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Cómo el diseño de la ayuda financiera moldea la fecundidad: evidencia de las becas de educación superior en Colombia*

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Resumen

¿Cómo afecta el diseño de la ayuda financiera para la educación superior a la fecundidad? Estudiamos los dos programas de becas más grandes de Colombia: uno basado en mérito, que seleccionaba a los estudiantes según su desempeño académico y su condición socioeconómica, y otro basado en necesidad, dirigido exclusivamente a estudiantes en situación de desventaja socioeconómica. Utilizando un diseño de regresión discontinua con registros administrativos enlazados, encontramos que ambos tipos de ayuda reducen la fecundidad temprana, aunque a través de mecanismos distintos. La ayuda basada en mérito reduce sustancialmente los nacimientos y los embarazos sin afectar el comportamiento en salud reproductiva, lo que es consistente con un mecanismo de costo de oportunidad. Por su parte, la ayuda basada en necesidad reduce el embarazo y el aborto, al tiempo que incrementa las consultas de planificación familiar y modifica el uso de anticonceptivos, en línea con un mecanismo de información y acceso. Estos hallazgos sugieren que los criterios de focalización de las becas no solo determinan quiénes se benefician de la educación superior, sino también la forma en que la educación influye en el comportamiento demográfico.

Palabras clave: Educación superior; ayuda financiera; fecundidad; salud reproductiva; diseño de becas; regresión discontinua; Colombia.

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How Financial Aid Design Shapes Fertility: Evidence from Colombia's Higher-Education Scholarships

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Abstract

How does the design of higher-education financial aid affect fertility? We study Colombia's two largest scholarship programs: merit-based aid, which selected students on academic performance and socioeconomic need, and need-based aid, which targeted socioeconomic disadvantage alone. Using a regression discontinuity design with linked administrative records, we find that both types reduce early fertility but through different channels. Merit-based aid substantially decreases births and pregnancies without affecting reproductive health behavior, consistent with an opportunity-cost mechanism. Need-based aid reduces pregnancy and abortion while increasing family planning visits and shifting contraceptive use, consistent with an information-and-access mechanism. These findings suggest that scholarship targeting criteria shape not only who benefits from higher education but how education affects demographic behavior.

Keywords: Higher education; financial aid; fertility; reproductive health; scholarship design; regression discontinuity; Colombia.

Contents

1 Introduction

Governments around the world invest heavily in financial aid for higher education, yet the effects of these programs for outcomes beyond schooling and the channels through which they operate remain poorly understood. Theoretical works have shown that education raises the opportunity cost of time and therefore the cost of raising children (Becker, 1960, 1965), shifts family decisions toward the quantity-quality margin (Becker, 1973), and alters intertemporal preferences in ways that influence the timing of births (Becker & Mulligan, 1997). Within these works, schooling, partner formation, and fertility are interdependent decisions determined jointly over the life cycle (Becker, 1981). A large body of evidence from both developing and developed countries empirically confirms that women with more education have fewer children and begin childbearing later (Baird et al., 2011; Duflo et al., 2015, 2021; Black et al., 2008; Geruso & Royer, 2018).

Understanding why education reduces fertility remains understudied, despite it is essential for designing policies that affect demographic behavior. Education can reduce fertility through multiple channels that typically move in tandem: by keeping young people in the education system during their peak fertility years (Jacob & Lefgren, 2003; Black et al., 2008; Geruso & Royer, 2018); by raising expectations about future opportunities, which changes behavior even before additional schooling is received (Bloem & Villero, 2024; Koohi, 2017; Kearney & Levine, 2012); by increasing the opportunity cost of time and strengthening reproductive autonomy (Duflo et al., 2015, 2021; Hahn et al., 2018; Baird et al., 2011); by altering matching opportunities in the marriage market (Kirkebøen et al., 2021; Ge et al., 2022; Artmann et al., 2021); and through the financial form of the transfer itself, since scholarships, loans, and liquidity can have different effects on household formation (Bozick & Estacion, 2014; Nau et al., 2015; Goodman et al., 2021). Because these channels simultaneously vary when a woman obtains more schooling, existing studies—most of which examine a single program or a single eligibility margin—cannot easily separate them.

Moreover, the causal evidence linking scholarships to fertility concentrates heavily in secondary education, particularly in low- and middle-income countries (Duflo et al., 2021; Hahn et al., 2018; Baird et al., 2011; Filmer & Schady, 2014; Bettinger et al., 2019b; Cortés et al., 2016). For higher education, by contrast, the direct evidence is considerably scarcer. Studies from Norway and the United States show that access to selective universities can affect partner formation, earnings, and fertility (Kirkebøen et al., 2021; Ge et al., 2022), but evidence on large-scale financial aid programs that target broad populations of students remains limited. This gap matters because higher education typically involves a longer and more intensive investment than secondary schooling, and the populations affected by

university scholarships may respond to different incentive structures than those targeted by secondary-level programs.

This paper addresses this gap by examining the effects of Colombia's two largest higher-education scholarship programs on early childbearing, family formation, and sexual and reproductive health. We study Ser Pilo Paga (SPP) and the Excellence component of Generación E (GenE), which allocated scholarships on the basis of both academic merit and socioeconomic disadvantage, alongside GenE's Equity component, which provided financial aid exclusively on the basis of socioeconomic need to students admitted to public universities. The coexistence of these programs within the same institutional context provides a unique opportunity to compare how merit-based and need-based financial aid shape fertility behavior—and, critically, to identify which of the channels described above dominate for different types of recipients.

We use a regression discontinuity design (RDD) exploiting the eligibility cutoffs of each program: the Saber 11 high school exit examination score for the merit-based scholarships, and the Sisbén poverty index for GenE Equity. Individual-level administrative records are linked across five sources, including test scores, socioeconomic classifications, scholarship disbursements, higher-education enrollment, and health system encounters. This allows us to track fertility, contraceptive use, and family planning behavior for up to five years after high school graduation.

Our results reveal a striking contrast. Eligibility for merit-based financial aid (SPP and GenE Excellence) substantially reduces early fertility: the probability of a live birth decreases by 0.6 pp (40 percent relative to the control mean), pregnancy by 1.1 pp (30 percent), and childbirth by 0.9 pp (31 percent). Importantly, these reductions occur without detectable changes in sexual and reproductive health behavior—there are no significant effects on the probability of an abortion, family planning visits, or the use of IUDs, subdermal implants, or oral contraceptives. This pattern is consistent with an opportunity-cost mechanism: the scholarship raises the returns to educational investment, making the cost of early childbearing particularly steep for high-performing students. The absence of behavioral change in reproductive health distinguishes this finding from the existing evidence on secondary-education programs, which typically documents fertility reductions alongside changes in marriage timing or health behavior.

