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TARGETING HIGH SCHOOL SCHOLARSHIPS TO THE POOR: THE IMPACT OF A PROGRAM IN MEXICO

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Targeting High School Scholarships to the Poor: The Impact of a Program in Mexico
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ABSTRACT

Based on an RCT, we evaluate a scholarship program in Mexico (PROBEMS) aimed at improving graduation rates and test scores among upper secondary school students from poor backgrounds. We find that, on average, the program has no impact either on graduation rates or on Math and Spanish test scores. We point to two possible reasons for this failure: a. the program was badly targeted, with many of the recipients being from less disadvantaged families than intended; b) the prior academic achievement of those eligible was often insufficient for completing successfully the academic requirements of upper secondary school. This points to accumulated achievement deficits that could be addressed by interventions targeting learning at an earlier stage.

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I Introduction

Improving high school or upper secondary graduation rates for children from lower income backgrounds is often seen as important for offering access to opportunity and improving intergenerational mobility. Indeed, in many circumstances low attendance is an important issue of economic efficiency and has implications for aggregate economic growth (Hanushek and Woessmann, 2012; WorldBank, 2018). As such it has motivated policy in numerous countries, where financial support is offered for upper secondary attendance that goes beyond providing tuition free. The underlying reason that is often cited is that certain high ability but low SES students are liquidity constrained, which generates a wealth gradient in attendance even conditional on ability (Abbott et al., 2019; Belley and Lochner, 2007). Such liquidity constraints can arise both because parents may be reluctant to fund education to the level that is efficient from the child's perspective when they are unlikely to be repaid and/or because willing parents are themselves poor and constrained in their ability to borrow the required funds. This can imply that children with potentially high returns do not obtain enough schooling. Both from efficiency and equity considerations, targeting such students appropriately is likely to be of first-order importance.

In light of such arguments, the Mexican government introduced a new scholarship program in 2007 (PROBEMS) targeted to poor upper secondary students, with the objective of increasing graduation rates as well as improving learning outcomes. The excess demand for such scholarships, relative to the available budget, offered the opportunity to evaluate their impact by randomly allocating them through a lottery system implemented in 2009. Based on this randomization, we estimate the impact of the intervention on beneficiary students' probability of graduation and on their test scores at the end of upper secondary in 2012. Henceforth we refer to PROBEMS as the Scholarship program.

The main result we obtain is that the scholarship program had no effects either on upper secondary graduation rates or on performance in the standardized test. This surprising result may be due to miss-targeting of the program. A conditional cash transfer can increase graduation rates because it alleviates liquidity constraints for some and because it reduces the cost of education,

drawing in people with potentially high returns. If liquidity constraints are not the central issue and if the effort cost for lower ability individuals are high, then it is quite possible that we do not observe an impact overall. Thus to get a better understanding we carry out subgroup analysis, while allowing for appropriate multiple testing adjustments. We find that the only subgroup of students where the scholarship had a positive and significant impact on the probability of graduation were those with relatively high initial test scores. For students at the top tercile of the test score distribution at baseline, being awarded a scholarship increases the probability of graduation by 4 percentage points. This reinforces the notion that the scholarship could be better targeted and specifically towards students whose level of prior achievement is sufficient to benefit from secondary school. It also emphasizes that a policy improving school readiness earlier, combined with ability and means tested financial aid would be much more effective in improving school outcomes. In other words it seems important to address quality of schooling as well as access.

The rest of the paper is organized as follows. In Section II we discuss the Mexican context and describe the intervention. In particular, in Section A, we discuss the upper secondary or high school system in Mexico, Section B describes the scholarship program, including the trends in number of beneficiaries. Section III describes the evaluation design, the baseline and follow-up data. Section IV presents the main results. Section V presents a discussion of some of the reasons that explain the lack of effects of the intervention. Finally, Section VI concludes with the policy implications of the results.

II Context and Intervention

Mexico, like other middle-income countries, has reached almost universal enrollment rates in primary school (grades 1 to 6) and lower secondary school (grades 7 to 9) school. However, its education system still faces important challenges, especially in upper secondary school. For instance, around 35 of every 100 students who enroll in upper secondary will never graduate. Among those who graduated from high school in 2015, more than 60% attained insufficient levels in math ac-

cording to the national standardized test, Planea (INEE (2017b)).[1] Many of the students dropping out or finishing high school but with insufficient skills come from poor or marginalized households. Therefore, upper secondary education dropouts and low achievement levels have important implications for Mexico's long-term economic growth and income disparities (de Hoyos et al. (2016)).

A Upper Secondary Education in Mexico

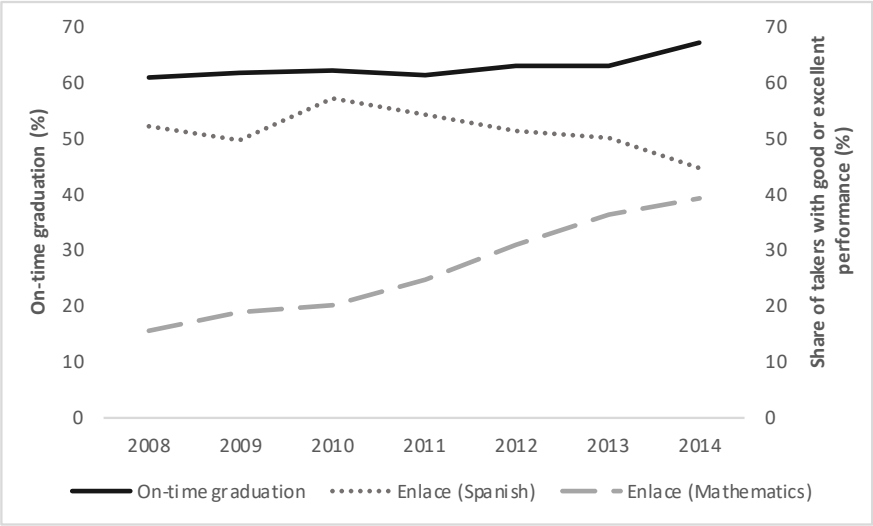
The upper secondary education/high school system in Mexico (EMS for its acronym in Spanish) consists of 4.9 million students, typically between 15 to 18 years old, in grades 10th, 11th and 12th. The High school system is large and complex with several service providers and types of degree programs. High school is offered by four different providers: 1) the federal government (accounting for 21.8% of total enrollment), 2) the state governments (47.4%), 3) publicly financed autonomous universities (12.3%), and 4) private entities. High school offers three types of degree programs: *general* – preparing students for higher education, *technological* – preparing students both for the labor market and for higher education, and *technical* – emphasizing technical and vocational education INEE (2017a)). We will refer to the upper secondary education system, EMS, as High school from now on to avoid the proliferation of acronyms.

