefore, the study does not suffer from the problem of the (possible) "endogeneity" of the work variable.

These recent projects represent progress in the knowledge of the effect of child labor in the school system. However, some insufficiencies can be observed. In first place, like the studies mentioned previously, recent studies do not use the technique of "statistical analysis by multiple levels", which is more appropriate for nested data structures, a typical characteristic of information originating in the educational system (students are grouped in classroom, classrooms in schools, schools in districts, and so on). In second place, recent studies do not explore the possible existence of the "composition effect" (for example, the effect of the "socioeconomic composition" of the school)[3] and interactions between child labor and the school context. Nor do they investigate the possible variation of the effect of child labor among schools in the same system. Under the assumption of relevance for countries with high rates of enrollment of working children, this study proposes to address such aspects. It will apply the statistical technique mentioned above to the analysis of a measurement of child labor especially constructed, based on the time and place of work.

The section below describes child labor in Argentina, followed by a listing of the specific objectives of the article. After discussing the concept of child labor, some methodological aspects of the study are presented. Lastly, an analysis is made of the results obtained, and the conclusions are discussed.

Urban Child Labor in Argentina

In Argentina, child labor has been addressed increasingly since the early 1980s. Greater concern about the topic has been justified primarily by the deterioration of the population's social conditions and the appearance and increase of levels of extreme poverty previously unknown. One of the most visible consequences has been progress in legislation as well as in the formulation of national programs and policies relative to child labor (see Annex A).

En 1997, the system of information, monitoring and evaluation of social programs (Sistema de Información, Monitoreo y Evaluación de Programas Sociales—SIEMPRO) and the national institute of statistics and the census (Instituto Nacional de Estadísticas y Censo—INDEC) completed a social development survey (Encuesta de Desarrollo Social—EDS) that included questions relative to the heterogeneous work activities of children, along with the possibility of more detailed knowledge of the subject. Given that the year of the survey1– 997¢o incides with the data analyzed in this article, it is appropriate to use EDS to characterize the general situation of child labor in Argentina.[4]

EDS refers to the population living in cities of more than five thousand inhabitants: 96% of the total urban population and 83.4% of the entire national population. Minors from ages ten to fourteen are estimated at 2,858,933. The employment rate for these children increases by age, according to the criteria adopted for the definition of employment. Based on traditional measurement and including only children who work outside of the home, employment rates by age are as follows: for age twelve, 1.07%; age thirteen, 1.80%; and age fourteen, 3.70%. But if a more lax definition is adopted—a broad rate– o include work outside of the home (at a business, workshop, office, etc.) and/or earning tips and/or habitually helping parents, relatives or neighbors at work, those rates increase to 16.3%, 18.1% and 19.5%, respectively. For the group aged ten to fourteen, the broad rate is estimated at 15%. If "habitual housework" is added, the rate rises to 43.3%.

Predominant among the components of the broad rate is work performed for parents, relatives or neighbors. Out of the total number of children who carry out work of any sort, 20% help their parents, 1.5% work away from home and 1.8% earn tips. The latter two categories are associated with high poverty levels: 85% of these children pertain to the first or second quintiles of the distribution of income.

The traditional measurement of children's work does not generally reflect incompatibility between work and school attendance. The percentage of the population aged ten to fourteen that attends or attended school (99.95%) is very similar to the percentage recorded for the economically active population of that age group (99.4%). Those not attending school represent 3.6%, but this percentage increases for children included in the broad rate (14%), and even more when considering only children who work for tips or outside of the home (20%). It should be noted, however, that this final category is extremely small. Besides, no attention was given to the fact that some of these children may not have been attending school because they had already finished elementary school. The survey of life quality of 2001 (Encuesta de Calidad de Vida) indicated that only 3.9% of young people aged eighteen (approximately fourteen years old 1997), had not finished elementary school. It should also be taken into account that dropping out cannot be attributed entirely to child labor.

Educational indicators of performance confirm the negative effects of child labor. Grade repetition is more common among children who do work of some sort. This tendency is accented among those who work away from home or earn tips (19.2% and 27.8%, compared with 9.2% in general). Learning problems are consistently associated with the family's economic level and the type of child labor. According to EDS, while 8.5% of the total number of children from ten to fourteen have "much difficulty" in reading and writing,[5] the percentages increases to 12.2% among children in the lowest quintile of income. On the other hand, 41% of the children who work outside of the home or earn tips have reading and writing problems, a percentage that decreases to 26% when those who habitually help their family or do housework are included.

In summary, although urban child labor in Argentina is strongly associated with poverty, many children who work are enrolled in school. On the other hand, indicators

such as the place of work (at or away from home) and the time spent at work (habitual or sporadic) seem to affect scholastic performance and learning. However, measurements of the level of achievement, available in sources of information like EDS, are very inexact and not highly reliable. In addition, they cannot be related to the child's school. In that context, it is relevant to attempt to discover the effect of child labor inside of the educational system, based on a more reliable measurement of scholastic achievement.

Objectives

An effort is made *to determine the intensity and performance of the effect of child labor on the level of mathematics achievement of seventh graders in basic general education, considering their grouping in schools.* With the technique and strategy of statistical analysis (multilevel) applied to the available data (ONE/97), this general objective can be broken down into the following specific questions:

1) Does child labor have an effect on achievement in mathematics? What kind of effect?
2) Is the effect of child labor on achievement in mathematics:
   - significant even after considering the effect of the student's social origin?
   - significant even after considering the effect of the school's socioeconomic and cultural "composition"?
   - significant even after considering the effect of the student's gender and grade repetition?
   - variable according to the socioeconomic and cultural context, student gender or academic background (grade repetition)?
   - variable by school?