In contrast, eligibility for the need-based scholarship (GenE Equity) reduces the probability of pregnancy by 0.7 pp (5.3 percent) and abortion by 0.3 pp (14 percent), while also changing reproductive health behavior. Eligible students are 1 percentage point (2.3 percent) more likely to attend a family planning visit and less likely to use an IUD. These results suggest a different mechanism: the need-based scholarship reduces fertility by alter-

ing reproductive health behavior, plausibly through improved access to information, health services, and contraceptive counseling in the university environment.

A key falsification exercise supports the distinction between mechanisms. Among students who satisfy the academic eligibility criteria for the merit-based scholarship, variation in the socioeconomic running variable—which determines the financial component of the aid—has no effect on fertility or reproductive health outcomes. This finding suggests that the financial transfer alone does not drive the merit-based scholarship's fertility effects. Instead, what matters is the combination of high academic ability and expanded educational opportunity, which together raise the opportunity cost of early childbearing. This result also speaks to the literature on the form of the transfer (Bozick & Estacion, 2014; Goodman et al., 2021), suggesting that the scholarship's effect on fertility operates through its educational content rather than through the liquidity it provides.

This paper makes two contributions. First, we provide evidence on the effects of large-scale higher-education financial aid programs on fertility and reproductive health using individual-level administrative data—an outcome domain that remains largely unexplored for university-level scholarships. While earlier work on Colombia's scholarship programs has focused on enrollment, academic performance, and earnings (Londoño-Vélez et al., 2020, 2023), and a recent study examines the long-run effects of SPP on partner formation, desired fertility, and labor market outcomes (Castleman & Long, 2016), our analysis is the first to use linked health system records to examine contraceptive behavior, family planning, and pregnancy outcomes for both merit-based and need-based scholarships. This complements the aggregate evidence on college access and teen fertility in Colombia (Bloem & Villero, 2024) with individual-level identification and a richer set of outcomes.

Second, and more fundamentally, we contribute to the literature on the education-fertility nexus by exploiting the coexistence of merit-based and need-based scholarships within the same institutional context. The divergent patterns we document—fertility reductions without behavioral change under merit-based aid, versus behavioral change in reproductive health under need-based aid—provide novel evidence that the pathways through which education reduces fertility depend on who receives aid and the incentives the aid creates. By contrasting two programs that expand access to the same level of education but select on different margins, we offer a decomposition of the education-fertility relationship that goes beyond what can be identified from any single program evaluation.

The rest of the paper is organized as follows. Section 2 describes the institutional background of SPP and GenE. Section 3 details the data sources. Section 4 presents the research design. Section 5 reports the main results. Section 6 concludes.

2 Higher-Education Financial Aid Programs in Colombia

Between 2014 and 2018, Colombia's main higher-education scholarship program was *Ser Pilo Paga* (SPP), a merit-based financial aid scheme targeted to high-achieving students from low-income households. SPP covered full tuition at government-certified high-quality universities and provided a maintenance stipend to support living expenses during college. Eligibility combined an academic requirement—a minimum score on the national high school exit examination (*Saber 11*)—with a socioeconomic requirement based on the *Sisbén* poverty index. The academic cutoff was adjusted across cohorts, while the socioeconomic eligibility threshold varied by place of residence.[1]

In 2018, SPP was replaced by *Generación E* (GenE), a broader higher-education financing program that expanded public support for low-income students through two distinct components: *Excellence* and *Equity*.[2] The *Excellence* component retained the merit-based logic of SPP, but relaxed both the academic and institutional eligibility criteria. Students qualified based on a minimum *Saber 11* score and a *Sisbén* threshold, and the scholarship covered tuition at institutions meeting a less restrictive quality requirement than under SPP. In this sense, GenE *Excellence* expanded merit-based aid to a broader set of students and institutions relative to SPP.

The *Equity* component differed from both SPP and GenE *Excellence* in that eligibility did not depend on academic performance. Instead, it targeted students from the lowest socioeconomic backgrounds, as determined by the *Sisbén* index, who had taken the *Saber 11* exam and were admitted to a public higher-education institution. For these students, GenE *Equity* covered tuition and additional support costs, making it a need-based subsidy tied to public-sector enrollment rather than to academic merit. This distinction between the merit-based design of SPP and GenE *Excellence*, on the one hand, and the need-based design of GenE *Equity*, on the other, is central to our empirical analysis.

The structure of these programs gives rise to two conceptually distinct forms of financial aid. SPP and GenE *Excellence* allocate scholarships based on both academic achievement and socioeconomic disadvantage, whereas GenE *Equity* allocates aid exclusively on the basis of socioeconomic need among students admitted to public higher-education institutions. These eligibility rules generate the discontinuities that underpin our empirical strategy.

[1] The *Sisbén* cutoffs used by SPP varied by place of residence in order to account for differences in living conditions across urban and rural areas.

[2] GenE also included institutional transfers to public higher-education institutions. Since our focus is on student-level financial aid, we do not analyze those investments here.

3 Data

Individual-level administrative records from five sources are used to identify scholarship eligibility and receipt and to track students' educational, health, and demographic outcomes over time. The analysis focuses on cohorts exposed to both *Ser Pilo Paga* (SPP) and *Generación E* (GenE), allowing the construction of eligibility and treatment status using administrative information on academic performance, socioeconomic conditions, and scholarship disbursements.

3.1. Socioeconomic Variables, Eligibility: The main source of information is the universe of students who took the High School Exit Exam (*Saber 11*) between 2014 and 2019. These records contain the test scores used to determine eligibility for SPP and for the *Excellence* component of GenE. For the *Equity* component, all students in the data satisfy the requirement of having taken the *Saber 11* exam. The database also includes demographic and socioeconomic characteristics, such as students' residential location, mother's education, and the code and location of the secondary school attended.

These records are linked to annual files from the System for the Identification of Potential Beneficiaries of Social Programs (*Sisbén*) for the period 2014–2024. The *Sisbén* database contains the poverty score used to determine the socioeconomic eligibility conditions of SPP and both GenE components. In addition, it provides detailed information on household composition, educational attainment, labor market participation, health conditions, income, assets, and participation in other social programs.