Although graduation rates and learning outcomes in High school have experienced an improvement during the last 10 years, their levels are consistently low (see Figure 1). According to the official statistics from Mexico's National Institute for the Evaluation of Education (INEE for its acronym in Spanish),[2] in 2014 only 67% of students graduated three years after enrolling in High school, with this share being significantly higher among females (70%) than males (62%). Graduation rates vary across types of degree programs with *general* schools showing the highest (69%), followed by *technological* schools with rates very close to the national average and *technical* schools showing the lowest (54%). According to INEE, more than 60% of the cumulative dropouts throughout the three years of High school take place during the first year. Household

[1] http://publicaciones.inee.edu.mx/buscadorPub/P2/A/328/P2A328.pdf
[2] http://publicaciones.inee.edu.mx/buscadorPub/P1/B/115/P1B115.pdf

survey data show that enrollment in High school among youths aged 15 to 18 varies substantially across household income deciles. For instance, according to the information reported by the national household survey ENIGH, in 2012, only 13.5 percent of youth aged 15 to 18 in the poorest households were enrolled in High school versus an enrollment rate of 95 percent among the richest households. The disparity in enrollment rates across the distribution raises the question of whether liquidity constraints have an important role to play. Moreover, information from the 2011 *EMS School Dropout Survey* shows that more than a third of the 2,549 High school dropouts surveyed declared that economic constraints were the main reason for leaving school (SEP (2012)).

Figure 1: Graduation Rates and Learning Outcomes



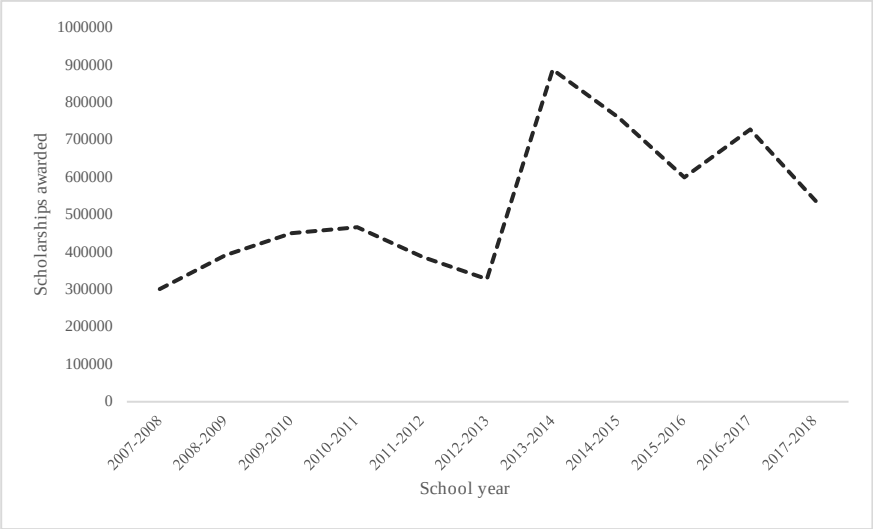
The High school system in Mexico is characterized by strict progression criteria. Students must pass five of eight disciplinary subject areas and practical modules. Otherwise they have to repeat the semester. Students who fail three or fewer subject areas can enroll in the next semester, but they have to attend and pass intensive courses (the so-called *regularización*) during a fixed time window. In addition, students must satisfactorily complete all their subject areas and modules within 10 semesters after enrolling in High school, otherwise they lose the right to re-enroll. Partly as a result of the strict promotion rules, there are very high grade and subject repetition rates, 15.3

percent and 31.3 percent, respectively in 2013.[3]

B The Scholarship Program

In the context of a major High school curricular reform[4], with the aim of reducing school dropouts and improving learning outcomes, in 2007 the Secretariat of Public Education (SEP for its acronym in Spanish) introduced a new scholarship program. The program targeted poor High school students mostly in urban areas since, at the time, a national conditional cash transfer program, *Progresa/Oportunidades* later renamed as *Prospera*, already benefited poor High school students in rural areas.[5] The number of beneficiaries with the Scholarship program increased substantially between 2007 and 2014, from less than 300,000 to almost 900,000 (see Graph 2), representing 24% of the total enrollment in High school in 2014. The budget assigned to the program in 2014, the year when the Scholarship program had the largest number of beneficiaries, was close to US $410 million, accounting for 23% of the total High school federal budget, excluding salaries.

Figure 2: Evolution in the Number of the Scholarship program Beneficiaries



The Scholarship program had three different types of scholarships: "support", "retention" and

[3]Students who fail three or more subjects for two consecutive semesters have to repeat the entire grade.

[4]For more information on the High school reform of 2008, see SEP (2008): http://cosdac.sems.gob.mx/portal/index.php/riems.

[5]The conditional cash transfer program has since then expanded to many urban areas.

