

Educational Grants Closing the Gap in Schooling Attainment between Poor and Non-Poor

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Abstract

The present work assesses the effectiveness of educational grants at raising schooling attainment of poor children in rural areas. The per grade gains in reducing drop outs cumulate in an additional half a year in total schooling. Progressive impacts are found along three dimensions: degree of poverty, parents' education and distance to school. The children of uneducated fathers living far from school gain twice as much as their counterparts with an educated father or close to a school. The intervention successfully closes the schooling gap along the wealth dimension but falls short of achieving the same in the other dimensions of parents' education and school distance.

1 Introduction

Education has long been recognized as a key weapon in fighting poverty, especially in developing countries. Hence governments and international development agencies have promoted policies that enhance educational achievement. Many such policies have focused on the lack or low quality of services, which are found to disproportionately affect poor children (Behrman and Knowles 1999, Alderman, Orazem and Paterno 2001). Initiatives encourage private sector involvement, like the Pakistani Quetta program (Kim, Alderman and Orazem 1999) and voucher programs in Colombia

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(Angrist, Bettinger, Bloom, King and Kremer 2002), Bangladesh, Belize and Lesotho (West 1997). Programs address problems with teachers' training, their attendance, school infrastructures, furniture, textbook availability and library resources. The Mexican Pare Program, in 1992-1997, is an example of provision of school inputs that successfully improved the students' schooling attainment (Lopez-Acevedo 1999).

A recent wave of programs took the issue from the demand side, encouraging parents to send their kids to school with conditional cash or food transfer programs. In 1997, the Mexican government launched the Progresa program that offers grants to rural poor for primary and secondary schooling. Similar programs were developed in Honduras, Nicaragua, Brazil. Other programs such as the Food for Education in Bangladesh offers in kind transfers to parents sending their children to school.

The premises for the success of such programs is that the supply of school is sufficiently adequate, and that the main barriers to schooling come from income constraints, direct costs, opportunity costs, as well as preferences. The heterogeneity of the poor households with respect to these characteristics presumes heterogeneity in impact of a cash transfer program. The present study assesses the Mexican program Progresa, and focuses on its impact on schooling attainment for a variety of clienteles. This impact analysis is based on a model of schooling attainment decision that highlights the determinants of school attainment across an heterogenous population (Bommier and Lambert 2000, Binder 1998, Tansel 1997, Akhtar 1996, Lillard and Willis 1994). The randomization of program beneficiaries in the sample of households selected for the program evaluation allows a clear identification of the program impact.

The current work complements assessments done of Progresa by Skoufias and Parker (2001), Schultz (2001) and Behrman, Sengupta and Todd (2001). Behrman et al study the average impact on the process of schooling including the entry age, grade repetition, dropout rates and school reentry rates. Schultz, on the other hand, offers disaggregate evidence by grade and gender on enrolments and evaluates the internal rate of return of the program. Finally, Skoufias and Parker investigate the potential of school grants for reducing child labor participation.

The three dimensions of heterogeneity that we study - degree of poverty, education of the parents and the proximity of a school - particularly matter for poor families. The high income elasticity of school has been documented by Behrman and Knowles (1999). Conditional transfers are however similar to a price subsidy, and hence their effect entails a substitution effect in addition to the income effect. There is, to our knowledge, no empirical studies of price elasticities for school. Poorly educated parents tend to invest less in their children. If low earnings are the root cause of the lower educational outcomes, then looking at differential impact by educational level of parents is equivalent to studying the impact by poverty level. If less educated parents have lower preferences or illiteracy handicap, the gains across parents' education levels may exhibit a very different pattern than across degrees of poverty.

Finally, families not served by a school in their community face a higher cost than other families to sending their children to school (Handa 2002, Lavy 1996). Low or no access to public services is another dimension of poverty. A price subsidy in the form of conditional transfer directly addresses the cost issue.

We find that the Mexican grant program succeeds, on average, to increase the schooling attainment of the poor by a little more than half of a ten-month school year, from 6.8 years to 7.4 years. Children from families facing the greatest barriers - the poorest of the poor, uneducated parents and living in a community not served by a high school - gain most from the program. Hence, the program has a progressive impact along all three dimensions. Furthermore, and most importantly, the grants succeed at closing the gap in schooling attainment between poor and non-poor.

The paper is organized as follows: we first describe the Progresas program and the schooling situation in Mexico. Section 3 presents a dynamic model of schooling attainment and its econometric implementation. We present the data used and discuss the impact measurement in the empirical strategy section. Results are then presented and policy considerations are discussed in sections 5 and 6.

2 The Mexican Cash Transfer Program Progresas

Mexico has experienced important gains in the 1990's towards universal basic education. Yet, the average schooling in rural areas, where a large portion of the poor lives, lags behind the average in urban areas, with 6.4 years compared to the national average of 8.5 years (de León, Hernández and Parker 1999, table 1, measured at age 17 years old). Hence, rural children miss almost three years of schooling to achieve basic education.¹ This difference does not span from more rural children never attending school, delaying entry, or dropping out during primary school. Indeed, only 2.5 percent of school-age children never attended school by the mid-1990's (Muñiz 1999, p.1). Rural continuation rates from one grade to the next throughout primary school are comparable to the national rates of 95-97 percent even in poor and extremely poor rural areas.² Furthermore, the majority of Mexican youth that enter secondary school complete the three years, whether in urban centers or in rural areas. The weak link in the schooling career of rural children is the *entry* to secondary school (see figure 1). Only a little more than 60 percent of the children that complete primary school pursue the following year in secondary school, and of those that do not directly only 18 percent will enter secondary school after one year of non-attendance.³

To encourage poor families in rural areas to invest further in their children's education and human capital in general, the Mexican government initiated in 1997 a program of cash transfers and non-monetary benefits called Progresas. The program approaches human capital from three angles: education, health and nutrition. Higher investments are promoted with educational grants, nutritional cash transfers and monthly visits to the health clinic. The educational component constitutes the largest monetary benefits received by families. A monthly stipend is given for every child attending 3rd grade of primary school through the 3rd year of secondary school (table 1).

¹Compulsory schooling or basic education in Mexico consists of 6 years of primary and three years of secondary school, nine years of schooling in total. Three additional years can be taken in upper secondary school for a total of twelve years.

²de León et al. (1999) (tables 1 and 2) present evidence by age. Upon normal progress, children complete primary school by the age of twelve years old.

³The figure and these percentages are for rural children and were calculated using data for the control villages from the Progresas dataset. Further details about the dataset are given below.

The benefits increase with each grade with a large increase between primary and secondary school. They are also slightly higher for girls than for boys in secondary school. The grants are paid to the mother of the family every two months, conditional on a minimum attendance of 85% of school days per month. The program also provides an amount for school supplies at the beginning of every school year. The value of the per family grant was capped at 790 pesos or about \$90 per month in January 2000.

Combined with the health intervention that promotes good health and nutritional status, Progresá benefits can induce higher primary school completion by reducing the drop-out rate each year, and enable more teenagers to pursue their schooling at the secondary school level. These cumulated impacts should increase the schooling attainment in rural Mexico and the proportion of children that complete basic schooling. The program has grown to include 2.6 million families in 2000,⁴ and the benefits represent an average of 22 percent of the recipient families' income. The extent and the importance of the benefits to the beneficiaries makes the program one of the largest cash transfers programs in a developing country, with a budget totaling 0.2% of the Mexican GDP.

