Análisis Económico
Núm. 45, vol. XX
Tercer cuatrimestre de 2005

Schooling and child labour in Mexico: an empirical analysis

(Received: february/05–accepted: june/05)

*Antonia López Villavicencio**

Abstract

Since education is a major factor in economic and social development, what determines school assistance is a major question that must receive special attention. We use the sample of children aged 6 to 17 from the Mexican Survey. We try to find what are the major factors determining school assistance, part-time or full time work. Here, working also implies home duties, even if these are unpaid. We found that family background and its economic and wealth situation play an important role in the decisions. We also found that girls older than 14 years old are less likely to work than boys.

Keywords: Latin America, Mexico, education, child labour, development.
JEL Classification: C35, D10, I20.

* Department of Applied Economics, Universidad Autónoma de Barcelona (alopezv@selene.uab.es).

Introduction

It is well known that education, particularly when obtained through schooling, is a major factor in economic and social development. Indeed, the connections between schooling and human capital on the one hand, and economic growth, income inequality and poverty on the other, are well established empirically as well as in economic theory.[1] There is also a growing consensus that schooling is an important development indicator in itself because it affects individual capabilities to satisfy needs through a more effective use of resources and it may be a source of utility per se (Behrman, 1989). Moreover, schooling is thought to be a major mechanism through which intergenerational social mobility is affected.

Low income, which induces families to send their children to the labour market, combined with a lack of or inadequate schools are often cited as constraints on human capital investment in developing countries. Which constraints are more important, and which policies can best promote schooling, are questions that have stimulated much research on the determinants of school enrolment and attainment (Glewwe and Jacoby, 1994).

School and work are usually considered mutually exclusive categories, both in the mind of the researcher as well as in official data (ILO, 1996). But is a fact that in developing countries many children work even when they are enrolled in school. Some authors believe that problems appear whenever children are allowed to work at all, arguing that this activity is detrimental to adult wages and employment, thus contributing to poverty. Another, opposing, view is that work can help with the processes of socialization and training. The problem in this case is that of the exploitation of children and their exposure to hazardous work. This has coincided with a widespread realisation that simply banning child labour is unlikely to eradicate this phenomena and may even be counter-productive (Ray, 2000).

In spite of the fact that there are several factors determining labour income inequality, without any doubt some of the main factors are the different educational levels and the way in which the market remunerates different types of education. According to some data (IDB, 1998) the world's largest per capita income inequalities

[1] On human capital, see Lucas (1988); Mankiw, Romer and Weil (1992). For examples on aggregate cross-country studies that emphasize schooling with a larger overview of the development process see Barro (1991); Barro and Lee (1993, 1994), Barro and Sala-I-Martin (1995), King and Hill (1993); Page *et al* (1993); Schultz (1990, 1993), UNDP (1998) and World Bank (1990, 1991). For the connections between schooling and income distribution see Almeida Dos Reis and Paes de Barros (1991), Knight and Sabot (1991) and Psacharopoulos *et al*. (1992), amongst others.

are found in Latin America, and especially in Mexico and Brazil, where income differences between the poorer and the richer strata of the population, and between workers, are extreme. In Mexico, for instance, a worker with six years of education (equivalent to completing primary school) earns almost twice as much as a worker with no education. With 12 years of education (completing secondary school), the difference in income compared with workers having no education amounts to 170 percent. Furthermore, for workers with 17 or more years of education, the gap is 260 percent (IDB, 1998).[2] Income gaps between educated and uneducated workers also tend to increase with other factors such as age, gender, area of residence, type of employment and economic sector.

Thus, if reductions of inequality and poverty are to be achieved, there is no doubt that one of the priorities in Mexico should be the investment in human capital and, particularly, the investment in education. Then, it is of crucial importance to see what determines school attendance behaviour, since this factor might indicate in which way the policies should be directed.

Thus, the objective of this paper is to study the determinants of school attendance behaviour in Mexico. The basic hypothesis of this study is that objective conditions, and especially poverty, are the main factors that compel families to send their children to the labour market. But we do recognize that, given these objective conditions, other factors also affect the degree in which children work and attend school, and we will attempt to measure the quantitative importance of the factors involved on the basis of econometric estimates.

The data we shall utilize for the analysis comes from the Mexican Household Survey on Income and Expenditure (ENIGH) for the years of 1992, 1994, 1996, 1998 and 2000. This survey covers 10,530, 12,815, 14,042, 10,952 and 10,108 households (randomly selected) and 50,561; 60,027; 64,562; 48,952 and 42,535 individuals respectively from the whole country.[3] Although this survey is not specialised in education nor child labour, it provides information on the educational and labour force status of household members that was collected from five sources of the ENIGH- separate household, individuals, expenditure, income and non-monetary transactions questionnaires.[4] One of the advantages of using this household survey data is that it is possible to divide the population sample into three different

[2] In accordance to the IDB, the gap for workers with six years of education is 40 percent in Peru and 35 percent in urban Argentina. For those with 12 years of education, the gap is 80 percent in both countries. See IDB (1998).

[3] Encuesta Nacional de Ingreso y Gasto de los Hogares (ENIGH 1992, 1994, 1996, 1998 and 2000), INEGI.

[4] In the ENIGH, a person is defined as being in the labour force if he/she worked at least one hour in the month before the survey or if he/she did not work for reasons beyond his/her control.

age categories: those in primary school age, those in secondary school age[5] and finally, those in high-school age. Second, it takes account of the whole population, that is, urban and rural households of all Mexico states.

Although there are a few studies on children's education and work in Mexico, to our knowledge, this dataset has not been hitherto utilized in order to analyse the issue we shall be dealing with in this paper. For instance, Knaul, Levinson y Moe (2001), using data from the Encuesta Nacional de Empleo Urbano (National Urban Employment Survey, ENEU), estimate the determinants of studying and working, doing both, or doing neither for 12 to 17 year-olds in urban Mexico. They find that when the definition of work includes both labour force employment and household domestic work, it is less likely for girls than for boys to specialise in school. Christenson y Juarez (1987) find that education of parents, family income, family size and female headship increase the likelihood of child employment, but they do not analyse schooling. Finally, Abler, Rodriguez & Robles (1998) use data from 1984 and 1992 rounds of the ENIGH and investigate tendencies in the allocation of children's time between school and work in Mexico. They find that adolescents moved decidedly away from school and towards work, and explain that change in time allocation by a decline in the quality of public schooling and an increase in the extent and severity of household borrowing constraints.

This paper is organized as follows. In the section that follows this brief introduction, we will provide a survey of the theoretical literature, and in particular that dealing with human capital. Next, we will describe the case of Mexico, where we introduce the reader to the general characteristics of school attendance, and put forward some of the characteristics of the households that emerge from the Income-Expenditure survey. In the section that follows we carry out econometric analysis. A final section presents our conclusions.

1. The theoretical literature

Although the literature on child labour is extensive, theoretical writings on the subject are relatively few.[6] Below we present mainly ideas that were originally put forward by Becker (1965), Jacoby (1994), Glewwe y Jacoby (1994), which, with te exceptions first one, deal with child labour in developing countries. Generally speaking, these authors study households as decision units that consider whether or

[5] Most of the empirical investigations on child labour and education pooled all the children into one big group. See, for instance, Jensen and Nielsen (1987) and Ray (2000).

[6] For an extensive discussion about child labour theories, see Basu (1999).

not to send their children to school, and where school attendance is regarded as an investment in "general human capital".[7] They assume that there is a trade-off between this investment and an investment in "specific human capital", acquired by children through their participation in the family's economic activities.

Parents are assumed to rely on their children to insure their subsistence after retirement. Therefore, their objective is to maximise the discounted total future income of their children, net of schooling costs, subject to a budget constraint. The life of the child can be divided into three periods. During the first part of its life, the child attends school on a full-time basis during which general human capital is accumulated.[8] During the second period, the child starts working while still attending school.[9] The last period is completely dedicated to work and the child's earnings depend on the educational level attained, on the experience acquired during the second period, and on the experiences acquired after its schooling.

