



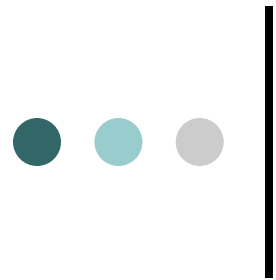
The Effects of User Fee Reductions on Enrollment: Evidence from a quasi-experiment

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The objective

What are the effects of user fee reductions on enrollment?



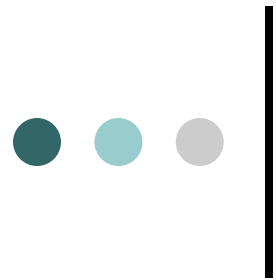
Literature review

- Proponents of school fee reduction programs argued that these charges can deter enrollment, particularly for credit constrained low income households. (Oxfam, 2001, 2002; Al-Samarrai and Zaman, 2000; MacJessie, 2002; Bentaouet-Kattan y Burnett 2004)
 - They point to increases in school enrollment in countries that have eliminated school fees (Kenya, Malawi)



Literature review

- Other authors make the case that both efficiency and equity may be advanced, and enrollment may even increase, if otherwise under-funded schools can charge prices (Bird, undated; Thobani, 1984; Hillman and Jenknerm, 2002; Jimenez, 1990)
 - Depends on to individuals' willingness and ability to pay
- A strand of the literature estimates demand elasticities of changes in user fees. They find that enrollment responses are sensitive to the size of the subsidy (Gertler and Glewwe, 1990; Birdall and Orivel, 1996; Mingar and Tan, 1986; Jimenez, 1990; and Reddy and Vandemoortele, 1996)



Literature review

- The empirical literature has not made clear headway on estimating the causal effects of fee reductions.
 - Most previous work compares enrollment before and after fee reductions
- To address this gap, we consider the *Gratuidad* fee reduction initiative, introduced in 2004 by the municipal government of Bogotá, Colombia.



Gratuidad program

- Each year the government issues a resolution that stipulates which items schools may charge for, as well as aspects like the maximum fee they can set for each.
- These expenses are equivalent to between 7 and 29 monthly dollars, which in turn represent between 6 and 25 percent of the minimum wage.
- The *Gratuidad* program reduces some of these fees.
- The program is targeted using the *Sisben* index that identify the most vulnerable households in Colombia.
- The extent to which students benefit from these reductions is a function of their *Sisben* level.



The *Sisben* index

- The *Sisben* is an instrument used to focalize social assistance.
- The system was first implemented in 1994 with a survey about households' infrastructure, demographics and human capital characteristics.
- Based on these, each household receives an score between 0 and 100
- Based on the score, it places households into six different levels, 1 being the most poor, and 6 the richest.
 - Households with scores below a cutoff score of 11 are given a Level of 1,
 - Those between 11 and a cutoff of 22 receive a Level 2.
 - Level 3—22 and 43



Gratuidad Reduction

- For basic education (grades 1-9) *Sisben 1* children enjoy a 100 percent reduction of complementary service charges, while those in *Sisben* levels 2 and above receive no reduction.
- For high school (grades 10-11), *Sisben 1* children benefit from the elimination of both academic and complementary services fees, while *Sisben 2* households receive roughly a 50 percent reduction
- Households in levels 3 and higher receive no benefit.



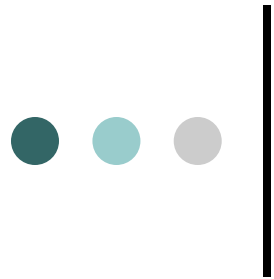
Gratuidad

- In short, the discounts individuals experience are a discontinuous function of their scores at
 - 11 points of *Sisben* index
 - basic school (grades 1-9)
 - high school (grades 10 and 11)
 - 22 points
 - high school (grades 10 and 11)



Identification and Estimation

- The strategy to identify the impact of *Gratuidad* on enrollment rate uses the discontinuity design of the program
 - Whether or not students benefit from the program is a discrete function of their score.
- Characteristics of the household (observable and unobservable) are continuously related to the score at the cutoff points of entry into the program
 - They are similar for students just above and below the cutoff scores.
- Discrete differences in attendance rates between treated and untreated students close to the cutoff can be attributed to the fee reductions.
 - Students with scores of 21.5 might provide an adequate control group for students with scores of 22.5



Estimation

- The basic equation for the estimation, *close to the discontinuity*, is the following:

$$y_i = \alpha + \beta G_i + f(S_i) + \varepsilon_i$$

where y is the enrollment variable, G is a dummy that capture the level of *Sisben*, and S is the score of *Sisben*.

- β will consistently estimate the effect of the program.
- It can be estimated within arbitrarily narrow bands close to the cutoff point,



Data

- The information comes from two sources.
- First, data collected (in 2004 and 2005) directly through the *Sisben* survey.
 - 570,648 children of school going age in 2006
 - Includes all student eligible for the program.
 - Demographic characteristics (gender, age, household composition, pregnancy, and marital status).
 - Educational attainment (grades completed), type of enrollment (public/private), labor force participation, and income.
- Second, we use administrative enrollment records (October 2006) kept by the District Education Department (SED)
- The merge rate is close to 60 percent.
 - Close to fraction of students claiming to be enrolled at baseline.
 - The other 40%: Individuals enrolled in private school and potentially migration and other mistakes.

