Conditional Cash Transfer (CCT) programs

School subsidies for the poor: evaluating the Mexican Progresa poverty program

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- This paper analyzes **the impact on school enrollment of a school subsidy program in poor rural communities in Mexico called Progresa**.
- The program was randomly allocated among an initial group of 495 localities, which allows for a straightforward evaluation of the short-run effect of the program by **comparing mean enrollment rates of those eligible (i.e., poor) for assistance in the treatment and control villages.**
- The implementation of the randomized design is appraised by comparing pre-program differences between enrollments in the treatment and control populations.

- The Progresa program in Mexico was designed to minimize disincentives to work by not conditioning transfers on current income after the initial targeting of the program to the poor, based on geographical and household poverty information.
- Most programs designed to increase school enrollments among the poor build schools closer to where they live, increase the resources for the schools in terms of raising teacher salaries and training, reducing class size, and augmenting other educational inputs.

- The household “demand’’ approach provides subsidies which can be administratively targeted to the poor within a community, and perhaps thereby able to close the gap between enrollments of the poor and not poor, reducing the substantial inequality in schooling and income found in Mexico and in many other parts of Latin America.

Monthly payments for Progresa program eligible families for children who attend at least 85% of days

Table 1
Monthly payments for Progresa program eligible families for children who attend at least 85% of days[a]

Educational levels of students eligible for payments		July–December 1998[b]
Primary school—both sexes		
3rd Year		70
4th Year		80
5th Year		105
6th Year		135
Secondary school		
1st Year	Males	200
	Females	210
2nd Year	Males	210
	Females	235
3rd Year	Males	225
	Females	255

Source: Progresa staff.

[a] Excluding those days for which medical or parent excuses were obtained, accumulated over the last 2 months.

[b] Corresponds to school year first-term, September to December, 1998.

- The size of the grants increase several fold at the higher grades.
- A premium for girls was introduced in junior secondary school, because enrollment rates for girls decreased relative to those for boys in the secondary schools in these communities.
- In sum, the Progresa educational grants should have reduced by 50–75% the private economic costs of attending school for children qualified to enroll in grades 3 through 9.

Modeling school enrollment and the empirical specification of evaluation methods

- In a setting such as rural Mexico where the schools serving the surveyed population are public, and free of tuition, the private price of schooling is predominantly the opportunity value of the time a student withdraws from other activities to attend school.
- Children are engaged in many activities outside of school in addition to paid work and even productive activities based in the home or family business, such as farming.

- In Becker's (1965) model of household production and consumption, the opportunity cost of an individual's time is the marginal value of her or his output in these alternative valued activities.
- The price of schooling is then this shadow wage of the child minus any Progresa school subsidy, plus any direct costs of attending school, such as special school clothing or uniforms, books and materials, and transportation costs.

- The effect of the school subsidy is both to decrease the price of schooling and increase the family's income.
- To the extent that schooling is a normal consumption good for which demand increases with income, or income relaxes a credit constraint that allows the poor family to invest more in the schooling of their child, both the income effect and the income-compensated price of schooling effect of the school subsidy will increase the household's demand for schooling.

Empirical specification of enrollment determinants

A linear approximation of the estimated enrollment model can be expressed as follows:

$$S_i = \alpha_0 + \alpha_1 P_i + \alpha_2 E_i + \alpha_3 P_i E_i + \sum_{k=1}^{K} \gamma_{ki} C_{ki} + \sum_{j=1}^{J} \beta_j X_{ji} + e_i$$

$$i = 1,2, \dots, n \qquad (1)$$

where i indexes the child, n represents the total number of children in the cross-sectional survey, and the explanatory variables and the interpretation of their linearized effects on enrollments are discussed below, i.e., derivatives of the probit function evaluated at sample means.

First, there may be an effect on enrollments, α_1 , associated with residing in a Progresa locality, P_i =1 (otherwise zero), although the random assignment of the community locations for the Progresa program is designed to minimize any such difference before the program informed the community of who would benefit from the program.

There may also be an effect, α_2 , of being designated as a child from a poor household, E_i =1 (otherwise zero), who would be eligible for Progresa benefits when the transfer payments are initiated, if the family resides in a Progresa locality.

One common hypothesis is that credit constraints limit the investment of the poor in their children's education, suggesting that α_2 would be negative.

An interaction binary variable defined as the product of the Progresa and poor variables, $P_i\ E_i$, would then exert an additional effect on enrollment denoted α_3 , which should be approximately zero until the program transfer payments are announced, and thereafter it is expected to be positive.

Having controlled for the two- way interaction effect, the direct effect of the Progresa program for those who are not eligible for the educational grants, or α_1 , might be small even after the program has started, possibly capturing "spillover effects'' between poor and rich families in Progresa-served communities and errors in program administration.