"excellence". The difference between the three types of scholarships was determined by the grade point average (GPA) during the year prior to applying to the program (the last year of lower secondary in the case of candidates about to enter High school). The "excellence" scholarship required a minimum GPA of 9 out of 10, "retention" a GPA between 8 and 8.9 and a minimum GPA of 6 (the passing mark) was required under the "support" modality. To incentivize students' efforts, monthly transfers were marginally larger under the "excellence" modality than under the "retention" modality and this was marginally larger than the transfer under the "support" modality. Transfers also varied between gender, grade and type of degree program. Table 1 shows the monthly transfer in 2009 under the different scholarship modalities, by grades and gender. The overall average monthly value of the scholarship was $716 MX or $56 US dollars in 2009, slightly less than the extreme poverty line of that same year.[6]

Table 1: Monthly Transfers by Type of Scholarship

	Grade	**Man**	**Woman**
Support (GPA 6.0 to 7.9)	1o	500	525
	2o	525	575
	3o and 4o	575	625
Retention (GPA 8.0 to 8.9)	1o	650	700
	2o	700	750
	3o and 4o	750	790
Excellence	ME1 (GPA 9.0 to 9.4)	850	900
	ME2 (GPA 9.5 to 9.7)	900	950
	ME3 (GPA 9.8 to 10)	950	1000

All amounts expressed in Mexican pesos of 2009 (13 pesos to the US$ at the time)

The Scholarship program' operating rules in 2009, the year when the lottery took place, defined the following eligibility criteria to be considered as a potential beneficiary:

1. Be enrolled in a public High school school.

2. Applicants who were about to enter High school, were required to present their lower sec-

[6]In 2009 the National Council of Social Policy Evaluation (CONEVAL) defined three poverty lines in Mexico: "food intake" (pobreza alimentaria) or extreme poverty line, "capabilities" (pobreza de capacidades) and "assets" (pobreza patrimonial), with values of $949 MX, $1,164 MX, and $1,905 MX, per person, per month, respectively.

ondary graduation certificate. Students continuing High school studies, were required to have a pass mark in all subject areas of the previous semester.

3. Not be enrolled in any other government program providing scholarships.

4. Have a household per capita income below the "assets" poverty line defined by CONEVAL as $1,413 MX and $2,102 per person, per month for households located in rural and urban areas, respectively.

5. Apply for a scholarship through the program's portal.[7]

To assign the scholarships, SEP issues one and sometimes two calls for applications per year depending on budget availability. The call for applications is usually issued in March of each year, targeting students starting or continuing High school in the following academic year (August). Interested candidates start their application process by filling in a form capturing household income, the availability of household assets, parents' education and basic academic information such as the school and grade of enrollment. All applicants must have a personal identifier known as the CURP, issued by the Government of Mexico.[8] SEP uses the CURP to identify applicants who are beneficiaries of the conditional cash transfer program (PROGRESA / Oportunidades) at the time of applying, which automatically excludes them from the Scholarship program. The self-declared household income and assets information included in the on-line application format is used to rank students in terms of their likelihood of being below the "assets" poverty line. Finally, as stated by the call for applications, SEP gives priority to first-year High school students. The likelihood of being poor, budget availability and High school grade of enrollment determined a list of pre-selected candidates.

When a candidate is pre-selected–usually one month after the call for applications is closed, he or she is notified by email with instructions on how to complete the application process. The next step is to enroll in High school or continue to the second or third grade, and present, at the school,

[7] https://www.becasmediasuperior.sep.gob.mx

[8] Mexican citizens have a unique personal identifier, known as *Clave Única de Registro Poblacional, CURP*, formed by an algorithm combining name, surname, date of birth, sex, state of birth, plus 2 randomly generated digits.

all the relevant documentation to validate the information uploaded in the program's portal. School directors receive the list of pre-selected candidates via email and are responsible for validating the information provided by the candidates through the program's portal. In particular, the school director has to validate that the student is indeed enrolled in his or her school, that the student has no subject areas of previous semesters below the passing mark, and validate the GPA as declared by the student. Once the school director validates the information, the candidates receive a second email notifying them that they have been awarded a scholarship. SEP issues debit cards under the name of the beneficiary. As a final step the student, together with their father, mother or legal guardian, collects the debit card at the closest branch of the commercial bank participating in the program.

III Evaluation Design

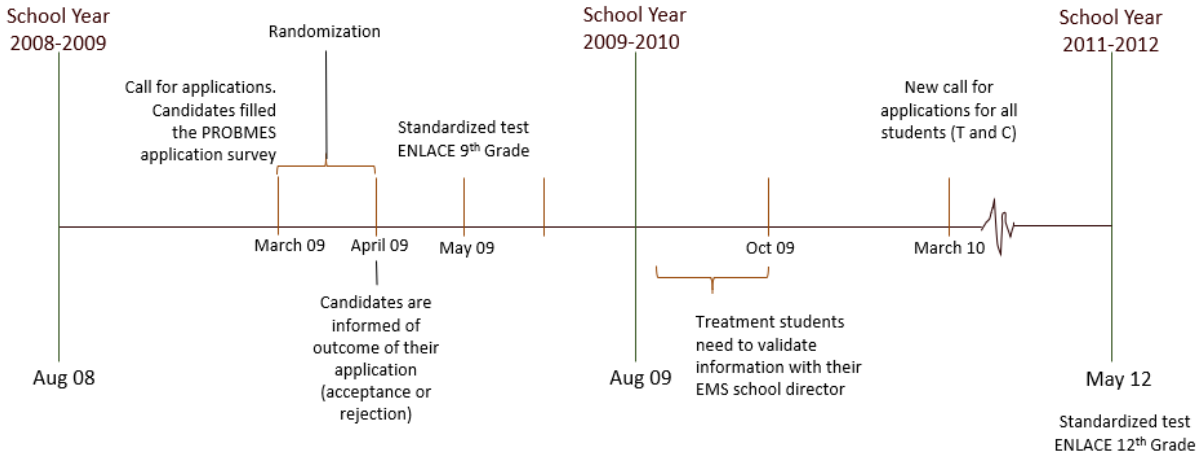
Our evaluation strategy relies on the random assignment into the program. The call for applications in March 2009 received close to 70,000 valid applications of which more than 50,000 of them fulfilled the eligibility criteria. However, SEP's budget was enough for awarding between 40,000 to 45,000 scholarships, depending on the distribution by type of scholarship. Thus, for the purposes of evaluation SEP authorized a randomized assignment of the scholarship in a pre-selected eligible population of 12,000 students: 6,000 students were randomly selected to be part of the treatment group and the same number formed the control group. All 12,000 students received an email from SEP at the end of April 2009 notifying them that they were granted or rejected a scholarship according to the random assignment. The Scholarship is assigned on an annual basis and therefore randomization itself could only exclude an applicant for one school year. Thus, all students, treatments and controls, could apply to receive a scholarship in the following call for applications in March 2010.