Some aspects of this formulation should be emphasized. The study does not include the "indirect" effect of child labor through non-schooling or dropping out; such an effect, in any event, does not seem very relevant in the Argentine case (see previous point). As a result, almost all of the damaging repercussions of child labor can be found within the educational system. This article will study only the effect on achievement, and ignore the other, plausibly important effect of grade/age distortion, a reflection of grade repetition and temporary interruptions. Lastly, the measurement of child labor adopted should include the aspects that most adequately detect its effect on achievement.

Concept and Measurement of Child Labor

In its recent international diagnosis of child labor, the International Labour Organization (ILO) affirms that "work is defined in terms of economic activity" (IPEC/ILO, 2002:29); it includes paid and unpaid activity in the formal and informal sectors, in urban and rural areas, and excludes housework. According to Convention No. 138 of ILO, the minimum age for starting to work in countries where the economy is not sufficiently developed, is the age at which mandatory school attendance ceases, not younger than age fourteen; the Convention does allow, however, "light work" by children no younger than twelve. Therefore, working at age twelve and thirteen is considered child labor, unless the children are performing "light work", which is defined as not harmful for children's health and development nor damaging for their school attendance or *ability to benefit from received instruction*.

Adopting this definition to estimate the magnitude of child labor to be abolished and to differentiate it from work that is acceptable for this age group, obviously creates a

problem of operational statistics. As a result, the ILO study opted finally to define "light work" as *non-hazardous work not exceeding fourteen hours per week*. Such work is assumed not to damage children's development.

The present study refers to the age group from twelve to fourteen, from a perspective in accordance with the spirit of the first definition[6] (although it also conditions "operations"). The assumption is that not all work is damaging for children; on the contrary, "it can serve as a gradual initiation into adulthood and a positive element in the child's development" (Fyfe, 1989: 4). Work becomes child labor only when it affects other activities essential for childhood (pleasure, play, education). In other words, child labor is defined *by its consequences*. This study's interest, however, is not to measure the extent of child labor, but to obtain a measurement that reflects adequately the damage caused to the *ability to benefit from received instruction.* At the same time, it permits an illustrative analysis of the behavior of child labor in relation to the operational unity of the educational system, the school. Since "correlational" models will be used and the criteria variable will be the student's achievement, it would be advisable to obtain a "continuous" variable of scholastic work, with increasing values from its lower end (does not work) that are associated with decreasing levels of scholastic achievement. The goal is an indicator of the *growing intensity of the negative effect of child labor*.

Methodology

Data

The source of the information is *a)* a standardized mathematics test and *b)* a questionnaire, completed by seventh-grade students of the primary level during the national evaluation of educational quality (Operativo Nacional de Evaluación de la Calidad Educativa de 1997--ONE/97), carried out by Argentina's Ministry of Culture and Education in 1997.[7] The tests were auto-administered. The analysis includes only schools with valid information for fifteen or more students. Under this condition, the file consists of 1,283 urban schools and 30,630 students, of whom 96% are between ages twelve and fourteen.

Variables

The *dependent variable* is achievement, and consists of the student's score on a standardized test of mathematics. The "table of specifications" for preparing the test contains two axes: *a) skills*: recognizing, conceptualizing, using algorithms and solving problems; and *b) content:* numbers and operations (natural, fractions, decimals and proportions), graphs, measurements, statistics and probability and notions of geometry. The most frequent skill is "problem solving" (42% of all items), while content is distributed in a more homogeneous manner. The test consists of multiple choice questions and some "open" questions; achievement is calculated with only the former.[8]

The independent variables are *characteristics of the individual student and of the school's socioeconomic and cultural "context":*

Individual Student Variables

These variables refer to the student's work situation, social origin, and demographic (gender and age) and academic (grade repetition) characteristics. The variables are defined as follows:

- Work: intensity of the student's extra-scholastic work (see definition in Table 1).

TABLE 1

1. Measurement of child labor

The definition of the variable, *work*, is based on four questions from the student questionnaire: *Do you work?* (yes/no); *Where?* (home/away from home); *Do you get paid?* (yes/no); *How many hours a day do you work?* (1, 2, 3, 4+). The procedure for constructing the variable, *work*, is the following:

1. The records are distributed on the matrix defined by crossing the 4 questions (18 cells).
2. The average achievement in mathematics is calculated in each cell of the matrix.
3. The eighteen categories are ordered according to average achievement in mathematics, in descending order.
4. If the frequency of a category is very low, it is assimilated into the contiguous category having the most similar average.

Thus defined, the variable, *work,* is the ordering of the possible combinations of the different aspects of the student's labor activity, according to decreasing scholastic achievement in mathematics. Its validity depends on the logical consistency of the final ordering and its effectiveness as a predictor of scholastic achievement compared with the predictive weight of the set of its four components. Notice that the variable is assumed to be "continuous" the increasing intensity of work that ranges from "does not work" to all forms of labor activity.

Socioeconomic and cultural origin:

- Goods + services: summative index of availability (=1) or unavailability (=0) of 17 durable goods and services in the home (re-codified from 1 to 9).
- Density: number of dwellers per room in the student's home.
- Parents' education: summative index of father's education and mother's education (re-codified from 1 to 9).
- Cultural goods: summative index of books at home and ownership of mathematics and language manuals and school supplies.

Personal characteristics of student:

- Female: girls = 1; boys = 0
- Repeater: 1 = has repeated at least one grade; 0 = has not repeated

Variables of "scholastic context"

These variables are the scholastic averages of each individual variable, with reference to the student's socioeconomic and cultural origin, and are named by adding the termination *_sch* to the individual variable of origin.