The linked *Saber 11* and *Sisbén* records allow the identification of students who satisfy the eligibility criteria of each scholarship program. Eligibility for SPP and GenE *Excellence* depends on both academic performance and socioeconomic status, whereas eligibility for GenE *Equity* is determined exclusively by the *Sisbén* score among students who took the *Saber 11* exam.

3.2. Beneficiaries: Information on scholarship receipt comes from individual-level administrative records maintained by the Colombian Institute of Educational Credit and Technical Studies Abroad (*ICETEX*). These records contain the monthly scholarship disbursements received by beneficiaries of SPP and GenE and are used to identify students who effectively received financial aid. They also provide information on other publicly financed higher-education funding instruments, allowing the identification of eligible students who did not receive a scholarship and instead relied on alternative sources of public financial support.

3.3. Fertility and Family Planning Outcomes: Student records are linked to administrative data from the Individual Registry of Health Benefits (*RIPS*, in Spanish) for the

period 2009–2024.[3] These records are used to construct measures of fertility and family planning outcomes based on diagnoses, procedures, and health service utilization.

To ensure comparability across cohorts, outcomes are measured over a common five-year window following the presentation of the *Saber 11* examination. The data allow the identification of pregnancies, live births, childbirth-related services, abortion-related services,[4] family planning consultations, and the use of contraceptive methods, including oral contraceptives, intrauterine devices (IUDs), subdermal implants, and sterilization procedures.

4 Research Design

We estimate the effects of Colombia's higher-education scholarships using regression discontinuity designs (RDD) based on the eligibility rules of each program. The empirical strategy follows Cattaneo et al. (2019) and exploits the sharp cutoffs that determine access to financial aid. Because the scholarship system combines two distinct allocation mechanisms, the analysis is organized around two designs. The first pools *Ser Pilo Paga* (SPP) and the *Excellence* component of *Generación E* (GenE), both of which assign aid based on academic performance and socioeconomic disadvantage. The second focuses on the *Equity* component of GenE, which assigns aid exclusively on the basis of socioeconomic need among students admitted to public higher-education institutions.

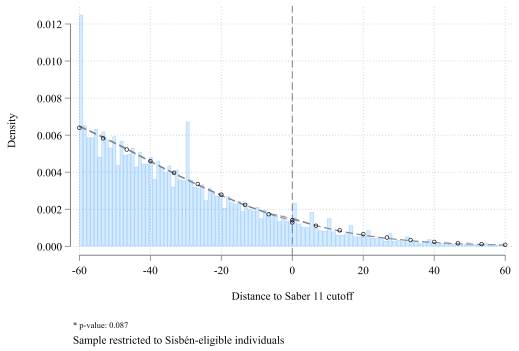
For the pooled merit-based scholarships, eligibility depends on both the *Saber 11* score and the *Sisbén* poverty index. We therefore implement two complementary RDDs. In the first, the running variable is the *Saber 11* score, and the sample is restricted to students who satisfy the relevant *Sisbén* eligibility condition. In the second, the running variable is the *Sisbén* score, and the sample is restricted to students who satisfy the academic eligibility criterion. These two specifications exploit the two margins along which merit-based financial aid is assigned and allow us to assess whether the estimated effects are driven by the academic margin, the socioeconomic margin, or both. For GenE *Equity*, by contrast, eligibility does not depend on academic performance. The corresponding RDD therefore uses the *Sisbén* score as the only running variable and focuses on students around the need-based cutoff.

[3] *RIPS* contains patient-level information on medical consultations, emergency care, hospitalizations, procedures, and pharmaceutical services reported by health providers.

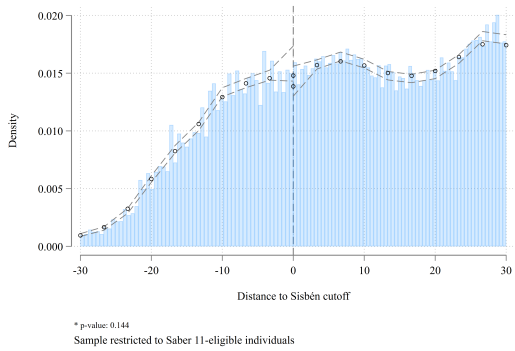
[4] Abortion-related services are identified using ICD-10 diagnoses O00–O08 ("Pregnancy with abortive outcome") recorded in *RIPS*. The measure captures abortion-related events observed in the formal health system. Before February 2022, induced abortion was legally permitted only under the exceptions established by Constitutional Court ruling C-355 of 2006.

FIGURE 1: Manipulation Testing Based on Density Discontinuity

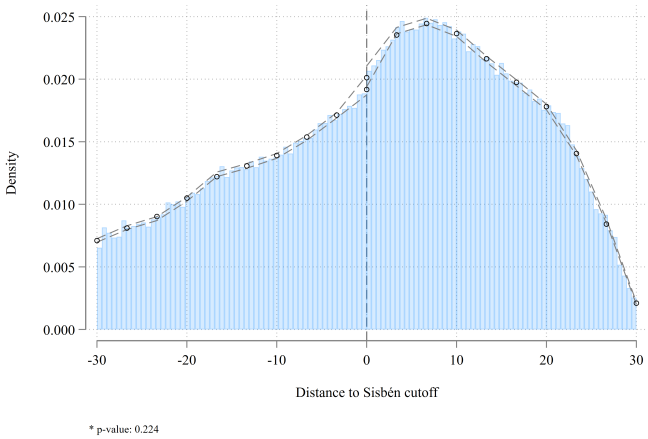
A. Saber 11 cutoff: merit-based scholarships



B. Sisbén cutoff: merit-based scholarships



C. Sisbén cutoff: GenE Equity



Note: The figure reports manipulation tests based on density discontinuities at the relevant eligibility cutoffs. Panel A uses the *Saber 11* score as the running variable for the pooled merit-based scholarships, restricting the sample to *Sisbén*-eligible individuals. Panel B uses the *Sisbén* score as the running variable for the pooled merit-based scholarships, restricting the sample to *Saber 11*-eligible individuals. Panel C uses the *Sisbén* score as the running variable for GenE *Equity*. Reported p-values correspond to the density discontinuity test proposed by Cattaneo & Titiunik (2022). *Source:* Own calculations based on *Saber 11* and *Sisbén* administrative records.