It is also necessary to take some heterogeneity in the learning capacity of children into account. Such heterogeneity can be linked, for instance, to differences in the education level of their parents.

The economic factors that affect child time allocation can be divided into three broad categories: expected rates of return on investment in human capital, household borrowing constraints (*i.e*. credit rationing constraint) and portfolio analysis.

The expected rate of return on human capital is defined as the average annual benefits from the investment, divided by net present value of all costs associated with the investment. Within these confines, the economically optimal decision concerning time allocation between schooling and other activities is based on whether

[7] It has been argued (Mincer, 1974, Flug *et al*., 1998, etc.) that human capital has several properties that differentiate it from investment in physical capital: investment in human capital is irreversible in the sense that it cannot be sold; human capital cannot serve as a collateral because it is not possible to expropriate; investment in human capital implies moral hazard because the effort that an individual puts into studying is difficult to observe by a third party; and investment in education has returns over the long term. All these properties make it difficult for the development of markets where resources are mobilised to finance education: imperfect information raises the cost of monitoring, the impossibility of using human capital as collateral makes lenders more cautious, the irreversibility of investment in human capital makes investors more cautious, and the fact that returns are spread over the long run makes all of these problems more severe.

[8] Given that in Mexico primary school is compulsory by law, in principle every child has to assist at least one year to the school. By 1996, 95.6% of the children aged 6 to 7 years were attending to school.

[9] It can be added, though, that at this stage the household decides whether or not the child will participate in the labour force. This decision will depend on several factors, amongst which household's income and wealth might be the most important. After that decision, for those who have to participate in the labour force, a job sector is chosen which maximises households profits. For instance, if the household decides that the child has to work but his market wage rate is less than the marginal value of his time in working on his family's farm or other enterprise, the optimal choice is to work in the family enterprise. Of course, most of the times the "decision" about the sector will not depend on the household's preferences but rather on labour market conditions.

the rate of return on an additional year of schooling exceeds the interest rate.[10] If the rate of return on an additional year of schooling is less than the interest rate, then the resources that would have been devoted to schooling could better be used elsewhere.

Monetary benefits to investments in schooling arise because those with more[11] schooling tend to earn more. These benefits not only depend on the number of years of schooling but also on the quality of schooling.[12]

The monetary costs of investment in schooling fall into two categories: the direct cost of going to school, which include such items as tuition, books, school uniforms, transportation costs and school supplies; and the opportunity cost of schooling, which basically take the form of foregone earnings or other foregone opportunities.[13] For poorer households, any increase in direct costs deters investments in schooling, both because it reduces the expected rate of return from schooling and because it represents an additional demand on limited current financial resources. Borrowing constraints play an important role in the decisions about school attendance. While some households have enough income to finance this investment, poorer households might not have enough income to cover the up-front costs. If they wish to make investments in their children's human capital, they have no choice but to borrow money.[14] Imperfections in the capital market make it particularly difficult for poorer households to have access to credit to finance education (Loury, 1981; Galor y Zeira, 1993; Flug, Spilimbergo y Wachtenheim, 1998). In general, poorer households are constrained in the amount they can borrow to finance all kinds of investments such as investments in human capital (*i.e*. investments in schooling).[15]

[10] The interest rate in this case should reflect the opportunity cost of resources or, in other words, what the resources devoted to the investment could have earned if they had been invested elsewhere.

[11] As mentioned before, some studies have found that the average returns on primary education in Mexico are about 14 percent, while those on secondary education are about 16 percent (IDB, 1999).

[12] Some sources (Ministry of Public Education, Mexico 1997) have found that school quality tends to be lower in rural areas of Mexico than in urban areas.

[13] In some cases, particularly in rural areas of developing countries, such as Mexico, transportation costs can be substantial. The opportunity cost of schooling is the income that the family could have earned if the child were working instead of going to school. This work could have been at a family-owned enterprise, such as farm or other business, or for an outside business. It has been argued that for many children, particularly young children, the opportunity cost of schooling is quite low, since there is little they could do productively if they worked (Abler, 1998). For many other children, particularly teenage children and young adults (*i.e.*, those in secondary school and high-school age), the opportunity cost of schooling can be substantial.

[14] In this case, collaterals, such a property of a house, play a significant role.

[15] Most of the time, poor families are not just constrained in the amount they can borrow, but they have no access to credit at all to be able to finance any kind of investment, such as education. The lack of collaterals (*i.e*. own house) and the household's economic uncertainty and instability (*i.e*. parents with unstable jobs) are crucial factors for this situation.

Finally, schooling and other forms of human capital can be viewed as part of a portfolio of assets held by both individuals and households, where every type of asset is beneficial to the individual because it yields income, and possible other, non monetary returns. Some individuals or households, especially in developing countries, may have very limited assets and may have very limited opportunities for diversifying their portfolios. The household then has to choose between competing types of investments (amongst which we find schooling) that vary in terms of their expected returns and their degree of risk.[16]

2. The case of Mexico

2.1 General data on education

In most developing countries, school attendance varies widely in response to economic and institutional changes. This sensitivity to the environment, added to the fact that school attendance rates are often very low, suggests that there is a wide margin of progress to exploit and that education is certainly a factor of development upon which institutions can have a great influence.

In reletion to this, the case of Mexico is worth studying. The elementary school enrolment rate is still very low. On the other hand, during the 1980s the country faced a severe economic crisis, which brought about cuts in the government budgets. Thus, the share of education expenditure as a porcentage of GDP dropped from 4.9 percent in 1981 to 3.1 percent in 1988.[17]

The Mexican economy recovered in the late 1980s and early 1990s. However, the economy suffered another serious jolt in late 1994, which brought about a fall in GDP of about 7 percent in 1995. While the economy has mostly recovered from these shocks, the recovery process is not yet complete; in fact, in 2001 output per head went down again. The economic perspectives for the near future are not much better and this might bring new budget cuts by the government, especially those focused on education and similar social programs.

Mexico's educational levels have increased and the illiteracy rate has considerably fallen over the past 30 years. In the early 1970s, one out of every four people aged 15 years or over was illiterate while in 1998 the figure was one in every ten. However, in absolute terms, the illiterate population has remained steady at above

[16] Expected rate of return analysis, like portfolio analysis, compares the expected rate of return on schooling to the expected rate of return on other investment. However, portfolio analysis differs from the expected rate of return analysis in that it introduces risk issues into the decision-making process.

[17] Secretary of Public Education (2000).

six million over all this time and tends to become concentrated in groups of elderly people, and isolated and dispersed communities, particularly indigenous ones, and is more pronounced among women than men. Furthermore, the educational progress has lagged far behind other developing countries in Asia and Africa and even from Latin America. Thus UNESCO reports that the average years of schooling in Mexico is about 5 years, compared with almost 10 years in Chile and 9 years in Argentina.

On the other hand, Mexico is one of the Latin American countries with greatest differences in returns to education-*i.e*. percent income increase by years of schooling-possibly a reflection of quality differences between rural and urban areas, as well as a lack of adequate labour opportunities for more educated rural workers. Returns on education vary among educational levels. In Mexico, the average returns on primary education were found to be 14 percent, while the returns on secondary education do not exceed 16 percent (IDB, 1998).[18]

Variations in school attendance rates are clearly linked with changes in the educational off supply. Nevertheless, in order to be fully understood, the problem of school attendance needs to be analysed in relation to the characteristics of the demand for education.

2.2. Some characteristics of school attendance in Mexican households

As mentioned before, we shall use data from Mexico's most recent Income and Expenditure Household Surveys. Below we briefly describe some of the most important characteristics of the sample.