All the variables have been standardized to facilitate the comparison of their relative weights. Further comments on variables can be found in Cervini (2002).

Technique and Strategy of Analysis

To analyze the relation between achievement and the different variables, use is made of the MLwiN program (Goldstein *et al.,* 1998), based on the method of "statistical analysis by multiple levels" or "linear hierarchical models" (Aitkin and Longford, 1986; Bryk and Raudenbush, 1992; Goldstein, 1987). A detailed description of the characteristics of this technique is found in Annex B.

The data permit defining models with two levels of groups: the student (1) and the school (2). The complete model to be adjusted is the following:

$$\text{Mathematics}_{ij} = \beta_{0ij}\text{cons} + \beta_1\text{Work}_{ij} + \sum \beta_2\text{Family}_{ij} + \sum \beta_3\text{Context}_j + \sum \beta_4\text{Student}_{ij} + + \sum \beta_5\text{Interactions}_{ij}$$

$$\beta_{0ij} = \beta_0 + \mu_{0j} + e_{0ij}$$

in which Mathematics_{ij} is the mathematics achievement of student *i* in school *j;* $ß_1$ is a parameter to be estimated and expresses the degree that child labor is related to achievement in mathematics; $\sum \beta_2$ is a set of parameters to be estimated that express the relation between achievement, on one hand, and some socioeconomic and cultural characteristics of the student's family, on the other hand; $\sum \beta_3$ is a set of parameters to be estimated that express the relation between student achievement, on one hand, and some characteristics of the school's socioeconomic and cultural 'composition', on the other hand; $\sum \beta_4$ is a set of two parameters that express the distances between the average achievement of boys and girls, and repeaters and non-repeaters, and which must be estimated; and $\sum \beta_5$ is a set of parameters to be estimated that express interactions between achievement in mathematics, on one hand, and the student's gender and grade repetition, and the socioeconomic and cultural context, on the other; *cons* is a constant = 1 and β_{0ij} is a parameter associated with *cons*, composed of: $\beta_{0ij} = ß_0 + \mu_{0j} + e_{0ij}$, where $ß_0$ is the estimated average achievement (*fixed part*), and μ_{0j} and e_{0ij} are "residues" at the student and school levels, respectively; in other words, random amounts, not correlated, normally distributed, with mean = 0, and whose respective variances (σ_μ and σ_e) must be estimated.

The sequence of analysis is adjusted to the research questions proposed as specific objectives, and to the technique of analysis used. The determination of the probability of the effect of the variables is based on the test of the ratio of maximum likelihood.[9]

Results

The Work Variable

Chart 1 presents the results obtained by utilizing the proposed procedure to construct the variable, *work* (Table 1) according to the available data. 45% of the seventh graders declared that they work. According to EDS, the largest rate of activity among children aged twelve to fourteen in the urban area is approximately 43%. On the other hand, EDS estimates at 4.2% the most restricted average rate of activity, which includes children who work outside of the home and/or ask for tips. According to the data of Chart 1, children who work outside of the home for four hours represent 4.8%. In general terms, therefore, the measurement of work analyzed in this study seems reasonable and compatible with other sources of information.

In general, the ordering obtained is reasonable and consistent with expectations, if the studies previously reviewed are taken into account (see introductory section). After the working situation (yes/no), the main determiner of the ordering is the "place of work", followed by the extension of the "daily time" of work. The achievement of those who work "outside of the home" is greater than those who work "at home", only when the former work one hour and the latter work three or more hours. The "pay/no pay" dichotomy, in contrast, shows erratic behavior. Therefore, the *work* variable is a combination of participation at work with the time and place of work.

CHART 1

Definition and Distribution (%) of the Work Variable

Questions from Questionnaire				*Work* Variable	Fr. (%)
Do you work?	Where do you work?	Do you get paid?	How many hours a day?		
No	----	----	-----	1	65,1
Yes	At home	Yes	1	2	2,3
Yes	At home	Yes	2	3	1,5
Yes	At home	No	1	4	7,7
Yes	At home	No	2	5	4,7
Yes	Away from home	Yes	1		
Yes	Away from home	No	1		
Yes	At home	No	3	6	3,3
Yes	At home	Yes	3	7	1,1
Yes	At home	Yes	4+	8	1,6
Yes	At home	No	4+	9	2,8
Yes	Away from home	Yes	2	10	0,9
Yes	Away from home	No	2		
Yes	Away from home	Yes	3	11	1,5
Yes	Away from home	No	3		
Yes	Away from home	Yes	4+	12	4,8
Yes	Away from home	No	4+		
			3 or 4	13*	2,6
(*) This value is a residue where 'Hours' = 3 or 4+, and one of the other variables is "missing" or "double mark".					100,0

(*) This value is a residue where "hours" = 3 or 4+, and one of the other variables is "missing" or "double mark".

Analysis

According to data on a larger sample of students (34 628), only 17.6% of those who do not work obtain "very low" achievement (first quintile), yet that percentage rises to close

to 30% when the student works three or more hours each day (see Chart B-1, Annex C). On the other hand, 25.1% of those who work "at home" are at a very low achievement level, and the percentage increases to more than 29% for those who work "away from home" (see Chart B-2, Annex C). In the sample analyzed in this article, the average (observed) achievement of students who work four or more hours each day away from home (*work* = 12) is 42.9%, while that of students who do not work (*work* = 1) is 51.6%; in other words, the "expected" achievement of the latter is 20% greater than that of children in the most extreme work situation (according to time and place). On the other hand, the average achievement of students who work "at home" is 46.2%, while that of students who work "away from home" is 42.7%. Lastly, average achievement descends clearly with the hours of work: one to two hours, 47%; three hours, 45%; and four hours, 43%.