3 Schooling: Result of Sequential Decisions

3.1 Theoretical Framework

Schooling attainment is the result of a series of sequential enrollment decisions. Parents⁵ decide to enroll their child in primary school for the first time with some desired or optimal length of schooling in mind. As the child progresses, parents must reiterate the enrollment decision every year until the optimal level of schooling is attained. While considering the current enrollment of their child, parents update their valuation for schooling and its corresponding desired level. Due to this updating, the optimal schooling may change as the child progresses through school.

Consider a child that has completed g grades. By enrolling the child in grade $g + 1$, the family anticipates benefits and costs associated with the extra year of schooling. The benefits here refer specifically to cash transfers to families. In addition, attendance of the extra grade gives access to further schooling to the child upon his success of the current grade. Thereby, the discounted value of future schooling adds to the net benefits of enrolling in $g + 1$. The full benefit associated with enrolling in grade $g + 1$ is thus: $T_{g+1} - C_{g+1} + \beta V(g + 1)$ where T_{g+1} is the transfer, C_{g+1} the cost, and $V(g + 1)$ the value function of having obtained grade $g + 1$ discounted by the time preference rate β .

On the other hand, the child can start working and earn wages associated with his completed schooling and his individual characteristics Z , for the rest of his working life. In this instance, the utility of not enrolling the child is the present value of lifetime earnings: $\frac{w(g;Z)}{1-\beta}$.

The value function for grade g takes the highest value between continuing school and starting to work. The following Bellman equation expresses this value upon which enrollment decision is

⁴Extended in 2002 to cover six years of secondary school and to include small cities, the program bears now the name of Oportunidades.

⁵We abstract from the consideration of intra-household sharing of the decisions, notably with the child, and called "parents" the decision-maker.

made:

$$V(g) = \max \left\{ T_{g+1} - C_{g+1} + \beta V(g+1), \frac{w(g; Z)}{1 - \beta} \right\}. \quad (1)$$

Let E_{g+1} represent the enrollment decision for grade $g + 1$. Then:

$$E_{g+1} = \begin{cases} 1 & \text{if } T_{g+1} - C_{g+1} + \beta V(g+1) \geq \frac{w(g; Z)}{1 - \beta} \\ 0 & \text{if } T_{g+1} - C_{g+1} + \beta V(g+1) < \frac{w(g; Z)}{1 - \beta} \end{cases}$$

conditional on $E_k = 1 \quad \forall k = 1, \dots, g. \quad (2)$

Parents will terminate their investment in the child's schooling when the present net benefit of an additional year of schooling is lower than the present value of the achieved schooling: $T_{g+1} - C_{g+1} + \beta V(g+1) \leq \frac{w(g; Z)}{1 - \beta}$ or $V(g) = \frac{w(g; Z)}{1 - \beta}$.

Assuming away reentry after a temporary absence of one or more years from school, schooling attainment is defined to be the last grade completed upon failure to enroll.

3.2 Econometric Implementation

The event that schooling attainment G takes the value g is equivalent to the event that the child drops out of school after achieving g grades. From the standpoint of the econometrician that imperfectly observes the elements of the enrollment process, the decision in equation 2 becomes stochastic with the addition of an error term, and leads to the conditional probability of observing a failure to enroll. Thus, the probability of failing to enroll in $g + 1$ matches the probability of attaining g years of schooling, conditional on past enrollment decisions:

$$\Pr(E_{g+1} = 0 | E_k = 1 \quad \forall k = 1, \dots, g) = \frac{\Pr(G = g)}{\Pr(G \geq g)} = \lambda(g+1). \quad (3)$$

This expression corresponds to the risk or hazard rate of dropping out of school after having completed grade g and before the completion of grade $g + 1$, given that the child has continuously been in school up to the $g + 1$ enrollment time.⁶

We use a proportional hazard duration model to estimate these conditional probabilities and to assess the impact of Progresa on the risk of drop-out and schooling attainment. Duration models fit the dynamic nature of the schooling attainment decision, while the proportional models impose a minimum of assumptions about the shape of the risk. Proportional models postulate that individual hazard rate λ for individual i at grade $g + 1$ are proportional to a baseline hazard rate $\lambda_0(g + 1)$ such that: $\lambda_i(g + 1) = \lambda_0(g + 1)\mu_i$. The baseline hazard rate can be thought as being the common risk of dropping out in the population. Common beliefs, such as cultural beliefs about the importance of schooling, and general labor conditions enter this common risk of dropping out. Rather than attempting to model this common risk, proportional hazard models

⁶Schooling attainment has the particularity that if you "exit" during grade $g + 1$, it takes the value g . To statistically satisfy this characteristic, the event is to drop-out after grade g which exactly corresponds to the failure of enrolling in $g + 1$ at the beginning of the school year.

take a non-parametric approach, i.e. estimate independent values for all grades.

The proportion μ_i by which the individual rate differs from the average, is determined by some function of the individual's covariates. We assume that the data generating process takes the form of an exponential function such that $\mu_i = \exp(X_i\beta)$. This specification makes μ_i nonnegative, which has the advantage of not imposing restrictions on β .⁷ The individual hazard rate for grade g is thus: $\lambda_i(g+1) = \lambda_0(g+1) \exp(X_i\beta)$ where X_i is a vector of covariates for observation i .

Following the decision rule (equation 2), the hazard rate is a function of the transfer T , the costs C , the wage $w(g; Z)$ for the schooling completed and individual characteristics that influence it, and the discount rate β - included in the vector of individual characteristics X_i in the hazard rate. The value function at the next higher grade $V(g+1)$ is unobserved and thus, is incorporated in the error term. The hazard rate can thus be written as:

$$\lambda(g+1) = \lambda_0(g+1) \exp(\alpha T_{g+1} + \gamma C_{g+1} + \delta w(g; Z) + \theta\beta + \sigma Z). \quad (4)$$

The hazard rates will be estimated following the Cox method. Cox proportional hazard model is a semi-parametric method that estimates parametrically the influence of individual characteristics, and estimates non-parametrically the baseline of the hazard ratio.

4 Empirical Strategy

To estimate the impact of educational grants on schooling attainment, the impact is first captured on the drop-out rates for each grade. Using the predicted hazard rates, the schooling attainment is then computed. Our empirical strategy makes use of the quasi-experimental nature of the Progresa data to measure the impact. The next section explains the data source and its quasi-experimental structure and how this advantage is exploited. The following section discusses the variables included in the analysis.

4.1 Assessing the Impact on Drop-Out Rates and Schooling

The National Direction of Progresa had evaluation goals and made use of implementation constraints to create a quasi-experimental dataset. The geographic coverage and size of the targeted beneficiary population made it impossible to initiate the program simultaneously throughout the country. A phase-in implementation approach was used and allowed to create a control group.

The program devised a two-step targeting mechanism to identify beneficiaries. First, the Direction identified localities with high levels of poverty where the program would be offered. The criterion was the degree of marginality of all the localities in rural areas,⁸ as computed on the basis of welfare indicators collected through population census by the Mexican government. This indicator also determined the timing of their incorporation of the villages into the program. Then, using census data from the selected villages, the eligible households were identified on the basis

⁷Kiefer (1988), p.664.

⁸Localities are defined as rural if their population is below 2,500 inhabitants. For services accessibility concerns, localities of less than 50 inhabitants were excluded.

of a discriminant analysis of income and other poverty considerations like dependency ratio and dwelling qualities. Households were characterized as poor and therefore eligible, or non-poor and non-eligible.

