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ABSTRACT

We study the impact of elite colleges on upward mobility. An unprecedented financial aid reform in Colombia dramatically increased the enrollment of academically successful students of low socioeconomic status (SES) in high-quality universities. We leverage the policy’s stringent eligibility criteria and population-wide administrative microdata, using regression discontinuity (RD) and difference-in-difference (DD) methodologies to estimate causal effects on later-life educational and labor-market outcomes. The program notably boosted attendance of low-SES high-achievers at colleges with high value-added, increasing their returns to ability. Low-SES students are more likely to obtain bachelor’s degrees from these colleges, especially in STEM fields, and they achieve higher scores in the college graduation exam. Nine years later, their earnings are 18 log points higher, with a greater likelihood of being in the top 1%, reflecting increased upper-tail mobility. The policy successfully narrowed socioeconomic gaps in college quality, attainment, skill development, earnings, and the returns to ability.

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1 Introduction

How can governments enhance upward mobility? While many policymakers and scholars consider higher education a pathway out of poverty (Goldin and Katz, 2008), there is limited evidence showing that colleges, particularly those in the top tier, significantly promote upward mobility. Students of low socioeconomic status (SES) face challenges accessing top-tier colleges, partly due to financial constraints (Chetty et al., 2023, 2020; Hoxby and Avery, 2013). Although financial aid programs can help low-SES students access these institutions, the evidence that they improve post-college earnings is limited and mixed (Dynarski et al., 2022). Furthermore, even when low-SES students enroll in elite colleges, they do not consistently achieve significantly higher earnings or reach top income levels later in life (Zimmerman, 2019). Therefore, understanding the impact of attending elite colleges for low-SES students is crucial for evaluating their role in promoting upward mobility and assessing the effectiveness of investing in financial aid.

This paper examines the role of elite colleges as engines of upward mobility in Colombia by studying a policy that gave low-SES students access to these institutions. In 2014, the national government launched *Ser Pilo Paga* (SPP), a groundbreaking student loan initiative that provided academically successful low-SES students with full tuition coverage at 33 government-certified "high-quality" (HQ) colleges, which are known for higher test scores, graduation rates, and per-student spending. Collectively, they comprise one-tenth of all postsecondary institutions and enroll about one-fifth of all undergraduate students. To qualify for SPP, students had to score in the top 10% on the national standardized high school exit exam and belong to the lower half of the wealth distribution.

SPP dramatically increased the number of low-SES students attending HQ colleges. On average, the share of low-SES students enrolling in these colleges increased by 46%, and at the nation's top university, the share of entering low-SES students nearly *quintupled* from 7% to 33% (Londoño-Vélez et al., 2020; Londoño-Vélez, 2022). SPP's stringent eligibility criteria created sharp exogenous variation in HQ college enrollment, making it one of the largest experiments in diversifying elite colleges anywhere in the world. The program's quasi-experimental variation and Colombia's population-wide data provide an ideal setting to estimate the long-term effects of high-quality colleges on upward mobility.

To measure individuals' later-life educational and labor-market outcomes, we leverage rich administrative microdata to create a dataset linking all high school test takers, postsecondary attendees, and formal workers nationwide, covering the period from 2012 (two years before the SPP reform) through 2023 (nine years after the reform). This dataset provides a comprehensive view of the educational and professional trajectories of all high school graduates, including both program recipients and nonrecipients. To identify the causal effects of HQ college attendance on upward mobility, we employ two complementary regression discontinuity (RD) designs. In the first, we compare outcomes for low-SES students (students who meet SPP's poverty requirement) who have test scores either slightly above or below the minimum eligibility cutoff. This group comprises high school graduates in the country's poorest tertile who score near the 90th percentile on the exam. In the other, we compare merit-eligible students (students who meet the test score requirement) who are either slightly above or below the poverty cutoff. This group comprises students near the 53rd wealth percentile who score within the top 5% on the exam. Students who fall either slightly below the test-score cutoff or slightly above the poverty cutoff, and thus do not qualify for SPP, serve as a control group to estimate the effects of increasing access to HQ colleges.

Both groups of students benefit from increased access to HQ colleges, implying substantial gains across the distribution of student SES and ability. Before the SPP policy, credit market imperfections forced students to either compromise on college quality or forgo college altogether. After the SPP policy, college outcomes for low-SES students improve substantially. Students just above the test-score cutoff are 10 p.p. more likely to ever attend any college, a 12% increase compared to the control group. They are also 44 p.p. more likely to attend an HQ college, a 240% increase over the control group, whose members predominantly enroll in low-quality (LQ) institutions. Moreover, the likelihood of attending an HQ *private* college, previously unaffordable to low-SES students, increased by more than 47 p.p. or over 1000%.

We first measure the impact of HQ college attendance on upward mobility by looking at absolute increases to low-SES students' B.A. attainment, skills development, and earnings. Low-SES students thrive in HQ colleges, and we find that college quality matters for later-life outcomes. B.A. attainment from HQ colleges increases by 32 p.p., or 330%, as shown by the reduced-form coefficient, while the instrumental variable (IV) estimate, which scales the reduced-form effect by the program take-up rate, is about 55 p.p. These attainment gains are concentrated in the STEM fields. Interestingly, students induced to attend these HQ universities also demonstrate improved skills, performing about 0.12 standard deviations (σ) or 28% higher on Colombia's mandatory standardized college graduation exam. Skills are typically a difficult outcome to measure, as most countries lack system-wide learning metrics, so our finding represents the first evidence that college quality enhances individuals' skills.

Through SPP, low-SES students also experience substantial labor-market improvements. Nine years after high school, their monthly earnings are about 18 log points higher—

among the largest effect sizes reported in the literature. They are also more likely to be in the top 25% and top 1% of their cohort's earnings distribution, showing higher upper-tail mobility. These earnings gains offset the temporary earnings losses during college and continue to grow over time, consistent with the returns to college quality rising with labor-market experience (MacLeod et al., 2017; Zimmerman, 2014). Additionally, comparing outcomes for similarly-achieving students before and after SPP was introduced reveals that these gains extend even to those at the very top of the test score distribution.

Our findings demonstrate that elite colleges can serve as engines of upward mobility for low-SES students by improving their skills and earnings, clarifying the returns to elite college attendance on later-life outcomes. The literature on this question has yielded conflicting findings, especially for low-SES students (Anelli, 2020; Barrios-Fernandez et al., 2023; Chetty et al., 2023, 2020; Dale and Krueger, 2014, 2002; Ge et al., 2022; Jia and Li, 2021; Sekhri, 2020). In general, the returns to elite college attendance for this group depend on academic match and cross-class social integration, as mismatches can lead low-SES students to drop out (Andrews et al., 2020). Moreover, low-SES students often lack access to the same networks as their high-SES peers due to high levels of friendship "homophily" (Chetty et al., 2022a,b), making it challenging to secure high-paying jobs (Michelman et al., 2021; Zimmerman, 2019). However, in our setting, exam-based policies at colleges facilitate academic match and social integration, with students forming friendships based on similar abilities (Carrell et al., 2013; Londoño-Vélez, 2022). Moreover, the scale of SPP's impact—one-third of students entering elite colleges were low-SES students—may have further promoted cross-class friendships. Combined with many low-SES students choosing high-return STEM fields, this arguably contributed to improved upward mobility.

We also measure the impact of HQ college attendance on upward mobility by considering low-SES students' educational and labor-market outcomes relative to high-SES students' outcomes, conditional on ability. We analyze all high school graduates before and after the SPP policy and compare outcomes for high-SES and low-SES students with similar test scores. Conditional on test scores, high-SES students were more likely than low-SES students to attend college, particularly institutions that offered better skill development and higher-paying job prospects. Conditional on SES, test scores increased college "earnings value-added" for high-SES students but not for low-SES students, who could not afford high earnings value-added colleges and attended institutions that struggled to enhance earnings. Consequently, the postsecondary system reinforced preexisting disadvantages. The SPP policy eliminated the socioeconomic gap in college quality, increased the returns to ability for low-SES students, and successfully narrowed SES disparities in college attainment, skill development, average earnings, and top earnings.

While SPP recipients benefit from HQ college attendance both absolutely and relative to high-SES students, previous research cautions that diversifying elite universities may not always enhance overall welfare. The observed reduction in inequalities could partly be due to the policy unintentionally disadvantaging high-SES students. Risks include crowding out other students or compromising instructional quality. Additionally, there are concerns about whether the potential benefits of funding elite education outweigh the substantial costs. It is crucial to explore whether governments can design programs that promote low-SES students' attendance at high-quality colleges without negative side effects or compromising social welfare.

To assess the efficiency of the SPP program, we compare high-SES and low-SES students across the distribution of test scores before and after the policy using difference-in-differences (DD). We determine whether any particular group experienced adverse consequences from the reform or whether the reform constituted a Pareto improvement. Despite concerns about potential crowding-out effects, our analysis reveals no discernible adverse impacts. This is largely because high-SES students' fallback option remained a high-value added college and because elite institutions responded to increased demand by somewhat expanding their incoming classes.[1] Our findings alleviate concerns that expanding access to HQ colleges could compromise instructional quality, diminish learning experiences, intensify job competition, and devalue degrees (MacLeod and Urquiola, 2015). We confidently rule out negative impacts on college quality, peer quality, degree completion, learning outcomes, and earnings for aid-ineligible students. Consequently, the SPP policy increased HQ college attendance for low-SES students—leading to upward mobility—while also improving efficiency.

Finally, we assess whether the SPP policy's benefits justify the high cost of elite education by conducting a welfare analysis using the marginal value of public funds (MVPF). Even under conservative assumptions, the estimated MVPF, defined as the ratio of recipients' willingness to pay for the policy to the net cost to the government, is 5.2 based on the test-score cutoff and 3.4 based on the poverty cutoff, positioning the Colombian program well above most estimated MVPFs for other grant aid programs (Angrist et al., 2021; Hendren and Sprung-Keyser, 2020).

Our findings contribute to the literature investigating whether government policies

[1] This expansion was facilitated by these colleges' reliance on student tuition (rather than endowments or government funding) and the fact that they did not need to house students, who typically lived off-campus. There was no discernible increase in prices or per-student spending.

can foster upward mobility. Education is often cited as a key lever to enhance economic mobility. While the few existing causal papers have focused on early childhood education policies (Bailey et al., 2021; Chetty et al., 2011; Fredriksson et al., 2012; Jackson et al., 2015), colleges also significantly influence future earnings (Chetty et al., 2023, 2020; Mountjoy, 2022, 2024; Mountjoy and Hickman, 2021). We show that financial constraints can hinder human capital investments, exacerbate inequalities, and stifle social mobility. In this setting, a government policy making high-quality colleges affordable for low-SES students enhances upward mobility and closes socioeconomic gaps in college quality, college attainment, skill development, earnings, and the returns to ability.