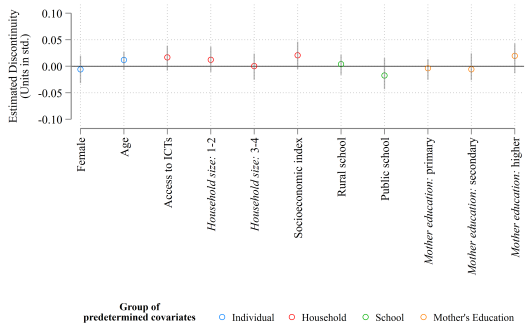
The identifying assumption is that potential outcomes evolve smoothly around the relevant eligibility threshold, so that students just above and just below the cutoff are locally comparable except for their probability of receiving financial aid. We estimate local linear specifications with a triangular kernel and mean-squared-error optimal bandwidths following Calonico et al. (2017), and report both intention-to-treat (ITT) effects and local average treatment effects (LATE) obtained by scaling reduced-form estimates by the first-stage discontinuity in scholarship receipt.

Figure 1 provides evidence on the no-manipulation assumption using density discontinuity tests at each eligibility threshold. Panels A and B report the results for the pooled merit-based scholarships, using *Saber 11* and *Sisbén* as running variables, respectively. Panel C

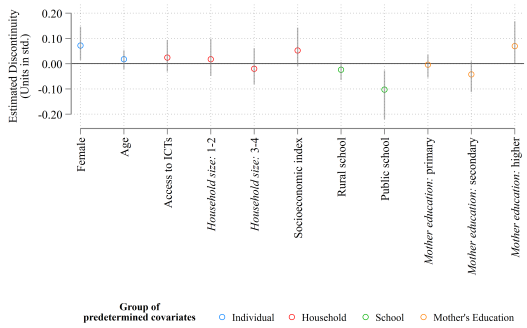
reports the corresponding test for GenE *Equity*, using the *Sisbén* cutoff. Across specifications, we find no evidence of sorting or bunching around the relevant thresholds, consistent with the absence of manipulation of the running variables.

FIGURE 2: Continuity of Predetermined Covariates

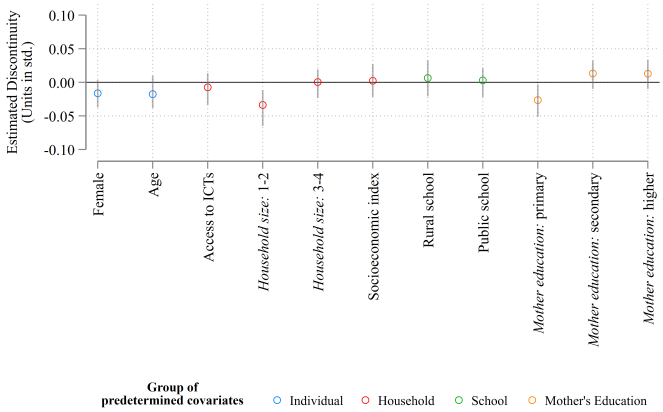
A. Saber 11 cutoff: merit-based scholarships



B. Sisbén cutoff: merit-based scholarships



C. Sisbén cutoff: GenE Equity



Note: The figure reports estimated discontinuities in predetermined covariates at the relevant eligibility cutoffs. Panel A uses the *Saber 11* score as the running variable for the pooled merit-based scholarships, restricting the sample to *Sisbén*-eligible individuals. Panel B uses the *Sisbén* score as the running variable for the pooled merit-based scholarships, restricting the sample to *Saber 11*-eligible individuals. Panel C uses the *Sisbén* score as the running variable for GenE *Equity*. Estimates are reported in standard deviation units. *Source:* Own calculations based on *Saber 11* and *Sisbén* administrative records.

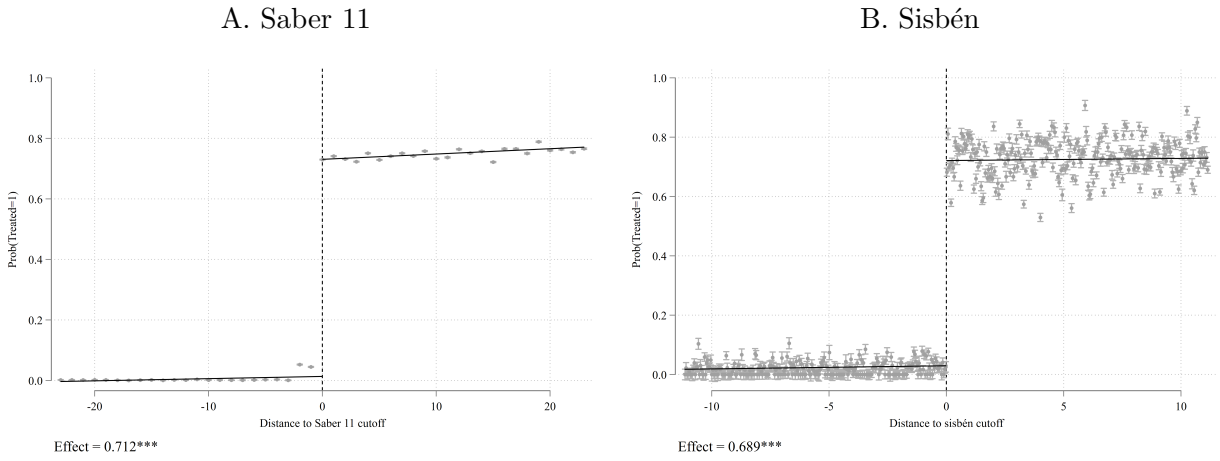
Figure 2 examines the local continuity of predetermined covariates around the same cutoffs. Panels A and B show continuity tests for the pooled merit-based scholarships using the *Saber 11* score and the *Sisbén* index as running variables, respectively. Panel C presents the same exercise for GenE *Equity*. For both the pooled merit-based design and the GenE *Equity* design, the majority of baseline demographic and socioeconomic characteristics are continuous at the relevant thresholds. While a small number of covariates display isolated

discontinuities, the overall pattern is consistent with local balance around the cutoff and supports the validity of the regression discontinuity design.