Table 4. Descriptive statistics

Variable	Full Sample	Basica (grades 1-9)		High sch. (grades 10-11)		High sch. (grades 10-11)		Correlation with Enrollment
		Sisben 1 to 2		Sisben 1 to 2		Sisben 2 to 3		
		Full sample	± 1 pt. from cutoff	Full sample	± 1 pt. from cutoff	Full sample	± 1 pt. from cutoff	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Household variables								
Household income per capita	98.0 (72.3)	85.9 (53.0)	69.5 (42.4)	88.1 (54.7)	72.5 (43.8)	107.9 (74.0)	146.3 (78.7)	-0.088 (0.00)
Household income	485.8 (340.1)	440.8 (284.7)	392.1 (252.6)	452.3 (290.4)	407.7 (261.4)	524.4 (350.6)	666.0 (381.2)	0.009 (0.00)
Number of people in hhld.	5.3 (2.0)	5.4 (2.0)	5.9 (2.1)	5.4 (2.0)	5.9 (2.1)	5.1 (1.8)	4.7 (1.4)	-1.892 (0.08)
Number of children under 6	0.37 (0.63)	0.41 (0.66)	0.49 (0.72)	0.31 (0.60)	0.38 (0.66)	0.26 (0.53)	0.19 (0.44)	-2.067 (0.12)
Number of children under 18	2.6 (1.3)	2.7 (1.4)	3.1 (1.5)	2.6 (1.4)	2.8 (1.5)	2.4 (1.2)	2.1 (1.0)	1.871 (0.09)
Household head yrs. of sch.	6.6 (3.5)	6.2 (3.2)	4.7 (2.5)	5.8 (3.1)	4.6 (2.5)	6.8 (3.4)	8.7 (3.2)	-0.703 (0.02)
Age of household head	43.5 (10.2)	42.8 (10.5)	43.2 (9.8)	46.2 (9.5)	46.3 (8.9)	46.2 (9.5)	46.0 (8.8)	0.002 (0.01)
Household head works	0.82 (0.39)	0.81 (0.39)	0.82 (0.38)	0.80 (0.40)	0.81 (0.39)	0.81 (0.39)	0.83 (0.37)	1.576 (0.18)
Household head is single	0.26 (0.44)	0.27 (0.44)	0.25 (0.43)	0.30 (0.46)	0.29 (0.46)	0.28 (0.45)	0.21 (0.41)	-3.884 (0.16)
N	570,648	388,238	39,646	118,481	13,949	97,450	8,097	

Table 4. Descriptive statistics (cont.)