To build the experimental sample for the evaluation purpose, a subset of 506 localities in seven states from the same incorporation round was drawn from the pool of localities identified as program recipients. Incorporation was delayed by two years for a third of these localities. They constitute the control villages and were randomly assigned to the later date of incorporation. We call Progresa villages the group of “on-time incorporated” localities and non-Progresa villages the group of the “incorporated with delay” localities. The outcomes of the eligible families in Progresa villages - the treated group - can thus be compared to those of eligible families in non-Progresa villages - the control group - to assess the impact of the program.⁹ We concentrate on the impact of being eligible as opposed to being treated. The intention-to-treat effect is in the present case close to the treatment effect since the number of eligible but non-participant households is small, less than 5%. Hence, we drop the distinction between intention-to-treat and treatment effect in the rest of the text.

Making use of the quasi-experimental nature of the data, the Progresa transfers T in equation 4 are represented using a set of dummies. First, a dummy P_v indicates the type of village (Progresa or not), and a second one e_i the type of family (poor and thus eligible or not) the child comes from. A set of dummies indicates the grade $g + 1$ the child will enter, for the grades primary 3 to secondary 3, that is $d_{h,g+1} = 1$ if $h = g + 1$ and 0 otherwise where $h \in [3, 9]$. The product of these dummies captures the grade specific effect of Progresa. Including these indicator variables and letting the costs, wage, personal characteristics and discount factor enter $X_{g+1} = [C_{g+1}, w, Z, \beta]$, the hazard rate for child i in village v (equation 4) becomes:

$$\lambda_{iv}(g + 1) = \lambda_0(g + 1) \exp \left(\alpha_1 P_v + \alpha_2 e_i + \sum_{h=3}^9 \gamma_h d_{h,g+1} e_i P_v + X_{i,g+1} \alpha_3 \right), \quad (5)$$

where $d_{h,g+1} e_i P_v \equiv T_{g+1}$. The γ_h 's capture the impact of the child's eligibility for receiving benefits for grade h on the drop-out rate in grade three (primary 3) through nine (secondary 3).¹⁰

Furthermore, an interaction term for wealth and the grants is included to assess how grants effectively counter the effect of poverty on schooling outcomes. For ease of interpretation, the wealth index is introduced for poor and non-poor separately as Y^p and Y^{np} in equation 5:

$$\lambda_{iv}(g + 1) = \lambda_0(g + 1) \exp \left(\alpha_1 P_v + \alpha_2 e_i + \sum_{h=3}^9 (\gamma_h + \zeta Y_i^p) d_{h,g+1} e_i P_v + \delta_1 Y_i^{np} + \delta_2 Y_i^p + X_{i,g+1} \alpha_3 \right). \quad (6)$$

The influence of wealth on the decision to continue school is captured with the three parameters

⁹Behrman and Todd (1999) verify the comparability of the treatment and the control groups on the basis of pre-program characteristics and outcomes. They find that the control group is similar in multiple dimensions to the treatment group.

¹⁰By adding γ_1 and γ_2 , the model can capture the anticipation effect the program may have on drop-out rates for these two grades. The possibility of anticipation effects was explored empirically and will be discussed in the results section.

δ_1 , δ_2 and ζ . The parameter δ_1 measures the role of relative wealth within the group of non-poor households, δ_2 measures the role of wealth among the poor households that are not in the treatment area, while $\delta_2 + \zeta$ measures the role of wealth among the poor that can benefit from the grants. Both parameters δ_1 and δ_2 are expected to be positive as children from wealthier households are expected to have a higher probability to continue school. This specification allows to test whether the grant program can counteract the poverty handicap among the poor by testing for the hypothesis $H_0 : \delta_2 = \zeta$.

To compute the schooling attainment from the survival model, drop-out risks are computed for all children and then averaged by grade. These average drop-out risks can be used to calculate the expected schooling attainment as follows:

$$E[G] = \sum_{g=1}^K g \Pr(G = g) = \sum_{g=1}^K g \prod_{k=1}^g (1 - \lambda_k), \quad (7)$$

which can be rewritten as:

$$E[G] = 1 + \sum_{g=1}^K \left(\prod_{k=1}^g (1 - \lambda_k) \right). \quad (8)$$

The schooling attainment for treated and control children are computed separately and the difference between the two groups gives the program impact.

4.2 Determinants of the Drop-out Rate

The present work draws data from the baseline survey (Encaseh) of November 1997 and the evaluation surveys (Encel) of October 1998 and November 1999. The surveys contain detailed information about each household member as well as household characteristics for 11,000 households with school-aged children.

We use information about adults' occupation along with the average level of schooling in the village and the distance to the capital to capture off-farm earning potential in the school continuation equation above (equation 2). On-farm labor needs are characterized by the household's agricultural assets, while demand for caring for younger siblings is captured by the number of children 0 to 5 years old. Both agricultural assets and the number of young siblings vary over time. We further include age dummies, gender and work experience in the previous year to capture the child's work opportunities.

Glewwe and Jacoby (1994) suggest that individual characteristics, such as ability, and family factors, such as parental education, affect the child's learning productivity and thus the earnings potential of the child. To account for learning productivity, the entry age to primary school, and grade failure in the previous year are included in Z . To proxy for schooling progress, the age is used within grade groups: for grades 1 to 3, for grades 4 to 6 and for grades 7 to 9. The human capital of the parents also influence the learning productivity, either due to higher preferences or higher earnings. These additional dimensions of learning productivity are proxied by the education

of parents, as well as their ethnicity (to allow preference differences across ethnicity).

The costs of schooling C_{g+1} for Mexican families are mainly travel costs, as schools are free and uniforms are generally not required. Since the program is offered in villages that have a primary school, there is no travel cost for this level. Only the distance to secondary school is included to capture costs of schooling for children considering an enrollment decision at the secondary school level.

Finally, the discount factor is influenced by the family's wealth and capacity to face the costs and opportunity costs of schooling, especially if there are market imperfections limiting the family's ability to borrow against the child's future earnings. The percentiles of the wealth index¹¹ calculated by the program direction to identify the poor families is included. The number of children in age to attend primary and secondary school are also included separately. The latter will capture the total schooling costs the family faces. The sample for this study counts 20,541 children between the age of 5 and 16 years old and include only children that were enrolled in 1997 and whose two parents were living at home¹², .

5 Results

5.1 Impact on the Drop-Out Rates

The drop-out risk is estimated using a Cox proportional hazard model with the baseline hazard being estimated non-parametrically. The estimation results are presented in table 2 with the non-parametric estimates of the baseline hazard $\lambda_0(g)$ depicted in figure 2. The figure presents the relative baseline hazard rate (normalized by the average hazard rate for primary school grades) for all six grades of primary school (labeled 1p to 6p) and the three grades of secondary school (labeled 1s to 3s). The graph echoes earlier observations, that the risk of dropping out is largest at the entry of secondary school. The risk at that moment, 1s in the figure, is 18 times greater than the average risk from primary grades and 7 to 9 times larger than the risks in higher grades of secondary school. The baseline risk is also higher for the rest of secondary school relative to primary school.