5 Results

Take-up of financial aid is substantial for merit-based scholarships. Figure 3 shows the discontinuity in the probability of receiving financial aid, using the high school exit exam as the running variable for need-eligible students (Panel A) and the Sisben score as the running variable for merit-eligible students (Panel B). In both cases, we pool SPP and GenE Excellence. We estimate a jump of about 70 percentage points (pp, hereafter) in the probability of receiving financial aid. This increase is similar across samples—students who meet the poverty criteria and students who meet the academic-score criteria.[5]

FIGURE 3: Discontinuity in the Probability of Receiving Financial Aid, Merit-based



Note: All specifications control for a vector of covariates $\mathbb{Z}$, including students' demographic and socioeconomic characteristics, and include cohort fixed effects. "Point Estimate" reports local linear regression ($p = 1$) with a triangular kernel and MSE-optimal bandwidth h_{mse}. Estimates are computed using the "rdrobust" package by Calonico et al. (2017). Standard errors are heteroskedasticity-robust, following Cattaneo et al. (2019). *Source:* Own calculations based on data from the Examen Saber 11° 2014–2019 (Icfes) and Sisbén III 2014–2019 (DNP).

Eligibility for financial aid based on academic excellence substantially reduces early fertility, five years after high school graduation, without affecting sexual and reproductive health

[5]Approximately 0.04% of students below the main test-score cutoff received financial aid through GenE *Excellence*. Under the program's operating rules, eligibility was not determined exclusively by the general score threshold: beneficiaries also included the three highest-scoring students in each department and in Bogotá, the score cutoff could be reduced if the number of accepted applicants was insufficient to fill available slots, and indigenous students registered in the official census of the Ministry of the Interior were exempt from the *Sisbén* requirement.

behaviors. In Table 1 we report pooled estimates for SPP and GenE Excellence, using the high school exit exam as the running variable in the sample that satisfies the poverty-score criteria. Eligibility decreases the probability of any live birth by 0.6 pp (40%), any pregnancy by 1.1 pp (30%), and childbirth by 0.9 pp (31%). Among scholarship recipients, the effects are larger and statistically significant. These sizable reductions in fertility do not appear to be driven by changes in the probability of having an abortion, the likelihood of a family planning visit, or in contraceptive method choice: the effects of eligibility on the probability of choosing an IUD, a subdermal implant, or oral contraceptives are small and statistically insignificant. Moreover, Appendix Table 3 shows that among students who satisfy the academic-merit criteria, eligibility based on financial need has no effect on fertility or health behaviors, except for a 2 pp decrease in the probability of using a subdermal implant.

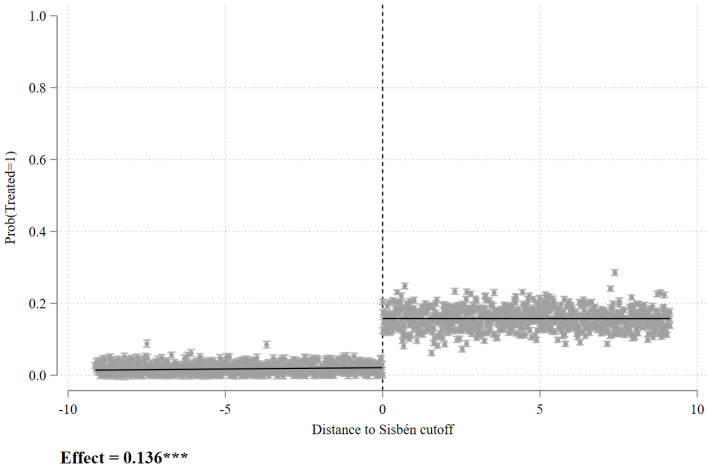
TABLE 1: **Fertility and Sexual and Reproductive Health, Merit-based**

	Fertility				**Sexual and Reproductive Health**			
	Pr(any live birth)	Pr(pregnancy)	Pr(childbirth)	Pr(abortion)	Pr(family planning visit)	Pr(IUD)	Pr(subdermal implant)	Pr(oral contraceptive)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. *First Stage*	0.709	0.701	0.714	0.701	0.700	0.704	0.704	0.706
p-value	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$
CI 95 percent	[0.69 ; 0.72]	[0.68 ; 0.72]	[0.70 ; 0.73]	[0.68 ; 0.72]	[0.68 ; 0.72]	[0.69 ; 0.72]	[0.69 ; 0.72]	[0.69 ; 0.72]
Panel B. *ITT*	-0.006	-0.011	-0.009	-0.001	0.004	0.001	-0.008	-0.010
p-value	0.018	0.023	0.004	0.613	0.723	0.784	0.191	0.177
CI 95 percent	[-0.011 ; -0.001]	[-0.021 ; -0.002]	[-0.016 ; -0.003]	[-0.006 ; 0.004]	[-0.021 ; 0.030]	[-0.006 ; 0.008]	[-0.021 ; 0.004]	[-0.025 ; 0.005]
Control Mean	0.015	0.037	0.029	0.010	0.307	0.017	0.067	0.110
Panel C. *LATE*	-0.008	-0.015	-0.012	-0.002	0.006	0.001	-0.012	-0.014
p-value	0.018	0.023	0.004	0.612	0.722	0.784	0.191	0.176
CI 95 percent	[-0.015 ; -0.001]	[-0.029 ; -0.002]	[-0.022 ; -0.004]	[-0.009 ; 0.005]	[-0.030 ; 0.043]	[-0.009 ; 0.012]	[-0.030 ; 0.006]	[-0.036 ; 0.007]
Bandwidth	15.2	11.1	17.4	11.1	10.9	12.8	12.7	13.9
Obs(left|right)	23219|13746	15615|11229	27322|14797	15615|11229	13980|10608	17312|11995	17312|11995	19397|12561

Note: This table reports RD estimates using *Saber 11* as the running variable. All specifications control for a vector of covariates $\mathbb{Z}$, including students' demographic and socioeconomic characteristics, and include cohort fixed effects. "Point Estimate" reports local linear regression ($p = 1$) with a triangular kernel and MSE-optimal bandwidth h_{mse}. Estimates are computed using the "rdrobust" package by Calonico et al. (2017). Standard errors are heteroskedasticity-robust, following Cattaneo et al. (2019).

In contrast to SPP and GenE Excellence, take-up of the equity scholarship is relatively low, with a discontinuity of around 13 pp in the probability of receiving financial aid (Figure 4). This lower take-up likely reflects a combination of lower baseline higher-education enrollment among eligible students and program design features—such as restrictions to public institutions—that limit the set of feasible options.