Analyzed below is the relation between achievement and child labor, reflected by the distances among percentages. The results agree with the proposed objectives and the strategy of analysis. In each section, the procedure used is briefly explained.

"Empty" model ("null" or "unconditional"): initial partition of the variance of the criteria variable in the two levels of aggregation and no predictor. The global mean (fixed part) is estimated and, *simultaneously*, the variation (%) at each level of aggregation (school and student) (random part). The results are presented in Chart 2. The estimated global mean for mathematics is 49.06; the variation (%) of the average achievement of the schools with regard to this global mean represents 45.9% of the total variation ("inter-school" variation), and 54.1% corresponds to the students' achievement with regard to the average achievement of their school ("within-school" variation).

Initial "achievement-work" association (Chart 2). The objectives are: *a)* to evaluate the initial relation between child labor and achievement in mathematics; *b)* to determine if the two category indicators (*away from home* and *3hs+*)[10] can be replaced by the *work* variable, as proposed (Table 1); and *c)* to contrast the hypothesis of a nonlinear relation between *work* and achievement. According to this hypothesis, *work* exercises a greater relative effect when moving from Category 1 (does not work) to Category 2 (works 1 hour at home) that on any other section of the scale. Therefore, the appropriate model is the logarithmic form: *mathematics* = $\alpha + \beta$ log *work*. To "linearize" the function, a variable of *work'* = log *work* is created; as a consequence, the linear function is now expressed as: *mathematics* = $\alpha + \beta$ *work'*. For a better direct perception of the behavior of data, and for a single occasion, the original measurement (not standardized) of achievement is used.

When the effects of *away from home* and *3hrs+* are analyzed *separately*, it is verified that students who work outside of their homes or three or more hours per day obtain, on the average, achievement that is three points lower than that of their classmates, a statistically significant difference. This estimation descends, however, when the two effects are analyzed *jointly*, reflecting a certain degree of superimposition of both effects. On comparing this model with the model that estimates the effect of the *work* variable in its *original* form, it is observed that: *a)* the value of the test of maximum likelihood of the latter (255009) is significantly less than the two *dummy* variables (=255092.8) and consistently, *b)* the residual variance also accompanies this tendency. These behaviors confirm greater predictive effectiveness of the *work* variable with respect to the two *dummy* variables.

CHART 2

Estimations of the model of components of variance with achievement in mathematics (criteria variable) and variables that refer to child labor

Variables and Levels	'Empty' Model	Adjusted Models			
		Separate	*Together*	*Original*	*Transformed*
Average	49.06				
Away from home		-3.046***	-1.221***	---	---
3hrs+		-2.922***	-2.329***	---	---
Work		---	---	-1.403***	-1.674***
School (%)	45.9	---	44.9	44.4	44.4
Student (%)	54.1	---	53.8	53.6	53.6
Test of Maximum Likelihood	255251.8	---	255092.8	255009.0	254971.4

(***) Prob. ≤ 0.001
NOTE: standard error obtainable from author.

Lastly, a comparison can be made between the obtained estimations and the two versions of *work*. The test of maximum likelihood with the *transformed* variable (= 254971.4) is significantly less than the calculation based on the *original* variable. On the other hand, the estimated coefficient of the effect of the *transformed* variable (= −1.674) is greater than that of the *original* variable (= −1.403). It can be inferred that the model with logarithmic transformation adjusts the data better. Since that estimation is statistically significant and has a negative value (−), the conclusion is that *to the degree the intensity of the student's work activity increases, the student's achievement in mathematics decreases, and this relation is most intense in the initial sections of the work variable*.

Because of these results, *away from home* and *3hrs+* are eliminated, and the analysis continues with *work* (transformed) only, proven to be a more efficient and adequate measurement for reaching conclusions about the effect of children's work on scholastic achievement. In addition, the decision has the advantage of noticeably simplifying the analysis.

Model A: effects of the student's work and social origin (Chart 3). The issue is to discover if the effect of work on achievement remains even after considering the effect of the different dimensions of the family's social origin. To do so, all available measurements are considered along with *work.* In line with predictions, although the intensity of the effect of *work* descends notably, the value of its estimation (−0.056) continues to be statistically significant.[11] Therefore, *the intensity of child labor influences the level of student achievement, even after controlling all the indicators of the family's socioeconomic level*.

Model B: the effects of context (Chart 3). This step evaluates the persistence of the effect of the student's labor situation on considering simultaneously the school's socioeconomic and cultural "composition". In addition, an evaluation is made of the possible existence of the "contextual" effect of child labor at school (*work_sch*). The data indicate that *work* continues to be significant, and therefore, *the intensity of child labor influences student achievement, even after considering the school's social context.* Yet at the same time, *work_sch* is not significant; i.e., the concentration of

working children at school does not adds to the verified effect of the student's individual labor situation.