The variable C_k is defined as 1 if the child has completed precisely k years of school, k = 0, 1, . . ., 8, 9, or more, which would qualify the child to enroll in the $k + 1$ grade. The coefficients on these dummy variables,γ_k, thus adjust for linear differences in enrollment by grade level.

With the passage of time, some variables that explain the probability of enrollment in Eq. (1) may change, such as C, which would change if a child completes one grade of schooling and qualifies to enroll in the next. The net effect of all unobserved variables that change over time is partially captured in the probit model by allowing a shift in the estimated intercept specific to each time period or survey cycle. In other words, α_{0t} is allowed to vary in each round of the survey, where $t = 1, 2, 3, 4, 5$.

Because Progresa grants only started in September 1998, the program effects on enrollments represented by the coefficients on P and PE are estimated as an additional set of interaction effects for the post-program periods in October 1998, May 1999, and November 1999 ($t = 3, 4$, and 5, respectively), and the estimated post-program effects are distinguished by asterisks in the enrollment equation (Eq. (2)) that combines all five survey cross sections:

$$S_{it} = \sum_{t=1}^{5} \alpha_{ot} + \alpha_1 P_i + \alpha_2 E_i + \alpha_3 (P_i E_i) + \sum_{k=1}^{K} \gamma_{ki} C_{kit} + \sum_{t=3}^{5} (\alpha_{1t}^{*} P_i + \alpha_{3t}^{*} (P_i E_i)) + \sum_{j=1}^{J} \beta_j X_{jit} + e_{it} \quad (2)$$

Eq. (2) is estimated separately for boys and girls, because the probit parameters differ significantly by gender, particularly at the secondary school level.

Given the relatively high level of enrollment at the primary level and the sharp decline in enrollment at the transition to the secondary level, the two school levels are estimated separately.

The primary sample is defined as all children age 6–16 who report C_{kt} =1, for $k = 0, 1, 2, \ldots, 5$, indicating that they have not yet completed primary school, and the secondary sample is defined as all children age 6–18 who report C_{kt} =1 for $k = 6, 7, 8, 9$, or more.

It is assumed that Progresa's effect on enrollment is uniform by school level across grades by gender, when the probit model for Eq. (2) is estimated at the individual level, but the effect is allowed to vary by grade level in the group differences.

If the J control variables, X, were uncorrelated in each time period with the program- designated localities, P, and the eligibility of the poor, E, the program effect on enrollment could be obtained directly by stratifying the population by E and P and observing the incremental effect of P and PE in the periods after the program started to make educational grants.

Fig. 1 illustrates the implied four-way stratification of the population of children for the purposes of calculating an enrollment rate, S_{gt}, $g = 1, 2, 3, 4$. The program effect in the post-program periods represents the program's impact on the school enrollment of poor children, which are stratified by grade completed.

Fig. 1. Schematic comparison of the proportion of children enrolled in school at time period t.

Program Selection of Locality	Economic Endowments of Households	
	Poor Households Eligible for Progresa grants	Not Poor Households and Ineligible for grants
Progresa Localities	S_{1t}	S_{3t}
Non-Progresa (Control) Localities	S_{2t}	S_{4t}

Fig. 2. Group differences representing effects of program grants

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1. Program-Control Differences in Outcomes among Comparable-Eligible (Poor) Groups

   $D1_t = S_{1,t} - S_{2,t}$

   Assumes Program placement is orthogonal to all other factors affecting or correlated with outcomes variables.

II. Double-Differenced Estimator of Change in Outcomes between Program-Control Eligible Groups over time:

   $DD1_t = (S_{1,t} - S_{2,t}) - (S_{1,t-1} - S_{2,t-1})$

III. Non-eligible-Eligible Differences between Program and Control regions measure Program effect on reducing equality in access to schooling, or a measure of targeting effectiveness:

   $D2_t = (S_{3,t} - S_{1,t}) - (S_{4,t} - S_{2,t})$

IV. Double-Differenced Estimator of Change in Inequality in Outcome over time:

   $DD2_t = (S_{3,t} - S_{1,t}) - (S_{4,t} - S_{2,t}) - [(S_{3,t-1} - S_{1,t-1}) - (S_{4,t-1} - S_{2,t-1})]$

   Assumes all factors affecting economic group differences in Program and Control regions do not change over time.

Summary and Conclusions

- The level of enrollment rates of comparably poor children in Progresa localities (treatment) are higher than in non-Progresa localities (control) in the three survey rounds collected after September 1998 when the Progresa program began offering educational grants to poor mothers whose children were enrolled in school in grades 3 through 9.

- This difference estimator of Progresa's impact on the enrollments of the poor is reported. It is statistically significantly different from zero within each distinguished group of children who had completed grades 1 through 6 in the previous year. These differences are often larger for girls than boys.