When and by how much do educational grants alter the drop-out decision? Table 2 presents the results of the hazard rate estimation. It gives the relative hazard ratio associated with each variable, which is e^θ rather than the estimated parameter θ . The hazard ratio tells by how much the independent variable alters the probability of dropping out of school. For example, the relative

¹¹The wealth index used is the initial index constructed by the Progresia Direction to identify the eligible families. The discriminant analysis included family composition, income and assets, and dwellings characteristics. The value of the index itself cannot be directly interpreted as the dollar value of the family's wealth. It only offers a relative ranking of the families. Hence, we choose to use percentiles of this index to ease the interpretation of the results. Furthermore, the wealth index does not perfectly correspond to the final classification of eligibility of families since there was a process of local adjustment of the list of beneficiaries. Thus, the percentiles of wealth can be included in the regression along with the dummy to identify the eligible families without introducing problems of multicollinearity.

¹²We chose to ignore the cases where either the father, the mother or both were absent from the household, as the characteristics of the absent parent such as his education are missing.

hazard ratio corresponding to being from an eligible family is 1.56, indicating that the probability to drop-out when being poor is 56% of what it would be if being non-poor.

The results reveal that Progresa grants significantly attenuate the risk of dropping out for all the eligible grades (table 2, variables "Treatment effects" in the second half of the table). For example, Progresa decreases drop-outs at the entry to secondary school by 45 percent from the baseline $\lambda_0(1s)$. Applied to the average continuation rate described in figure 1, this would approximately raise the continuation rate into secondary school from 63% to 80%. In the overall, the grants reduce the risk of dropping out for all grades by 40 to 54%. Although the point estimate is lower for the first two grades, none of these effects are significantly different from each other.

The model was also estimated to account for possible anticipation effects of the program (results not presented here). Parents may be influenced in their decisions for first and second grades, knowing that the child will be eligible for grants starting in third grade. No effect was found.¹³ This lack of anticipation effect may be due to the initial announcement that the eligibility of the families would last three years and then be re-evaluated.

The basic drop-out pattern, the baseline hazard rate, does not vary between 1998 and 1999 as indicated by the year 1998 dummy (table 2). One could imagine that the program may have a stronger impact the first year of its implementation than in the following years. To test if this hypothesis is true, an average time impact was added to equation 4 in the form of $\gamma^{98}t_{98}e_iP_v$ where γ^{98} captures the differential impact between the first year of the program and the following one (results not reported). This varying average impact was rejected at 95%. We also checked for a potential first year impact by grade, by adding $\sum_{h=3}^9 \gamma_h^{98}t_{98}d_{g,h+1}e_iP_v$ in equation 4 (results not reported). Once again, the tests rejected time-varying impact of the transfers for all the grades except the second grade of secondary school.¹⁴

As discussed in section 4.2, some covariates may influence the drop-out risk differently across grades, levels or age groups. To determine whether a covariate should vary in any of these three dimensions, several specifications were estimated and tested.¹⁵ The proportional hazard model assumes that the influence of individual characteristics on the hazard is constant over grade. For example, the family asset effect increases the hazard by 6%, the proportional hazard model implies that the family asset effect is constant throughout schooling. The test verifies the validity of this assumption for each covariate and for the overall specification. Only the overall specification test is reported at the bottom of the table. The hypothesis of constant effect cannot be rejected for the overall specification, and for all the individual variables except five including being 12 years old or older, having failed a grade between grades 4 and 6 in primary school and between grades 1 and 3 in secondary school (included as two separate factors), the birth order in primary school

¹³Behrman et al. (2001) found evidence of less grade repetition throughout the primary school grades, including in first and second grades. Thus, parents may not choose to have their children start early as a consequence of the grants, but once children are in first and second grades, they may monitor more closely their progress.

¹⁴The effect for the secondary 2 over the two years becomes insignificant, and only the effect for the first year is significant, decreasing the drop-out risk by 50 percent. Since the results are almost identical to the ones presented in table 2, these results are not included.

¹⁵The test follows a generalization of Grambsch and Therneau (1994).

and finally, having siblings aged 6-11 years for children aged 6-11 years old.¹⁶ Hence, for these variables, the hazard coefficient should be interpreted as the average effect of the variable on the hazard rate instead of the exact influence. After experimenting with various specifications, the present specification was chosen as it adequately takes into account the meaningful grade-varying elements of the drop-out phenomenon.

As expected, costs and opportunity costs from foregone earnings have a large influence on schooling decisions. Distance to secondary school strongly discourages pursuing secondary schooling. For every additional kilometer, up to three kilometers, students are 20% more likely to drop-out of school. The effect of distance stabilizes after three kilometers, as additional kilometers do not further reduce the probability to attend school.¹⁷ Labor markets that offer greater work opportunities other than self-employment, the default category, draw students out of school earlier. Moreover, work opportunities in large urban areas induce students to leave school earlier. For example if the capital is 10 kilometers further away, the student will be 2% more likely to stay in school. On the other hand, the more educated the village population is, the greater the incentives for children to remain in school. The average education in the village can take two related interpretations. First, a labor market with more educated workers will expect a higher level of education from future workers, matching at least the education of the current work force. Second, a village where educated people choose to stay rather than to migrate to large urban center probably offers greater work opportunities for educated individuals and higher returns to schooling.

The opportunity cost of attending school associated with activities at home comes mainly from the need for someone to watch over the younger siblings (aged 0 to 5 years old), one of them increasing the risk of drop-out for older siblings by 5 percent. Interestingly, the amount of agricultural land the family operates helps parents send the children 8 to 11 years old to school, but does not increase the drop-out rates for older children. One could have expected that the older children's labor would be in greater demand in families cultivating some agricultural land. However, it should be noted that 50% of the families involved in agriculture work on 2 or less hectares of land. The need for labor on plots of this size does not interfere with school time and children can help out after school.¹⁸ Hazard rate do not vary with the age group of the child, nor with previous work experience. However, girls are less likely than boys to stay enrolled in secondary school. This result may have less to do with greater work opportunities for girls with a primary schooling than for boys with similar schooling than cultural valuation of schooling for girls.

Conditions and circumstances surrounding the schooling play an important role in determining the drop-out rates. Having failed in the previous year and repeating the grade doubles the risks of dropping for the upper grades of primary school and for secondary school. Similarly, age is an influential determinant for the pursuit of primary schooling: being one year older than the other children increases the risk of dropping out by 63% and 70% respectively in the first and second

¹⁶The hypothesis of constancy of the effect over time was rejected at 10 percent for two variables, the distance to high school and the importance of schooling in the village.

¹⁷The non-linear effect was determined by trying different values for the threshold of the spline.

¹⁸School hours particularly fit such after-school work, as children attend from 8am to 1pm. It should be noted however that Akabayashi and Psacharopoulos (1999) find that there is a trade-off between work and the acquisition of skills in reading and mathematics in Tanzania, suggesting that after-school work conflicts with time for homework.

half of primary school. The effect continues to be large for the pursuit of secondary schooling with a 30% higher drop-out rate for older children. The positive effect of the age of entry in school suggests that letting children physically mature one more year leads them to attain a higher level of education.

Fathers' and mothers' education equally encourage school continuation, by decreasing the drop-out risk by about 5% for every additional year of schooling. Having an indigenous mother also positively influences school continuation by decreasing the drop-out risk by 20%.