Since the Scholarship program prioritized first-year High school students, 60% of the eligible candidates were completing lower secondary (9th grade) while submitting their application in March 2009. Therefore 3,648 students in the treatment and 3,673 in the control group, respec-

tively, were about to start High school in August of 2009. For the purposes of this paper, we will concentrate on this subsample. Focusing on first-year students and following them through the three school years of High school, estimates the impact of one year of exposure to the program at the beginning of High school, versus not having this monetary support, on graduation rates and learning outcomes measured by the standardized test ENLACE in 12th grade.

Figure 3 presents a timeline of the evaluation design. The key dates are the point of randomization (March-April 2009), national testing at the end of lower secondary was in May 2009. In March 2010 all students could reapply for a scholarship, including the those part of the control group. Hence the experimental variation consisted of random offer of funding (or not) for the first year of High school (grade 10). The national standardized test ENLACE 12th grade was applied to all students finishing High school on time in May 2012. We also merge our baseline data with ENLACE 12th grade of 2013 to identify lagging students that nevertheless graduated from High school. These are the administrative data used to measure the outcome variables: graduation rates and math and Spanish test scores.

Figure 3: Timeline of the PROBEMS Impact Evaluation Strategy



A Evaluation Data

In order to measure students' characteristics at baseline, we use two sources. First, we rely on the form completed by all applicants in March 2009, through the Scholarship program portal. This

survey included self-reported information on household income, education of parents, number of family members living in the same household, the availability of household assets as well as gender, age, geographic location and GPA of the applicant, among others.

Second, to measure students' ability at baseline, we use the information from the census-based ENLACE 9th grade, measuring math and language achievement levels. From 2007 to 2013, ENLACE was administered to all students in 3rd to 9th grades and those finishing 12th grade. The test had no consequences either on graduation or on student's GPA. The score of ENLACE is normalized to have a mean of 500 and a standard deviation of 100.

Using the CURP we were able to merge the baseline application format with the micro data from ENLACE 9th grade which was taken by applicants in May 2009. For ease of exposition and interpretation, when presenting the results, we renormalize the ENLACE results to a mean of zero and a standard deviation of 1. Table 2 shows the baseline characteristics, distinguishing between students in the treatment and the control groups. In the top panel we report the socioeconomic characteristics measured through the baseline format completed by all applicants, in the bottom panel the administrative information on 9th grade test scores. Overall, the characteristics of the treatment and control groups are well balanced in line with the randomized design of the evaluation.

Outcome variables are measured through ENLACE 12th grade administered in May 2012 and May 2013 to all students finishing High school. Additionally, our evaluation sample was also merged with ENLACE 12th grade of 2013 to identify students that graduated from high school but that had a lag of one year. The participation of students in our sample, who entered High school in August 2009, in ENLACE 12th grade of 2012 or 2013 is used as a proxy for upper secondary graduation.[9] The same end-of-secondary-school test is also used to measure the impact of the Scholarship program scholarship on math and Spanish test scores.

[9]In what follows, when we refer to ENLACE 12th grade, which includes the information from the tests administered in 2012 and 2013. Of the total 7,321 students in our evaluation sample, 4,978 where identified in ENLACE 12th grade of 2012, a proxy for on-time graduation. An additional 262 students were identified in ENLACE 12th grade of 2013, these students also graduated but with a lag of one year. So most of the effects on outcome "graduation" are, indeed, on-time graduation. For a discussion on the reliability of this measure as a proxy for High school graduation, see Dustan et al. (2017), Avitabile and de Hoyos (2018).

Table 2: Baseline Characteristics by Treatment Status

Variable	Treatment		Control		T=C
	Mean	SD	Mean	SD	p-value
Panel A: Household and location					
Mud floors*	0.04	0.19	0.04	0.19	0.86
Refrigerator	0.91	0.29	0.91	0.29	0.79
Piped water	0.92	0.27	0.93	0.26	0.54
Piped water inside	0.82	0.38	0.82	0.38	0.99
Toilet exclusive for the household	0.82	0.39	0.83	0.37	0.10
Piped water toilet	0.77	0.42	0.77	0.42	0.79
Electricity	0.98	0.15	0.97	0.17	0.20
Blender	0.87	0.34	0.87	0.33	0.60
Gas stove	0.93	0.25	0.93	0.25	0.79
Radio	0.57	0.49	0.56	0.50	0.49
Time to school (hours)	0.17	0.81	0.17	0.81	0.97
Expenditure transportation to school	54.69	63.63	53.19	61.97	0.31
Urban	0.46	0.50	0.46	0.50	0.99
Panel B: Other characteristics					
Income	634.79	496.06	631.09	490.81	0.75
Age+	15.26	0.44	15.27	0.44	0.39
Male+	0.55	0.50	0.56	0.50	0.40
Spanish score ENLACE 2009	0.01	1.01	-0.01	0.99	0.30
Math score ENLACE 2009	0.01	1.01	-0.01	0.99	0.50

Observations 7321 except *7320 and +7220. "Income" is self-declared, personal monthly income in Mexican pesos of 2009.