- The randomization of assignment of localities to the first wave of the Progresa program is tested by calculating the differences in enrollment by the poor in the treated and control localities before the program started. These pre-program differences were not significant, suggesting that the implementation of the random assignment was performed successfully.
- Difference in difference estimates over time confirm a slightly smaller program impact on enrollment, as shown in Figs. 3 and 4 for girls and boys, respectively. The cumulative cohort effect on schooling attainment are extrapolated, and the difference in difference estimator implies that the program has caused an increment of 0.66 years on the baseline level of 6.80 years of schooling.

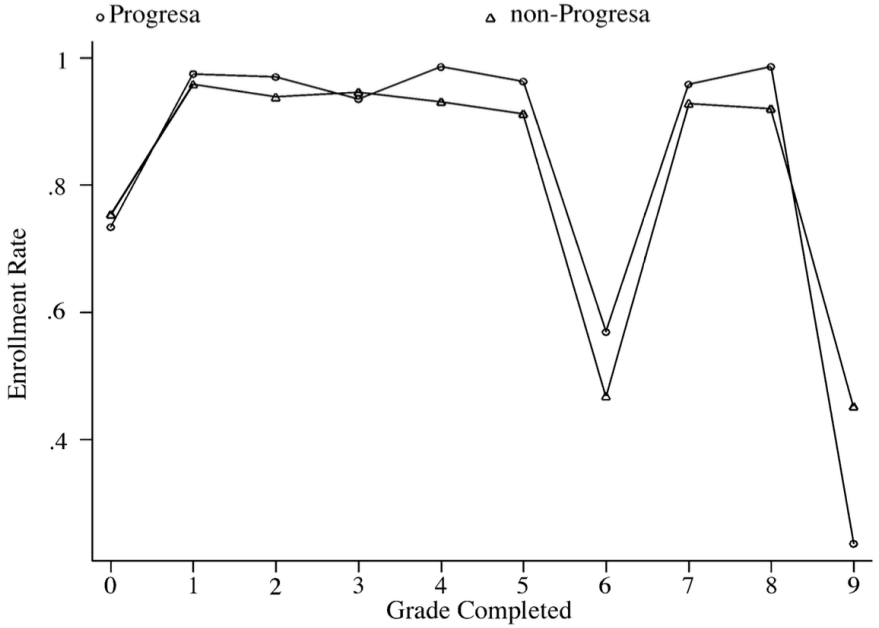

Fig. 3. Girls' enrollments in Progresa and non-Progresa localities over time.

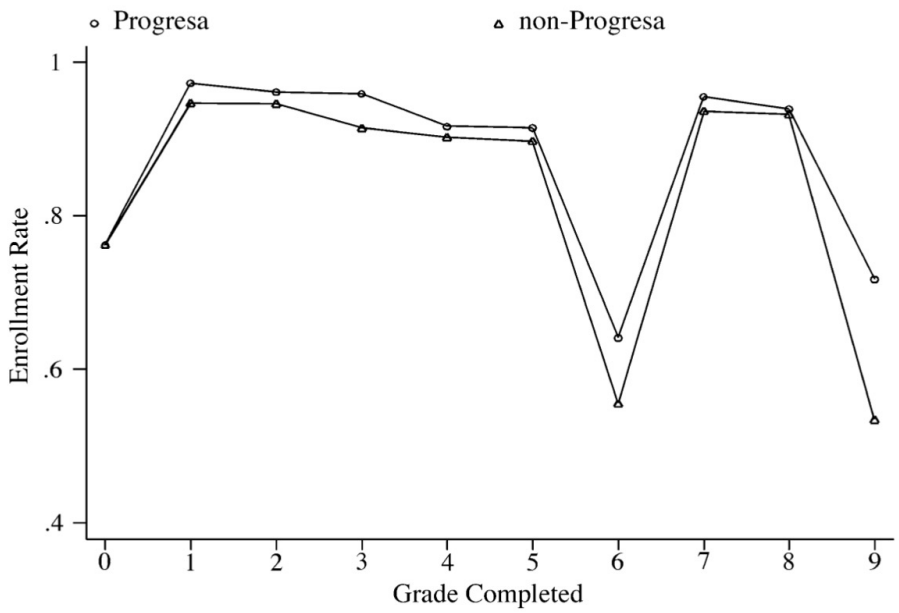

Fig. 4. Boys' enrollment in Progresa and non-Progresa localities over time.

- The Progresa program targets geographically and economically (at the household level) the poor, located in relatively immobile, rural villages of Central and Southern Mexico.
- Evidence is presented that this targeted transfer payment has the effect of reducing the economic inequality in school enrollments within the Progresa localities compared with that in the non-Progresa localities, and these impacts on enrollment inequality reach statistical significance from grades 4 through 6.
- The pre- program inequality differences between the Progresa and non-Progresa localities are not jointly statistically significant and consequently appear to be assigned randomly.
- The estimated difference in difference in enrollment inequality over time is negative and statistically significant after grade 6.