Table 1 shows some characteristics regarding the school attendance and labour force participation of the entire population of children aged 6 to 17 for the years 1992, 1994, 1996, 1998 and 2000. As can be seen, the percentage of children that attend school steadily has increased since 1992. This might be due to the fact that in 1993 secondary school attendance was made compulsory . Nevertheless, a sharp increase in the percentage of working children (*i.e*. paid jobs) can be observed since 1992, growing from 8 percent in that year to 20 percent in 2000. Despite the government's efforts to stimulate schooling the data suggest that the share (and the number) of children combining school with work has grown over the past years.[19]

[18] The same source reports that the returns on secondary school in Africa were around 30 percent in 1990 while in industrial countries they were about 12 percent that same year.

[19] PROGRESA is one of the major programs of the Mexican government aimed at developing the human capital of poor households. PROGRESA began its operations in august of 1997 in an effort to break the entangling web of poverty where malnutrition, morbidity, high infant mortality rates, high fertility, school dropout rates and unhealthy living conditions prevail.

Table 1
Schooling and labour force participation for children aged 6 to 17

Year	*Children´s activity*	
	Attending shool %	*Not attending school* %
1992	78.6	21.1
% of these children working	2.9	25.5
1994	80.6	19.4
% of these children working	4.7	26.8
1996	82.6	17.4
% of these children working	6.5	30.8
1998	82.6	17.4
% of these children working	7.4	32.9
2000	84.1	15.8
% of these children working	16.7	36.8

Source: ENIGH, different years.

A breakdown of the age groups is presented in Table 2. As it can be seen, the percentage of children that attend school rom ages 6 to 14, and 15 to 17 has increased, particularly in the case of the second group. At the same time, the percentage of the population aged 15 or more with complete primary and complete secondary school education has slightly increased since 1992.

Table 2
Indicators for the mexican educational system sample population

	1992 %	*1994* %	*1996* %	*1998* %	*2000* %
Population aged 6 to 14 years old attending school	88.7	90.7	91.9	92.4	93.5
Population aged 15 to 17 years old attending school	45.3	45.8	50.9	48.7	52.9
Percentage of the population 15 and Older with at least completed primary school	64	66	69	66	66
Percentage of the Population 15 and older with at least completed secondary school	37	39	41	41	41

Source: ENIGH, different years.

Table 3 presents the percentage of children, by area of residence, who were attending school during the 5 periods considered in this study. It can be noticed that the differences between urban areas[20] has diminished since 1994 for people

[20] Includes all areas with more than 2,500 habitants.

ages 6 to 14 (around 94% in urban areas and 91% in rural areas) but is still of considerable importance, especially for children aged 15 to 17 (it is more than 10% higher in rural areas). In both age groups the section that attends school has increased since 1992, especially for children living in rural areas, where it has increased by about five percent in each of the age groups.

Table 3
Population aged 6 to 14 and 15 to 17 attending school, by geographic area

	Metropolitan area	*100,000 and more inhabs.*	*15,000 to 99,999 inhabs.*	*2,500 to 14,999 inhabs.*	*Less than 2,500 inhabs.*	*Total*
6 to 14 years old						
1992	95.27	92.98	92.64	90.64	83.04	88.73
1994	95.30	94.57	94.34	88.90	87.02	90.65
1996	95.17	94.65	94.21	91.82	88.71	91.92
1998	95.33	93.56	91.76	93.49	89.64	92.43
2000	..	95.86	95.82	93.54	91.01	94.00
15 to 17 years old						
1992	61.75	57.42	58.59	48.18	28.03	45.87
1994	61.52	59.13	53.87	46.55	30.38	45.87
1996	65.79	66.30	50.38	50.76	32.44	50.88
1998	61.48	53.70	56.63	51.29	33.71	48.79
2000	..	66.49	56.49	55.25	39.02	52.87

Source: ENIGH, different years.

Table 4 reports the principal activity for children between 6 and 11, children from 12 to 14 and for children 15 to 17. While school assistance has increased since 1992 for all age groups, the figures also show an increase in children that participated in the labour force, or were out of the labour force but who were working at home, the increase being larger for children aged 12 to 14.[21] Finally, for all age groups home production has decreased. Again, these data show that children are increasingly combining school with work.

[21] Children who where in the labour force including those who had, at least, one paid temporary or permanent job. Children who were full time students are those who did not report to be receiving any kind of income.

Table 4
Principal activity of children (percentage)

Year	*In labour force*[1] *%*	*Not in labour force*			
		Family worker not retributed	*Full-time student %*	*Home production*[2] *%*	*Unemployed* [3]
6 to 11 years old					
1992	1.1	n.s	93.2	3.2	n.s
1994	2.6	n.s	95.7	3.3	n.s
1996	3.2	n.s	96.7	3.0	n.s
1998	5.4	n.s	96.2	0	n.s
2000	12.1	n.s	96.3	0	n.s
12 to 14 years old		%			%
1992	6.1	6.0	75.2	10.2	n.s
1994	6.8	7.7	75.2	8.9	n.s
1996	10.2	8.4	74.2	7.0	n.s
1998	11.6	9.3	87.1	6.4	1.2
2000	24.3	7.3	87.4	5.0	0.7
15 to 17 years old					
1992	23.6	10.0	41.2	18.9	3.3
1994	22.7	11.2	41.0	18.5	2.9
1996	24.5	10.7	44.2	15.2	2.4
1998	27.2	11.7	58.4	14.5	2.8
2000	32.1	10.2	62.1	13.7	2.8

[1] Children who had a paid job . It does not exclude those studying at the same time.
[2] Namely, domestic chores.
[3] Children who looked for a job the month prior to the survey and did not find one.
n.s. Not significant.
Source: ENIGH, different years.

Table 5 shows the activities of children in secondary school age. As previously mentioned, the participation in the labour force has increased for both urban and rural areas, the highest increment being for rural girls. At the same time, there has been a significant decline in the proportion of boys who are full time students. This table also shows that there are generally no significant differences between girls and boys in the percentages that are full-time students. However, there are significant differences in labour force participation and in home production. Boys are significantly more likely than girls to be in the labour force, while girls are more likely than boys to be engaged in home production.[22] There are also

[22] In other words, the principal opportunity cost for boys was foregone earnings, while for girls it was household work.

significant differences in time allocation between rural and urban children. Urban children are significantly more likely than rural children to be full-time students, and less likely to be in the labour force.

Table 5
Principal activity of children 12-14, by gender and geographical area

		Not in labour force [1]		
Year	*In labour force**	*Family worker not retributed*	*Full-time student*	*Home production*
Urban boys	%	%	%	%
1992	8.4	2.0	91.2	1.1
1994	10.4	4.0	88.7	1.4
1996	11.0	4.6	86.9	0.1
1998	8.9	4.8	88.7	1.3
2000	10.8	3.8	90.4	1.2
Urban girls				
1992	3.2	1.0	87.8	9.9
1994	3.1	2.0	87.2	9.8
1996	6.8	3.2	85.4	7.1
1998	7.7	3.3	87.4	8.0
2000	7.3	2.9	90.5	5.4
Rural boys				
1992	27.4	17.0	71.8	2.5
1994	30.1	19.0	70.6	2.1
1996	16.3	22.3	63.7	1.1
1998	17.9	22.4	67.7	2.1
2000	46.8	19.9	65.9	1.4
Rural girls				
1992	5.1	1.0	64.2	31.5
1994	7.5	7.0	64.6	26.6
1996	10.7	7.4	63.7	20.1
1998	11.8	9.3	69.6	18.3
2000	45.0	6.5	67.6	24.6

* Children who had a paid job . It does not exclude those studying at the same time.
[1] Children who did not receive an economic remuneration.
Source: ENIGH, different years.

Table 6 below presents the same information as our previous table but for children aged 15 to 17 years. Note the sharp increase in the proportion of rural girls in the labour force, or doing domestic chores with the correspondent decrease in the proportion of these girls studying full time. The proportions have remained quite similar for urban girls, only the percentage of home production decreases significantly. Rural boys are participating more in the labour force, and less as unpaid family workers, while urban boys are doing more paid jobs while their percentage as unpaid workers also increases.