CHART 3
Results of multilevel analysis, by model.
Achievement in mathematics. Coefficients and level of significance

Variables and Levels	Multilevel Models			
	A	B	C	D
FIXED PART				
Work	-0.056 ***	-0.053 ***	-0.045 ***	-0.057 ***
Culture	0.076 ***	0.070 ***	0.060 ***	0.062 ***
Education	0.074 ***	0.066 ***	0.053 ***	0.054 ***
Density	-0.051 ***	-0.047 ***	-0.040 ***	-0.040 ***
Goods + services	0.023 **	0.016 **	0.010	
work_sch		-0.024		
culture_sch		0.132 ***	0.136 ***	0.133 ***
education_sch		0.079 ***	0.075 ***	0.079 ***
density_sch		-0.083 **	-0.082 **	-0.082 **
Female			-0.057 ***	-0.061 ***
Repeater			-0.283 ***	-0.299 ***
*education*work*				-0.031 ***
*culture*work*				0.056
*density*work*				-0.008
*female*work*				-0.001
*repeater*work*				0.062 ***
RANDOM PART				
School (%)	37.6	30.0	29.6	29.4
Student (%)	52.9	52.9	51.8	51.6
Test of Likelihood	71084.2	70797.5	70148.8	70047.3

(***) Prob. ≤ 0.001; (**) Prob. ≤ 0.01
NOTE: standard error obtainable from author.

Model c: gender and grade repetition (Chart 3). To evaluate the effect of both variables, they are incorporated into the analysis and all the estimations are recalculated. The two effects are significant. At the same time, the estimation of *work* shows an important decrease (from −0.053 in *model b* to −0.045 in this model). Processes not presented here showed that this fall is due to *grade repetition* and not to *female*.[12] So clear indications exist that a proportion of the effect of *work* would be indirect, through grade repetition or vice versa.[13]

Model d: interactions. The final exercise to carry out in the fixed part of the model refers to possible interactions between the effect of work, on one hand, and the student's gender and grade repetition, as well as the school's socioeconomic and cultural context, on the other hand. For this reason, the interactive terms are defined and included simultaneously in the previous model. The results show that only two terms are significant. In first place, there is interaction between *work* and grade repetition, with a positive sign. Therefore, there are clear indications that the effect of child labor is stronger among non-repeaters than among repeaters. In second place, *work* has more of an influence the higher the average educational level of the parents.

Model e: randomness of the effect of work. All the previous models assumed that the effect of *work* was similar in all schools. It can vary, however. The final step investigates the possible variation of the intensity of the effect (pending *ß1*) and its covariance with the average achievement of the school (intercept).[14] Neither of the two estimations was significant. No correlation exists between the school's average achievement and the intensity of the effect of *work*; knowing the average achievement of the school does not help predict the force of the relation between *work* and *z_math*. On the other hand, the effect of child labor on achievement is similar in all schools. In general, schools should not be expected to be significantly different with respect to the ability to decrease the correlation between *work* and achievement in mathematics.

Conclusions

Without doubt the cause of child labor is poverty. As a result, its eradication will require long-term policies. Organizations like ILO, through the International Programme on the Elimination of Child Labor, act under the assumption that they are dealing with a problem that cannot be solved over the short term. The priorities are "to suppress the intolerable" (Lansky, 1997:271), focusing their efforts on "the most defenseless children; i.e., those who suffer from situations of forced work or servitude, those who perform dangerous tasks" or children under age twelve. The strategy is to support the development of preventive programs and the approval and application of norms that prohibit such forms of child labor.

In the urban areas of Argentina, it is very probable that most of that extreme sort of child labor among children from ten to fourteen involves children not enrolled in school (3.6%). And if the policies implemented for their benefit are not effective, many of them will soon join the adult population in conditions of extreme poverty, society's future outcasts.

The data analyzed in this study do not refer to children in a situation of extreme exclusion; on the contrary, they refer to children who are near completion of the seventh year of basic education in an urban area. The center of attention of the analysis has been the association between achievement in mathematics, a typically scholastic area of knowledge, and the working activity of those students, in an attempt to determine the possible damage child labor has on *the ability to benefit from instruction received at school*. With that end, an indicator has been used that expresses growing levels of child labor defined by two demonstrably relevant aspects:

place and (amount of) time of work. The analysis has utilized the technique of "hierarchical linear models" or "multilevel" analysis.

The results have contributed the most reasonable hypothesis: *the greater the child labort– ime and placet– he lower the achievement in mathematics*. It is the combination of the place and time of work that most concentrates the effect of work on student achievement. The relation, however, is not linear. The greatest difference in the level of achievement is detected on comparing children who simply do not work with those who do, although for only a few hours and at home. In any case, students who declare that they work away from home for four or more hours each day show the lowest achievement. Although the magnitude (estimated) of the effect decreases when the socioeconomic and cultural level of the family and the school are taken into account, it continues to be statistically significant. Even if part of the effect of child labor is due to socioeconomic and cultural conditions, another part is inherent; under equal conditions, those who work most will achieve least. The data indicate another superposition of effects: *work* and the student's academic background, expressed as grade repetition. No data are available to analyze any hypothesis of causality; therefore, it is possible to affirm only that grade repetition and child labor affect scholastic achievement in direct and/or indirect form, with one acting as a mediator. Lastly, it is pertinent to recall that the possible "endogeneity" of child labor has not been controlled, and that, according to the literature consulted, this may imply an underestimation of its effect.

Other findings are situated at the school level: *a)* the "contextual effect" of child labor, i.e., the degree of concentration of child labor in a school does not alter the expected achievement, according to the individual work situation of each student; *b)* the effect of child labor is not associated with the average level of achievement of students at the school; and lastly, *c)* schools do not differ with respect to the ability to "compensate" for the damaging effect of child labor; in other words, no schools are more "fair" than others in this respect.

According to the data, the average achievement of students who work outside of the home, and for four or more hours, is 20% less than the achievement of students who do not work. The analysis has shown that this distance is statistically significant and constitutes a facet of the educational inequity within the system. But at the same time, another conclusion is suggested: although significant, the phenomenon is less marked than a hypothesis of total incompatibility between education and work would expect. This affirmation should not be interpreted, however, as a defense and acceptance of child labor. Rather, it provides support for two ideas. First, the inclusion of the working child at school is not superfluous or inconsequential with regard to the learning of basic academic knowledge. Second, it is viable to attain goals of equity in the distribution of such knowledge, through educational policies and programs that consider the employment activity of the group of students who are socially less fortunate.