The siblings composition of the household also affects the drop-out risk of a child, as it dictates the total schooling costs and needs of the family (under "Discount factor grouping in the table). Elder children (or first-born) are less likely to complete their basic schooling. Having siblings aged twelve to sixteen years old (corresponding to potential attendance to secondary school) increases the risk of dropping out. The risk is even higher for younger children (six to eleven years old) than for kids of the same age (twelve to sixteen), and the difference in hazard rates is significant with statistics of $\chi^2(1) = 20.1$. A possible explanation for these contrasting results is that constrained parents pursue the strategy of equally investing in all their children at least until the completion of primary school. Further work is needed to understand the educational investment strategy at the household level, and requires a different theoretical and empirical framework than the present one.

Finally, wealth itself influences education decisions. The dummy indicating that the child is from a poor family is not significant (top of table 2) but the percentiles of wealth indicate that the amount of resources affects the drop-out rate for poor children. Coming from a less wealthy family by the equivalent of one percentile leads to an increase in the child's drop-out rate by .3 percent. This wealth effect does not influence school attendance of non-poor children suggesting that beyond a certain threshold, family resources do not interfere anymore with primary and secondary schooling.¹⁹ Educational grants mitigate this wealth effect for poor children. For every percentile of greater poverty, the grants encourage the continuation of studies by .5 percent. These incentives surpass the poverty disincentives by .2 percent, and the difference is significantly at a level of 90% (the χ^2 statistics is 3.12 rejecting that the sum of the two underlying coefficients is less or equal to 0 with a ρ -value of 0.078). To isolate the pure wealth effects, the model was also estimated under a stripped-down specification including only wealth, the program effect per grade and village characteristics. All individual and family characteristics were excluded to avoid the possibility of correlated effects between one of these characteristics and the wealth measure (results not reported). The pure wealth effects concord with the results found in the extensive specification: only the poor are affected by wealth in their schooling decision, poverty (the percentiles of wealth) increases the drop-out rate by .2% and the program more than mitigates the wealth effect with a positive .5% impact per centile. The mitigation is significantly greater than the wealth effect at 5%. Further analysis of the effect of the grant program by wealth level is presented in the next section.

To summarize, the educational grants succeed at reducing the drop-out rates for all the grades

¹⁹The average wealth percentile among the non-poor is 87th while for the poor it is 45th. It is therefore not surprising that no wealth effect is found for the non-poor.

they are offered in by 40 to 55% and more than mitigate the effect of poverty. In absence of program, the poor are at a higher risk of not going to school than the non poor. Older children are particularly vulnerable, more so at the end of primary school. Traveling to school discourages school continuation, as well as unskilled work opportunities and being close to a large urban center. Finally, educated parents and indigenous mothers favor higher schooling attainment for their children.

5.2 Gains in Schooling Attainment

Using these regression results and the estimated baseline hazard rates, the cumulative impact of the educational grants is calculated using sample enumeration. Overall, treatment children complete 7.4 years of schooling, while control children achieve 6.8 years (see table 3).²⁰ Estimates of the standard errors are calculated by bootstrapping the full estimation procedure for 150 iterations, that is re-sampling the observations, estimating the Cox hazard model, predicting the individual hazard rates for the bootstrapped sample and computing the average schooling attainment.

Progesa leads to an increase of a 0.56 year of schooling, which is equivalent to having 20% more young people enter and complete secondary school or three more years of school.²¹ Children receiving the grants on average will also attain schooling level similar to non-poor who achieve 7.3 years (table 2). Using different methods, Behrman et al. (2001) and Schultz (2001) find similar results of seven months respectively. Behrman et al. obtain this result by estimation of Markov processes while Schultz reaches his conclusion using double differences.

Looking at hazard rates per grade (figure 2), the rationale for giving educational grants in primary school seems questionable since the obvious critical drop-out time is at the entry into secondary school. We use the regression results to simulate the gains that would be achieved with grants given only for the first grade of secondary school. The predictions of drop-out are obtained by setting all the eligibility terms equal to zero except for the first grade of secondary school (that is $d_{h,g+1} = 0$ except for $g + 1 = h = 1s$). Under that trimmed scheme, giving grants only for one academic year instead of the current seven-year scheme, children would achieve 7 years of education, which represents a gain of 0.22 years. Giving grants from the third grade of primary school to the third grade of secondary school increases the gains by 150% from 0.22 year to 0.56 year (or two months to almost six months) and the extra months gain is significantly different from zero. The two schemes have, however, costs of very different order of magnitude.

We turn next to assessing the gains for various sub-groups. Three dimensions particularly influence the schooling outcomes: degree of poverty, parents' education, and distance to school.

To compare the gains along the dimension of poverty, the schooling attainment is calculated by quartiles of wealth for all poor (eligible) children. Table 4 presents the results for the schooling attainment and the gains. As expected, schooling attainment in the control group increases with wealth, although with no difference between the two highest quartiles. Educational grants successfully lead to significant gains for all four groups. They particularly help the children from

²⁰The calculations are performed under the following assumptions: 1) The grant program is running for a period of seven years, such that a child can receive the grants from primary 3 through secondary 3; and 2) the impact of the grants remains constant over time.

²¹Under the simplifying assumptions that children drop-out exclusively at the entry of high school.

the first two quartiles, with gains a little more than the double of the ones children from the third and fourth quartiles experience. Furthermore, the grants completely cancel the effect of wealth, as children from the first and second quartiles attain with the grants the same schooling as their counterparts of the third and fourth quartiles. Finally, all the eligible children see their attainment being equated to that of the non-poor (7.3 years in table 3).

To get a better sense of how the gains vary with poverty, we repeated the procedure to estimate the gains in schooling attainment by percentiles rather than quartiles. This allows to get a better sense of how the .3% gain for each one percentile found in the proportional hazard estimation cumulate over the schooling career of the child to increase his total schooling attainment. Figure 3 shows these gains, which due to the smaller number of observations used for each one of them exhibit greater variation than the quartile estimates. A kernel estimation²² reveals a decreasing quasi-monotonic trend in the gains as the welfare of the family increases, that is moving right towards higher percentiles of the wealth, confirming the results found with the quartiles.

We turn next to the dimension of parents' education. Throughout the literature, parents' education has been repeatedly shown to influence schooling (Handa 1996, Behrman and Knowles 1999, Tansel 2002, for example), and the results in table 2 add further evidence. On the one hand, higher education may directly translate into higher preferences for education and thus educated parents invest more in their children's education. On the other hand, more educated individuals have higher earning opportunities allowing them to achieve schooling outcomes for their children closer to the optimal level. Hence, if the preference effect dominates, educated families will take greater advantage of grants than less educated families. Alternatively if the financial constraints are tighter for less educated parents, their children could benefit most from grants like Progresa.

The results tend to support the later in the case of Mexican children (table 5). Children from families where the father has no education gain twice as much from the program than their counterparts with an educated father. This difference in gains is particularly important for boys and less so for girls. On the other hand, the mother's education influences less the gains. The initial gap, seen in the control group, is smaller as children with an uneducated mother achieve a significant .3 year (the standard error calculated by bootstrap is .07) more schooling than those with an uneducated father. When gains are calculated for boys and girls separately, similar results as under the father's education are found (results not reported). This result comes a little as a surprise since girls receive higher grants than boys in secondary school. Yet, work by Desmombynes (2002) shows that the barriers for girls lie in the sibling composition - more particularly in having siblings of the same age or younger. Schooling attainment for eligible children from uneducated families remains however well below that of children from educated families - for example, 6.6 years of schooling for eligible children from uneducated fathers compared to 7.2 years for control children from educated fathers.