Second, our findings contribute to the literature on the long-term impact of financial aid on educational and labor-market outcomes. While financial aid generally boosts college completion rates (Nguyen et al., 2019), its effect on post-college earnings remains unclear. A handful of studies find positive effects (Black et al., 2023; Denning et al., 2019) or positive outcomes for some students but not others (Bettinger et al., 2019). However, most studies find imprecise or null results (Barr et al., 2021; Bucarey et al., 2020; Chu and Cuffe, 2021; Eng and Matsudaira, 2021; Gurantz, 2022; Scott-Clayton and Zafar, 2019). This ambiguity often arises because financial aid typically funds attendance at lower-quality institutions without upgrading the quality of the marginal institution attended. For example, U.S. aid often funds community colleges, for-profit institutions, and local public colleges, whose returns can be lower than counterfactual institutions (Dynarski et al., 2022). Evidence outside the U.S. is scant, but Bucarey et al. (2020) show that even when financial aid increases enrollment (Solis, 2017), it fails to boost earnings due to the low quality of the marginal institution.

In contrast, we examine the first financial aid initiative explicitly designed to propel low-SES students into higher-quality universities, finding substantial earnings gains—more than double the largest effect sizes in the existing literature. Additionally, we highlight impacts on both equity and efficiency, overlooked due to data and identification challenges. Our findings reveal inequalities in the postsecondary system and demonstrate how a well-designed financial aid policy can bridge rich-poor gaps and increase efficiency.

2 Higher Education in Colombia

Colombia has around 300 higher education institutions, including professional technical institutions, technological institutions, technological schools, university institutions, and universities. For simplicity, we refer to all these institutions as "colleges." Colombian colleges offer "short-cycle" programs lasting two or three years, called "technical and technological" programs, as well as "professional" programs lasting four or five years, similar to associate and bachelor's degree programs in the United States.Programs and colleges vary in selectivity, quality, and price.

Colleges admit students based primarily on their performance in the national standardized high school exit exam, SABER 11. This exam assesses students' knowledge of subjects such as mathematics, physics, chemistry, biology, language, philosophy, social science, and English. Almost 90% of high school seniors take SABER 11, regardless of their college plans. When applying to colleges, students indicate their preferred college-major combination. Admissions are decentralized and occur twice a year due to varying high school academic calendars. About 85% of students begin college in the spring term, while the remaining 15%, mostly from elite private high schools, start in the fall.

Since 2010, Colombia colleges have required that students take a standardized college graduation exam (Law 1324/2009). Bachelor's degree seekers who have completed at least 75% of their academic credits take an exam called SABER PRO. Students pursuing associate degrees take a separare exam called SABER T&T. These exams assess generic competencies such as writing, critical reading, quantitative reasoning, English, and citizenship, as well as program-specific skills. The exams provide valuable insights into the educational value added by individual colleges, a measure challenging to obtain in most countries (OECD, 2016), and we will use them as measures of students' educational outcomes.

To recruit students, all programs and colleges must meet the Ministry of Education's "Qualified Registry" standards. Additionally, colleges can opt for a peer review process to obtain "High-Quality Accreditation" (HQA). HQA promotes continuous self-evaluation, self-regulation, and improvement of institutions and programs (OECD, 2016).[2] Colleges without HQA can still offer individual programs that achieve it, while programs offered by colleges with HQA automatically receive HQA. By 2014, 9% of programs and 12% of colleges had achieved HQA. Of the 43 institutions with HQA, 33 were universities. For convenience, we refer to these 33 universities with HQA as HQ colleges, and to all other colleges as LQ colleges.

Table A.1 reports key descriptive statistics for different college types. Among the 33 HQ colleges, 13 are public and 20 are private; together they account for about one-fifth of total college enrollment. Students at HQ colleges have higher entry and exit test scores compared to those at LQ colleges. Additionally, HQ colleges boast superior graduation rates and a higher percentage of faculty with Ph.D.s. However, these advantages come at

[2] HQA is granted by the National Accreditation Council, which is composed of members of the academic and scientific community, and lasts for three to ten years, requiring re-accreditation thereafter.

a higher cost: HQ colleges are about twice as expensive as LQ institutions, even though public colleges offer discounted fees due to substantial government subsidies.

Before 2014, Colombia's student loan and grant programs lagged behind those of other OECD countries (OECD, 2016), and private colleges offered limited financial aid. Because financial resources played a crucial role in access to college, low-SES students faced challenges pursuing higher education. High-achieving students with financial means could afford HQ private colleges, while only an exceptional minority was admitted to the competitive and affordable HQ public colleges. Consequently, most low-SES students either attended LQ colleges or faced barriers accessing higher education altogether (Ferreyra et al., 2017). This financial sorting resulted in a misallocation of talent and socioeconomic segregation, whereby students' educational opportunities and future prospects were heavily influenced by their financial circumstances, perpetuating inequality and hampering economic mobility.

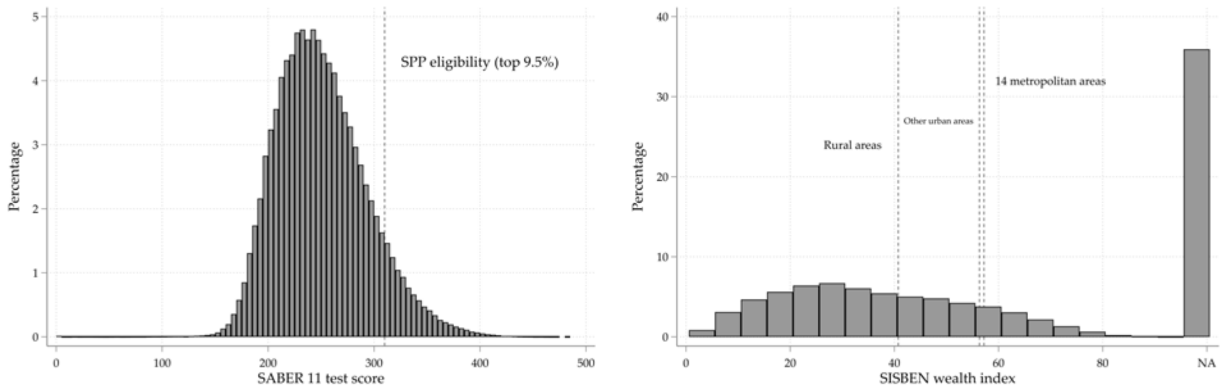
The SPP Financial Aid Program

On October 1, 2014, the Colombian government announced SPP, a merit-based financial aid program aimed at low-SES students. SPP was a publicly funded student loan program that fully covered the tuition fees for four- or five-year bachelor's degree programs at any of Colombia's 33 HQ colleges. The government directly paid the tuition for each SPP beneficiary to their chosen university. Additionally, beneficiaries received a modest stipend every six months, equivalent to one monthly minimum wage or about US$40 per month. (If the student relocated to a different metropolitan area to attend college, the stipend increased to four times the monthly minimum wage.) Crucially, SPP included an incentive component where the loan was automatically forgiven upon graduation.

SPP eligibility was based on individual test scores and household wealth. Students had to score at least 310 out of 500 in the August 2014 SABER 11 exam, placing their score in the top 9.5% (see Figure I, Panel A). Additionally, students had to come from economically disadvantaged households. This was assessed through the government's proxy-means testing instrument, *Sistema de Identification de Potentiates Beneficiaries de Programas Sociales* (SISBEN). SISBEN assigned households a wealth score from 0 to 100 based on factors like housing quality and possession of durable goods. The student's SISBEN index had to fall below a cutoff that varied by location: 57.21 in the 14 main metropolitan areas; 56.32 in other urban areas; and 40.75 in rural areas (Figure I, Panel B). Around 52.8% of test takers qualify based on their SISBEN score. Henceforth, we refer to them as "low-SES" students and to all others as "high-SES" students. Importantly, applicants must have secured admission to an HQ university; SPP did not alter the college admissions process for aid beneficiaries.

Figure I: Eligibility Conditions for the SPP Financial Aid Program

(a) Standardized high school test score (b) Wealth index



Notes: The SPP financial aid program has specific eligibility criteria based on performance in the national standardized high school exit exam, SABER 11, and the household SISBEN wealth index. Panel A shows the distribution of test scores two months before the policy announcement in 2014, with the vertical line marking the highest 9.5% of test scores eligible for SPP. Panel B illustrates the wealth distribution for test takers, with vertical lines indicating SPP's location-specific eligibility thresholds. (One-third of test takers are not included in SISBEN and denoted as "N/A.") Among test takers, 52.8% meet the eligibility criteria based on their SISBEN score. The subsequent figures use "SISBEN-eligible" or "low-SES" interchangeably to refer to individuals meeting SPP eligibility based on their SISBEN score, while "SISBEN-ineligible" or "high-SES" describe those who do not. Figure A.1 displays the distribution of test scores, categorized by SES, revealing that high-SES students tend to exhibit higher test scores. *Sources:* Authors' calculations based on SABER 11 (Icfes) and SISBEN (DNP).

High-SES students tend to achieve higher SABER 11 scores than low-SES students, as shown by Figure A.1. Among students who meet the test-score requirement, 71.4% were high SES while 28.6% were low SES. Among low-SES students, approximately one in twenty meet the test score requirement, compared to one in seven among high-SES students. Despite this performance gap, there are nearly twice as many high-achieving students from low-SES backgrounds in Colombia as Chetty et al. (2020) find in the U.S.

Crucially, the announcement of SPP came as a surprise, nearly two months after students had taken the SABER 11 exam. Eligibility for SPP was determined based on test scores that were received before the application deadlines of most colleges. This prevented students from manipulating their scores or wealth index to become eligible for SPP, supporting our assumption of quasi-random assignment near the eligibility cutoffs, which we validate in Section 4.1. The program benefited approximately 40,000 students between 2014 and 2018 or about 10,000 per year. Additionally, a widespread government advertising campaign contributed to SPP becoming one of Colombia's most renowned social programs.

3 Data

We use administrative data from six main sources. Three sources identify the eligible population and program recipients:

1. The population of SABER 11 test takers from the *Instituto Colombiano para la Evaluación de la Cducación* (Icfes), which oversees standardized testing in Colombia. These data include test scores and sociodemographic information (e.g., parental education, sex) and cover the fall semesters of 2012, 2013, and 2014, both before and after SPP's expansion of financial aid.

2. The universe of households from SISBEN from 2012 to 2014.

3. The population of SPP beneficiaries from ICETEX, the institution managing financial aid for postbaccalaureate programs. These data allow us to identify beneficiaries and quantify program costs.

Three sources measure educational and labor-market outcomes:

4. The Ministry of Education's *Sistema Nacional de Información de la Educación Superior* (SNIES). This system tracks postsecondary students, providing student-by-semester data on enrollment status, institution, program type (e.g., associate, bachelor's, graduate), field of study, and degree completion, among others. We have SNIES microdata from 2013 to 2020. We complement this dataset with information from institutional financial accounts and balance sheets submitted to Colombia's Ministry of Education, which detail annual educational expenditures per full-time student.

5. The population of college graduation test takers from Icfes, including information from SABER PRO (2013 to 2021) and SABER T&T (2016 to 2021). Since 2016, SABER PRO is offered annually, while SABER T&T is offered each semester for associate degree students. Both exams include five generic competency tests (writing, critical reading, quantitative reasoning, English, and citizenship) and field-specific components related to students' majors (e.g., economics, biology). Scores from the five generic modules were summed and standardized to have a mean of zero and standard deviation of one for 2016 test takers. These scores are comparable from 2013 and 2021.