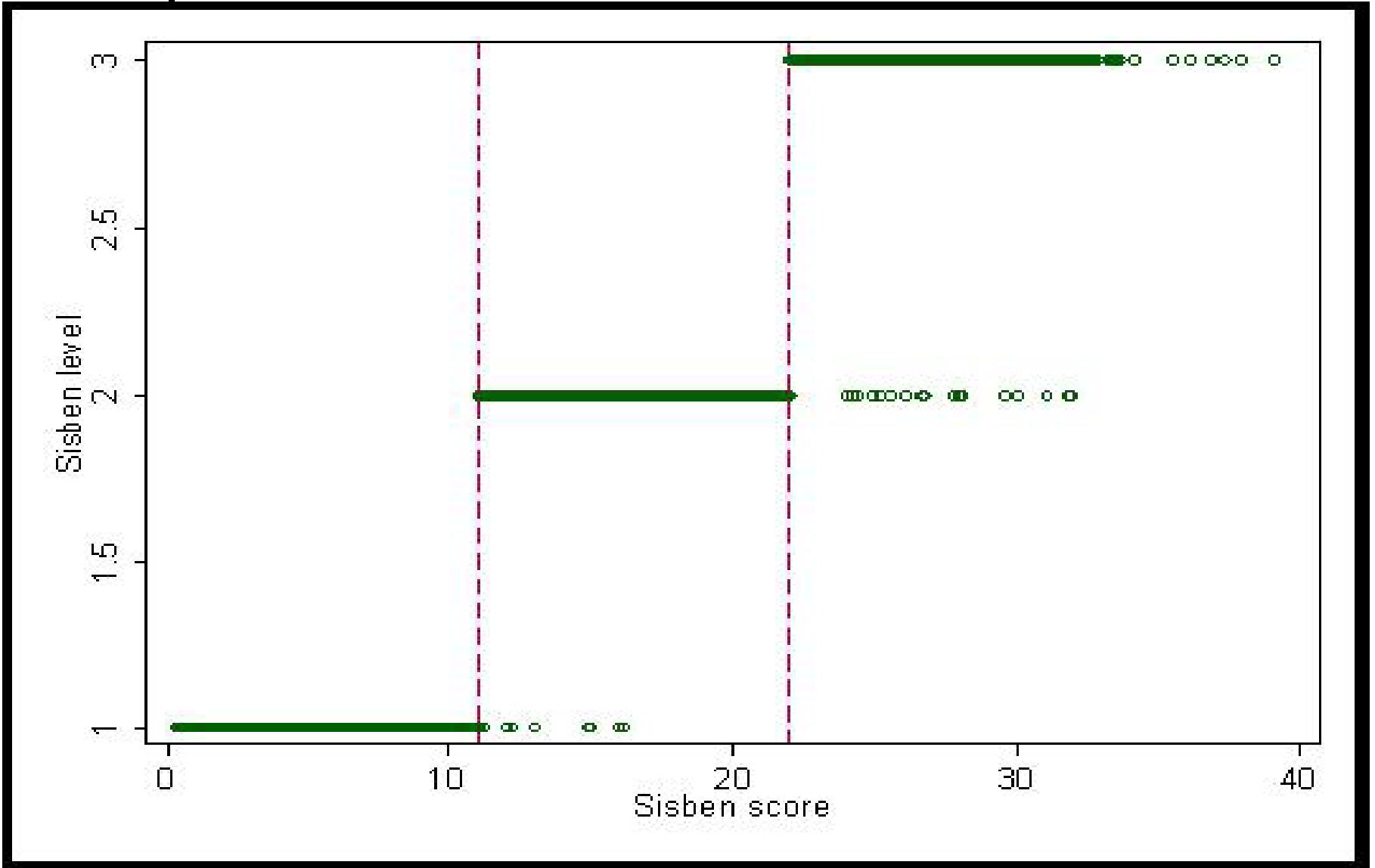
Variable	Full Sample	Basica (grades 1-9)		High sch. (grades 10-11)		High sch. (grades 10-11)		Correlation with Enrollment
		Sisben 1 to 2		Sisben 1 to 2		Sisben 2 to 3		
		Full sample	± 1 pt. from cutoff	Full sample	± 1 pt. from cutoff	Full sample	± 1 pt. from cutoff	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel B: Individual variables								
Enrolled at baseline	0.898 (0.30)	0.89 (0.31)	0.85 (0.36)	0.88 (0.32)	0.81 (0.39)	0.93 (0.26)	0.97 (0.16)	1.727 (0.27)
Employed	0.00 (0.07)	0.00 (0.03)	0.00 (0.03)	0.02 (0.13)	0.02 (0.16)	0.01 (0.11)	0.00 (0.07)	-14.866 (1.98)
Own income	0.6 (11.7)	0.1 (5.7)	0.1 (5.6)	2.4 (22.9)	3.3 (26.8)	1.8 (20.5)	0.8 (12.8)	0.016 (0.01)
Age	12.0 (3.4)	11.0 (2.6)	11.1 (2.6)	17.0 (0.8)	17.0 (0.8)	17.0 (0.8)	16.9 (0.8)	-2.831 (0.05)