B Empirical Strategy

To estimate the causal impact of providing a scholarship to first-year High school students on education outcomes, we estimate the following equation:

$$Y_i = \beta_0 + \beta_1 D_i + \gamma' X_i + u_i \tag{1}$$

where Y_i is either an indicator that the student participated in the final exam (ENLACE in 12th grade) or his or her test score recorded in ENLACE. D_i is an indicator dummy that takes the value 1 if student i is assigned to the treatment group, 0 otherwise. β_1 measures the intention-to-treat effect of the scholarship on education outcomes. X_i is a vector of baseline covariates measured at the individual level and includes age and gender of the student, math and Spanish test scores in 9th grade ENLACE, a dummy controlling for rural areas of the school where the student attended 9th grade, regional dummies and self-declared household income and the availability of household assets.

We standardize all test scores using the mean and the standard deviation observed in the control group. In order to address the inference issues related to the presence of multiple outcomes, we

consider the effect on a composite score, defined by the simple average of the standardized scores in math and Spanish. When we consider multiple separate hypotheses, we compute stepdown p-values that correct for multiple hypothesis testing based on the method by Romano and Wolf (2005).

IV Results

A Education Outcomes

The main results are summarized in Table 3. We present the effects of the Scholarship program on four education outcomes: High school graduation–proxied by students present in the standardized test ENLACE 12th grade–math test scores, Spanish test scores, and a simple average of math and Spanish scores. We ran two specifications for each of these four outcomes, one without controls and a second one including the controls as defined above. Regardless of the specification, we do not find statistically significant effects of scholarships on any of the four education outcomes. All the effects are very small and not statistically different from zero, even though our sample is large enough to detect small impacts. Indeed, the 95% confidence intervals do not include large impacts. For example, the top part of the confidence interval for the graduation rate, proxied by taking the ENLACE exam is 3.4 percentage points, while for Spanish (with no controls) gives a top part of the CI at 7.3% of a standard deviation. These are all small effects, precisely estimated, which is a puzzle to which we turn below offering some explanations.

Table 3: Impact of the Scholarship program on High school Education Outcomes

Outcome variable	ENLACE (Y/N)		Math		Spanish		Average	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.012	0.008	0.006	-0.016	0.018	-0.004	0.012	-0.010
	(0.011)	(0.011)	(0.029)	(0.023)	(0.028)	(0.023)	(0.026)	(0.026)
(RW p-value)	0.68	0.90	0.91	0.90	0.91	0.90	0.91	0.90
Controls		Yes		Yes		Yes		Yes
N	7,321	7,220	5,050	4,988	5,050	4,988	5,050	4,988
Mean Dep. Control group	0.68	0.69	0.07	0.07	-0.03	-0.03	0.02	0.02
SD Dep. Control group	0.47	0.46	1.00	1.00	0.98	0.99	0.90	0.90

Romano-Wolf (RW) stepdown p-values for two groups of coefficients. Columns (1), (3), (5) and (7) for estimations with no controls and columns (2), (4), (6) and (8) for estimations including controls The full set of controls include age, dummies for sex and area (urban-rural) and test scores on Enlace 9, one for Spanish and other one for mathematics. ENLACE (Y/N) takes the value of 1 if the student took the 12th grade exam in 2012 and 0 otherwise. Math and Spanish refer to the ENLACE score in 2012. Average refers the average of spanish and math scores in 2012.

Before we move on it is important to note that the impact of the scholarship on test scores is estimated on the subsample of children who attended high school and participated in the exam process. This is an endogenously selected subsample. In principle, this could bias the results because of the potential composition differences (in relevant unobservable dimensions) between the treated and non-treated sample. However, the program had no effect on high school participation. Attanasio et al. (2011) point out that under these circumstances there will be no bias in the treatment-control comparison so long as the treatment, as well as having no effect on participation, did not alter the composition of those attending high school.

Heterogeneity We now consider whether these overall results mask significant impacts in subgroups. By using stepdown p-values adjusted for multiple testing, we avoid the pitfalls of data mining that could lead us to false positives from such an analysis.

Tables A1 and A2 in Appendix VII show the effects of the scholarship on graduation rates by age, rural versus urban, gender and geographical region. The scholarships did not increase either girls' or boys' probability of graduating. It also did not have any impact among students enrolled in rural or urban lower secondary schools at the time of applying to the scholarship. The only effect that is marginally significant (p-value=0.06) is among slightly older candidates, those who were 16 years old at the time of applying for the scholarship. In this population subgroup–who have a significantly lower probability of graduating compared to younger students– the Scholarship program is increasing the probability of graduation by 4 percentage points, on a mean graduation rate of 62%. Table A2 also in Appendix VII, presents the effects by geographical region showing zero impact of the scholarship in the 5 regions defined. Although not presented here, the lack of statistically significant effects on graduation rates by age, area, sex and region hold for math and Spanish test scores.

V Why was the scholarship program ineffective?

Before we move to further explanations, it is important to remember that the scholarship promise

for the lottery winners was only for one year and that in subsequent years anyone could apply and would be selected without randomization subject to the overall available budget and the eligibility criteria. This allows members of the original control group to obtain a scholarship in subsequent years. While we always use the original randomization as the treatment indicator, this feature will have an attenuating effect: students from the control group may have attended in the first year without funding in anticipation of a possible future scholarship. And moreover, some students who would have attended if the scholarship was promised for all of high school, may not have done so with the promise of just one year. This would be particularly true if the value of high school lies in completing it, rather than in individual years of attendance. Both these issues could attenuate the impact of the policy relative to a policy that promised full funding for the entire high school period.

Beyond this point the other questions that arise are about targeting by wealth and school readiness. In this section, we perform further analysis to identify the effects of these three potential explanations behind the lack of impact of the scholarship program. At this point we also need to remember that the treatment only lasted for one year. In other words, following the first year students in the control group could also apply for the scholarship, which would have blunted the effects of the program. So here we are measuring the impact of providing the scholarship for one year.