6. Social security records from Colombia's Ministry of Health and Social Protection's *Planilla Integrada de Liquidación de Aportes a Seguridad Social* (PILA). These provide comprehensive monthly records of individual contributions to healthcare, pension funds, and workers' compensation. They include detailed information on payroll, earnings, days worked, and employer characteristics (e.g., firm size, sector, location) for all formal workers in Colombia. The dataset covers April, August, and December from 2013 to 2023.

Of the 574,259 individuals who took the SABER 11 exam in August 2014, we exclude approximately 11,000 (2%) who had prior college experience before retaking the exam. Our main analysis focuses on the remaining 563,027 individuals. Among these, 297,279 (52.8%) qualify for SPP based on their SISBEN score, and 53,636 (9.5%) qualify based on their SABER 11 score. Of the latter group, 22,552 have a SISBEN score.

4 Absolute and Relative Economic Mobility

4.1 RD Design and Validity

To estimate the causal effects of HQ college attendance on SPP recipients, we use an RD design that leverages the cutoffs in test scores and household wealth. Successful applicants had high test scores, low SES, and admission to an HQ college. We focus on eligibility as determined by SABER 11 and SISBEN to avoid biases stemming from students adjusting their college applications based on expected financial aid. This multidimensional RD setting identifies two types of compliers: (1) low-SES students near the test-score cutoff and (2) merit-eligible students near the poverty cutoff. We present separate estimates by collapsing the discontinuity into a single dimension for each student, gauging the distance of their SABER 11 (SISBEN) scores from the eligibility cutoff based on their SISBEN- (SABER 11-) eligibility status.[3]

We use this univariate approach instead of presenting a weighted average of the two RD effects due to differences in the student populations affected by each discontinuity. Specifically, the RD design using *test scores* as the running variable compares students scoring around the 90th percentile, whose household wealth hovers near the 31st percentile of all high school seniors' wealth (Table A.2). In contrast, the RD design utilizing the *wealth* index compares students around the 53rd percentile of the wealth

[3] We use a data-driven approach to select the optimal bandwidth using the 'rdrobust' package by Cattaneo et al. (2014). Notwithstanding, Appendix B shows that the estimated RD coefficient and 95% confidence intervals are stable across smaller and larger bandwidth choices for all of our main outcomes of interest.

distribution. This group exhibits higher SES, smaller family sizes, better-educated parents, attendance at private full-day high schools, and urban residency. This group also excels academically, with the control group achieving test scores above the 95th percentile. Given their higher SES and academic performance, they are less likely to face financial constraints and more likely to attend an HQ college without financial aid. Consequently, we expect SPP's impact on college attendance and quality to be more pronounced for the former group than the latter.

To investigate long-term outcomes, our primary RD analysis focuses on students who took the high school exit exam in fall 2014. This cohort, informed about the financial aid program and strict eligibility criteria *after* their SABER 11 exam, offers the highest internal validity, mitigating concerns about non-random sorting. Our analysis supports the identifying assumption of no manipulation of SABER 11 or SISBEN, as evidenced by histograms in Figure I. Formal manipulation tests using the local polynomial density estimator proposed by Cattaneo et al. (2020) yield robust-corrected p-values of 0.494 for SABER 11 and 0.734 for SISBEN (Figure A.2). Furthermore, Table A.2 shows that we cannot reject the joint null hypothesis of balanced covariates around the two discontinuities.

SPP exhibited a substantial take-up rate of 58.3% at the test-score cutoff and 64.5% at the poverty cutoff (Figure A.3). Uptake at the poverty cutoff aligns was likely higher because the complier population, characterized by higher SES and test scores, was more inclined to apply and gain admission to an HQ college. The stringent eligibility criteria prevented all but a few students below the cutoffs from receiving SPP. However, incomplete take-up occurred for various reasons: students did not apply or were not admitted to an HQ college that semester, or did not apply to the SPP program.

4.2 College Attendance and Quality

We start by examining the impact of SPP on the likelihood of attending any college within six years after high school. Figure II compares low-SES students above and below the test-score cutoff and demonstrates that test scores predict college attendance. For instance, in Panel A, a student scoring 40 points above the cutoff (98th percentile) has over a 50 p.p. higher probability of enrollment compared to a student scoring 40 points below (71st percentile). Financial aid eligibility increases immediate postsecondary enrollment by 28.7 p.p., from 41.4% among control students to 70.1%, marking a 69.5% increase.[4] Panel

[4] Londoño-Vélez et al. (2020) examines immediate enrollment effects and finds a 32 p.p. impact using SPADIES data. In contrast, we estimate a 28.7 p.p. impact using SNIES data. This difference is due to control group students who attended SENA, Colombia's largest vocational training institution. These students were

B shows that the proportion of control students ever attending any college has risen from 41.4% immediately after high school to 77.3% six years later. Consequently, the overall enrollment effect is 9.6 p.p. or 12.4% (Table I).

Crucially, the policy succeeded in drastically improving the quality of the marginal institution attended. Figure III depicts the probability of attending HQ and LQ colleges. Around three-quarters of control group students opt for LQ institutions. However, the policy steers students away from these institutions toward HQ colleges, with marginally-eligible students being 33.7 p.p. (57.5%) less likely to attend LQ colleges and 43.7 p.p. (241%) more likely to attend HQ colleges. Remarkably, this effect is concentrated in *private* HQ colleges, where attendance increases by 47.3 p.p. Subsequent sections will present evidence that this shift led to higher-quality educational opportunities based on various measures of college "value-added," ultimately resulting in improved economic mobility.

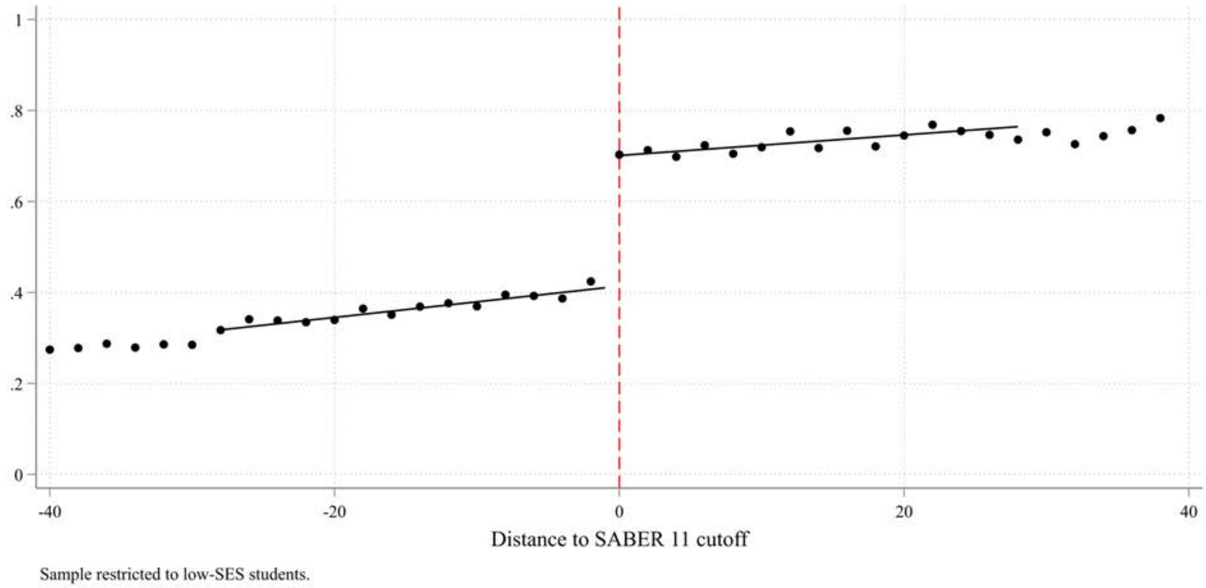
Several pieces of evidence support the argument that credit market imperfections had distorted human capital investments, compelling students to compromise on college quality or forgo college altogether. First, the impact on HQ college enrollment is more pronounced for students from the poorest socioeconomic stratum than for their less economically disadvantaged counterparts (Figure A.4). Second, the rise in college enrollment and quality is less substantial at the poverty cutoff, where students demonstrate higher test scores and SES. For this group, overall enrollment increases by roughly half—4.9 p.p. compared to 9.6 p.p.—and HQ enrollment increases by four-fifths—35.8 p.p. compared to 43.7 p.p. (Table I). Instead, these students primarily shift on the *intensive* margin, away from LQ colleges and even HQ *public* colleges, which they were twice as likely to attend.[5]

included in SNIES but not in SPADIES.

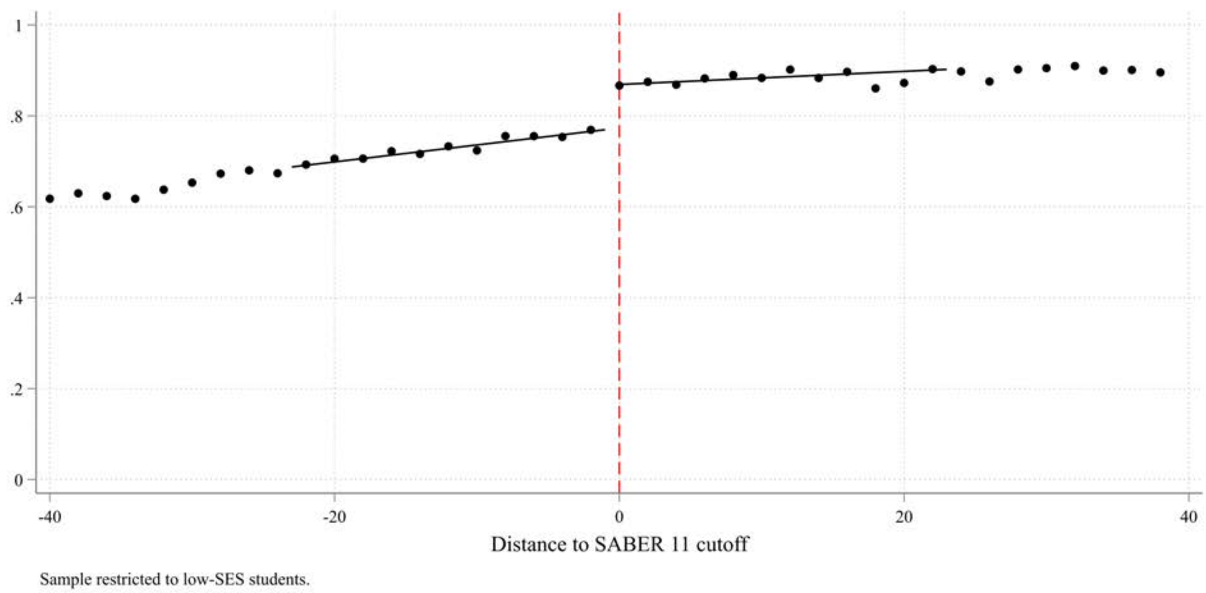
[5] Additionally, the policy shifts students from associate's degree programs toward bachelor's degree programs (Table I).