FIGURE 4: Discontinuity in the Probability of Receiving Financial Aid, Need-based



Note: All specifications control for a vector of covariates $\mathbb{Z}$, including students' demographic and socioeconomic characteristics, and include cohort fixed effects. "Point Estimate" reports local linear regression ($p = 1$) with a triangular kernel and MSE-optimal bandwidth h_{mse}. Estimates are computed using the "rdrobust" package by Calonico et al. (2017). Standard errors are heteroskedasticity-robust, following Cattaneo et al. (2019). *Source:* Own calculations based on data from the Examen Saber 11° 2018–2019 (Icfes) and Sisbén III 2018–2019 (DNP).

Eligibility based on need, without selection on academic performance, reduces the probability of pregnancy and abortion and is also associated with changes in sexual and reproductive health behaviors. Table 2 reports discontinuity estimates of GenE Equity on fertility and sexual and reproductive health outcomes, using the Sisben score as the running variable. Eligibility for the equity scholarship decreases the probability of any pregnancy and of abortion by 0.7 pp (5.3%) and 0.3 pp (14%), respectively. It also reduces the probability of any live birth and of childbirth, but these effects are not statistically significant. These changes in early fertility are accompanied by a 1 pp (2.3%) increase in the probability of any family planning visit and a 0.05 pp (23%) decrease in the probability of using an IUD. We also estimate a 0.7 pp (4%) reduction in the probability of using a subdermal implant, although this effect is not statistically significant.

Overall, the estimates for GenE Equity are consistent with a shift away from long-acting reversible contraceptive methods, alongside a higher likelihood of attending family planning visits for advice, information, and screening. Moreover, while the estimates for oral contraceptive use are not statistically significant, we cannot rule out substitution toward short-acting methods that may be obtained outside health visits recorded in our data.

TABLE 2: **Fertility and Sexual and Reproductive Health, Need-based**

Panel A1. Sisbén	Fertility				Sexual and Reproductive Health			
	Pr(any live birth)	Pr(pregnancy)	Pr(childbirth)	Pr(abortion)	Pr(family planning visit)	Pr(IUD)	Pr(subdermal implant)	Pr(oral contraceptive)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. *First Stage*	0.131	0.131	0.131	0.131	0.131	0.131	0.131	0.131
p-value	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$
CI 95 percent	[0.12 ; 0.14]	[0.12 ; 0.14]	[0.12 ; 0.14]	[0.12 ; 0.14]	[0.12 ; 0.14]	[0.12 ; 0.14]	[0.12 ; 0.14]	[0.12 ; 0.14]
Panel B. *ITT*	-0.004	-0.007	-0.005	-0.003	0.010	-0.005	-0.007	0.001
p-value	0.249	0.077	0.334	0.054	0.072	0.002	0.094	0.979
CI 95 percent	[-0.009 ; 0.002]	[-0.015 ; 0.001]	[-0.011 ; 0.004]	[-0.007 ; 0.000]	[-0.001 ; 0.024]	[-0.008 ; -0.002]	[-0.015 ; 0.001]	[-0.009 ; 0.009]
Control Mean	0.057	0.130	0.112	0.022	0.440	0.022	0.187	0.171
Panel C. *LATE*	-0.029	-0.057	-0.036	-0.021	0.075	-0.035	-0.054	0.007
p-value	0.250	0.077	0.335	0.055	0.072	0.002	0.093	0.980
CI 95 percent	[-0.066 ; 0.017]	[-0.113 ; 0.006]	[-0.084 ; 0.028]	[-0.052 ; 0.001]	[-0.008 ; 0.186]	[-0.065 ; -0.015]	[-0.115 ; 0.009]	[-0.066 ; 0.068]
Bandwidth	12.5	13.1	12.9	12.6	10.0	12.5	15.5	12.5
Obs(left|right)	77598|117613	80801|123126	79430|120768	78104|118479	64482|94376	77519|117377	92639|143626	77567|117496

Note: All specifications control for a vector of covariates $\mathbb{Z}$, including students' demographic and socioeconomic characteristics, and include cohort fixed effects. "Point Estimate" reports local linear regression ($p = 1$) with a triangular kernel and MSE-optimal bandwidth h_{mse}. Estimates are computed using the "rdrobust" package by Calonico et al. (2017). Standard errors are heteroskedasticity-robust, following Cattaneo et al. (2019).

Taken together, the results point to two distinct pathways through which higher-education scholarships reduce early fertility. Merit-based financial aid generates sizable reductions in live births, pregnancies, and childbirth without detectable changes in sexual and reproductive health behavior. This pattern suggests that the scholarship operates primarily through the opportunity cost of time: by expanding access to high-quality higher education for high-performing students, the program raises the returns to continued investment in human capital, making early childbearing particularly costly. Consistent with this interpretation, the financial component of the scholarship in isolation—as measured by variation in the socioeconomic running variable among merit-eligible students—has no detectable effect on any fertility or reproductive health outcome (Appendix Table 3).

In contrast, the need-based scholarship reduces fertility through a different channel. Eligibility for GenE Equity decreases the probability of pregnancy and abortion while increasing family planning visits and shifting contraceptive use away from long-acting reversible methods such as IUDs. These behavioral changes are consistent with an information-and-access mechanism: enrollment in higher education exposes disadvantaged students to health services, reproductive health information, and peer environments that alter contraceptive decision-making.

Two features of these results deserve further discussion. First, the magnitude of the first stage differs substantially between the two types of scholarships. Take-up for the merit-based scholarships is high, with a discontinuity of approximately 70 pp, whereas take-up for

GenE Equity is substantially lower at approximately 13 pp. The lower take-up of the equity scholarship likely reflects a combination of lower baseline enrollment rates among the eligible population and program design features—such as the restriction to public institutions—that limit the set of feasible educational options. Consequently, the LATE estimates for GenE Equity are considerably larger than the ITT estimates, implying substantial effects among compliers.

Second, the results for the need-based scholarship show reductions in pregnancy and abortion, but the estimated effects on live births and childbirth—while negative—are not statistically significant. This pattern may reflect the lower statistical precision arising from the smaller first stage, or it may suggest that the behavioral channel primarily prevents unwanted conceptions and pregnancy terminations rather than reducing overall childbearing. The fact that abortions decline alongside increased family planning engagement is consistent with the interpretation that the equity scholarship reduces unintended pregnancies specifically.