The central dilemma of reflecting on child labor is either to accept it as a condition for the family's survival and for child's attendance at school or, on the contrary, to reject it as one of the mechanisms responsible for reproducing poverty. The first focus will tend to be reinforced by economic contexts in which over the short term, child labor has a positive return in terms of opportunity costs (low educational level), and which offer the child a greater probability employment at a wage that covers the losses of reduced attendance (Beegle, Dehejia. and Gatti, 2004), while permitting the acquisition of work and social skills that will place the child at an advantage. Empirical evidence of a high correlation between the parents' low educational levels and child labor, or between

having worked as a child and sending a child to work (Wahba, 2001), supports the second focus.

At this point, it should be asked if the distribution of achievement in nations of high educational levels, is no longer influenced by the damaging effect of child labor. The question is empirical and the response should be sought in a longitudinal analysis of the educational and occupational paths of working children. It is very probable that child labor, accompanied by episodes of grade repetition and low scholastic learning, contains "possibilities and impossibilities, freedoms and needs, facilities and prohibitions that are inscribed in objective conditions"w- hich "engender dispositions objectively compatible with those conditions" (Bourdieu, 1991:94). In this manner, "the most improbable practices are excluded without any examination, as *unthinkable*"; in other words, "to refuse the refused, and to want the inevitable", leading to "excluding without violence, without method, without arguments all 'craziness' ("this is not for us") (p. 95), including remaining and progressing in the educational system. The search for an education and therefore, a more fair and equal society, should confront this "expected" consequence.

Annex A

Legal and Political Framework in Argentina

The constitutional reform of 1994 granted this hierarchy to the Convention on Children's Rights (approved by law number 23 849), which establishes "the child's right to be protected []… from performing any work that may be dangerous or hinder his education"… (Article 32). Law number 24 650/1996 ratified Convention No. 138 of ILO, making use of the option to specify initially a minimum age of fourteen for starting work. National law number 25 255/2000 approved Convention No. 182 of ILO on eliminating the worst forms of child labor.

Law number 20 744, regarding work contracts, regulates the employment of children from age fourteen to eighteen (special title on "The Work of Minors") and establishes the minimum age of fourteen for starting work in any activity, whether for profit or not (Article 189). According to this norm, if a child has not completed his mandatory education, he must have express authorization from the educational authorities (Ministerio Pupilar) to be able to work; he must demonstrate that his work is considered indispensable for the subsistence of his direct family.

Annex IV of Law number 25 212 (Federal Labor Pact) defines Argentina's National Action Program in Child Labor, in an attempt to homogenize national programs of action and control. In 1996, Argentina joined the ILO's International Programme on the Elimination of Child Labour (IPEC). In 1997, the Argentina's National Commission for the Elimination of Child Labor (CONAETI) was created and formalized by decree 719/2000, of an inter-ministerial and inter-sectorial character. In 2002, CONAETI formulated the National Plan for the Prevention and Elimination of Child Labor, a referential framework of all programs and projects that are linked directly or indirectly to this problem. One of its objectives is to ensure the entrance, re-entrance and/or permanence in the formal educational system of children who are at risk in social/educational/labor terms and/or are separated from labor circuits. Other objectives are to establish a national integrated system of information on child labor; to sensitize society with regard to the problem; to articulate social and inter-sectorial networks at regional and local levels; to strengthen systems of detection and inspection, and to encourage the updating and coordination of standards.

In 2003, CONAETI formulated the Program for the Prevention and Elimination of Urban Child Labor. It promotes local projects, given the diversity of forms of child labor, and recommends decentralized projects while coordinating them from a central axis; it also attempts to formulate strategies of direct intervention and guidelines of public policy that perfect feasible, viable and sustainable alternatives and favor the intervention and participation of social actors at the local level. Such actions must be integrated into national policy that supports local actions and interventions with material and human resources. CONEATI is responsible for central coordination, as well as articulation and advising at the regional and national levels, and the recording, systematization and diffusion of all activities carried out at all jurisdictional levels of the nation and in all types of organizations. Over the short term, through diverse activities, its goal is local institutional strengthening and decentralized local actions and projects in the urban setting. The Program includes a detailed guide for presenting projects of intervention.

Annex B

"Multilevel" Statistical Analysis

This technique permits analyzing variations in the characteristics of individuals who are members of a group. Students are part of a group ('the classroom', the 'division'), that pertains to a "school" in a "district" of a "state", and so on. Students from the same school have a homogeneous share of some characteristics (for example, the social composition of the school), and are simultaneously differentiated from students in other institutions (with a different average socioeconomic level). In that type of reality, to explain the variation of individual behaviors (achievement, for example), an investigation should be made not only of the characteristics of the student (for example, the student's work situation), but also of the school where the student is enrolled (for example, the average socioeconomic level of the student body). In other words, *the effects on achievement must be specified by level of aggregation* (student, school, etc.).

The main attractions of the technique are that it offers the possibility of:

a) Evaluating simultaneously the different levels of variation (for example, student and school), thus making it possible to discover the proportion of variation of scholastic achievement that is due to student characteristics and the proportion that is due to school characteristics.
b) Permitting the level of achievement (*intercept a*) and the strength of the relation between factors (slope *b*) to vary freely at different levels of aggregation (classroom, school), thus making it possible to discover how *quality and equity* vary in the educational system.