Figure II: An Expansion of College Enrollment

(a) Probability of Attending College Immediately After High School



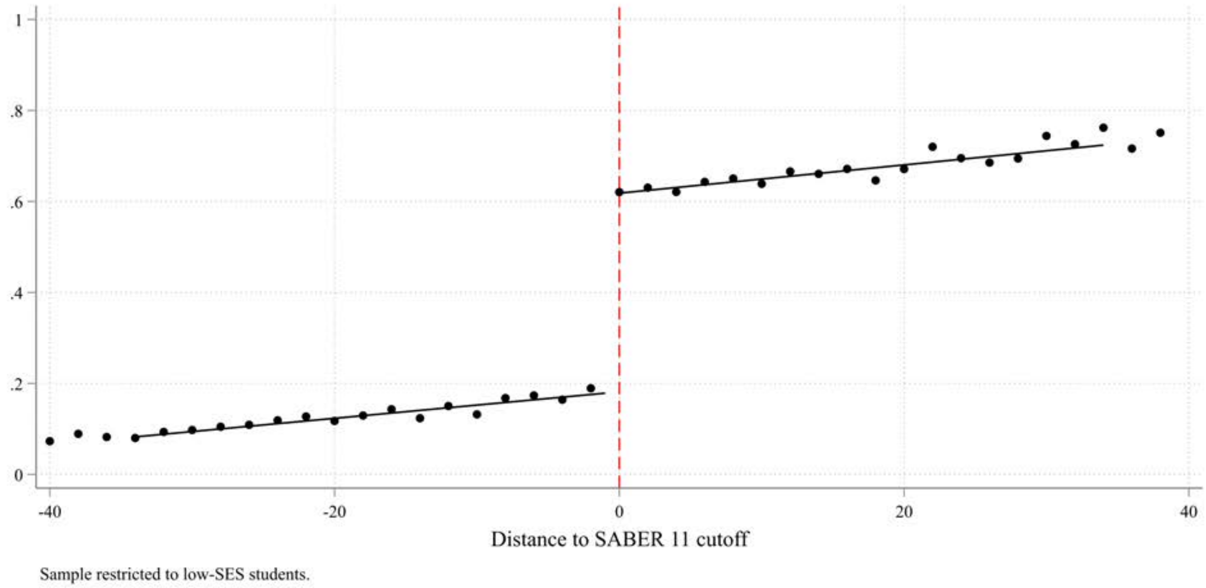
(b) Probability of Ever Attending College



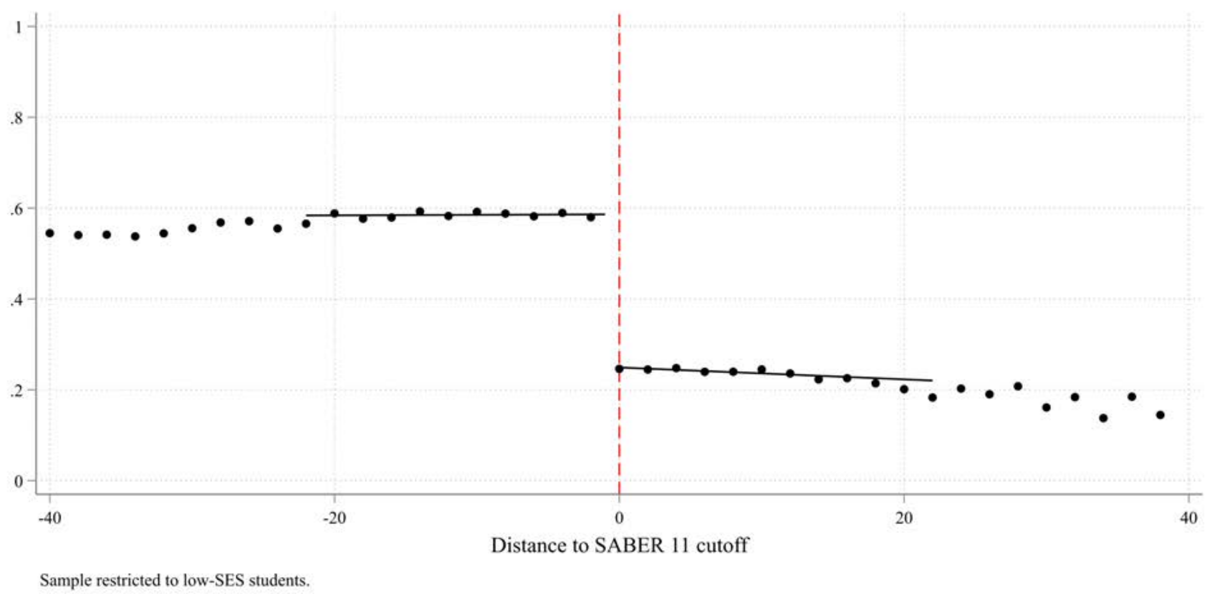
Notes: Panels A and B display low-SES students' probability of ever attending college within zero and six years after completing high school, respectively, based on the distance to the test-score cutoff. A student scoring 40 points below the test-score cutoff is in the 71st percentile of the test-score distribution, while a student scoring 40 points above the cutoff is in the 98th percentile. Test scores predict college attendance. However, financial aid eligibility increases the likelihood of attending any college within six years after high school by 9.6 p.p. Table I reports the reduced-form RD estimates. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SNIES (MEN).

Figure III: Increased Attendance at Higher-Quality Colleges

(a) Probability of Ever Attending an HQ College



(b) Probability of Ever Attending an LQ College



Notes: The figure breaks down the long-term enrollment effect by college quality. An HQ college refers to one of the 33 institutions with high-quality status by October 2014; all other colleges are LQ colleges. Around three-quarters of barely ineligible students choose LQ colleges. However, the SPP program redirects these students toward HQ colleges, increasing the likelihood of attending an HQ college by 43.7 percentage points. Table I shows that this effect is concentrated in HQ *private* colleges, where enrollment increases by 47.3 p.p. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SNIES (MEN).

Table I: Reduced-Form Estimates on Enrollment Over Time by Type of College and Program

	Enrollment within zero years from high school completion									Enrollment within six years from high school completion								
	Any	High-quality college			Low-quality college			Program duration		Any	High-quality college			Low-quality college			Program duration	
	college	Any	Private	Public	Any	Private	Public	Two years	Four years	college	Any	Private	Public	Any	Private	Public	Two years	Four years
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
***Panel A**: SABER 11 is the running variable*																		
Reduced form	0.287	0.469	0.471	-0.004	-0.182	-0.064	-0.121	-0.062	0.347	0.096	0.437	0.473	-0.039	-0.337	-0.120	-0.219	-0.121	0.213
	(0.011)	(0.010)	(0.009)	(0.006)	(0.009)	(0.005)	(0.007)	(0.007)	(0.012)	(0.010)	(0.009)	(0.010)	(0.008)	(0.012)	(0.008)	(0.010)	(0.009)	(0.012)
Mean control	0.414	0.097	0.028	0.071	0.317	0.106	0.215	0.110	0.307	0.773	0.181	0.044	0.141	0.586	0.200	0.390	0.213	0.563
Observations										297,279								
BW loc. poly.	28.48	27.37	26.86	24.20	28.46	31.13	35.64	24.10	21.74	23.33	35.00	23.87	25.28	22.39	27.24	28.09	22.82	20.77
Effect obs. control	29,368	27,607	25,871	23,070	29,368	33,592	41,192	23,070	18,948	21,963	39,059	21,963	24,714	20,459	27,607	29,368	20,459	17,966
Effect obs. treat	11,214	11,002	10,754	10,299	11,214	11,718	12,330	10,299	9,489	10,107	12,172	10,107	10,576	9,815	8,796	11,214	9,815	9,317
***Panel B:** SISBEN is the running variable*																		
Reduced form	0.226	0.418	0.472	-0.052	-0.186	-0.077	-0.109	-0.060	0.287	0.049	0.358	0.470	-0.113	-0.302	-0.125	-0.179	-0.094	0.143
	(0.021)	(0.019)	(0.016)	(0.014)	(0.017)	(0.011)	(0.015)	(0.010)	(0.021)	(0.016)	(0.020)	(0.017)	(0.017)	(0.021)	(0.015)	(0.018)	(0.012)	(0.019)
Mean control	0.535	0.240	0.072	0.167	0.294	0.114	0.181	0.095	0.440	0.851	0.359	0.095	0.264	0.492	0.199	0.293	0.150	0.702
Observations										22,552								
BW loc. poly.	11.24	12.67	13.82	12.79	10.93	11.64	9.72	12.79	11.60	9.33	12.14	11.93	11.83	9.57	10.84	10.39	13.27	9.88
Effect obs. control	4,674	5,125	5,436	5,152	4,555	4,836	4,140	5,154	4,816	4,005	4,984	4,920	4,898	4,078	4,528	4,383	5,297	4,196
Effect obs. treat	4,797	5,311	5,720	5,349	4,671	4,954	4,171	5,350	4,940	4,012	5,162	5,075	5,035	4,107	5,234	4,447	5,531	4,237

Notes: This table presents the reduced-form effect of program eligibility on postsecondary enrollment within zero (Columns 1–9) and six years (Columns 10–18) of high school completion using an RD design. The dependent variable is enrollment by college type (e.g., HQ, LQ) and program duration (two or three years versus four or five years). Panel A uses the SABER 11 test score as the running variable, restricting the sample to low-SES students. Panel B uses the SISBEN wealth index as the running variable, restricting the sample to merit-eligible students. The reduced-form coefficient in Column (1) of Panel A suggests that, for low-SES individuals, program eligibility raises immediate postsecondary enrollment by 28.7 p.p., or 69.5%, relative to a control mean of 41.4%. Conventional local linear RD estimates and standard errors in parentheses are estimated with package rdrobust (Cattaneo et al., 2014). *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SNIES (MEN).

4.3 College Attainment

We now examine impacts on college attainment, both absolutely and relative to high-SES students, to address concerns that increasing HQ attendance for low-SES students may not improve completion if these students face challenges and drop out.

Figure IV examines the probability of obtaining a bachelor's degree within seven years after high school, using the SABER PRO college graduation exam as a proxy. Panel A shows a strong correlation between high school test scores and B.A. attainment. Low-SES students who scored 40 points above the cutoff (98th percentile) are nearly 44 p.p. more likely to earn a B.A. compared to those who scored 40 points below the cutoff (71st percentile). Financial aid eligibility increases this outcome by 15.6 p.p. or 38.8% compared to barely-ineligible students (Table II). The IV estimate, obtained by scaling the reduced-form RD coefficient by the take-up rate of 58.3%, indicates a 26.8 p.p. improvement in B.A. attainment, or 66.5% (Table III). Notably, this *attainment* effect is similar at both the test-score and poverty cutoffs, despite a larger *enrollment* effect at the test-score cutoff. This is because students at the poverty cutoff have higher test scores and SES, making them less likely to drop out.