Table 6
Principal activity of children 15-17, by gender and geographical area

		Not in labour force [1]		
Year	*In labour force*	*Family worker not retributed*	*Full-time student*	*Home production*
Urban boys	%	%	%	%
1992	30.0	6.2	56.2	1.1
1994	28.7	6.5	52.9	1.7
1996	26.6	6.0	56.4	2.6
1998	30.3	8.1	52.4	1.2
2000	32.0	7.8	52.1	2.1
Urban girls				
1992	18.0	1.1	58.2	21.7
1994	16.6	5.8	51.8	23.0
1996	16.2	3.5	54.7	21.0
1998	18.9	4.9	50.7	18.2
2000	19.7	4.1	56.2	15.7
Rural boys				
1992	33.2	32.1	28.9	2.1
1994	31.6	31.1	28.8	2.4
1996	38.8	29.8	27.7	0.6
1998	37.4	29.1	28.9	1.0
2000	52.8	24.0	24.5	1.1
Rural girls				
1992	13.4	6.0	31.9	53.0
1994	14.4	9.0	26.7	49.1
1996	19.8	10.0	26.9	41.2
1998	25.4	10.9	26.5	36.2
2000	30.3	9.5	24.5	33.6

Source: ENIGH, different years.

3. Econometric analysis

3.1 data and descriptive statistics

We already mentioned that the ENIGH dataset we employed in this study is a very complete household survey. However, it also has some important drawbacks. The tirst is the lack of longitudinal information -even though the questionnaire includes some retrospective questions-. This imposes the need to assume a strong stationary hypothesis in the econometric analysis. Second, the data does not permit the control of some aspects of the educational offer, since information on school quality is not available and thus cannot be introduced in the estimated demand equations. It is, therefore, impossible to know at how educational demand responds to school quality.

A sample of 13,850; 16,051; 16,643; 12,238; and 10,258 children in the age bracket of 6 to 17 for the years 1992, 1994, 1996, 1998 and 2000 respectively, included in the ENIGH survey, was pooled in the present work (a total of 69,040 children). This group was selected because these ages are supposed to be the normal ones for starting primary school and tinishing high school in the Mexican Education System. Three sub-samples were taken from this sample of children. The first pooled sub-sample consists of the 37,590 children between the ages of six and eleven (the most common ages for enrolment in Mexico's six grade primary school sequence) who have not spent more than five years in school. Of these children, 90.6 percent were full-time students –namely, those who did not have a paid or unpaid job and were attending school– and 5.0 percent had a part-time job –those with a paid or unpaid job while studying–.[23] The second sub-sample consists of 19,944 children aged 12 to 14, which is supposed to be the normal secondary school age, from which 71.9 percent were full time students as defined above, 10.9 percent had a part-time job and 12.5 percent were working on a full-time basis. Finally, the third sub-sample consists of 11,506 children aged 15 to 17, of which 40.5 percent were only attending school, 8.2 percent were doing part-time work and 40.8 percent were full time workers.

3.2 The model

We applied econometric techniques in order to identify the determinants of school attendance in Mexico. Our estimation procedure advanced along the following lines. Firstly, an ordered probit model was specified for the whole sample and for the different age groups. Secondly, the sample was split into girls and boys, estimating particular equations by gender for the different age groups. The dependent and independent variables were chosen on the basis of the theoretical literature previously discussed, taking previous results from other studies also into account.

We decided to use an ordered probit model because it is useful in the presence of several alternatives and also because we believe that the choices are made simultaneously rather than sequentially. Indeed, the well known ordered response models can be used when there is a choice between *M* alternatives, with a logical ordering in them (for example, full-time work, part-time work or not working).[24] Another characteristic is that some quantitative variables can only be

[23] Notice that the percentage do not sum up to 100% since there were some ambiguous answers. We did not include these children in the econometric analysis.

[24] An ordered response model can only be applied if there exists a logical ordering of the alternatives. The reason is that there is assumed to be exist one underlying latent variable that drives the choice between the

observed to lie in certain ranges.[25] Multi-response models are developed to describe the probability of each of the possible outcomes as a function of personal or alternative specific characteristics. An important goal is to describe these probabilities with a limited number of unknown parameters and in a logically consistent way. The model can be written as:

$$y_i^* = x_i'\beta + \varepsilon_i$$
$$y_i j = if\ \gamma_{j-1} \prec y_i^* \leq \gamma_j \qquad (1)$$

where y_i^* is a latent variable, the $y_j s$ are unknown threshold values with $\gamma_0 = \infty, \gamma_1 = 0$ and $\gamma_M = \infty$. Consequently, the probability that alternative *j* is chosen is the probability that the latent variable γ_i^* is between two boundaries γ_{j-1} and γ_j.

Briefly, in our example, the outcome of interest is whether a child works full-time, part-time or not at all. To model the outcomes, y_i = 1 (not working), y_i = 2 (part-time working) and y_i = 3 (full-time working). If part-time is defined as working between 1 and 25 hours while studying, we might consider modelling the choice of work status as arising from the value of a single indicator variable y_i^*. The higher the value of y_i^*, the more likely the child is to work. Then ,the model can be written as:

$$y_i^* = x_i'\beta + \varepsilon_i$$
$$y_i = \begin{cases} 1 & if\ y_i^* \leq 0, \\ 2 & if\ 0 \prec y_i^* \leq \gamma, \\ 3 & if\ y_i^* \succ \gamma \end{cases} \qquad (2)$$

In (2), one of the boundaries is normalized to zero, which fixes the location. To normalize the scale of one can assume that has a fixed variance. In the ordered probit model this means that is NID(0,1). The implied probabilities are obtained as:

alternatives. In other word, the results will be sensitive to the ordering of the alternatives, so this order should make sense. For a full explanation, see Verbeek (2001).

[25] This may be because questionnaire respondents are unwilling to give precise answers, or unable to do so.

$$
\begin{aligned}
P\{y_i=1|x_i\}&=P\{y_i^*\le 0|x_i\}=\Phi(-x_i^*\beta),\\
P\{y_i=3|x_i\}&=P\{y_i^*\prec\gamma|x_i\}=1-\Phi(\gamma-x_i^*\beta),\\
P\{y_i=2|x_i\}&=\Phi(\gamma-x_i'\beta)-\Phi(-x_i^*\beta)
\end{aligned}
\tag{3}
$$

where Φ is the standard normal distribution function. Since is unknown, it is estimated jointly with β, based upon maximum likelihood, where the above probabilities enter the likelihood function. The interpretation of the β coefficient is in terms of the underlying latent variable model. For our particular case, a positive β coefficient means that the corresponding variable increases a child's need to work.

Thus, the dependent variables are full-time schooling (FSCHOOL), part-time work (PARTIME) and full-time work (FTWORK).[26] In the specification, full-time schooling means children who only attended school, part-time work means children who were attending school and nad some kind of economic activity, including unpaid family workers or household activities, and, finally, full-time work which includes the same activities as part-time but without school assistance. We decided to account for all these activities because we are interested in analysing all actions, even the unpaid ones, that inhibit children from attending school.[27] Table 7.1, 7.2 and 7.3 below present the descriptive statistics of the dependent variables for the whole population as well as for girls and boys in different groups.

Table 7-1
Full-time school attendance, part-time work and labour force participation: definition of variables, mean and standard deviations for the total sample of children, by age groups and by gender

Dependent variables	*Definition*	*Sample*	*Girls boys*	
Fschool	= 1 if the child does not work at all and attends school, 0 otherwise	0.742 (0.437)	0.740 (0.438)	0.743 (0.436)
Partime	= 1 if the child works part-time (attends school and works less than 25 hours), 0 otherwise	0.071 (0.258)	0.062 (0.245)	0.080 (0.272)
Ftwork	= 1 if the child works full-time, 0 otherwise	0.127 (0.332)	0.150 (0.357)	0.104 (0.305)

Note: Standard deviation in parenthesis.