In the specification of the model, two parts can be defined:

- *Fixed*: the parameters that permit determining an average line for *all* students from *all* schools. In this part, it is assumed that the intensity of the association of the independent variable with learning is constant for all schools in the system. In fact, *this part of the model indicates the level of quality and equity of the educational system as a whole.* This is so because, in our case, the fixed part of the model estimates:

- The average value of achievement (α), adjusted for the factor (for example, student work); i.e., *quality.*

- The average value of the strength of the relation between achievement and the factor (for example, student work); i.e., the slope of the line that represents the relation between both variables (ß), an indicator of *equity*.

- *Random:* shows the estimations of: *a)* the variation of the average achievement of schools (α) in terms of the average achievement of all schools and *b)* the variation of the individual lines (for example, socioeconomic level/achievement) of *each school* (ß) in terms of the general average line. In other words, *this part of the model indicates if quality and equity vary among schools.*

Annex C

Statistics

CHART B-1

Percentage Distribution of Seventh Graders by Place of Work, according to Achievement in Mathematics (1997)

Achievement in mathematics	Does not work	Place of work			TOTAL
		At home	*Away from home*	*N/R*	
Very low	17.6	25.1	29.2	29.5	20.6
Low	17.6	20.8	24.6	25.0	19.1
Regular	21.9	22.8	22.1	24.3	22.2
High	21.6	18.0	14.6	14.2	20.0
Very high	21.4	13.3	9.4	7.0	18.1
Total	100.0	100.0	100.0	100.0	100.0
(n=…)	22543	8686	2490	909	34628

CHART B-2

Percentage Distribution of Seventh Graders by Hours of Work per Day, according to Achievement in Mathematics (1997)

Achievement in Mathematics	Does not work	Hours of Work per Day					Total
		One	*Two*	*Three*	*Four*	*Three or four*	
Very low	17.6	23.6	26.1	28.1	26.8	29,5	20,6
Low	17.6	19.5	21.3	20.6	23.7	25,0	19,1
Regular	21.9	22.1	24.6	21.8	23.1	24,3	22,2
High	21.6	19.7	16.8	17.3	15.6	14,2	20,0
Very high	21.4	15.1	11.2	12.2	10.8	7,0	18,1
Total	100.0	100.0	100.0	100.0	100.0	100,0	100,0
(n=)..	22543	3472	825	2026	4853	909	34628

Notes

[1] In this respect, see the list of countries that have completed the diagnoses promoted by the Statistical Information and Monitoring Programme on Child Labour (SIMPOC) of the International Programme on the Elimination of Child Labour of the International Labour Organization (IPEC/ILO), at: http://www.ilo.org/public/english/standards/ipec/simpoc/

[2] The problem of "endogeneity" appears because "reverse causality" can exist between child labor and scholastic achievement. While the first can affect the second, it is possible that early entry into the labor market is a consequence of scholastic achievement: families tend to send their children who show least scholastic aptitude, to work. To obtain a good estimate of the effect of child labor on scholastic achievement, it is necessary to have variables that affect the probability of child labor but not the score of the test, at least not directly.

[3] In this study, "composition" is a summarized statistic (mean or proportion) of an aggregate (school), relative to a determined variable (for example, parents' education) of individual units (students) who conform that aggregate (school). "Composition" effect is understood to be the incidence of that summarized statistic on student performance, provided that the effect of the individual variable has been considered (Goldstein, 1995; Nutall *et al.,*1989).

[4] The data in this section have been extracted from IPEC/MTEySS (2002).

[5] EDS included two questions in this respect: Do you have difficulty reading? Do you have difficulty writing? The response options were: "a lot", "a little" and "none".

[6] Due to the lack of progress in the effective reduction of child labor, in 1999, ILO promoted the signing of Convention No. 182, which sets the priority of adopting "immediate and effective measures to secure the prohibition and elimination of the *worst forms of child labour* as a matter of urgency" (Article 1). Article 3 specifies those *worst forms* (slavery or practices similar to slavery; prostitution, the production of pornography or pornographic performances; illicit activities), including "work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children" (part d). This line does not refer to damage to the child's education. However, it is important to note that the objective of this convention is to establish more realistic short-term goals (*worst forms of child labor*), and not to modify the broader definition of child labor, which must be prohibited and eradicated over the long term.

[7] The files and dictionary of the questionnaire are available at http://diniece.me.gov.ar/diniece/documentos/alum7_97.zip

[8] For greater details on the test, see Emilio Tenti (org.) (2002). *El rendimiento escolar en Argentina. Análisis de resultados y factores,* Buenos Aires: Losada.

[9] The estimated degree of adjustment (probability) of a model is based on the difference between the ratio of maximum likelihood of the model being analyzed and the antecedent. The difference can be reported by the chi-square distribution, with degrees of freedom defined by the amount of new adjusted parameters in the model being analyzed.

[10] Both variables are defined as "dummy" variables: (house = 0; outside = 1); (1 and 2 hours = 0; 3 hours or more = 1). Processes carried out showed that the variable relative to the "payment" of work has no significant effects, and can thus be eliminated without altering the results of the analysis.

[11] The *work* coefficient in Chart 2 is estimated with original and not standardized achievement. The same estimation, but with standardized achievement, is −0.071, with a standard error of 0.005. The estimation of Model A should be compared with the latter estimation.

[12] When the term (*grade repetition*) acts alone, the estimation of the effect of *work* is less (= 0.041).

[13] Since the design is not experimental, we cannot solve unequivocally the "causality" of *work*/*grade repetition*. The child's work history may have influenced his episodes of grade repetition; yet it is also possible that due to the child's limited scholastic aptitudes (grade repetition), his probability of working at an early age may have been greater.