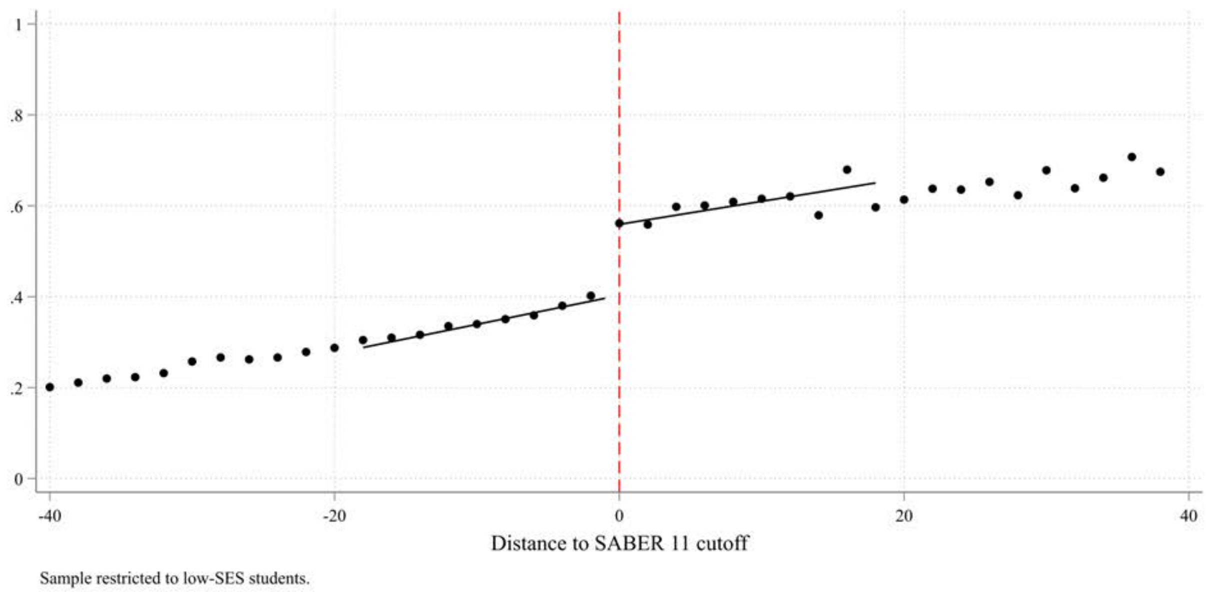
To examine impacts on relative upward mobility, Panel B of Figure IV compares low-SES students who took the high school exit exam pre-reform (in black), with high-SES students (in gray), the wealthier half who do not qualify for SPP either due to lacking a SISBEN score or having a score above the SPP cutoff. Before the reform, high-SES students were about ten p.p. more likely to earn a B.A. than low-SES students, with this gap consistent across all test score ranges. The policy significantly improved attainment for low-SES students (in red) without affecting attainment for high-SES students (in blue), fully eliminating the SES gap in B.A. attainment among equally achieving students.[6]

As expected, the attainment effect is concentrated in HQ colleges, with reduced-form and IV coefficients of 32.3 p.p. (330%) and 55.3 p.p. (565%), respectively. Notably, this effect holds across all test score ranges, including the top 2% (Figure A.5). The increase is entirely driven by HQ *private* colleges, with an IV coefficient of about 60 p.p. at both the test-score and poverty cutoffs (Table II). These results demonstrate that low-SES students thrive in HQ colleges.

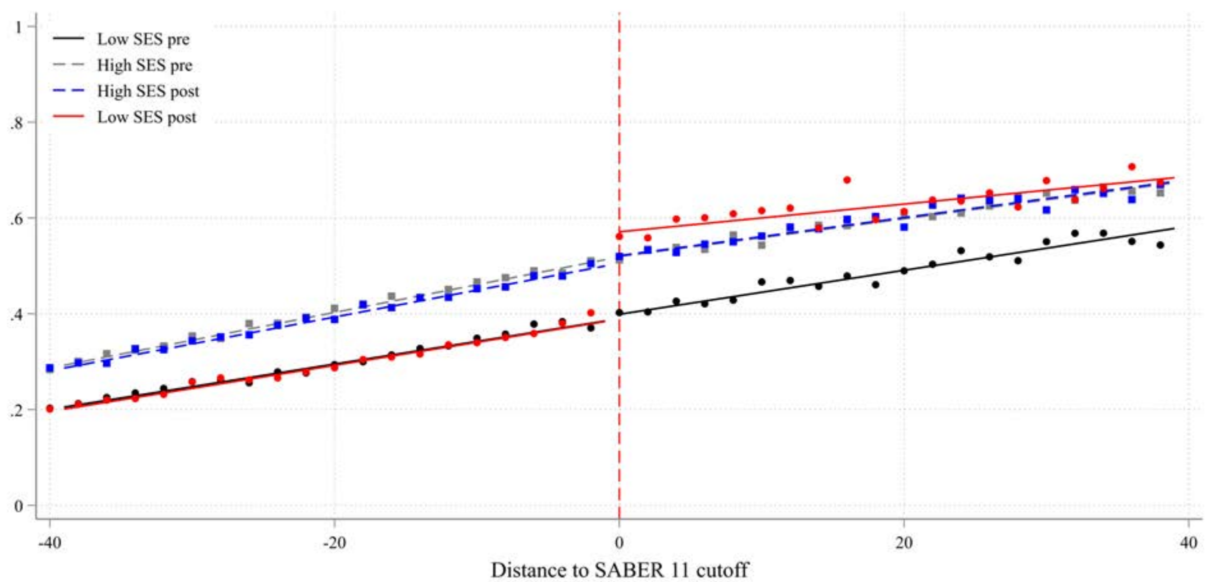
[6] Before the SPP reform, low-SES students' likelihood of earning a B.A. is constant at the cutoff (the p-value is 0.71), supporting causal interpretations.

Figure IV: Higher Likelihood of Earning a Bachelor's Degree

(a) Probability of Earning a Bachelor's Degree



(b) The Program Eliminated the SES Gap in Bachelor's Degree Attainment



Notes: Panel A depicts low-SES students' likelihood of obtaining a bachelor's degree, proxied by taking the SABER PRO exam within seven years of high school completion, as a function of the distance to the test-score cutoff. Table II provides the reduced-form RD estimate. Panel B demonstrates the impact on equity by comparing this outcome before and after the policy for high-SES and low-SES students. Before the policy, there was a 10 p.p. gap in bachelor's degree attainment between low-SES and high-SES students with similar test scores (in black and gray, respectively). The policy had no discernible effect on bachelor's degree attainment for high-SES students (in blue). However, it significantly increased attainment for low-SES students (in red), effectively eliminating the socioeconomic gap. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

Table II: Reduced-Form Estimates on Degree Attainment by Type of College and Program

	Any	Two	Four Year Degree											
	Degree	Year	Any	High-quality college			Low-quality college			Field of study				
		Degree	college	Any	Private	Public	Any	Private	Public	STEM	STEM Plus	Arts	S.S.H.	N.A.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
***Panel A:** SABER 11 is the running variable*														
Reduced form	0.062	-0.101	0.156	0.323	0.344	-0.016	-0.162	-0.066	-0.081	0.084	0.122	0.016	0.032	-0.017
	(0.012)	(0.009)	(0.014)	(0.011)	(0.009)	(0.006)	(0.009)	(0.005)	(0.007)	(0.010)	(0.014)	(0.003)	(0.006)	(0.005)
Mean control	0.584	0.184	0.403	0.098	0.032	0.063	0.303	0.108	0.148	0.138	0.301	0.004	0.052	0.048
Observations								297,279						
BW loc. poly.	22.71	22.97	18.78	18.85	26.06	20.19	31.58	31.52	25.38	23.89	17.72	23.38	28.41	24.59
Effect obs. control	20,459	20,459	15,683	15,683	25,871	17,966	33,592	33,592	24,714	21,963	14,367	21,963	29,368	23,070
Effect obs. treat	9,815	9,815	8,796	8,796	10,754	9,317	11,718	11,718	10,576	10,107	8,464	10,107	11,214	10,299
***Panel B:** SISBEN is the running variable*														
Reduced form	0.077	-0.060	0.145	0.325	0.389	-0.066	-0.176	-0.077	-0.081	0.063	0.099	0.017	0.053	-0.015
	(0.023)	(0.015)	(0.020)	(0.019)	(0.017)	(0.015)	(0.018)	(0.013)	(0.013)	(0.019)	(0.023)	(0.007)	(0.015)	(0.009)
Mean control	0.661	0.111	0.546	0.239	0.072	0.168	0.305	0.122	0.137	0.238	0.411	0.016	0.067	0.045
Observations								22,552						
BW loc. poly.	8.72	7.42	12.43	13.78	12.65	12.04	11.59	10.12	11.39	12.58	10.27	12.04	7.85	10.52
Effect obs. control	3,738	3,199	5,053	5,430	5,118	4,962	4,809	4,300	4,716	5,097	4,339	4,963	3,356	4,424
Effect obs. treat	3,761	3,162	5,234	5,706	5,303	5,119	4,926	4,345	4,846	5,276	4,402	5,121	3,357	4,496

Notes: This table presents the reduced-form effect on the likelihood of earning a degree (proxied by taking the mandatory college graduation exam) within seven years of high school using an RD design. Following the U.S. Department of Homeland Security, STEM fields include Engineering, Biological and Biomedical Sciences, Mathematics and Statistics, Physical Sciences, and Medicine. STEM-Plus adds Agriculture and Related Sciences; Natural Resources Conservation; Architecture; Education; Military Science; Psychology; Accounting, Business, and Economics; and Health Professions and Related Programs. Arts includes Plastic and Visual Arts, Music, Advertising, and Design. Social Sciences and Humanities (S.S.H.) include Anthropology, Geography and History, Sociology and Social Work, Philosophy and Theology, Literature, Library Science, Social Communication and Journalism, Sports and Physical Education, Law, and Political Science and International Relations. N.A. refers to missing field of study (all of which come from LQ colleges). See the notes under Table I for other details. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SABER PRO (Icfes), and SABER T&T (Icfes).