[26] Here, full-time studying took the lowest value while full-time working took the highest one.

[27] In their study, Knaul, et al.(2001) used the Encuesta Nacional de Empleo Urbano (National Urban Employment Survey, ENEU). Since the ENEU does not include an explicit question on school attendance or drop-out, they inferred it from a positive number of hours spent studying. For each dependent variable they set 15 hours per week to be the level that determines primary activity. In other words, for a youth to be categorised as

Table 7-2
Girls by age groups

Dependent variables	*6 to 11*	*12 to 14*	*15 to 17*
Fschool	0.906	0.717	0.407
	(0.291)	(0.450)	(0.491)
Partime	0.049	0.090	0.062
	(0.216)	(0.286)	(0.242)
Ftwork	0.000	0.165	0.455
		(0.371)	(0.498)

Table 7-3
Boys by age groups

Dependent variables	*6 to 11*	*12 to 14*	*15 to 17*
Fschool	0.905	0.720	0.402
	(0.292)	(0.448)	(0.490)
Partime	0.050	0.127	0.098
	(0.220)	(0.333)	(0.297)
Ftwork	0.000	0.085	0.360
		(0.280)	(0.480)

Three kinds of variables were included as independent variables in the econometric work: those concerning the child's characteristics, those concerning the household's characteristics, and finally those concerning regional characteristics. Table 8.1, 8.2 and 7.3 provide the definitions of the explanatory variables that were included in each equation model as well as their mean and standard deviations.

Table 8-1
Independent variables: definition of variables, mean and standard deviations for the total sample: child´s characteristics

Name of variable	*Definition*	*Mean*	*S.D.*
Age	Child´s age in years	11.37	3.41
Femate	= 1 if child is female, 0 otherwise	0.49	0.49

specialising in school, she must study for at least 15 hours per week and work less than 15 hours. In order to be categorised as combining work and school, the youth must spend at least 15 hours per week studying and 15 hours per week working. Finally, the youth who specialises in work must spend at least 15 hours per week working but fewer than 15 hours per week studying.

First, regarding the child's characteristics, two individual characteristics were included in the specifications. On the one hand, the child's age (AGE) since older children are more likely to work than younger children and, accordingly, are less likely to attend school. On the other hand, the gender of the child, which may influence the decisions about schooling and work. In most studies on the subject, being a girl (FEMALE) has been found to have a negative effect on attendance at school (Jensen & Nielsen, 1987; Bommier & Lambert, 2000; Ray, 2000; etc.). Nevertheless, as previously mentioned, boys are more likely to be sent to the labour market by their parents, while girls are more likely to stay at home doing some household chores (*i.e*. taking care of younger siblings, etc) which, even if it is most probably an unpaid job, is considered as a job in our study because it also represents an activity which makes it harder to continue studying.

Second, with respect to household characteristics, some activities and particularities of the siblings were taken into consideration.[28] The number of younger siblings - (NYYOUNSI) was included, since older children may have to stay at home instead of attending school, substituting for their parents while they work. It may also be the case that older children have to work while either the mother or the father stays at home to take care of younger siblings.[29] Besides, the presence of younger siblings may imply bigger economic responsibilities for elder brothers or sisters. At the same time, the presence of older siblings, working or not (NOLSI) may imply that the youngest can study instead of working since older siblings contribute to the family income and thus, the primary responsibility for funding children's education does not fall completely on the parents. This variable may offset the negative effects on the school attendance result from having younger siblings or brothers/sisters close in age.

On the other hand, parental income (LOGINC)[30] was included because, in accordance with the notion of borrowing constraints, higher income reduces the necessity for the family to send the children to the labour market, so that they are more likely to attend school full time and even for their entire educational careers.

[28] See Patrinos and Psacharopoulos (1997) for a very complete work about the importance of siblings in the household.

[29] It has been argued (Abler, 1998) that the presence of young children can deter investments in schooling by adolescent girls (because young children increase the opportunity cost of time spent by adolescent girls in school), this negative relationship is stranger for households facing borrowing constraints. For these households, the presence of young children not only reduces the expected rate of return to schooling but also represents an additional demand on limited current resources.

[30] That is, log of household income net of children's earnings.

On the other hand, as a proxy for wealth and a possible collateral associated with looser borrowing constraints (*i.e.*, the borrowing constraint may be not binding) we included house ownership (HOUSE).[31]

Table 8-2
Household characteristics

Name of variable	*Definition*	*Mean*	*S.D.*
LOGINC	Log of the household income net of children's earnings	2.37	1.03
NYOUNSI	No. of younger siblings	1.39	1.56
NOLSI	=1 if there is presence of older siblings in the labour force, 0 otherwise	0.31	0.46
HEDUFA	=1 if head of family is literate, 0 otherwise	0.82	0.38
HWORKS	=1 if head of the family has a paid job, 0 otherwise	0.92	0.26
HNCONTRA	=1 if head of family does not have a labour contract, 0 otherwise	0.26	0.44
HFEM	=1 if head of the family is female, 0 otherwise	0.11	0.31
SPARENT	=1 if head of the family is single-parent, 0 otherwise	0.16	0.37
HAWORKER	=1 if head of the family works in the primary sector, 0 otherwise	0.08	0.28
HSELFE	=1 if head of the family is self-employed, 0 otherwise	0.20	0.40
HEADAGE	Head of the family's age	41.62	13.87
HOUSE	01 if family owns a house, 0 otherwise	0.53	0.49
Y92,Y94,Y96,Y98,Y00	Dummy equal to 1 for year i (I=1992,1994,1996,1998,2000)		

Characteristics of the head of the family were also considered in the analysis. On the one hand, we include whether or not the head of the household is literate (HEDUFA) since more educated parents may put a higher value on children's education, or may feel more secure about their work stability, or both. On the other hand, an indicator for whether or not the head is a single parent (SPARENT) was also included, since this condition may make it more difficult for the household to send the children to school instead of sending them to the labour market or to work without economic retribution.[32] We also included an indicator for whether or not the head household is a woman (HFEM) since women and men may value children's education differently.[33] The age of the head of the household (HEADAGE) was also

[31] Flug, Spilimbergo and Wachtenheim (1998) found evidence that secondary enrolment in some Latin American countries is negatively affected by the lack of financial markets, income or employment volatility and income inequality. In their study they argued that these three factors explain almost half of the educational gap of Latin America vis-à-vis the industrialised countries.

[32] It may be added, though, that the head's absence in Mexico is linked to seasonal migration and it may imply extra remittances to households.

[33] It has been argued that female-headed houses usually receive extra income from what is known as "survival strategies" which is, mainly getting extra income from relatives or other people who rent a room in the house.

included. The activities of the head where split into whether or not the head is working and receiving an income for this (HWORKS), if he/she does not have a labour contract (HNCONTRA), and whether or not the head of the household is self-employed (SELFE) since the presence of an inadequately employed head of household may be positively associated with child labour. Other variables included are whether or not the head is an agricultural worker (HAWORKER), since children living on farms may have greater work opportunities and, therefore, this variable may have a negative effect on schooling.[34]

Finally, two types of regional and year dummy variables were included in order to control regional variations in labour markets and levels of development. An indicator for whether or not the household is located in a rural area in also included (RURAL).[35] Rural dwellers, for example, typically live far from schools and therefore face higher transportation costs. Given that rural family incomes are, in general, lower than urban family incomes, the extra cost of sending the child to school may put a heavier burden on rural families than on urban ones.[36] We also incorporated an indicator variable for whether or not the household is located in the south of Mexico (SOUTH), which includes the states of Guerrero, Oaxaca and Chiapas, the less developed, most agrarian, most illiterate, most natural-resource based and poorest states of the country. Furthermore, Chiapas and Oaxaca contain the highest percentage of people speaking indigenous languages, and they are the principal areas of migration for the seasonal population (together with the state of Guerrero).[37] These two regional characteristics probably make the value of child labour higher in rural areas and in the south of the country.