To test for heterogenous impacts by socio-economic status we use information from the application portal to compute an index of self-declared household assets. The index of household assets (IHA) is the sum of four variables, indicating, respectively, the following basic characteristics of the dwelling: (1) concrete floors, (2) running water inside the house, (3) toilets connected to sewerage, and (4) concrete roof. A zero is used to indicate the absence of the amenity and a one its presence. The IHA index, therefore, has a maximum value of 4 and minimum of 0. The distribution of the IHA is shown in Figure 4. Few students self-declared that they live in a household with zero or only one of the basic dwelling characteristics; close to 70% of students have only two or three of the basic needs met, and 23% of students in our sample declared living in a household that

meets all four basic needs.

The evaluation sample was divided in two groups according the value of the IHA: those with a value of the IHA of 2 or less and the rest. Table 4 shows the effects of the Scholarship program on graduation rates, by socioeconomic status in a specification with and without controls. The effects of the Scholarship program are zero, even within the group of more marginalized individuals (IHA of 2 or below).

A Targeting

Figure 4: Share of Students in the Different Categories of the IHA

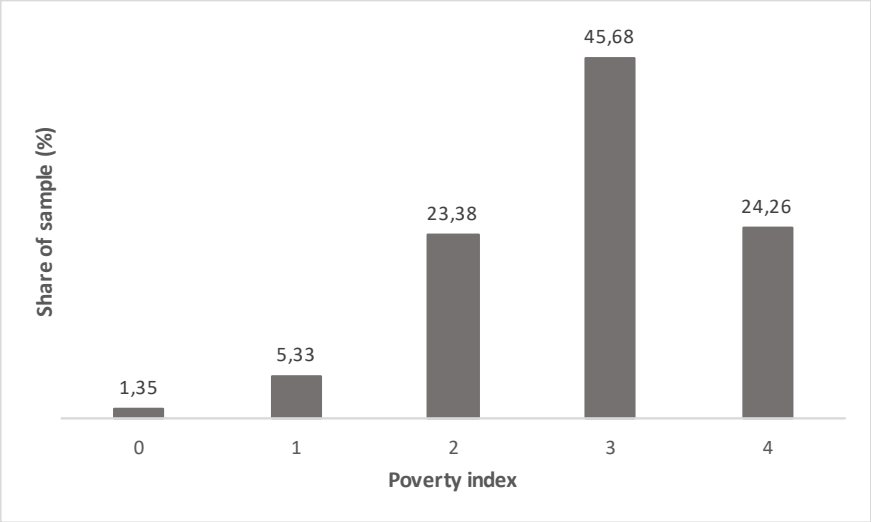


Table 4: Impact of the Scholarship program on High school Graduation by Levels of Household Assets

Outcome variable	ENLACE (Y/N)			
	Household index (0, 1 & 2)		Household index (3 & 4)	
	(1)	(2)	(3)	(4)
Treatment	0.006	0.005	0.015	0.010
	(0.020)	(0.020)	(0.013)	(0.013)
Controls		Yes		Yes
N	2,201	2,176	5,120	5,044
Mean Dep. Control group	0.67	0.68	0.69	0.69
SD Dep. Control group	0.47	0.47	0.46	0.46
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$				

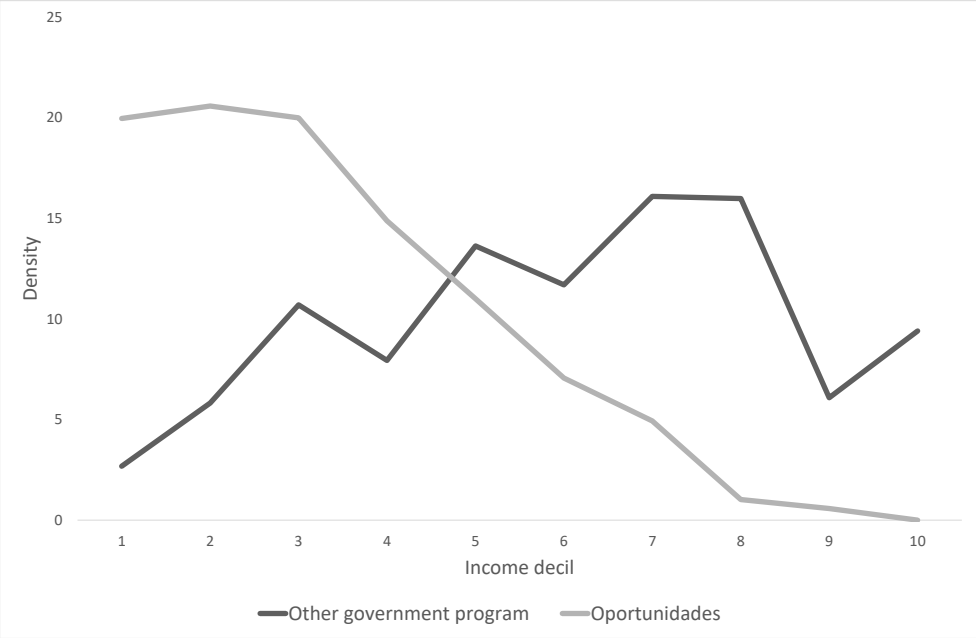
The full set of controls include age, dummies for sex and area (urban-rural) and test scores on Enlace 9, one for spanish and other one for mathematics. ENLACE (Y/N) takes the value of 1 if the student took the 12th grade exam and 0 otherwise. The household index takes a value from 0 to 4 depending if the student's household has cement roof, cement floor, piped water and piped water toilet, respectively.

To identify how well targeted our scholarship program was, we use the Mexican national household survey ENIGH, which measures incomes and expenditures, to identify, self-declared, scholarship holders and divide them between beneficiaries of the conditional cash transfer program *Oportunidades*[10] and "other government program". Using this survey for 2010[11] we identify households with students enrolled in High school and, among this subsample, those that declared having an *Oportunidades* scholarship or a scholarship from another program from the federal government. Figure 5 shows the share of scholarship beneficiaries by decile of the distribution of per capita household income. Overall, *Oportunidades* scholarships seem to be well-targeted, benefiting the poorest High school students. However, beneficiaries of "other government programs", a category basically capturing the Scholarship program we are considering, tend to be located in deciles 5 to 9 of the income distribution. This evidence shows that the program's targeting mechanism was not very effective in reaching the poorest, or they were already covered by the conditional cash transfer program (*Oportunidades*).