6 Conclusions

This paper examines the effects of Colombia's two largest higher-education scholarship programs on early childbearing and sexual and reproductive health. Exploiting eligibility cutoffs in a regression discontinuity design, we compare the impacts of merit-based financial aid (Ser Pilo Paga and GenE Excellence) with need-based financial aid (GenE Equity) on fertility and reproductive health behavior within five years of high school graduation.

Our central finding is that both types of scholarships reduce early fertility, but through markedly different channels. Merit-based aid generates substantial reductions in live births, pregnancies, and childbirth without affecting sexual and reproductive health behavior — no changes in abortion, family planning visits, or contraceptive method choice. Need-based aid, by contrast, reduces pregnancy and abortion while increasing family planning engagement and shifting contraceptive use away from long-acting reversible methods. The divergence in behavioral responses, despite the common outcome of lower fertility, points to fundamentally different mechanisms linking higher education to demographic behavior.

We interpret these patterns in light of the multiple channels through which education can affect fertility, as documented in the existing literature. For merit-based scholarship recipients, the evidence is most consistent with the opportunity-cost channel. The scholarship raises the returns to human capital investment, making early childbearing costly for students on an upward academic trajectory. These students reduce fertility not by changing their reproductive health behavior but by altering the timing and structure of family formation

decisions.

The absence of effects along the socioeconomic running variable among merit-eligible students reinforces the idea that financial transfer in isolation does not drive the result, suggesting that the mechanism operates through the interaction of academic ability and educational opportunity rather than through liquidity or income effects. This finding connects to recent evidence showing that SPP transformed partner formation—reducing the probability of having a partner without a university degree—and increased desired fertility, even as it did not produce robust changes in observed fertility within a single-program design (Londoño-Vélez et al., 2026). Our multi-program comparison adds to this picture by showing that, when the merit-based scholarship is evaluated at the academic eligibility margin, the fertility reductions are substantial and operate through a non-behavioral channel.

For need-based scholarship recipients, the evidence points to an information-and-access mechanism. University enrollment exposes these students to health services, contraceptive counseling, and peer environments that change how they manage reproductive risk. The decline in abortions alongside increased family planning engagement is particularly informative: it suggests that the equity scholarship prevents unintended pregnancies by expanding reproductive agency. This pattern is consistent with the broader literature documenting that educational interventions can reduce fertility by increasing autonomy and access to reproductive health services (Duflo et al., 2015, 2021; Hahn et al., 2018), though in our setting the channel operates through higher education rather than through secondary schooling.

These findings carry several implications for policy. First, they suggest that the design of higher-education financial aid—and in particular, whether scholarships target academic merit, socioeconomic need, or both—has consequences that extend well beyond educational attainment and labor market outcomes. Policymakers evaluating scholarship programs should consider their broader demographic effects, which may operate through different channels depending on the targeting criteria.

Second, the divergent mechanisms suggest complementarities between the two types of programs. Merit-based scholarships may be most effective at reducing fertility among high-performing students by raising the opportunity cost of childbearing, while need-based scholarships may be most effective for disadvantaged students by expanding access to reproductive health information and services. A financial aid system that combines both types of targeting may thus generate fertility reductions across a broader population through mutually reinforcing pathways.

Our analysis has limitations that should guide future work. The five-year follow-up period captures early fertility but cannot establish whether the observed reductions represent permanent declines or postponement of childbearing—a distinction that matters for the welfare

implications of these programs and that echoes findings from secondary-education contexts where delayed fertility did not always translate into lower completed fertility (Geruso & Royer, 2018; Bettinger et al., 2019a). We observe reproductive health interactions in the formal health system but cannot capture contraceptive methods—such as condoms—that do not generate administrative records, nor can we observe behavioral and aspirational shifts that may mediate the fertility effects.

The two scholarship programs operate at different eligibility margins and serve different populations, which limits direct comparability of the estimated effects; the contrast across programs is informative about mechanisms but should not be interpreted as a within-experiment decomposition.

Future research could strengthen the analysis by incorporating data on marriage and cohabitation patterns, labor market outcomes, and survey-based measures of fertility intentions, contraceptive behavior, and normative shifts that administrative records cannot capture. The question of whether the opportunity-cost and information-access channels interact—and whether their relative importance varies with the strength of local fertility norms, the availability of reproductive health infrastructure, or the degree of geographic mobility induced by the scholarship—remains an important avenue for future investigation.

References

Artmann, E., Ketel, N., Oosterbeek, H., & van der Klaauw, B. (2021). Field of study and partner choice. *Economics of Education Review*, 84, 102149.

Baird, S., McIntosh, C., & Özler, B. (2011). Cash or condition? evidence from a cash transfer experiment. *The Quarterly journal of economics*, 126(4), 1709–1753.

Becker, G. S. (1960). An economic analysis of fertility. In *Demographic and Economic Change in Developed Countries*. Princeton University Press.

Becker, G. S. (1965). A theory of the allocation of time. *The economic journal*, 75(299), 493–517.

Becker, G. S. (1973). A theory of marriage: Part i. *Journal of Political Economy*, 81(4), 813–846.

Becker, G. S. (1981). *A Treatise on the Family*. Harvard University Press.

Becker, G. S. & Mulligan, C. B. (1997). The endogenous determination of time preference. *The quarterly journal of economics*, 112(3), 729–758.

Bettinger, E., Gurantz, O., Kawano, L., Sacerdote, B., & Stevens, M. (2019a). The long-run impacts of financial aid: Evidence from california's cal grant. *American Economic Journal: Economic Policy*, 11(1), 64–94.

Bettinger, E., Kremer, M., Kugler, M., Medina-Durango, C. A., Posso-Suárez, C. M., & Saavedra, J. E. (2019b). School vouchers, labor markets and vocational education. *Borradores de Economia*, (Borradores de Economía; No. 1087).

Black, S. E., Devereux, P. J., & Salvanes, K. G. (2008). Staying in the classroom and out of the maternity ward? the effect of compulsory schooling laws on teenage births. *The economic journal*, 118(530), 1025–1054.

Bloem, M. D. & Villero, J. (2024). College opportunity and teen fertility: Evidence from ser pilo paga in colombia. *Journal of Development Economics*, 171, 103321.

Bozick, R. & Estacion, A. (2014). Do student loans delay marriage? debt repayment and family formation in young adulthood. *Demographic Research*, 30, 1865–1891.