The last criterion to assess differentiated impact deals with supply constraints to education. As results in the previous section indicate, the distance to the closest secondary school considerably

²²With a bandwidth of 0.4, i.e. using 40% of the observations of the central points. The number of observations diminishes to 20% as you move to either end of the graph, and is 40% for the central points.

discourages school continuation. 31% of the children in the sample live in a village that enjoys a secondary school, while the average distance to school is 3.2 kilometers for the others, and is greater than 3 kilometers for 32%. Building schools in all villages is not a financially viable solution as a large number of the villages have few children in age to attend secondary school (the sample has 75% of the villages with fewer than 40 school-aged children). As indicated by Coady and Parker (2002), the demand-side approach in the form of educational transfers is more cost-effective than a program of school construction for the Mexican rural areas at large.

Educational grants effectively reduce the gap between children with and without a school in their village (table 6). Children traveling more than three kilometers gain 0.74 year compared to 0.4 for children with a school close by. With financial help and incentives, educational attainment of children living far from school can be raised substantially from 6.3 years to 7.1 years of schooling, at a level nearing the one achieved by children with a school in their village (7.4 years in the control group).

In conclusion, Progresa grants prove to differentially reach the more disadvantaged children along the three dimensions analyzed. Educational grants successfully eliminate schooling attainment differences along the wealth dimension: independently of the wealth of their families, all the children receiving Progresa grants exhibit the same schooling attainment of 7.4 years. It should however be noted that even though children with uneducated parents and who live more than three kilometers away from a school experience among the largest gains, their schooling attainment remain significantly lower than the average of 7.4 years for all eligible children and at times even lower than the attainment of some control children who don't receive grants.

6 Conclusion

Educational grants offer a demand-side intervention to address problems of low schooling attainment. The experience in Mexico proves that such demand-side approach can effectively counter the effect of poverty and even further lower drop-out rates of poor children. While drop-out rates increase by .3% going down each percentile in poverty, the grants more than compensate this effect by reducing the drop-out rate by .5% for every percentile of poverty. These gains cumulate to raise schooling attainment of poor children by .6 year. Most importantly, the cumulative gain amounts to leveling the playing fields for poor children - they achieve the same schooling of 7.4 years as children from wealthier families.

This gap closing effect is the product of the neediest children gaining the most from the program. Children of the bottom half of the wealth distribution experience gains of .8 year while the upper half have their schooling attainment increase by .4 year. The program did not have any built-in rule or scheme to achieve progressive gains in schooling. Hence, the equalizing result is remarkable.

The educational grants have other progressive impacts of interest. In the dimensions of parents' education and distance to school, benefits accrue particularly to children with the greatest barriers. Uneducated parents take advantage of the program more than their educated counterparts. However, it should be noted that while the gains are the largest, the schooling attainment continue to lag behind the average by .6 year.

Similarly, children that have to travel the most to get to school benefit the most from the program, although their schooling still falls short that of children with a school in their village by .3 year. The grants thus offer an additional policy option to supply-based approaches to raising schooling attainment in areas not too remote from schools. Yet, they do not guarantee a silver bullet to resolve accessibility issues.

Much further analysis will be needed to determine when and to what extent educational grants can effectively counter the effect of poverty onto schooling outcomes. Opportunities to extend the understanding of educational grants effectiveness and impact are growing as other countries have initiated similar programs and the Mexican government has extended Progres a to urban areas. Many questions could not be answered here: what is the optimal grant level? What is the optimal grant level that insure the progressive impacts? Can grants completely close the gap in schooling between children of educated and uneducated parents? How can a demand-side approach be combined with a supply-side approach to eliminate the accessibility issues? The Mexican program Progres a has proved that poor children can achieve schooling levels comparable to those of wealthier children. Answering the above questions shall determine how to design programs to further improve school attainment.

References

- Akabayashi, H. and G. Psacharopoulos**, “The Trade-off between Child Labour and Human Capital Formation: A Tanzanian Case Study,” *Journal of Development Studies*, 1999, 35 (5), 120–140.
- Akhtar, S.**, “Do Girls Have a Higher School Drop-out Rate than Boys? A Hazard Rate Analysis of Evidence from a Third World City,” *Urban Studies*, 1996, 33 (1), 49–62.
- Alderman, H., P. F. Orazem, and E. M. Paterno**, “School Quality, School Cost and the Public-Private School Choices of Low-Income Households in Pakistan,” *Journal of Human Resources*, 2001, 36 (2), 304–326.
- Angrist, J. D., E. Bettinger, E. Bloom, E. King, and M. Kremer**, “Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment,” *American Economic Review*, December 2002, 92 (5), 1535–1558.
- Behrman, J., P. Sengupta, and P. Todd**, “Progressing Through Progresa: An Impact Assessment of a School Subsidy Experiment,” April 2001. University of Pennsylvania.
- Behrman, J. R. and J. C. Knowles**, “Household Income and Child Schooling in Vietnam,” *The World Bank Economic Review*, 1999, 13 (2), 211–256.
- and **P. E. Todd**, “Randomness in the Experimental Samples of Progresa,” March 26, 1999. Washington, DC: Progresa Evaluation Project of IFPRI, mimeo.
- Binder, M.**, “Family Background, Gender and Schooling in Mexico,” *Journal of Development Studies*, 1998, 35 (2), 54–71.
- Bommier, A. and S. Lambert**, “Education Demand and Age at School Enrollment in Tanzania,” *Journal of Human Resources*, 2000, 35 (1), 177–203.
- Coady, D. P. and S. Parker**, “A Cost-Effectiveness Analysis of Demand- and Supply-side Education Interventions: The Case of Progresa in Mexico,” March 2002. Food Consumption and Nutrition Division Discussion Paper 127, IFPRI.
- de León, J. G., D. Hernández, and S. Parker**, “Intergenerational Transmission of Poverty in Mexico: The Impact of the Education, Health and Nutrition Program (Progresa),” June 1999. Mexico DF: National Coordination of Progresa, mimeo.
- Desmombynes, G.**, “Sibling Composition, Gender and the Effects of School Grants in Rural Mexico,” November 2002. University of California, Berkeley, mimeo.
- Glewwe, P. and H. Jacoby**, “Student Achievement and Schooling Choice in Low-Income Countries: Evidence from Ghana,” *Journal of Human Resources*, 1994, 29 (3), 842–864.
- Grambsch, P.M. and T.M. Therneau**, “Proportional Hazards Tests and Diagnostics Based on Weighted Residuals,” *Biometrika*, 1994, 81, 515–526.
- Handa, S.**, “The Determinants of Teenage Schooling in Jamaica: Rich vs. Poor, Females vs. Males,” *Journal of Development Studies*, 1996, 32 (4), 554–580.