Table III: Instrumental Variables Estimates for Educational and Labor-Market Outcomes

	Degree attainment					College exam score if taken within...		Work	Earnings		
	Any degree	Two-year degree	Four-year degree			Five years	Seven years		in constant pesos§	in monthly min. wages§	in natural logarithm
			Any college	High-quality college							
				Any	Private						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
***Panel A:** SABER 11 is the running variable*											
IV	0.106	-0.173	0.268	0.553	0.591	0.119	0.076	0.046	336,870.70	0.353	0.178
	(0.021)	(0.015)	(0.023)	(0.016)	(0.012)	(0.026)	(0.025)	(0.022)	(62,952.02)	(0.066)	(0.044)
First stage	0.583	0.583	0.584	0.584	0.582	0.804	0.732	0.583	0.584	0.584	0.619
	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.011)	(0.011)	(0.009)	(0.010)	(0.010)	(0.011)
Mean control	0.584	0.184	0.403	0.098	0.032	0.423	0.448	0.622	987,997.10	1.035	14.010
Observations			297,279			23,059	41,430		297,279		149,356
BW loc. poly.	22.714	22.966	18.781	18.854	26.063	26.531	24.858	21.879	18.803	18.798	24.406
Effect obs. control	20,459	20,459	15,683	15,683	25,871	4,491	7,350	18,948	15,683	15,683	14,223
Effect obs. treat	9,815	9,815	8,796	8,796	10,754	4,576	6,186	9,489	8,796	8,796	6,821
***Panel B:** SISBEN is the running variable*											
IV	0.124	-0.100	0.225	0.497	0.601	0.059	0.044	-0.017	211,862.80	0.221	0.190
	(0.038)	(0.022)	(0.038)	(0.033)	(0.029)	(0.046)	(0.047)	(0.036)	(129,777.50)	(0.136)	(0.089)
First stage	0.634	0.634	0.635	0.635	0.633	0.801	0.740	0.636	0.634	0.634	0.653
	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.017)	(0.018)	(0.018)	(0.021)
Mean control	0.659	0.114	0.546	0.240	0.068	0.809	0.842	0.710	1,372,507.00	1.438	14.131
Observations			22,552			9,047	13,694		22,552		15,652
BW loc. poly.	8.135	8.075	8.663	8.594	7.412	12.116	10.209	9.040	8.249	8.249	8.012
Effect obs. control	3,481	3,466	3,721	3,685	3,196	1,572	2,386	3,843	3,526	3,526	2,430
Effect obs. treat	3,475	3,450	3,720	3,685	3,159	2,376	2,851	3,894	3,520	3,520	2,431

Notes: This table presents the IV estimates on educational and labor-market outcomes using an RD design. The outcomes in Columns (1)–(7) are measured within seven years of high school completion, while the outcomes in Columns (8)–(11) are measured exactly nine years after high school. See the notes under Table I for other details. § Includes zeros. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SABER PRO (Icfes), SABER T&T (Icfes), and PILA (MinSalud).

Surprisingly, more than half of the overall increase in B.A. attainment is seen in science, technology, engineering, mathematics, and medicine ("STEM" in Table II). This outcome is not ex-ante obvious because SPP covered tuition for all majors, giving students the freedom to choose their field of study. When including STEM-related majors like Architecture, Business, Economics, and Psychology (referred to as "STEM-Plus"), the effect expands to over four-fifths of the B.A. attainment gains.[7] Near the poverty cutoff, where students perform better academically and come from higher socioeconomic backgrounds, the likelihood that students in the control group earn a STEM degree almost doubles, and 70% of the B.A. effect is in STEM-related fields. Crucially, STEM fields show the highest labor-market returns on average (Lovenheim and Smith, 2023).

Tables II and A.4 illustrate impacts on additional educational outcomes. Graduation from LQ colleges and short-cycle programs declines as recipients opt for other colleges and programs. However, there is an overall increase in the likelihood of earning *any* degree. Additionally, there is a rise in the likelihood of pursuing graduate studies. Although graduate education is uncommon in our data (only 0.8% of control students at the test-score cutoff attend graduate studies within six years of completing high school), program eligibility increases this likelihood by 0.5 p.p. (61.6%). For merit-eligible students at the poverty cutoff, who exhibit higher test scores and SES, this increase is three times larger.[8]

4.4 Skill Development

Having demonstrated improvements in the quality of the marginal institution students attended, we now use Colombia's mandatory college graduation exam to examine the impact of HQ college attendance on students' skill development, both absolutely and relative to high-SES students. We focus on the five generic competency tests taken by all bachelor's degree graduates, comparable to the SABER 11 exam.[9] These scores are widely used by the Colombian government and researchers to assess college learning outcomes. First, we analyze exams taken before 2020—that is, within five years of high school graduation—to align with the timing of college test-taking for most SPP recipients

[7] Additionally, the likelihood of earning a B.A. in social sciences and humanities increased by 3.1 p.p., and the likelihood of earning an art degree increased by 1.5 p.p. The likelihood of earning a B.A. with a missing field of study, reported by some LQ colleges, dropped ("N.A." in Table II).

[8] Moreover, increasing college attendance, persistence, and program duration resulted in a rise of 0.51 to 0.76 years attended an undergraduate program, depending on the group analyzed. However, financial aid decreases time to graduation by 0.13 to 0.19 years, partially due to SPP's emphasis on timely completion, and the fact that *private* HQ colleges typically offer shorter B.A. programs (Table A.1).

[9] We focus on SABER PRO scores because the standardized testing institution, Icfes, advises against comparing SABER PRO and SABER T&T scores. Moreover, we emphasize the generic component to avoid issues with changes in major and "teaching to the test," as all students take the generic component and compete for awards based only on the program-specific component.

and the average student in Colombia, and to avoid COVID-19 disruptions. We then show similar results when including exams taken during and after 2020.

We find that attending HQ colleges improves students' skills. Figure V plots the average standardized college test scores taken before 2020 against the distance to the SABER 11 test-score cutoff for low-SES students. The steep slope indicates a strong correlation between *high school* scores and *college* scores. Marginally-eligible students perform better in the college exam, with a reduced-form coefficient of 0.096σ (22.7% compared to the control group) and an IV estimate of 0.12σ (28.2% compared to the control group). Considering all exams taken within seven years of high school also shows statistically significant and economically meaningful effects: the the IV estimate is 0.076σ or 17% (Table III).

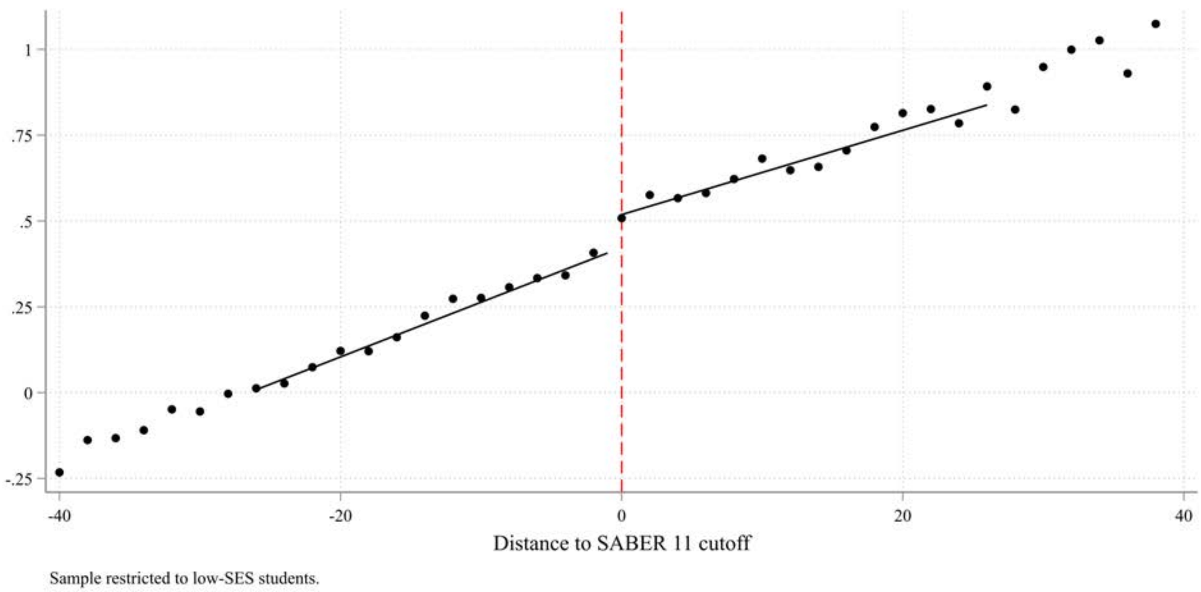
Panel B highlights the impact on equity. Prior to the reform, there is an SES gap in college skill development: even conditional of high school test scores, high-SES students (in gray) outperform low-SES students (in black) in college by at least 0.05σ across the entire high school test-score distribution. Section 4.7 will illustrate that this disparity arises because high-SES students attended "higher-value-added" colleges than low-SES students, resulting in learning gaps in college despite their similar high school skills. The postsecondary system thus exacerbated preexisting disadvantages. However, after SPP is introduced, low-SES students score higher, and the learning gap between low- and high-SES students (in red and blue, respectively) is completely eliminated.[10]

The college graduation exam is administered to all graduating students, which means that we observe test scores for students who are about to graduate from all bachelor's degree programs. However, we are more likely to observe SABER PRO scores for SPP recipients, since the program increased the likelihood of earning a bachelor's degree. For example, college test-takers located just above the SPP test-score cutoff are more likely to have attended a public, rural high school (Table A.3). If these students tend to perform worse than inframarginal students, our approach produces lower-bound estimates on skill development.

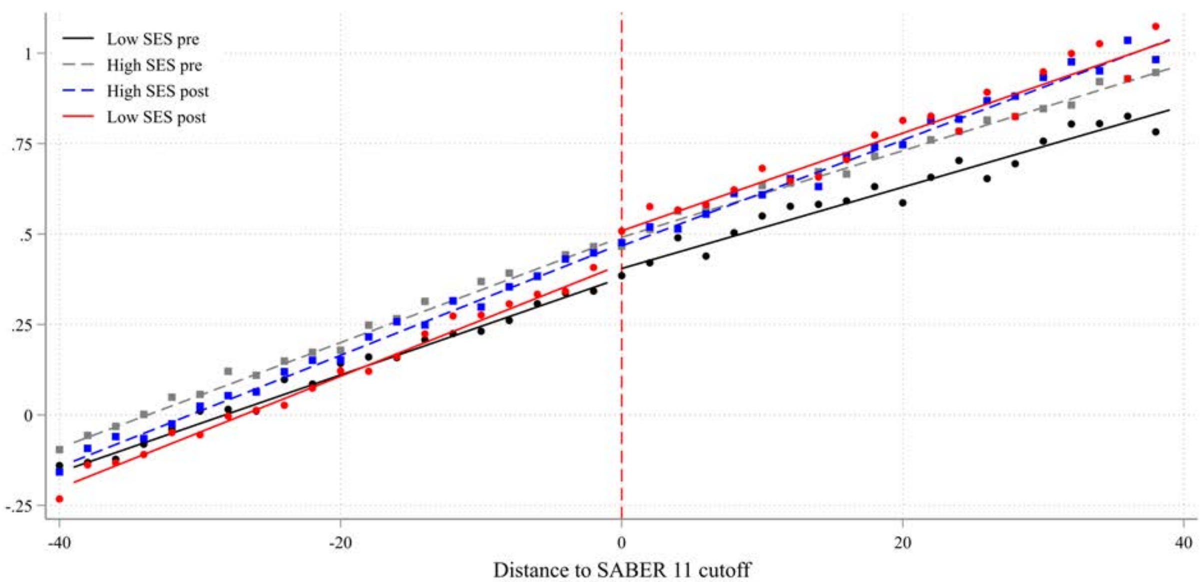
[10] Near the poverty cutoff, students have higher SES, higher high school test scores, and higher college test scores (Table III). Despite their already strong performance, these students still show positive learning effects. Similarly, Figure A.6, which compares the pre- and post-reform series five years after high school, indicates increased learning during college. However, the sample size is smaller. The wide confidence intervals prevent us from rejecting the null hypothesis, with these effects recovering statistical significance under different bandwidths (Appendix B).