Years of schooling	3.4 (2.9)	2.3 (2.2)	2.0 (2.1)	6.9 (2.0)	6.2 (2.0)	7.3 (1.8)	7.8 (1.5)	4.349 (0.05)
Male	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.52 (0.50)	0.50 (0.50)	0.51 (0.50)	-0.142 (0.13)
Enrolled in public school	0.69 (0.46)	0.69 (0.46)	0.71 (0.45)	0.78 (0.42)	0.75 (0.43)	0.76 (0.43)	0.69 (0.46)	26.97 (0.18)
Estrato 1	0.25 (0.44)	0.28 (0.45)	0.32 (0.47)	0.28 (0.45)	0.25 (0.43)	0.06 (0.23)	0 (0.05)	4.005 (0.16)
N	570,648	388,238	39,646	118,481	13,949	97,450	8,097	



Validation

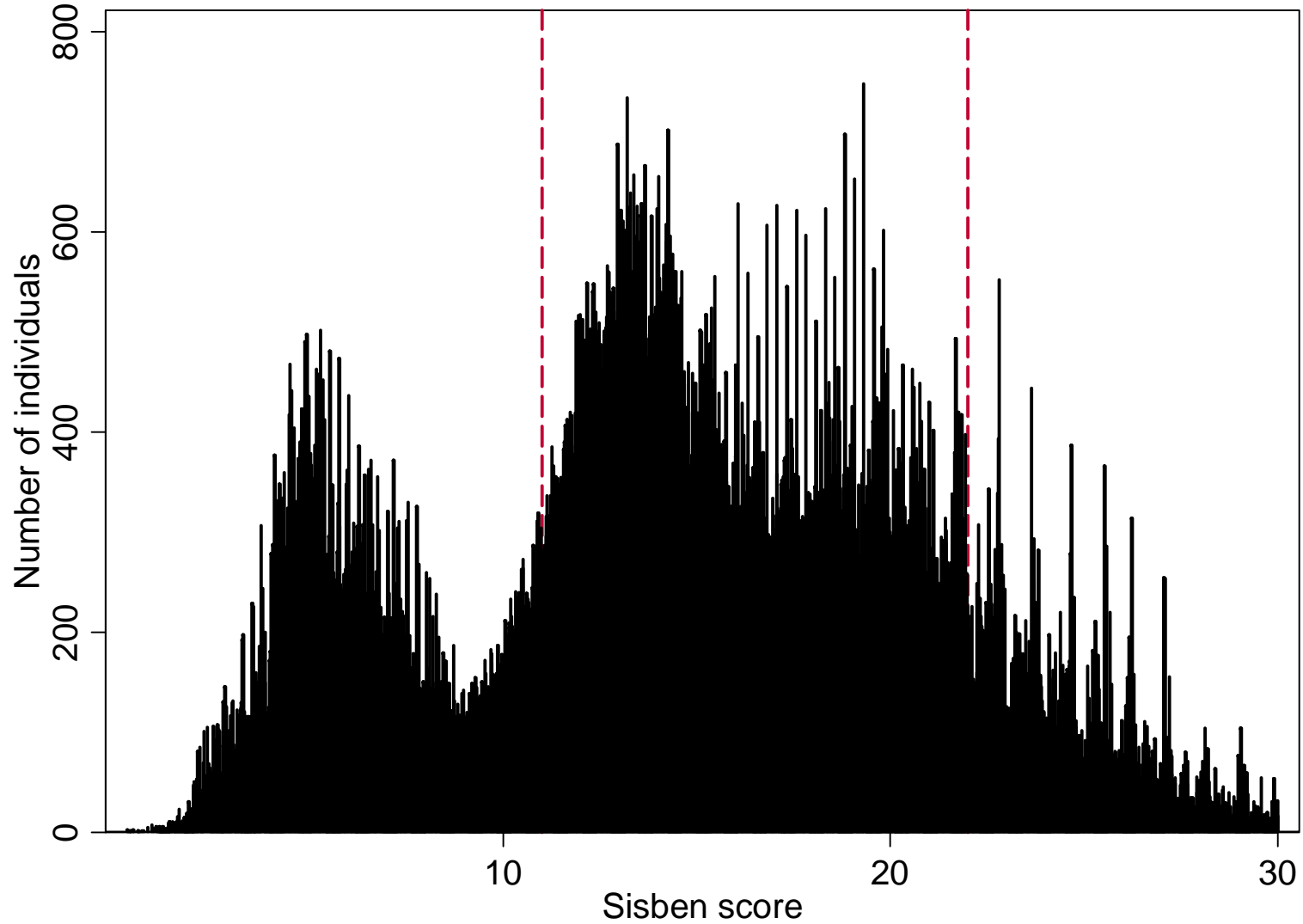
- First, properties of the assignment variable:
 - Is students' *Sisben* score a good predictor of their level? What is the magnitude of exclusion and inclusion errors?
 - Are households able to influence their *Sisben* score either directly by hiding assets or, indirectly by lobbying with program administrators?