[10]Formerly know as PROGRESA.

[11]ENIGH is collected every two years and there was no survey in 2009, the year when the Scholarship program applicants filled the online format with the socio-economic information.

Figure 5: Receipt of alternative scholarships across the income distribution: Oportunidades vs. "other government program"



B Academic Readiness

We now consider the role of school readiness and whether this can explain the lack of impact. Academic readiness is measured by the proficiency level at the end of lower secondary (grade 9). We use, separately, math and Spanish results of ENLACE 9th grade of 2009–the year when the candidates applied for a scholarship–to divide our sample in terciles of the distribution of test scores. Since in 2009 65% of the students in our sample got an insufficient proficiency level in math according to ENLACE 9th grade, the top tercile corresponds to those above the insufficient level or with academic readiness. We ran two specifications within each of the terciles, with and without controls, to measure the effects of the scholarship on the probability of graduating and test scores at the end of High school. The effects of the Scholarship program on the probability of graduation, by tercile of the 9th grade math distribution, are summarized in Table 5.

The results show positive and statistically significant effects (adjusted p-value of 5%) of the

scholarship on the probability of graduation among those candidates in the top tercile of the 9th grade math test scores distribution (i.e. those with academic readiness). The inclusion of controls does not change the results. The effect is still quite small: for students with academic readiness, receiving a scholarship increases their probability of graduation by 4 percentage points (of a mean level of 76% among the control group). We found no effects within the lowest and middle terciles of the 9th grade test scores distribution. There are also no effects of the scholarships on learning outcomes by tercile of 9th grade math or Spanish test scores.[12]

Students with academic readiness, i.e. those at the top tercile of the 9th grade math test scores, have the largest probability of finishing High school (76%), as compared to those in the bottom tercile (57%). It seems that the scholarship can be marginally effective for those with sufficiently strong prior achievement, pointing to the need for interventions that improve outcomes earlier on. This is consistent with other school interventions that seem to build on prior success Machin et al. (2010).

In Appendix Table A3, we cross academic readiness with socio-economic status measured by the IHA. We found a positive effect of the Scholarship program on High school graduation rates among students with academic readiness both in households with relatively "high" and "low" socio-economic status (IHA below or equal to 2), but statistically significant only for relatively well-off households. In the appendix we also consider whether baseline student motivation makes a difference to the impact of the program, but we again find no effect.

[12]Results available upon request.

Table 5: Impact on high school graduation by performance in ENLACE 2009 (math)

Outcome variable	ENLACE (Y/N)					
	Lowest tercile		Middle tercile		Highest tercile	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.004	-0.003	-0.004	-0.005	0.040**	0.037*
	(0.020)	(0.020)	(0.018)	(0.018)	(0.017)	(0.017)
(RW p-value)	0.97	0.95	0.97	0.95	0.05	0.08
Controls		Yes		Yes		Yes
N	2,486	2,452	2,449	2,418	2,386	2,350
Mean Dep. Control group	0.57	0.58	0.72	0.72	0.76	0.76
SD Dep. Control group	0.49	0.49	0.45	0.45	0.43	0.43
RW *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$						

RW p-values for two groups of coefficients. Columns (1), (3), (5) for estimations with no controls and columns (2), (4), (6) and for estimations including controls. The full set of controls include age, dummies for sex and area (urban-rural) and test scores on Enlace 9, one for spanish and other one for mathematics. ENLACE (Y/N) takes the value of 1 if the student took the 12th grade exam and 0 otherwise. The three groups are formed using the terciles of performance in ENLACE math 2009.

C Interpretation

The results presented here are consistent with other evidence on the effects of scholarships and conditional cash transfers in High school education outcomes in Mexico. The most recent evidence identifies the importance of targeting to make scholarships effective. For instance, both Parker and Vogl (2018) and Araujo et al. (2018) relying on a difference-in-difference estimator show that young children exposed to Progresa-Oportunidades, a well-targeted conditional cash transfer program, increase the likelihood of graduating from High school. However, when the cash transfer is not well-targeted it has no effects on High school graduation rates, as shown by Dustan (2020) evaluation of "Prepa Si" a universal scholarship program for High school students in Mexico City. Dustan (2020) also finds that "Prepa Si" had no impact on test scores measured by the end of upper secondary ENLACE. The evidence here is consistent with these earlier results.

An important explanation for the absence of impacts of the Scholarship program is the large share of first-year High school students without academic readiness. Two out of three eligible candidates for a scholarship declare that income is not the binding constraint for attending High school and the results suggest that the monetary incentive is not strong enough to affect their decision. For the majority of first-year High school students, the real problem lies in the profound academic deficiencies that students carry over from basic education.

Finally, as we mentioned earlier, the program did not guarantee funding for the entire period of high school. Moreover, randomly excluded individuals could reapply the following year if they were attending high school. Thus the intervention should best be interpreted as the effect of one year of funding, with the possibility (but not the certainty) of being offered a scholarship later, whether originally in the treatment or the control group. Nevertheless, the incentive generated by the program among the lower income individuals should have been strong enough to observe an effect, if it had been targeted well enough and students were prepared adequately for such further study.

VI Conclusions

In this paper, we present evidence of the impact of a randomized scholarship program aimed at low-income students with the intention of improving High school graduation rates and test scores. The results we obtain show that, by and large, the program was ineffective.

We explore this negative result in detail, to understand the reasons behind it. We show that the program was not effectively targeted, as students from poor households were a minority among its beneficiaries. The only positive impact we find is among students with sufficient academic readiness, that is, those students who finish lower secondary school with a proficiency level above insufficient.