[14] A subscript *j* is added to the coefficient of *work,* and is composed of an average value in the fixed part ($ß_1$) plus a random part (μ_{1j}), with mean of 0 and variance $\sigma_{\mu 1}$, which must be estimated. Also evaluated is the covariance between μ_{1j} and the random term μ_{0j}, associated with the intercept.

Bibliography

Aitking, M. and Longford, N. (1986). "Statistical Modelling Issues in School Effectiveness", *Journal of the Royal Statistical Society A*, 149, pp.1-42.

Akabayashi, H. and Psacharopoulos, G. (1999). "The Trade-off between Child Labour and Human Capital Formation: a Tanzanian Case Study", *Journal of Development Studies*, vol. 35, no. 5, pp. 120-140.

Beegle, K., Dehejia, R. and Gatti, R. (2004). *Why Should We Care about Child Labor?*, World Bank and Columbia University (manuscript).

Boozer, M. A. and Suri, T. K. (2001). *Child Labour and Schooling Decisions in Ghana*, Yale University (manuscript).

Bourdieu, P. (1991). *El sentido práctico*, Madrid: Taurus Humanidades.
Bryk, A. y Raudenbush, S. (1992). *Hierarchical Linear Models for Social and Behavioral Research: Applications and Data Analysis Methods*, Newbury Park, ca: Sage.
Cervini, R. (2002). "Desigualdades en el logro académico y reproducción cultural en la educación primaria de argentina. Un modelo de tres niveles", *Revista Mexicana de Investigación Educativa*, vol. 7, núm. 16, pp. 445-500.
Edmonds, E. (2002). *Is Child Labour Inefficient? Evidence from Large Cash Transfers*, Dartmouth University (manuscript).
Fyfe, A. (1989). *Child Labour*, Cambridge: Poly Press.
Goldstein, H. (1987). *Multilevel Models in Educational and Social Research*, London: Griffin.
Goldstein, H.; Rasbash, J.; Plawis, I.; *et al.* (1998). *A User Guide to MLWINN*, London: University of London.
Heady, C. (2000). "What is the Effect of Child Labour on Learning Achievement? Evidence from Ghana", *Innocenti Working Papers*, no. 79, Florencia: UNICEF.
IPEC/ILO (2002). "Every Child Counts. New Global Estimates on Child Labour", *International Programme on the Elimination of Child Labour*, Geneva: International Labour Office.
IPEC/MTEySS (2002). "Actualización diagnóstica del trabajo infantil en la Argentina". *Programa Internacional para la Erradicación del Trabajo Infantil*, Buenos Aires: Ministerio del Trabajo, Empleo y Seguridad Social.
Laboratorio Latinoamericano de la Evaluación de la Calidad de la Educación (LLECE) (2001). *Primer estudio internacional comparativo. Informe técnico,* Santiago: OREALC/UNESCO.
Lansky, M. (1997). "Perspectivas. Trabajo infantil. Cómo se está enfrentando el problema", *Revista Internacional del Trabajo*.
Nielsen, H.S. (1998). "Child Labour and School Attendance: Two Joint Decisions", *Working Paper 98-15*, Centre for Labour Market and Social Research, University of Aarthus and the Aarthus School of Business.
Nuttall, D.; Goldstein, H.; Prosser, R. and Rasbash, J. (1989). "Differential School Effectiveness", *International Journal of Educational Research,* vol. 13, no. 7, pp. 769-776.
Orazem, P. and Gunnarsson, V. (2003). "Child Labour, School Attendance and Performance: A review". *ILO/IPEC Working Paper*, Geneva: International Programme on the Elimination of Child Labour/International Labour Office.
Patrinos, H. A. and Psacharopoulos, G. (1995). "Educational Performance and Child Labour in Paraguay", *International Journal of Educational Development*, vol. 15, no. 1, pp. 47-60.
Patrinos, H. A. and Psacharopoulos, G. (1997). "Family Size, Schooling and Child Labour in Peru. An Empirical Analysis", *Journal of Population Economics*, vol. 10, pp.387-405.
Post, D. and Pong, S. (2000). "Employment during Middle School: The Effects on Academic Achievement in the US and Abroad", *Educational Evaluation and Policy Analysis*, vol. 22, no. 3, pp. 273-298.
Psacharopoulos, G. (1997). "Child Labor versus Educational Attainment: Some Evidence from Latin America", *Journal of Population Economics*, vol. 10, pp. 377-386.
Ravallion, M. and Quentin Wodon (2000). "Does Child Labour Displace Schooling? Evidence on Behavioral Responses to an Enrolment Subsidy", *Economic Journal*, 100, March, pp. C158-175.
Ray, R. and Lancaster, G. (2003). "Does Child Labour Affect School Attendance and School Performance? Multi Country Evidence on Simpoc Data", *Discussion Paper 2003-2004 School of Economics*, Australia: University of Tasmania.
Rosati, F. and Rossi, M. (2001). "Children's Working Hours, School Enrolment and Human Capital Accumulation: Evidence from Pakistan and Nicaragua", *Understanding Children's Work*, ILO/UNICEF/WB (manuscript).
Sánchez, M., Orazem, P. and Gunnarsson, V. (2003). "The Effect of Child Labour on Mathematics and Language Achievement in Latin America", in P. Orazem, G. Sedlacek y Z. Tzannatos (eds.). World Bank.
Wahba, J. (2001). "Child Labor and Poverty Transmission: No Room for Dreams", *ERF Working Paper Series*, Working Paper 0108, Cairo: Economic Research Forum.

Article Received: November 5, 2004
Accepted: February 21, 2005