Table 8-3
Regional´s characteristics

Name of variable	*Definition*	*Mean*	*S.D.*
South	=1 if the household is located in the south of the country, 0 otherwise	0.09	0.29
Rural	=1 if Household is located in an area with less than 2 500 habs., 0 otherwise	0.39	0.48

[34] Farms and many other family enterprises in Mexico tend to be labour intensive and family members themselves supply a large proportion of this labour.

[35] That is, areas with less than 2,500 habitants.

[36] While education is free in Mexico, there are still costs to the family, in particular in terms of foregone earnings, but also for outlays on school uniforms, utensils and transportation.

[37] As mentioned before, this brings the problem of migrating children who work for long periods to accompany their parents in order to help the family income.

3.3 Estimation results

Table 9 shows the coefficients and t-statistics of the ordered probit models for the whole sample of children and for the three sub-sample of total children (*i.e*., children aged 6 to 11 years, children aged 12 to 14 and children aged 15 to 17 respectively). The results for girls and boys in separate groups are presented in Table A.1 and A.2, respectively (see Appendix).

Table 9
Ordered probit estimates

Children aged 6 to 17	*children aged 6 to 11*		*children aged 12 to 14*		*children aged 15 to 17*		*Notin labour force*[(1)]	
	N=65953		*N=35936*		*N=19386*		*N=10632*	
	Coefficient	*Z value*	*Coefficient*	*Z value*	*Coefficient*	*Z value*	*Coefficient*	*Z value*
Age	0.2117	86.91	0.0425	6.31	0.2434	18.21	0.2876	21.25
Female	-0.1149	-9.30	-0.0185	-0.88	-0.0852	-2.93	-0.2213	-10.14
Loginc	-0.1033	-11.22	-0.1200	-12.04	-0.1254	-12.67	-0.1232	-12.40
Nyounsi	0.1120	26.78	0.0699	7.88	0.1249	17.72	0.1457	21.14
Nolders	0.0075	1.58	0.0035	0.48	0.0196	2.27	0.0382	3.89
Hnocont	0.2221	13.55	0.1336	4.84	0.2105	7.27	0.3284	11.27
Hedufa	-0.3093	-17.79	-0.2226	-7.39	-0.3091	-10.42	-0.4520	-13.8
Sparent	0.0929	2.47	0.0767	1.02	0.0648	0.97	0.1885	3.08
Headage	0.0089	12.25	0.0046	3.43	0.0077	6.07	0.0130	10.62
Hselfe	0.3202	17.42	0.2146	6.64	0.3885	12.01	0.3623	11.47
Haworker	0.1608	6.62	0.1405	3.66	0.2504	6.03	0.1107	2.23
Hfem	0.2216	5.72	0.2320	3.02	0.2950	4.31	0.1231	1.95
Hworks	-0.2347	-6.97	-0.0153	-0.21	-0.2414	-4.05	-0.3099	-5.84
Rural	0.5284	37.91	0.4656	19.31	0.5820	24.18	0.5936	24.06
South	0.1459	7.46	0.1460	4.52	0.2319	6.89	0.0941	2.59
Houseouth	-0.0791	-5.87	-0.0997	-4.39	-0.0450	-1.91	-0.0859	-3.5

Note: t-statistic significant at 5% level.

As it can be seen, the decisions concerning school attendance or labour force work (paid or unpaid) are indeed determined by family income and wealth, but other factors play an important role as well. Thus, other relevant factors are the age of the child and some characteristics of the household, such as the number of younger siblings or the presence of older ones in the labour market, the economic activity, the age and the educational status of the household's head and area of residence (*i.e*. living in a rural area or in a poor county).

Certainly, the estimates from all of the equations show that children from households with a higher income and with more valuable holdings of durable goods (*i.e*. a properties such as a house) are significantly less likely to work and more likely to attend school.[38]

Turning to other results, the significance of the number of younger siblings increases with age and it seems to play a more important role for girls than for boys. Its positive effect on working as opposite to specialisation in school might be explained, as mentioned before, by the fact that the presence of infants increases the value of older time spen siblings' on economic activities, leading to early entrance into to the labour market, or to unpaid family workers –as might be the case for boys in Mexico– or, to engage in household's chores and supervise younger siblings –in the case of girls– (see Tables 4.5 and 4.6). On the other hand, the presence of older siblings working doesn't seem to play a significant role on the decisions regarding studying and working.[39] This result contrasts with those found in some other studies on the topic (Chernichovsky, 1985) where it was found that there exists some kind of "specialization", so that some children are assigned to economic activities, while others are sent to school and concentrate on this activity. What seems to be happening in Mexico is that larger families seem to be poorer than average, so that there is a greater likelihood of employment for children with more siblings, even if they are working. There might also be some kind of "custom" or tradition in the household whereby, when older siblings work, it seems natural for younger brothers or sisters to follow suit.

On the other hand, the coefficient on the female dummy variable shows that girls and boys of primary school age have similar probabilities of working or specialising in school. Nevertheless, girls older than 14 years old are considerably less likely to work than boys, even in our broad definition of work.[40]

[38] Nonetheless, this latest variable seems to play only a small part for some of the sub-groups of children, as well as for those in secondary school age and or boys aged more than 15 years old. This result might be related to the fact that the variable *house* implies a broad definition, so it takes the value of one for all those families who own any kind of house, no matter the quality (i.e. the materials used for building it), the size, the marketable value, etc. In Mexico, this is important, since many poor families are indeed owners of a house, but it might be of a poor quality and with low value.

[39] We kept all the variables in the model, even if they are not particularly significant, in order to control for this characteristics.

[40] By defining work to include both labour force employment and household domestic work, in Knaul, et al (2001), it was found that girls are 7.7 percentage points less likely than boys to specialise in school. As mentioned before, the data only include urban households. Our results defer from those in the sense that we also include rural families, and this may be the reason for males to be more likely to work instead of attending school than girls. Indeed, while girls are substantially more likely to engaged in household work, it is very common for rural boys to work as farmers with their parents, with or without getting an economic retribution.

Besides that, rural residence has a great positive impact on participation in the labour market as opposed to school attendance, and children from these areas are much more likely to be out of school and working full time than urban children, especially after primary school, the percentage increasing with the child's age. However, being from one of the poorest states in Mexico has no significantly negative effect on school attendance or labour force participation, particularly for older children.

The activities of the head of the family seem to have a strong effect on the decisions regarding whether or not to send the children to school or to work. In this sense, parental education is positively and highly associated with school attendance, and negatively related to work. Possible explanations may be that parental schooling improves the child's home environment; moreover it also raises unmeasured components of permanent income since higher educated heads have a better potential income than lessed educated ones.

Our results also show that the mere fact that the head of the household is working is not as relevant as the household's head uncertainty in his/her job (i.e. if he/she has a labour contract, or is self-employed). Indeed, children in a household with more economic uncertainty are particularly more likely to work. At the same time, coming from a household where the head works in an agricultural activity, has a negative effect on attendance to school and a positive effect on working, and it increases with the children's age. This may be due to the fact that agriculture and the informal sector are two main sources of demand for child labour in Mexico. Households that have farms are among the largest users of child labour and, more specifically, family labour.

At the same time, female headship decreases the probability to specialise in school while it increases the likelihood of working, particularly for girls. This effect may be due to a scarcity of monetary resources in this kind of households, which forces children to go into the labour market, or to do some household chores even before after secondary school.

Finally, the age of the child affects school assistance negatively, and part-time and full-time work positively. Older children, after primary school, are more likely to drop out of school and work.