These results are important not only because they demonstrate the importance of targeting but also the need for improving quality of education at lower levels of schooling. Only then one can hope to improve the educational outcomes of poor students by increasing graduation and learning at the High school level. Interventions aimed at improving the demand for upper secondary should be complemented and preceded by interventions aimed at improving foundational skills of poor students to expand education opportunity during adolescence.

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VII Additional Results

Table A1: Heterogenous Impact of the Scholarship program on High school Graduation

Outcome variable	ENLACE (Y/N)					
Group variable	Age		Area		Sex	
	15 years	16 years	Rural	Urban	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.001	0.041	0.017	0.007	-0.000	0.019
	(0.012)	(0.022)	(0.015)	(0.015)	(0.017)	(0.014)
(RW p-value)	0.99	0.26	0.60	0.95	0.99	0.52
N	5,308	1,912	3,962	3,359	3,213	4,007
Mean Dep. Control group	0.71	0.62	0.66	0.72	0.68	0.69
SD Dep. Control group	0.45	0.48	0.48	0.45	0.47	0.46
RW *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$						

RW p-values for all coefficients. ENLACE (Y/N) takes the value of 1 if the student took the 12th grade exam and 0 otherwise.

Table A2: Impact of the Scholarship program on High school Graduation, by Region

Outcome variable	ENLACE (Y/N)				
	Northwest	Northeast	West	Center	Southeast
	(1)	(2)	(3)	(4)	(5)
Treatment	0.002	0.024	0.030	-0.008	0.004
	(0.028)	(0.020)	(0.024)	(0.026)	(0.024)
N	1,096	2,077	1,586	1,291	1,271
Mean Dep. Control group	0.70	0.69	0.61	0.68	0.75
SD Dep. Control group	0.46	0.46	0.49	0.47	0.43
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$					

ENLACE (Y/N) takes the value of 1 if the student took the 12th grade exam and 0 otherwise. Northwest includes Baja California, Baja California Sur, Chihuahua, Sinaloa and Sonora; Northeast includes Coahuila, Durango, Nuevo León, San Luís Potosí and Tamaulipas; West includes Aguascalientes, Colima, Guanajuato, Jalisco, Michoacán, Nayarit, Queretaro and Zacatecas; Center includes Ciudad de México, Guerrero, Hidalgo, México, Morelos, Puebla and Tlaxcala; Southeast includes Campeche, Chiapas, Oaxaca, Quinatan Roo, Tabasco, Veracruz and Yucatán.

A Motivation

A random sample of around 10% of the ENLACE takers were administered a survey that elicits a broad set of information about student sociodemographic characteristics, such as student effort, family composition and aspirations. We merge the information of this survey applied to students in our evaluation sample to test whether motivation impacts the treatment effect.

The merged sample includes only 564 individuals, a sample substantially smaller than our original one but still well-balanced between treatment and control and showing the same lack of treatment effects as with the entire sample. Students' motivation is proxied by the, self-declared, highest degree they expected to achieve, the options being: lower secondary, High school, technical higher education, university or postgraduate. Of the students in our sample, 80% expected to finish, at least, a university degree and 47% expected to get a postgraduate degree. We classify these two groups as "motivated students" and "highly motivated students", respectively.

Table A4 shows the results of a specification including, separately, our two definitions of motivation on High school graduation and test scores. As expected, motivated and highly motivated students have a higher probability of graduating and better test scores at the end of High school. However, the treatment effect of the Scholarship program on graduation and test scores remains zero in these new specifications and the interaction between the treatment and motivation is not statistically significant. In other words, even among motivated and highly motivated students, the scholarship is not relevant for increasing their likelihood of finishing High school or obtaining better grades. The results remain when we use the self-declared hours spent doing homework (from the *ENLACE de contexto*) as an alternative proxy for "motivated students".

Table A3: Impact by academic readiness and socio-economic status

Outcome variable	ENLACE (Y/N)					
	"High" socio-economic status			"Low" socio-economic status		
	(1) Highest tercile	(2) Middle tercile	(3) Lowest tercile	(4) Highest tercile	(5) Middle tercile	(6) Lowest tercile
Treatment	0.038	0.003	0.007	0.036	-0.047	0.030
	(0.019)	(0.022)	(0.024)	(0.032)	(0.034)	(0.034)
(RW p-value)	0.12	0.99	0.99	0.50	0.75	0.78
N	1,727	1,666	1,727	661	703	837
RW *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$						

RW p-values for two groups of coefficients, columns (1), (2), (3) and columns (4), (5), (6). ENLACE (Y/N) takes the value of 1 if the student took the 12th grade exam and 0 otherwise. The three groups are formed using the terciles of performance in ENLACE math 2009. "Low" socio-economic status are households with an IHA of 0,1, or 2, "High" socio-economics status are households with an IHA of 3 and 4.

Table A4: Heterogenous effect by motivation

	Enlace (Y/N)	Math	Spanish	Enlace (Y/N)	Math	Spanish
	(1)	(2)	(3)	(4)	(5)	(6)
Motivated (M)	0.127**	0.345**	0.331**			
	(0.054)	(0.134)	(0.141)			
Highly Motivated (HM)				0.210***	0.530***	0.346*
				(0.065)	(0.180)	(0.192)
T x Motivation	-0.019	0.045	-0.035	0.001	0.063	-0.058
	(0.075)	(0.185)	(0.196)	(0.093)	(0.257)	(0.274)
Treatment (T)	0.013	0.141	0.025	-0.006	0.084	0.037
	(0.052)	(0.133)	(0.141)	(0.083)	(0.237)	(0.253)
(RW p-value Treatment)	0.96	0.63	0.96	0.98	0.97	0.98
Observations	564	410	410	564	410	410
RW *** p<0.01, ** p<0.05, * p<0.1						

RW p-values for two groups of coefficients, columns (1), (2), (3) and columns (4), (5), (6).