Validation, First Step: *Sisben* level versus *Sisben* index





Validation, First Stage: Histogram of Sisben scores



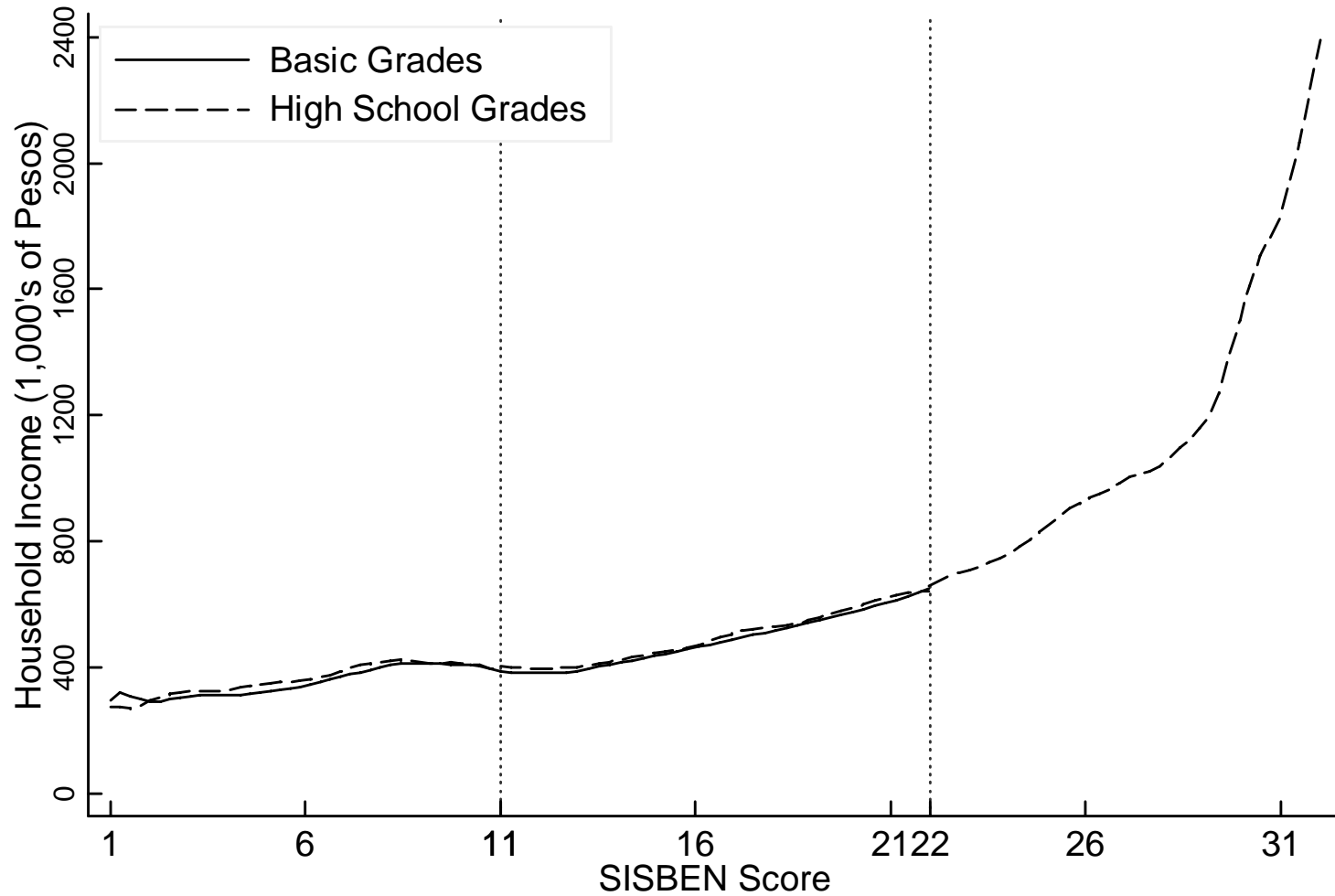


Validation

- Second, are the characteristics of individuals smoothly related to the *Sisben* score at the cutoff points?
 - E.g., are the control and treatment groups similar?