Calonico, S., Cattaneo, M. D., Farrell, M. H., & Titiunik, R. (2017). rdrobust: Software for regression-discontinuity designs. *The Stata Journal*, 17(2), 372–404.

Castleman, B. L. & Long, B. T. (2016). Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation. *Journal of Labor Economics*, 34(4), 1023–1073.

Cattaneo, M. D., Idrobo, N., & Titiunik, R. (2019). *A practical introduction to regression discontinuity designs: Foundations*. Cambridge University Press.

Cattaneo, M. D. & Titiunik, R. (2022). Regression discontinuity designs. *Annual Review of Economics*, 14, 821–851.

Cortés, D., Gallego, J., & Maldonado, D. (2016). On the design of educational conditional cash transfer programs and their impact on non-education outcomes: the case of teenage pregnancy. *The BE Journal of Economic Analysis & Policy*, 16(1), 219–258.

Duflo, E., Dupas, P., & Kremer, M. (2015). Education, hiv, and early fertility: Experimental evidence from kenya. *American Economic Review*, 105(9), 2757–2797.

Duflo, E., Dupas, P., & Kremer, M. (2021). *The impact of free secondary education: Experimental evidence from Ghana*. Technical report, National Bureau of Economic Research.

Filmer, D. & Schady, N. (2014). The medium-term effects of scholarships in a low-income country. *Journal of Human Resources*, 49(3), 663–694.

Ge, S., Isaac, E., & Miller, A. (2022). Elite schools and opting in: Effects of college selectivity on career and family outcomes. *Journal of Labor Economics*, 40(S1), S383–S427.

Geruso, M. & Royer, H. (2018). *The impact of education on family formation: Quasi-experimental evidence from the UK*. Technical report, National Bureau of Economic Research.

Goodman, S., Isen, A., & Yannelis, C. (2021). A day late and a dollar short: Liquidity and household formation among student borrowers. *Journal of Financial Economics*, 142(3), 1301–1323.

Hahn, Y., Islam, A., Nuzhat, K., Smyth, R., & Yang, H.-S. (2018). Education, marriage, and fertility: Long-term evidence from a female stipend program in bangladesh. *Economic Development and Cultural Change*, 66(2), 383–415.

Jacob, B. A. & Lefgren, L. (2003). Are idle hands the devil's workshop? incapacitation, concentration, and juvenile crime. *American economic review*, 93(5), 1560–1577.

Kearney, M. S. & Levine, P. B. (2012). Why is the teen birth rate in the united states so high and why does it matter? nber working paper no. 17965. *National Bureau of Economic Research*.

Kirkebøen, L., Leuven, E., Mogstad, M., & Mountjoy, J. (2021). *College as a marriage market*. Technical report, National Bureau of Economic Research.

Koohi, S. (2017). College prospects and risky behavior among mexican immigrant youth: The effects of in-state tuition policies on schooling and childbearing. *Economics of Education Review*, 58, 162–174.

Londoño-Vélez, J., Álvarez-Arango, L. E., Rodríguez, C., & Sánchez, F. (2026). Nonpecuniary returns to selective higher education.

Londoño-Vélez, J., Rodríguez, C., & Sánchez, F. (2020). Upstream and downstream impacts of college merit-based financial aid for low-income students: Ser pilo paga in colombia. *American Economic Journal: Economic Policy*, 12(2), 193–227.

Londoño-Vélez, J., Rodriguez, C., Sánchez, F., & Álvarez-Arango, L. E. (2023). *Financial aid and social mobility: Evidence from Colombia's Ser Pilo Paga*. National Bureau of Economic Research.

Nau, M., Dwyer, R. E., & Hodson, R. (2015). Can't afford a baby? debt and young americans. *Research in social stratification and mobility*, 42, 114–122.

Appendix

A. Tables

TABLE 3: **Fertility and Sexual and Reproductive Health, Merit-based**

	Pr(any live birth)	Pr(pregnancy)	Pr(childbirth)	Pr(abortion)	Pr(family planning visit)	Pr(IUD)	Pr(subdermal implant)	Pr(oral contraceptive)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. *First Stage*	0.701	0.702	0.703	0.701	0.701	0.700	0.700	0.698
p-value	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$
CI 95 percent	[0.67 ; 0.73]	[0.67 ; 0.73]	[0.67 ; 0.73]	[0.67 ; 0.73]	[0.67 ; 0.73]	[0.67 ; 0.73]	[0.66 ; 0.73]	[0.66 ; 0.73]
Panel B. *ITT*	-0.002	-0.001	-0.001	-0.001	-0.008	0.002	-0.018	0.009
p-value	0.461	0.956	0.833	0.973	0.881	0.739	0.069	0.345
CI 95 percent	[-0.010 ; 0.004]	[-0.012 ; 0.011]	[-0.009 ; 0.007]	[-0.008 ; 0.007]	[-0.046 ; 0.039]	[-0.009 ; 0.012]	[-0.040 ; 0.002]	[-0.015 ; 0.043]
Control Mean	0.005	0.017	0.008	0.010	0.288	0.018	0.053	0.098
Panel C. *LATE*	-0.004	-0.001	-0.002	-0.001	-0.012	0.002	-0.026	0.012
p-value	0.459	0.956	0.833	0.971	0.874	0.739	0.066	0.344
CI 95 percent	[-0.014 ; 0.006]	[-0.017 ; 0.016]	[-0.013 ; 0.010]	[-0.011 ; 0.011]	[-0.066 ; 0.056]	[-0.012 ; 0.017]	[-0.058 ; 0.002]	[-0.022 ; 0.062]
Bandwidth	12.3	12.8	14.1	12.1	12.4	11.1	11.5	9.3
Obs(left|right)	5531|6289	5707|6518	6166|7184	5453|6175	5570|6348	5041|5725	5196|5909	4304|4843

Note: This table reports RD estimates using the *Sisbén* score as the running variable. All specifications control for a vector of covariates $\mathbb{Z}$, including students' demographic and socioeconomic characteristics, and include cohort fixed effects. "Point Estimate" reports local linear regression ($p = 1$) with a triangular kernel and MSE-optimal bandwidth h_{mse}. Estimates are computed using the "rdrobust" package by Calonico et al. (2017). Standard errors are heteroskedasticity-robust, following Cattaneo et al. (2019).