Figure V: Greater Skill Development

(a) Performance in the College Graduation Exam



(b) The Program Eliminated the SES Gap in Skill Development



Notes: The figures plot students' performance in Colombia's college graduation exam, SABER PRO, within five years of completing high school. Table A.4 provides the reduced-form RD estimates. Panel B compares this outcome before and after the policy for high-SES and low-SES students. Even conditional of high school test scores, a learning gap emerged between low-SES and high-SES students in college (in black and gray, respectively). The postsecondary system exacerbated preexisting disadvantage. This learning gap was attributed to differences in college "learning value-added" based on SES (Figure VIII). The program had no discernible effect on learning performance for high-SES students (in blue). However, it significantly improved learning for low-SES students (in red), effectively eliminating the SES gap. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

4.5 Labor-Market Outcomes

Having demonstrated that HQ college attendance improved educational outcomes for low-SES students, we now analyze the impacts on labor-market outcomes, both absolutely and relative to high-SES students. We observe these outcomes up to nine years after high school.

We start by focusing on monthly earnings, assigning zeros to individuals not formally employed. Given that two-thirds of Colombian workers earn between 0 and 110% of the monthly minimum wage (DANE, 2021), we express earnings as multiples of the monthly minimum wage for full-time workers. Panel A of Figure VI shows the earnings of low-SES students nine years after high school relative to their distance from the test-score cutoff. The data reveals a strong correlation between high school test scores and earnings nine years later: a low-SES student in the top 2% of test scores earns more than twice as much as one in the 71st percentile. Program eligibility increases earnings by 20.6% of a monthly minimum wage, equivalent to US$49 more per month, a 20% increase compared to the control group mean. The IV estimate indicates an increase of US$83 per month, or a 34.1% improvement in upward economic mobility. This effect does not solely stem from increased formal employment, which we describe below, as the IV coefficient on log earnings is also positive, nearly 18 log points, and statistically significant (Table III).

Panel B of Figure VI illustrates the dynamics of the earnings impact. Earnings decline one to four years after high school, while marginally-eligible students are more likely to be in college. However, the trend reverses in year five, after they likely graduate. By year six, the coefficient on earnings becomes positive and marginally significant (the p-value is 0.089). The earnings effects continues to grow in year seven, surpassing the earlier temporary reduction, and increases further in years eight and nine. This pattern is consistent with findings in MacLeod et al. (2017) and Zimmerman (2014) that returns to higher-quality colleges increase with experience.

To examine upper-tail mobility, Table IV presents the impacts of HQ college attendance on students' earnings relative to their peers of the same cohort. We rank individuals who took the high school exam in fall 2014 by their formal monthly earnings nine years later. Program eligibility increases low-SES students' ranking by 3.6 percentiles. It also makes them 4.5 p.p. (12.2%) more likely to belong to the top earnings quartile and 1 p.p. (56.8%) more likely to belong to the top 1%, signifying a substantial increase in upper-tail mobility.

Figure VII assesses impacts on relative upward mobility by comparing low-SES and high-SES students before and after the SPP reform. Before SPP, high-SES students (in gray) consistently earned more than low-SES students (in black), with nearly double the likelihood of reaching the top 1% of earnings. Interestingly, the earnings gap *widens* with higher test scores, as scores are more predictive of future earnings for high-SES students. Low-SES students, in contrast, experience lower returns to their abilities. We will later show how financial barriers limited low-SES students' attendance in high "earnings value-added" colleges, resulting in lower earnings and a flatter earnings-test score profile. The policy increases earnings for low-SES students (in red) without affecting high-SES students (in blue), thereby narrowing the earnings gap, enhancing equity, and improving relative upward mobility.[11,12] Additionally, the reform increases the returns to test scores for low-SES students, making the earnings-test score profile closer to that of high-SES students. This highlights the crucial role of financial aid in equalizing opportunities and reducing socioeconomic disparities.[13]

Employment also improves significantly, a crucial outcome given that one in five Colombians aged 15 to 24 are unemployed, according to SEDLAC (CEDLAS and The World Bank). Initially, during the first four years after high school, employment is lower due to higher college attendance (Figure A.8). By year five, as students completed their degrees and entered the labor force, this trend reverses. Starting in year seven, barely-eligible students have higher employment rates. By the ninth year, the IV coefficient indicates a 4.6 p.p. (7.4%) increase in employment.

Students near the poverty cutoff, who typically have higher test scores and come from higher socioeconomic backgrounds, tend to earn higher salaries compared to those near the test-score cutoff. Despite this, they experience a similar earnings gain (Figure A.9).[14] However, they do not see an employment effect. Their earnings growth primarily stems from improvements in daily wages, with the IV coefficient on log earnings at 19 log points.[15]

[11] When focusing on earnings, we restrict the comparison group to the 2013 cohort because the COVID-19 pandemic affected the earnings of the 2012 cohort nine years after high school. However, Figure A.7 shows similar results using both the 2012 and 2013 cohorts as the comparison group.

[12] Few low-SES students reach the top 1% earnings before the policy, leading to noisy estimates. The apparent jump at the cutoff (in black) lacks statistical significance (the p-value is 0.26).

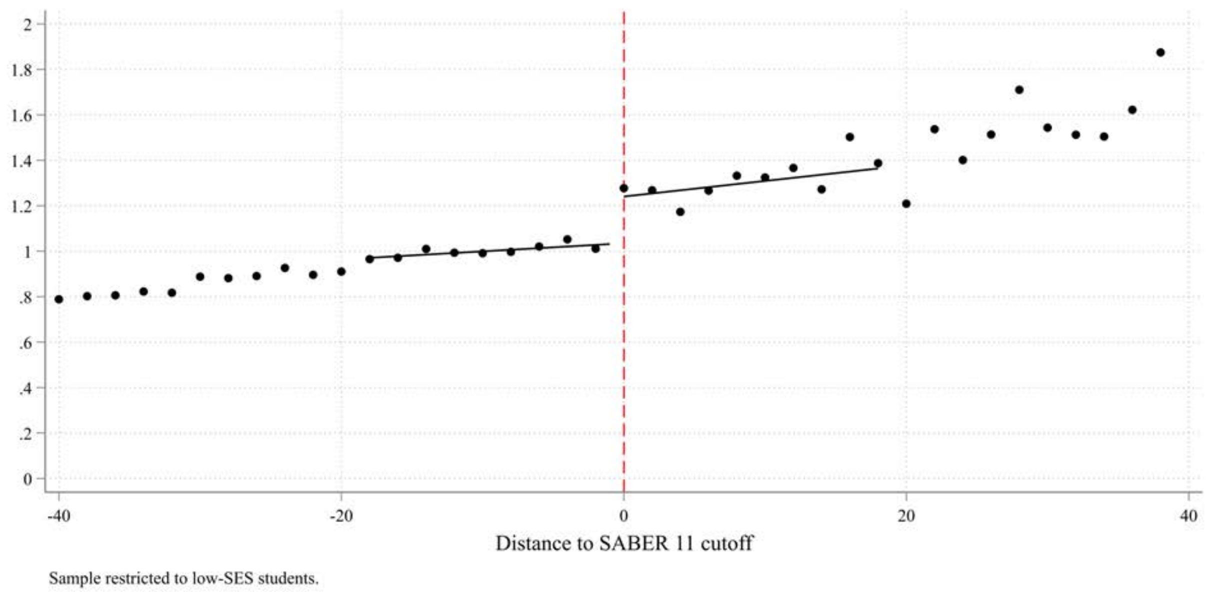
[13] Since the policy improved students' skills, the earnings gains are not solely driven by signaling effects from graduating from elite institutions. Pre-reform, a one standard deviation increase in the college test score five years after high school is associated with about US$46 higher earnings, after controlling for baseline characteristics. Consequently, an IV estimate of 0.12σ means recipients would earn US$5.42 more, meaning about 6.5% of the observed impact on earnings can be attributed to improved skills. However, this estimate is not causally identified and should be interpreted with caution.

[14] The coefficient on earnings is large, but its statistical significance varies depending on the choice of bandwidth. Similarly, the effects on earning ranks and top 25% earnings are positive but also depend on the selected bandwidths (Appendix B).

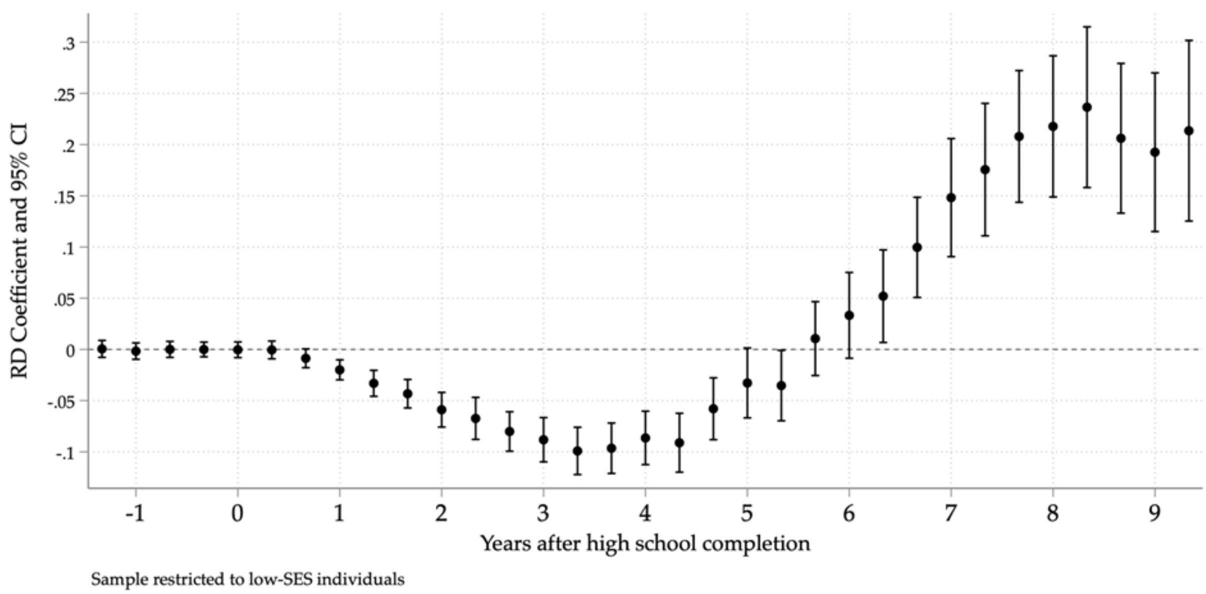
[15] Additionally, both groups show a slight reduction in the time it takes to secure employment after college graduation. They are more likely to work in one of Colombia's 13 largest cities, where most HQ colleges are located, and tend to be employed at slightly larger firms (Table A.5). Low-SES students just above the test-score cutoff are more likely to have jobs in finance and insurance, while merit-eligible students just above the poverty cutoff are more likely to work in information and communication (Table A.6).