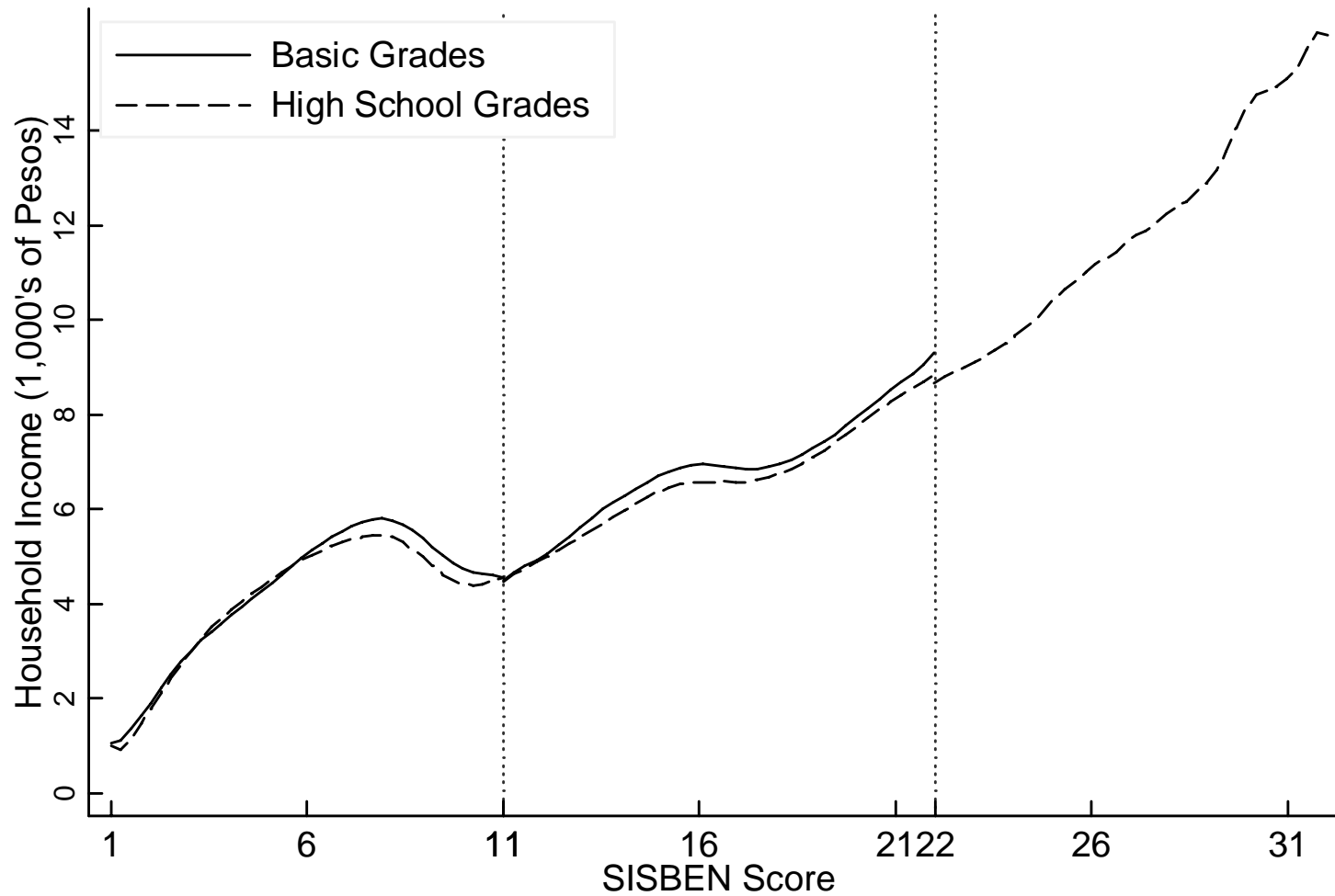


Example, Validation of Second Step: Income

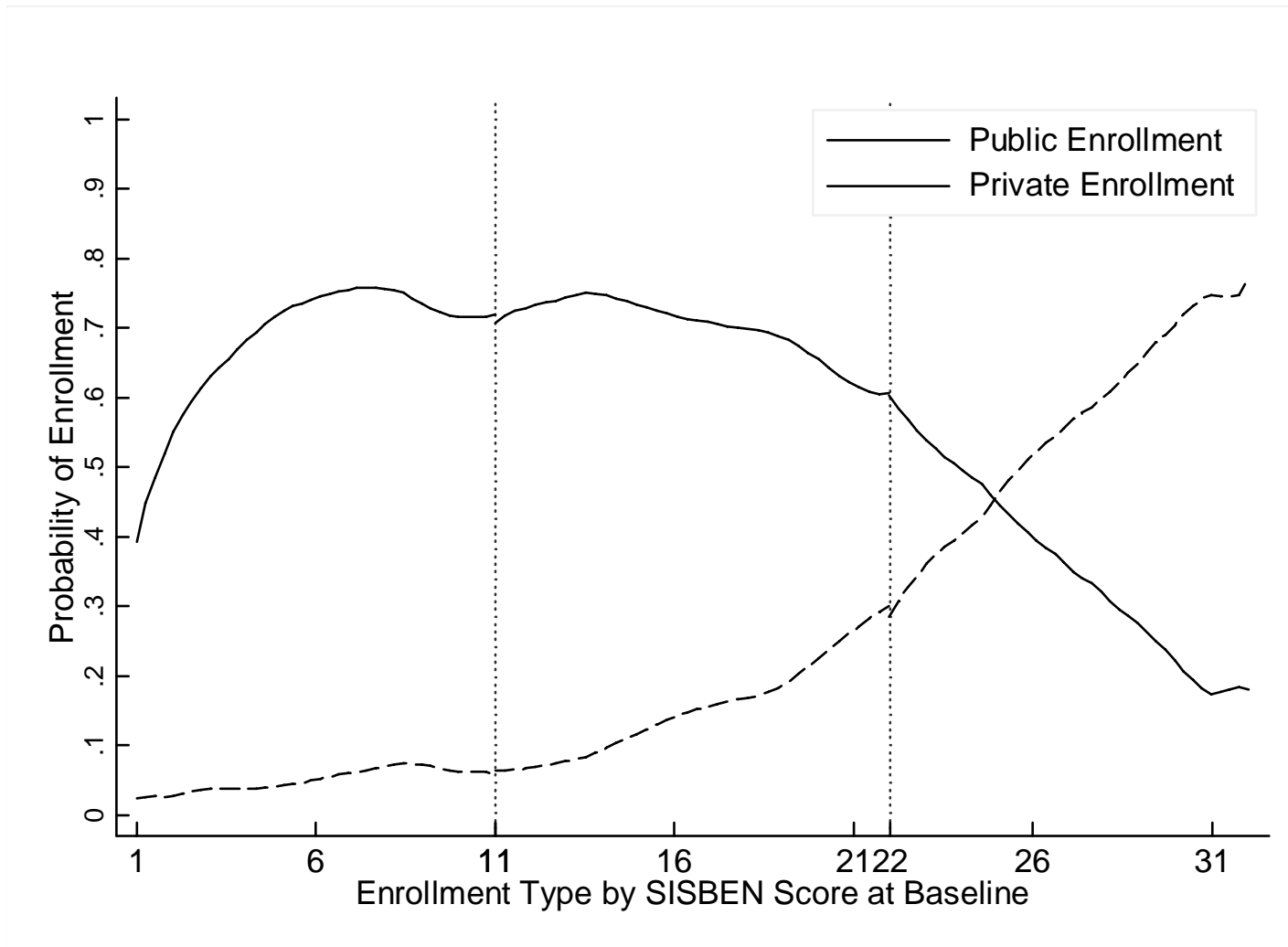




Example, Validation of Second Step: Years of Education hh head



Example, Validation of Second Step: Enrollment by type of institution





Validation, Second Step: Similarity between beneficiaries and non- beneficiaries

Table 6. Continuity checks for household and individual level variables

	Grades 1-9 Sisben 1 to 2		Grades 10 and 11 Sisben 1 to 2		Grades 10 and 11 Sisben 2 to 3	
	Within band of		Within band of		Within band of	
	1 point (1)	0.25 points (2)	1 point (3)	0.25 points (4)	1 point (5)	0.25 points (6)
<i>Panel B. Individual variables</i>						
Enrolled at baseline	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Employed	0 (0.0)	0 (0.0)	0 (0.0)	-0.0* (0.0)	0 (0.0)	0 (0.0)
Own income	-0.2 (0.2)	-0.3 (0.2)	0.9 (1.2)	-1.2 (2.7)	-0.3 (0.8)	-1 (1.2)
Age	0.1 (0.1)	0.1 (0.1)	0 (0.0)	0 (0.1)	-0.1 (0.0)	0 (0.1)
Years of schooling	0 (0.1)	0 (0.1)	0.1 (0.1)	0 (0.2)	0.2** (0.1)	0 (0.2)
Male	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-0.1** (0.0)	0.1 (0.1)
Attends public school	0.0* (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-0.1** (0.1)
N	39646	9411	13949	3374	8097	1901



Validation, Second Step: Similarity between beneficiaries and non- beneficiaries

Table 6. Continuity checks for household and individual level variables (cont.)