In brief, there are some characteristics of the children, households and region that have strong effects on the decision concerning sending the children to school or to work –even if they do not get any economic remuneration for it–, and most of these characteristics became get more important when the age of the child increases. This happens because in Mexico, where primary and secondary school are compulsory, so, in principle, any child has the right to attend school. Nonetheless, when schooling is no longer compulsory, there are some characteristics

such as income, gender, household composition and area of residence that do have very strong effects on school attendance. Of these, family wealth scems to be playing a very important role in child's time allocation.

Conclusions

Education has a value in itself, but can also be considered an investment, in the sense that it requires the expenditure of resources that could have been used for an alternative purpose. Like other types of investment, investments in schooling and other forms of human capital have an up-front cost in anticipation of future returns. Some households have enough income –from wages, salaries, interest income, or other sources– to finance these investments, while poorer households might not have enough income to cover the up-front costs. If the latter wish to invest in their children's human capital, they have no choice but to borrow money.[41]

Banks and other formal private-sector lenders typically require collateral in order to obtain a loan. Poorer households, though, are constrained in the amount they can borrow to finance investment in schooling. Because of borrowing constraints, a household's investment in its children's schooling depends positively on its current income and is closely associated with the ownership of durable goods. In this sense, if the household needs to get a loan, its economic stability is very important. This implies most of the time that the head of the household must have a stable job (i.e. have a labour contract, in the formal sector).

Moreover, it has been argued that in the presence of credit market imperfections (*i.e.*, absence of resources to finance education), the unequal distribution of wealth (or income) leads to lower accumulation of human capital. Furthermore, the adverse effects will be long lasting, because investment in human capital generally takes place at a critical age, and it cannot be postponed.

As in many other studies, the empirical evidence found in this investigation suggests that, in Mexico, the access to education is highly influenced by both the economic as well as the educational status of the household. In other words, the family background and its economic and wealth situation play an important role in the decision making process regarding school attendance and child work activity.

This analysis has found evidence that is consistent with the hypothesis that income as well as possessions of valuable holdings have an important positive influence on school attendance. By the same token, constraints on borrowing influence school attendance and labour force participation patterns in Mexico.

[41] Abler (1998).

Children from households with lower income and with less valuable durable goods holdings are more likely to work.[42] This is particularly the case when children have greater child-care responsibilities. On the other hand, the evidence also speaks against the view that children from richer households are less likely to work because they are more highly motivated or because their parents value education more.

Our analysis, thus, suggests that borrowing constraints are a mechanism by which poverty is transmitted across generations. In the presence of credit rationing, student loans or a stipend policy, even at the primary school level, may be effective in raising educational achievement in Mexico where only a very limited number of financial instruments are available for students.[43] This suggests at least the perception of imperfections in the market for credit. Thus, if the goal is to erradicate child labour and to stimulate investment in human capital through education, these policies should be particularly directed at large, rural and poor households.

As a matter of fact, it has been argued (Mankiw, 1986) that government intervention in the allocation of credit for students can be socially efficient and can at times improve on the market allocation. Mankiw suggests that a small credit subsidy, which would reduce the market interest rate, could have two effects. First, some of the students with high returns and high repayment probabilities who were previously not investing in education are now induced to do so. Second, some more students with low repayment probabilities are induced to invest. The first effect is socially beneficial, while the second is socially harmful. A government credit subsidy has, of course, a budgetary cost. In this sense, if the government must raise money using distortionary taxes, then the dead-weight losses are an additional cost to the credit program. As with all expenditure programs, the marginal benefit must exceed the marginal dead-weight losses if the program is to be socially efficient.[44] Even more, by computing the private and social returns on education as well as the returns on public investment in education, in a recent work (Barceinas & Raymond, 2002), it was found this kind of investment is highly profitable and that this profitability is

[42] The case of the imperfections of the capital market on the decisions to invest in education has been the subject of theoretical research going back to Becker (1965). However, empirical research is still relatively scarce.

[43] In 1997, PROGRESA, a social program that pays special attention to the poorest families, was implemented. The main purpose of PROGRESA was to increase school attendance by giving some financial aid to almost two million families living in rural localities with high-to-very-high degrees of marginalisation, focusing particularly on rural families with girls, who, as we saw, are less likely to attend school and to do house duties after primary school. PROGRESA constitutes a first well intentioned program, but the truth is that Mexico still lacks a credit market for basic education. It must be added that boys work as family workers with no retribution, in detriment of their schooling, particularly in agricultural areas.

[44] Mankiw (1986) also argues that a necessary condition for efficient government intervention is unobservable heterogeneity among would-be borrowers regarding the probability of default. The greater such heterogeneity, the greater the potential for efficient intervention.

positively related to educational level. It was also found that the government can generally recuperate the investment in education, in less that 20 years.

On the other hand, while it is true that wealth and income play an important role in education decisions, some other factors, such as the human capital accumulated by the head of the household, his age, and position, as well as household composition and area of residence also play an important role in the determinants of school assistance.

Finally, it is important to notice that a complete analysis on educational choice and child labour market participation cannot be fully understood without linking micro data, like the ones used here, with aggregate economic conditions (*i.e*., variables for macroeconomic stability, factor endowments, demographic developments, institutions, culture and religion). It is also crucial to take into account the influences coming from the side of labour supply, such as quality of the school, distance and other factors, which may also affect the decisions. These extensions, however, are beyond the scope of the present work.

References

Abler, D., Rodriguez J. et al (1998).“The allocation of children’s time in Mexico and Peru”, *Working Paper*, Pennsylvania State University, University Park.

Almeida dos Res, J. and Ricardo Barros (1991). “Wage inequality and the distribution of education: a study of the evolution of regional differences in inequality in metropolitan Brazil”, *Journal of Development Economics*, num. 36, pp. 117-143.

Barceinas, F. and J. L. Raymond (2002). “¿Es rentable para el sector publico subsidiar la educación en México?, Paper presented at the V annual meeting of Applied Economics, Oviedo, Spain.

Barro, R. (1991). “Economic growth in a cross-section of countries”, *Quarterly Journal of Economics*, num. 106, pp. 407-443.

Barro, R. and Lee J. (1993). “International comparision and educational attainment”, *Journal of Monetary Economics*, num. 32, (3), december, pp. 363-394.

Barro, R. and Sala-I-Martin, J. (1995). *Economic Growth*, New York: McGraw-Hill.

Becker, G. S. (1965). “A theory of allocation of time”, *Economic Journal*, num. 75, pp. 493-517.

Becker, G. and Nigel, T. (1976). “Child endowment and the quantity and quality of children”, *Journal of Political Economy*, num. 84 (4), pp. s143-S162.

Behrman, J.R., Pollack, R.A. and Taubman P. (1989). “Family Resources, family size, and access to financing for financing for college education”, *Journal of Political Economy*, num. 97 (2), pp. 398-419.

Chernichovsky, D.(1985). "Socioeconomic and demographic aspects of achool enrollment and attendance in rural Botswana", *Economic Development and Cultural Change*, num. 32(1), pp. 319-332.

Christenson, B. A., & Juarez, F. (1987). "Household economy and the labor force participation of male and female children in Mexico", Paper presented at the annual meeting of the Population Association of America, Chicago.

Dustmann, C., Mickelewright J. and Najma R. (1995). "Intra-household transfers and the part-time work of children", IFS, London, *Working Paper* No. W96/3.

Flug K., Spilimbergo and Wachtenheim, E. (1998). "Investment in education: do economic volatility and credit constraints matter?", *Journal of Development Economics*, num. 55, pp. 465-481.

Galor, O. and Zeira ,J. (1993). "Income distribution and macroeconomics", *Review of Economic Studies*, num. 60, pp. 35-57.

Glewwe, P. and Jacoby, H. (1994). "Student achievement and schooling choice in low-income countries: evidence from Ghana", *The Journal of Human Resources*, num. 29, 3 (Summer), pp. 842-864.