- , “Raising Primary School Enrollment in Developing Countries - the Relative Importance of Supply and Demand,” *Journal of Development Economics*, 2002, 69 (1), 103–28.
- Kiefer, N.M.**, “Economic Duration Data and Hazard Functions,” *Journal of Economic Literature*, June 1988, 26, 646–679.
- Kim, J., H. Alderman, and P. F. Orazem**, “Can Private School Subsidies Increase Enrollment for the Poor? The Quetta Urban Fellowship Program,” *World Bank Economic Review*, 1999, 13 (3), 443–65.
- Lavy, V.**, “School Supply Constraints and Children’s Educational Outcomes in Rural Ghana,” *Journal of Development Economics*, 1996, 51, 291–314.
- Lillard, L.A. and R.J. Willis**, “Intergenerational Educational Mobility: Effects of Family and State in Malaysia,” *Journal of Human Resources*, 1994, 29 (4), 1126–1166.
- Lopez-Acevedo, G.**, “Learning Outcomes and School Cost-Effectiveness in Mexico: The Pare Program,” Working Paper 2128, World Bank May 1999.
- Muñiz, P.E.**, “La Situacion Escolar en Localidades Rurales Marginadas en México,” 1999. Mexico DF: National Cordination of Progresa, mimeo.
- Schultz, T. P.**, “School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program,” 2001. forthcoming in *Journal of Development Economics*.
- Skoufias, E. and S. Parker**, “Conditional Cash transfers and their Impact on Child Work and Schooling: Evidence from the Progresa Program in Mexico,” October 2001. Food Consumption and Nutrition Division Discussion Paper 123, IFPRI.
- Tansel, A.**, “Schooing Attainment, Parental Education, and Gender in Côte d’Ivoire and Ghana,” *Economic Development and Cultural Change*, 1997, 45 (4), 825–856.
- , “Determinants of School Attainment of Boys and Girls in Turkey: Individual, households and Community Factors,” *Economics of Education Review*, 2002, 21 (5), 455–70.
- West, E.G.**, “Education Vouchers in Principle and Practice: A Survey,” *World Bank Research Observer*, February 1997, 12 (1), 83–103.

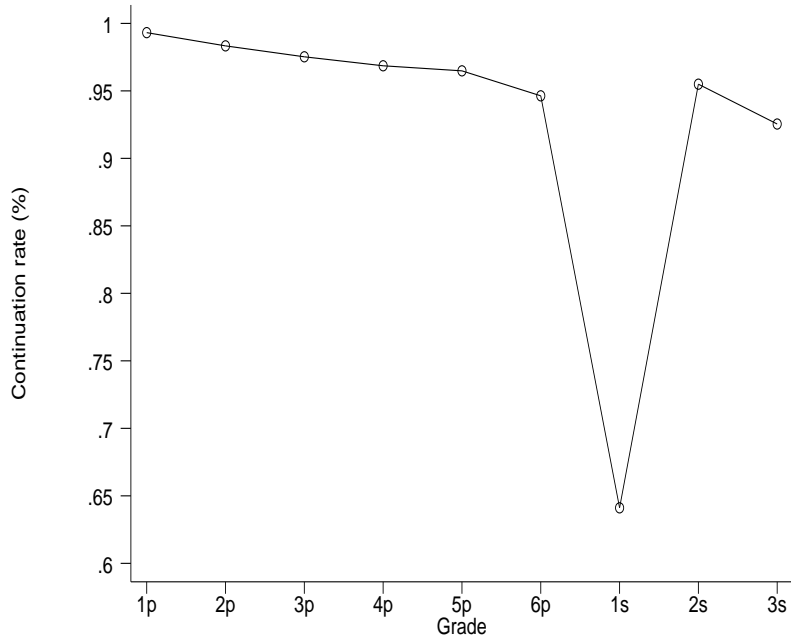


Figure 1: Continuation rate for grades of primary and secondary school (Progres data).

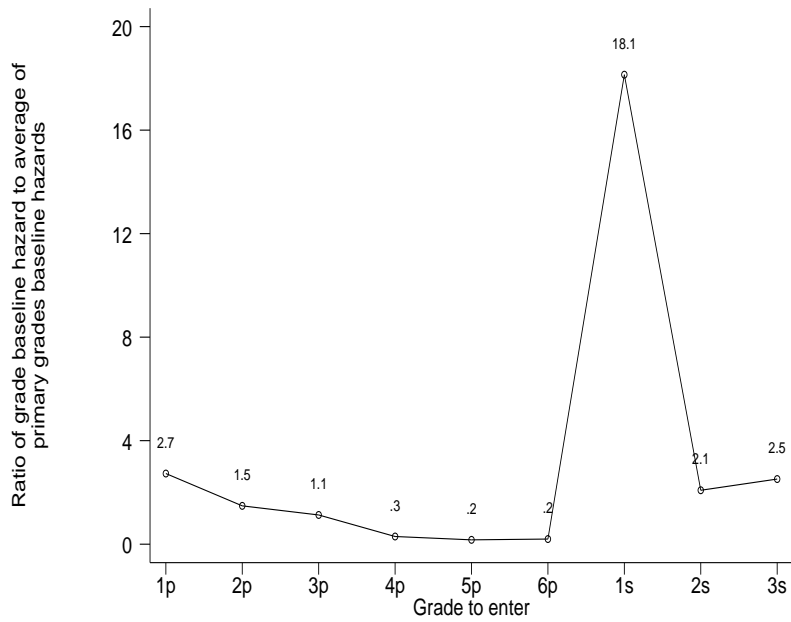


Figure 2: Non-parametric estimates of the baseline hazard rate.

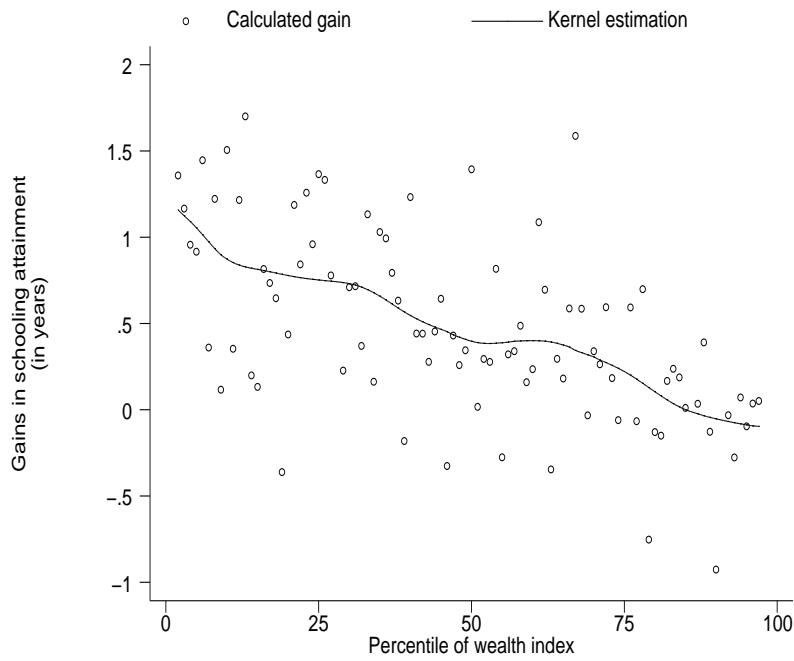


Figure 3: Kernel estimation of the gain in school attainment by poverty level.

Table 1: Progresa educational monthly grants by grade and gender.

Grade	Grant (in pesos)					
	July 1998		July 1999		Jan 2000	
primary						
3	70		80		85	
4	80		95		100	
5	100		125		130	
6	135		165		170	
secondary	boy	girl	boy	girl	boy	girl
1	200	210	240	250	250	265
2	210	235	250	280	265	295
3	220	255	265	305	280	320
Maximum per family	625		750		790	

9 pesos is worth about US\$1.

Grants are adjusted every six months for inflation.

Source: National Direction of Progresa, 2000

Table 2: Impact of Progresa on the conditional probability to drop out of school.