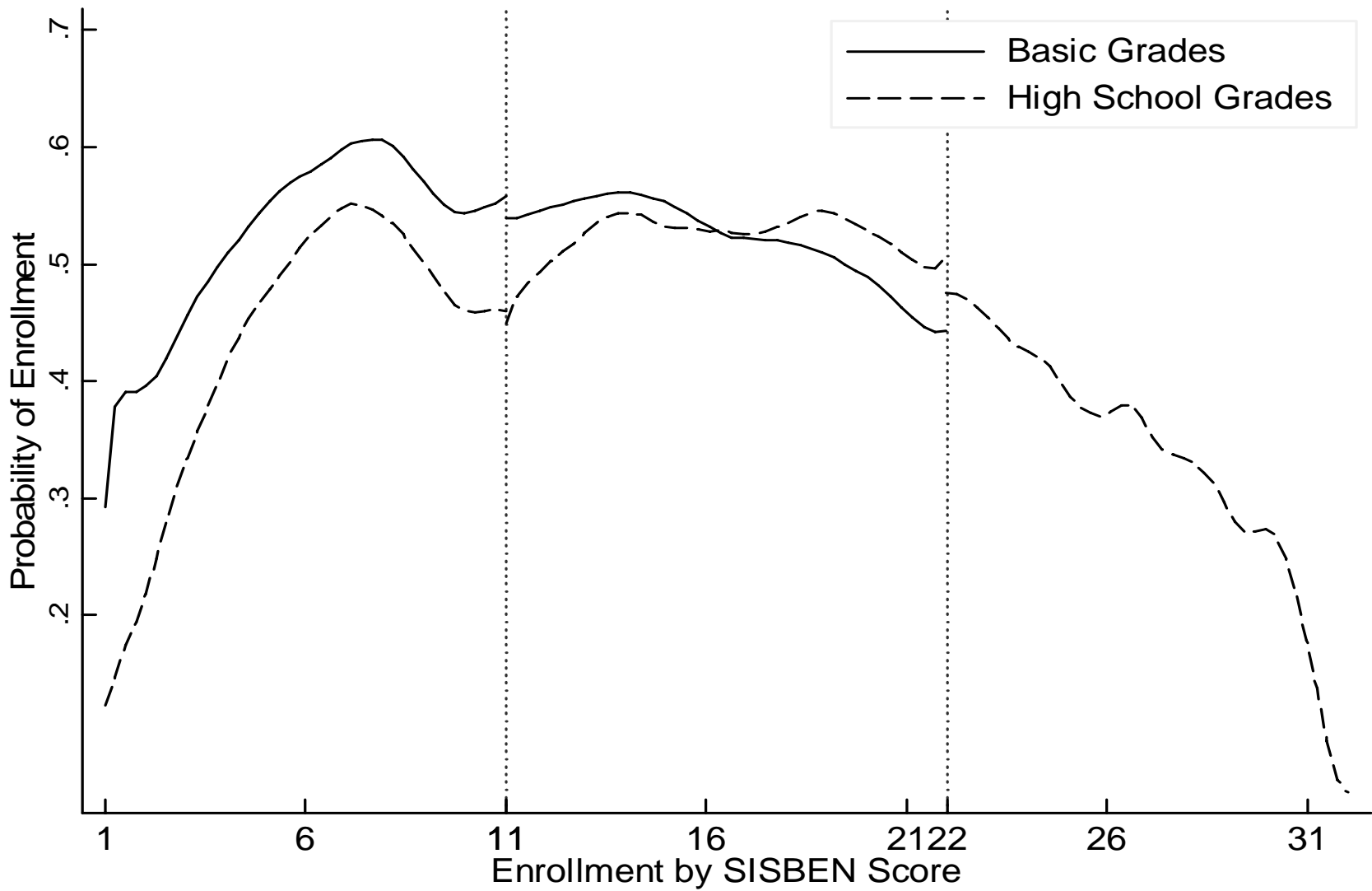
	Grades 1-9 Sisben 1 to 2		Grades 10 and 11 Sisben 1 to 2		Grades 10 and 11 Sisben 2 to 3	
	Within band of		Within band of		Within band of	
	1 point (1)	0.25 points (2)	1 point (3)	0.25 points (4)	1 point (5)	0.25 points (6)
<i>Panel A: Household variables</i>						
Household income per capita	-0.4 (1.2)	-0.1 (2.4)	-1 (2.0)	-3.6 (4.0)	-0.4 (4.8)	7.9 (9.8)
Household income	-10.1 (6.9)	4.9 (14.2)	-30.0** (11.9)	-48.6** (24.1)	-21.7 (23.1)	-0.4 (46.3)
Number of people in the hh	-0.1** (0.1)	0 (0.1)	-0.3*** (0.1)	-0.4* (0.2)	-0.3*** (0.1)	-0.2 (0.2)
Number of children under 6	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.1)	0 (0.0)	-0.1 (0.1)
Number of children under 18	-0.1 (0.0)	0.2* (0.1)	-0.2** (0.1)	-0.1 (0.1)	-0.1* (0.1)	-0.3** (0.1)
Household head yrs of sch.	0 (0.1)	0.4** (0.1)	0 (0.1)	0.3 (0.2)	0.4* (0.2)	1.2*** (0.4)
Age of household head	-0.7** (0.3)	-1.7*** (0.6)	-0.5 (0.4)	-2.3*** (0.8)	-0.4 (0.5)	0.1 (1.1)
Household head works	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Household head is single	0.0** (0.0)	0 (0.0)	0.0** (0.0)	0.1 (0.0)	0 (0.0)	0.1 (0.0)
N	39646	9411	13949	3374	8097	1901



Results

- We are presenting regressions' coefficients between enrollment and level of *Sisben* (controlling by cube on the score)
 - Linear model
- We are presenting results for several subpopulations (e.g., gender, public / private students, etc)
- Present results for full sample and narrowing to 1 percentage point above and below cut-off.