Glewwe, Paul and Jacoby, H. (1994). "An economic analysis of delayed primary school *Enrolment* in a low income country- the role of Early Childhood nutrition" *Review of Economics and Statistics*, num. 77(1), pp. 151-69.

Heckman, J. (1976). "A life-cycle model of earnings, learning, and consumption", *Journal of Political Economy*, num. 84 (4), pp. S11-S44.

ILO (1996). *Economically Active Populations: Estimates and Projections*. 1950-2010, International Labour Organisation, Geneva.

Inter-American Development Bank (1998). *Facing Up the Inequality in Latin America*, Washington, DC, IDB.

Inter-American Development Bank (1999). "Schooling investments and aggregate conditions: a household survey-based approach for Latin America and the Caribbean", Washington, DC, IDB. *Working Paper*.

Inter-American Development Bank (1998). "Intergenerational schooling mobility and macro conditions and schooling policies in Latin America. Washington, DC, IDB. *Working Paper*.

Jacoby, H. (1994) "Borrowing constraints and progress through school: evidence from Peru", *Review of Economics and Statistics*, num. 76, pp. 151-160.

Jacoby H. and Skoufias, E. (1997). "Risk, financial markets, and human capital a in developing country", *The Review of Economic Studies*, num. 64 (3), N. 220, pp. 311-335.

Jensen, P. & Nielsen, N. (1987) "A search model applied to the transition from education to work", *The Review of Economic Studies*, vol. 54, (3), july, pp. 461-472.

King, E. M. and Hill , M. A. (1993). *Women's Education in Developing Countries: Barriers, Benefits, and Policies, Baltimore and London*, The Johns Hopkins University Press, Published for the World Bank.

Knaul, F.M., Levinson, D. and Moe, K. (2001). "Youth education and work in Mexico", *World Development*, vol.29 (1), pp. 167-188.

Loury, C. G. (1981). "International transfers and the distribution of earnings", *Econometrica*, 49 (4).

Lucas, R.E. (1988). "On the mechanics of economic development", *Journal of Monetary Economics*", num. 21, pp. 3-42.

Mankiw, G. (1986). "The allocation of credit and financial collapse", *The Quarterly Journal of Economics*, august, pp. 455-470.

Mankiw, N.G., Romer, D. and Weil, D. (1992). "A contribution to the empirics of economic growth", *Quarterly Journal of Economics*, num. 107, pp. 407-437.

Page, Jonn, et al. (1993) *The East Asian miracle: economic growth and public policy*, The World Bank, Washington, D.C.

Park, Y., Ross, D., and Sabot R., (1996). " Educational expansion and the inequality of pay in Brazil and Korea", in Nancy Birdshall and Richard H. Sabot, eds., *Opportunity Foregone: Education in Brazil*, Baltimore, MD: The Johns Hopkins University Press for the Inter-American Development Bank, pp. 267-288.

Patrinos, H.A. and Psacharopoulos G. (1997). "Family size, schooling and child labour in Peru- an empirical analysis", *Journal of Population Economics*, num. 10, pp. 387-405.

Powell, B. and Steelman, L.C. (1993). "The educational benefits of being spaced out: sibship density and educational progress", *American Sociological Review*, num. 58, pp. 367-381.

Psacharopoulos, G., Morley, S. et al. (1992). *Poverty and income distribution in Latin America: the story of the 1980s*, Washington, D.C, The World Bank.

Ray, R. (2000). "Analysis of child labour in Peru and Pakistan: a comparative study", *Journal of Population Economics*, num. 13, pp. 3-19.

UNPD, (1998). *Human Development Report*, UNPD: New York.

Verbeek, M. (2001). *A Guide to Modern Econometrics*, England: John Wiley & Sons, Ltd.

World Bank (1990). *World Development Report*: Poverty, Oxford: Oxford University Press For the World Bank.

World Bank (1991). *World Development Report: The Challenge of Development*, Oxford: Oxford University Press for the World Bank.

Appendix

Table A.1
Ordered probit estimates, girls

	Girls aged 6 to 17		*Girls aged 6 to 11*		*Girls aged 12 to 14*		*Girls aged 15 to 17*	
	N=31480		*N=17038*		*N=8140*		*N=6302*	
	Coefficient	*Z value*	*Coefficient*	*Z value*	*Coefficient*	*Z value*	*Coefficient*	*Z value*
Age	0.1936	54.33	0.0457	4.69	0.2417	12.11	0.2390	11.56
Loginc	-0.1159	-11.80	-0.1252	-12.34	-0.1277	-12.56	-0.1275	-12.54
Nyounsi	0.1208	21.42	0.0801	7.31	0.1362	13.84	0.1535	15.85
Nolders	0.0131	1.88	0.0097	0.94	0.0264	2.05	0.0369	2.53
Hnocont	0.2268	9.49	0.1542	3.87	0.2433	5.74	0.3154	7.30
Hedufa	-0.3321	-12.85	-0.1938	-4.48	-0.3733	-8.31	-0.5047	-10.14
Sparent	-0.0016	-0.03	0.0566	0.53	-0.0264	-0.26	0.0408	0.44
Headage	0.0092	8.51	0.0048	2.46	0.0074	3.87	0.0149	7.91
Hselfe	0.2816	10.23	0.2729	5.86	0.3285	6.68	0.2645	5.48
Haworker	0.1995	5.52	0.2030	3.74	0.2780	4.42	0.1393	1.75
Hfem	0.3360	5.84	0.2867	2.61	0.3930	3.82	0.2886	3.03
Hworks	-0.2705	-5.51	-0.0086	-0.08	-0.3189	-3.67	-0.3421	-4.31
Rural	0.5008	24.35	0.4620	13.32	0.5298	14.74	0.5591	15.12
South	0.1182	4.03	0.1099	2.31	0.1703	3.31	0.1124	2.04
House	-0.1761	-3.82	-0.0871	-2.68	-0.0200	-0.57	-0.1344	-3.67

Note: t-statistic significant at 5% level.

Table A.2
Ordered probit estimates, boys

	Boys aged 6 to 17		*Boys aged 6 to 11*		*Boys aged 12 to 14*		*Boys aged 15 to 17*	
	N=34473		*N=17846*		*N=8919*		*N=7708*	
	Coefficient	*Z value*	*Coefficient*	*Z value*	*Coefficient*	*Z value*	*Coefficient*	*Z value*
Age	0.2273	67.93	0.0398	4.26	0.2460	13.57	0.3290	18.30
Loginc	-0.1150	-11.94	-0.1261	-12.42	-0.1288	-12.81	-0.1260	-12.49
Nyounsi	0.1047	16.48	0.0599	3.81	0.1171	11.33	0.1407	13.14
Nolders	0.0032	0.50	-0.0028	-0.27	0.0130	1.12	0.0390	2.92
Hnocont	0.2146	9.51	0.1160	4.03	0.1839	4.62	0.3330	8.42
Hedufa	-0.2937	-12.46	-0.2511	-5.98	-0.296	-6.78	-0.4085	-9.35
Sparent	0.1687	3.32	0.0891	0.84	0.1376	1.54	0.3161	3.86
Headage	0.0084	8.66	0.0045	2.36	0.0079	4.62	0.0116	7.13
Hselfe	0.3433	13.85	0.1612	3.59	0.4273	9.84	0.4316	10.27
Haworker	0.1238	5.77	0.0779	3.43	0.2321	4.17	0.0904	4.41
Hfem	0.1321	2.51	0.1874	1.74	0.2152	2.33	-0.0107	-0.13
Hworks	-0.1997	-4.31	-0.0182	-0.18	-0.1693	-2.05	-0.2844	-3.97
Rural	0.5495	29.92	0.4703	13.99	0.6270	19.21	0.6217	18.67
South	0.1669	6.34	0.1793	4.07	0.2683	5.99	0.0723	1.50
House	-0.0803	-4.37	-0.1099	-3.46	-0.0669	-2.10	-0.0462	-1.42

Note: t-statistic significant at 5% level.