	Hazard Ratio	Z stat ^a	
Year 1998 dummy	1.00	-0.05	
Progresa village (α_1)	0.99	-0.14	
Eligible family (α_2)	1.56	1.46	
Costs (C_{g+1})			
Distance to school ¹ (in km)	1.20	8.69	***
Distance over 3 km	0.82	-5.79	***
Earnings ($w(g, Z)$)			
Off-farm earning opportunities			
Share of employment sectors in the village ^{2,5}			
Agricultural sector (0-100)	1.01	4.33	***
Non-agricultural sector (0-100)	1.03	7.10	***
Other employment types (0-100) ⁶	1.02	4.15	***
Village average level of schooling (0-6 yrs)	0.78	-6.88	***
Distance to capital (per 10 Km) ²	0.98	-5.88	***
Family's labour needs			
Family owes business ³	1.06	1.01	
Agricultural land cultivated by the family (in Ha)			
for a child aged 8-11	0.92	-2.21	**
for a child aged 12-16	1.00	0.32	
# of draft animals ²	1.01	1.84	*
# of cattle heads	0.99	-1.33	
# of small productive animals	1.00	-0.05	
# of 0-5 yr old children ³	1.05	2.34	**
Child's work opportunities			
Age dummy for 8 years and older	1.15	0.43	
Age dummy for 12-16 years old	1.24	0.72	
Work while in school the year before	1.00	-0.03	
Girl in primary school	0.92	-0.93	
Girl in secondary school	1.17	3.94	***
Child's ability (Z)			
Entry age to primary school	0.93	-2.44	**
Child failed his grade the previous year			
Grade 1-3	1.25	1.25	
Grade 4-6	2.05	7.11	***
Grade 7-9	1.69	10.51	***
Age (proxy for school progression)			
In grade 1-3	1.62	13.00	***
In grade 4-6	1.73	17.14	***
In grade 7-9	1.30	14.74	***

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	Hazard Ratio	Z stat ^a	
Parents' human capital (Z)			
Mother's schooling (in years)	0.96	-4.06	***
Father's schooling (in years)	0.94	-5.96	***
Indigenous mother	0.79	-2.04	**
Indigenous father	0.88	-1.14	
Discount factor (β)			
Birth order ⁴			
In primary school	0.56	-7.26	***
In high school	0.81	-4.55	***
# of siblings aged 6 to 11 for a child aged 6-11	0.98	-0.17	
for a child aged 12-16	1.00	0.00	
# of siblings aged 12 to 16 for a child aged 6-11	1.61	5.78	***
for a child aged 12-16	1.10	3.72	***
Wealth (δ)			
Percentile of wealth index for non-poor	1.002	0.65	
Percentile of wealth index for poor	0.997	-2.07	**
Treatment effects (T_{g+1})			
By grade (γ_h)			
Primary 3	0.48	-2.81	***
Primary 4	0.46	-3.49	***
Primary 5	0.61	-2.33	**
Primary 6	0.54	-3.60	***
Secondary 1	0.55	-4.86	***
Secondary 2	0.57	-2.70	***
Secondary 3	0.52	-3.17	***
By percentile of wealth (ζ)	1.005	2.91	***
No. of observations	=	35387	
No. of subjects	=	20541	
Overall Chi ²	=	3507	
Log Likelihood	=	-17483	
Time Varying Hazard test, Chi ²	=	43	

^a Z statistics associated with the underlying coefficient. A Huber correction is used to obtain robust error estimates at the family level.

* significant at 90% ** significant at 95% *** significant at 99%

¹ For high school grades only; ² For teens 12-16 years old only; ³ For children 8 years and older; ⁴ 1 = Eldest, 2 = Second child, ...; ⁵ Against the share of self-employed individuals; ⁶ Includes non-renumerated work, work for a cooperative and work in a communal farm (ejido).

Table 3: Predicted schooling attainment and gains from Progresa grants.

	Schooling Attainment (in years)	Gain over control	
Non-Poor ¹	7.3 (.07)		
Poor in control villages	6.8 (.07)		
Poor in treatment villages			
1. Current program covering primary 3 to secondary 3	7.4 (.05)	0.56 (.07)	**
2. Program in secondary 1 only	7.0 (.10)	0.22 (.11)	**
Difference in gains (Treatment 1. vs 2.)		0.34 (.09)	**

Note: The standard errors calculated by bootstrapping the complete estimation procedure are found in parenthesis.

** indicates significant at 95% and * significant at 90%.

¹ Includes the non-poor from Progresa and non-Progresa villages.

Table 4: Predicted schooling attainment $E[G]$ and gains by wealth among eligible households.

		$E[G]$ (in years)		Gain	
		Treatment	Control	over control	
Wealth index, by quartile					
	First	7.3 (.08)	6.4 (.11)	0.88 (.13)	**
	Second	7.4 (.06)	6.6 (.10)	0.86 (.10)	**
	Third	7.4 (.07)	7.0 (.08)	0.37 (.10)	**
	Fourth	7.3 (.10)	7.0 (.10)	0.35 (.13)	**
Diff in gains	First vs second			0.02 (.14)	
	Second vs third			0.49 (.12)	**

Note: The standard errors calculated by bootstrapping the complete estimation procedure are found in parenthesis.

** indicates significant at 95% and * significant at 90%.

Table 5: Predicted schooling attainment $E[G]$ and gains by parents' education.

		E[G] (in years)		Gain	Diff	
		Treatment	Control	over control	in gains ¹	
Father's education						
	None	6.6	5.7	0.86	**	
		(.09)	(.13)	(.13)		0.40 **
	Some	7.6	7.2	0.46	**	(.11)
	(average = 4.2)	(.05)	(.06)	(.07)		
For girls						
	None	6.6	5.8	0.73	**	
		(.10)	(.17)	(.16)		0.25 *
	Some	7.6	7.2	0.48	**	(.15)
		(.06)	(.07)	(.08)		
For Boys						
	None	6.5	5.6	0.97	**	
		(.13)	(.16)	(.18)		0.53 **
	Some	7.6	7.2	0.44	**	(.17)
		(.06)	(.07)	(.07)		
Mother's education						
	None	6.7	6.0	0.65	**	
		(.10)	(.11)	(.12)		0.15
	Some	7.7	7.2	0.50	**	(.10)
	(average = 4.2)	(.04)	(.06)	(.07)		

Note: The standard errors calculated by bootstrapping the complete estimation procedure are found in parenthesis.

** indicates significant at 95% and * significant at 90%.

¹ Tests $\text{Gain}(\text{None}) - \text{Gain}(\text{Some})=0$.

Table 6: Predicted schooling attainment $E[G]$ and gains by distance to school.

		E[G] (in years)		Gain	
		Treatment	Control	over control	
Distance to high school					
	Within 1 Km	7.8 (.06)	7.4 (.07)	0.40 (.07)	**
	Between 1 to 3 Km	7.4 (.06)	6.7 (.08)	0.64 (.08)	**
	Beyond 3 Km	7.1 (.06)	6.3 (.09)	0.74 (.09)	**
Diff in gains	1 Km vs 1-3 Km			0.24 (.06)	**
	1-3 Km vs 3 + Km			0.10 (.08)	
	1 Km vs 3 + Km			0.34 (.08)	**

Note: The standard errors calculated by bootstrapping the complete estimation procedure are found in parenthesis.

** indicates significant at 95% and * significant at 90%.