Results





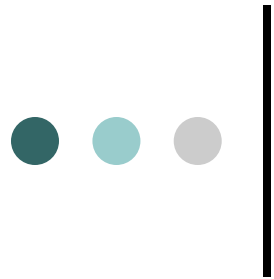
Results: Regressions' coefficients between enrollment and level of *Sisben*

	Grades 1 to 9 - Sisben 1 and 2			Grades 10 and 11 - Sisben 1 and 2			Grades 10 and 11 - Sisben 2 and 3		
	Full sample		Band of	Full sample		Band of	Full sample		Band of
	(1)	(2)	One point	(4)	(5)	(6)	(7)	(8)	(9)
All students	2.8*** (0.2) 388238	2.4*** (0.4) 388238	2.9** (1.4) 39646	-5.3*** (0.3) 118481	0.6 (0.7) 118481	0.7 (2.3) 13949	10.9*** (0.5) 97450	2.1** (0.9) 97450	6.1** (3.0) 8097
Attending public school	1.1*** (0.2) 269415	2.3*** (0.5) 269415	2.9* (1.6) 28014	-3.2*** (0.4) 92153	2.6*** (0.8) 92153	2.9 (2.6) 10565	-0.9 (0.6) 74329	1 (1.1) 74329	5.4 (3.5) 5582
Attending private school	12.3*** (0.7) 46467	-0.1 (1.4) 46467	5.1 (5.4) 2624	10.5*** (1.2) 12225	-3.8 (2.6) 12225	-5.5 (8.9) 760	13.2*** (0.7) 15674	0.6 (1.5) 15674	5.9 (4.6) 2301
Not attending at baseline	1.5*** (0.5) 42642	0.4 (1.1) 42642	2.3 (3.2) 6076	-2.4*** (0.6) 13856	-2.9** (1.3) 13856	-6.2* (3.4) 2583	1.3 (2.4) 7258	10.6*** (4.1) 7258	-1.9 (13.6) 206
Attending at baseline	4.8*** (0.2) 345596	1.8*** (0.4) 345596	2.8* (1.5) 33570	0.2 (0.4) 104625	2.1*** (0.8) 104625	2.3 (2.5) 11366	13.8*** (0.5) 90192	2.3** (0.9) 90192	6.0* (3.1) 7891
Cubic in score	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes



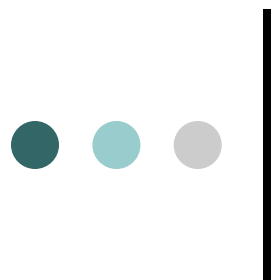
Results: Regressions' Coefficients between enrollment and level of *Sisben*

	Grades 1 to 9 - Sisben 1 and 2			Grades 10 and 11 - Sisben 1 and 2			Grades 10 and 11 - Sisben 2 and 3		
	Full sample		Band of	Full sample		Band of	Full sample		Band of
	(1)	(2)	One point (3)	(4)	(5)	(6)	(7)	(8)	One point (9)
Estrato 1	-0.6 (0.4)	-0.5 (0.8)	1.6 (2.4)	-9.6*** (0.7)	-4.2*** (1.5)	-5.5 (4.6)	33.7*** (10.1)	23.3 (16.9)	14.6 (51.1)
	111852	111852	12664	33446	33446	3493	5521	5521	23
Estrato2	-4.5*** (0.5)	-0.8 (0.8)	3.7** (1.7)	-14.7*** (0.7)	-1.3 (1.2)	2.4 (2.6)	10.5*** (0.5)	1.8** (0.9)	6.0** (3.0)
	276386	276386	26982	85035	85035	10456	91929	91929	8074
Males	2.1*** (0.3)	2.8*** (0.6)	4.3** (1.9)	-6.5*** (0.4)	0.6 (1.0)	-0.1 (3.1)	9.6*** (0.7)	1.2 (1.3)	4.7 (4.2)
	197394	197394	20212	60093	60093	7243	49118	49118	4136
Females	3.4*** (0.3)	2.0*** (0.6)	1.5 (1.9)	-3.9*** (0.5)	0.6 (1.0)	1.7 (3.3)	12.3*** (0.7)	3.2** (1.3)	7.6* (4.4)
	190844	190844	19434	58388	58388	6706	48332	48332	3961
Old for grade	2.8*** (0.2)	1.9*** (0.5)	4.8*** (1.7)	-5.2*** (0.3)	-0.1 (0.8)	-0.1 (2.4)	9.0*** (0.6)	1.6 (1.1)	7.7** (3.7)
	206495	206495	24445	95645	95645	12481	73263	73263	5376
Age appropriate	1.9*** (0.3)	3.2*** (0.7)	-0.7 (2.2)	4.3*** (1.0)	2 (2.1)	10.5 (7.3)	16.7*** (0.8)	4.2*** (1.6)	2.9 (5.3)
	177423	177423	14933	22507	22507	1445	23845	23845	2687
Cubic in score	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes



Conclusion

- Results suggest that the program had a significant impact.
 - The program raises the probability of enrollment for basic-aged Sisben 1 students by about 3 percent, and for high school-aged Sisben 2 students by about 6 percent.
- The results suggest that the discounts have encouraged students who otherwise would not have enrolled in school to do so.
- These positive effects seem to be larger for at-risk students.
- The program also seems to display a substantial degree of heterogeneous impacts for different populations.



Gratuidad: items of charges

Category	Frequency	Items
1. Academic fees	Annual or monthly	Registration Board
2. Complementary services	Annual, monthly, or when event takes place	Report cards School handbook ID cards Pedagogical materials Maintenance of infraestructure Field trips
3. Periodic charges	Monthly	Transportation Food services
4. Other	When event takes place	Certifications Replacement of ID cards Replacement of school handbook Graduation fees