Figure VI: Higher Earnings

(a) Earnings Nine Years After High School



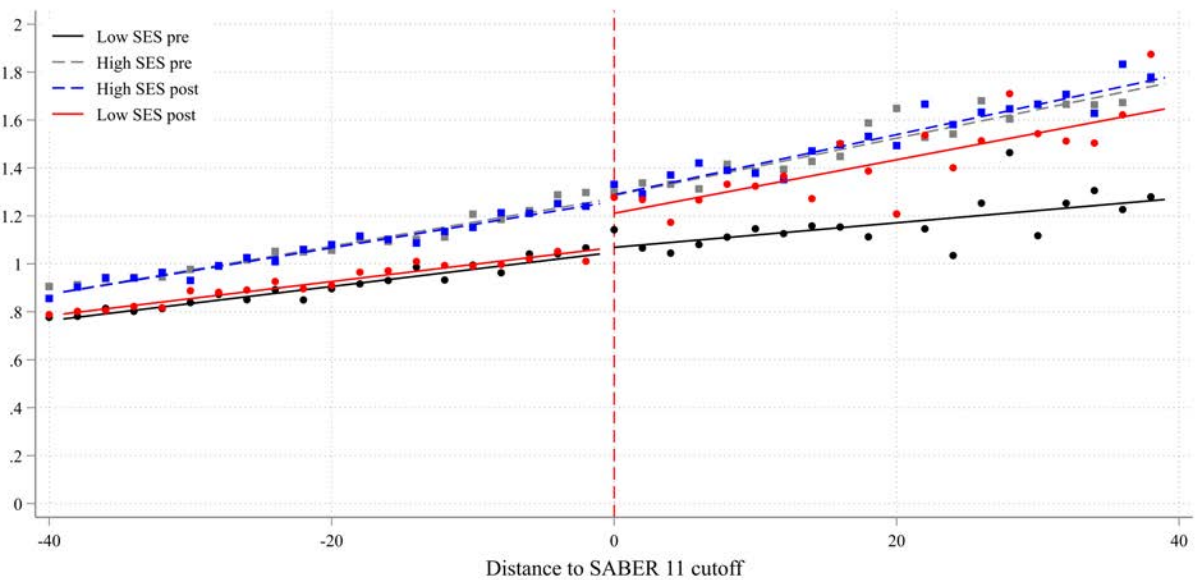
(b) The Dynamics of the Earnings Effect



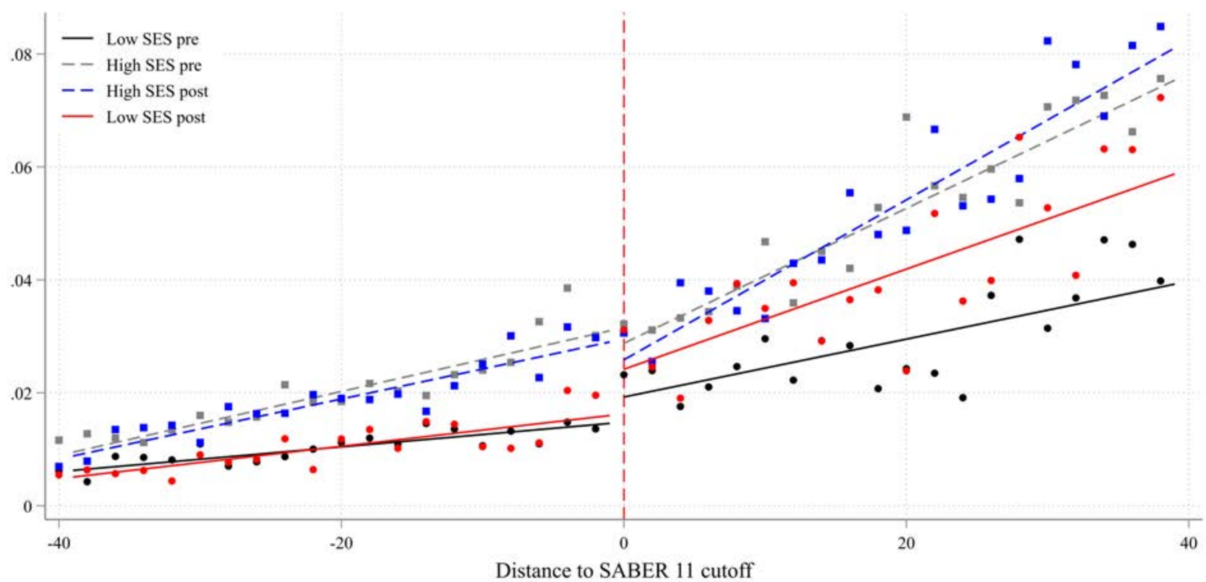
Notes: The figures depict the impact on formal monthly earnings, expressed as multiples of the monthly minimum wage, for low-SES students. Individuals without formal employment are assigned zeros earnings. Panel A compares earnings nine years after high school completion based on individuals' proximity to the test-score cutoff. Table IV reports the reduced-form RD estimates. Panel B plots the RD coefficient and 95% confidence intervals over time using triannual information. Figure A.9 shows similar effects using SISBEN as the running variable. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Figure VII: Narrowed Socioeconomic Gap in Earnings and Higher Returns to Ability

(a) Earnings



(b) Top 1% of Earnings



Notes: This figure illustrates that the policy reduced earnings disparities. Panel A shows formal earnings nine years after high school, measured in multiples of the monthly minimum wage. Panel B shows the likelihood of earning in the (within-cohort) top 1% of earnings. Pre-policy, high-SES students (in gray) consistently out-earned low-SES students (in black). This earnings gap *widened* with higher test scores, which were more predictive of future earnings for high-SES students due to access to higher "earnings value-added" colleges. The policy increased earnings for low-SES students (in red) without affecting high-SES students (in blue), narrowing the earnings gap and promoting equity. Furthermore, it strengthened the earnings advantage from test scores for low-SES students, aligning their outcomes more closely with those of high-SES students. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Table IV: Reduced-Form Estimates on Labor-Market Outcomes

	Work	Earnings					
		in constant pesos§	in monthly min. wages§	in natural logarithm	Percentile rank§	Top 25%§	Top 1%§
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
***Panel A:** SABER 11 is the running variable*							
Reduced form	0.027	196,599.20	0.206	0.110	3.605	0.045	0.010
	(0.013)	(36,931.22)	(0.039)	(0.027)	(1.070)	(0.013)	(0.003)
Mean control	0.622	987,997.10	1.035	14.010	48.624	0.365	0.017
Observations	297,279	297,279	297,279	149,356	297,279	297,279	297,279
BW loc. poly.	21.88	18.80	18.80	24.41	20.36	21.99	29.04
Effect obs. control	18,948	15,683	15,683	14,223	17,966	18,948	30,526
Effect obs. treat	9,489	8,796	8,796	6,821	9,317	9,489	11,339
***Panel B:** SISBEN is the running variable*							
Reduced form	-0.013	135,674.80	0.142	0.122	1.336	0.043	-0.007
	(0.024)	(80,882.52)	(0.085)	(0.057)	(1.718)	(0.024)	(0.010)
Mean control	0.711	1,377,613.00	1.443	14.136	57.390	0.455	0.050
Observations	22,552	22,552	22,552	15,652	22,552	22,552	22,552
BW loc. poly.	7.85	8.65	8.64	8.42	11.75	9.35	8.43
Effect obs. control	3,353	3,710	3,710	2,547	4,868	4,009	3,615
Effect obs. treat	3,353	3,711	3,711	2,551	5,004	4,017	3,603

Notes: This table presents the reduced-form estimates on labor-market outcomes using an RD design. The outcomes in Columns (1)–(7) are measured nine years after high school completion. Earnings are reported in December 2021 pesos. Converting COP to USD at the market exchange rate on December 31, 2021 (USD 1 = COP 4,051.27), the reduced form coefficient in Column (2) of Panel A is US$48.53 and the control mean is US$243.87 including zeros and US$392.08 excluding zeros. See the notes under Table I for other details. § Includes zeros. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Our focus on formal labor-market outcomes means that we record individuals engaged in informal work as having zero formal earnings. If control students work informally, we might overestimate earnings increases at the cutoffs. However, several factors mitigate this concern. First, informality is uncommon among individuals with some college education, including about four-fifths of control students: only 7.9% of this group works informally, according to SEDLAC (CEDLAS and The World Bank). Second, our study sample consists of high-achieving students, and those with high test scores are more likely to work formally (Figure A.8). Third, even among formally-employed individuals, high-quality college attendance still resulted in a substantial and nearly 18 log-point increase in earnings.

We anticipate the earnings effect might increase in the coming years for several reasons. First, as noted earlier, the returns to high-quality college attendance increase with experience (MacLeod et al., 2017; Zimmerman, 2014). Second, because SPP promotes graduate studies, the earnings effect will strengthen as recipients complete their degrees and secure high salaries, reflecting the substantial returns to graduate education. Last, graduates with STEM majors typically experience faster earnings growth in Colombia (Bayona and Sanchez, 2023).

4.6 Outcome Heterogeneity by Baseline Characteristics

In Appendix C, we explore heterogeneous treatment effects on students' educational and labor-market outcomes. The policy consistently led to significant improvements across all groups. The largest impacts are observed among students from disadvantaged high schools with low test scores and few students transitioning to HQ colleges. Financial aid has a larger effect on HQ graduation rates for females, but since they often choose lower-return fields like social sciences and humanities, their earnings gain is slightly smaller than that for males. Finally, first-generation college students benefit at least as much as individuals with college-educated parents.

4.7 The Role of College Quality

In this section, we assess how much of SPP recipients' educational and labor-market gains can be attributed to the "value-added" of their college-major combination (which we refer to hereafter as their *program*). Following Melguizo et al. (2017) and Riehl et al. (2018), we assess various dimensions of program "value-added," considering graduation rates, skill development, and labor-market outcomes separately. This approach recognizes that different programs may excel in certain outcomes but not others. For example, programs that teach the most skills may not necessarily lead to the highest earnings.

Appendix D provides more detailed information on our empirical approach; here, we summarize the main steps. We utilize data from students who graduated from high school in fall 2012 and 2013, before SPP, to estimate programs' value-added. We regress outcome y for individual i in cohort t on the program fixed effects $\delta_{p(i,t)}$ and control for a dense vector of baseline characteristics $\mathbf{X}$ using the following ordinary least squares (OLS) regression:

$$y_{i,t} = \alpha + \delta_{p(i,t)} + \mathbf{X_i}'\Gamma + \epsilon_{i,t} \tag{1}$$

where $\epsilon_{i,t}$ is a student-specific error term and $\mathbf{X}$ includes the student's SABER 11 score using a third-degree polynomial and baseline demographic and socioeconomic characteristics correlated with the outcomes of interest and influencing students' selection across programs.[16] By controlling for these factors, we aim to isolate programs' contributions independent of student, household, and high school characteristics.

Crucially, we observe labor-market outcomes for all students, including graduates, dropouts, and those who never attended any program within six years of high school. For this reason, we express labor-market value-added measures relative to students without any college experience. Therefore, a positive $\hat{\delta}_p$ indicates that the program adds more value in the labor market than never attending college, while a negative $\hat{\delta}_p$ indicates otherwise.

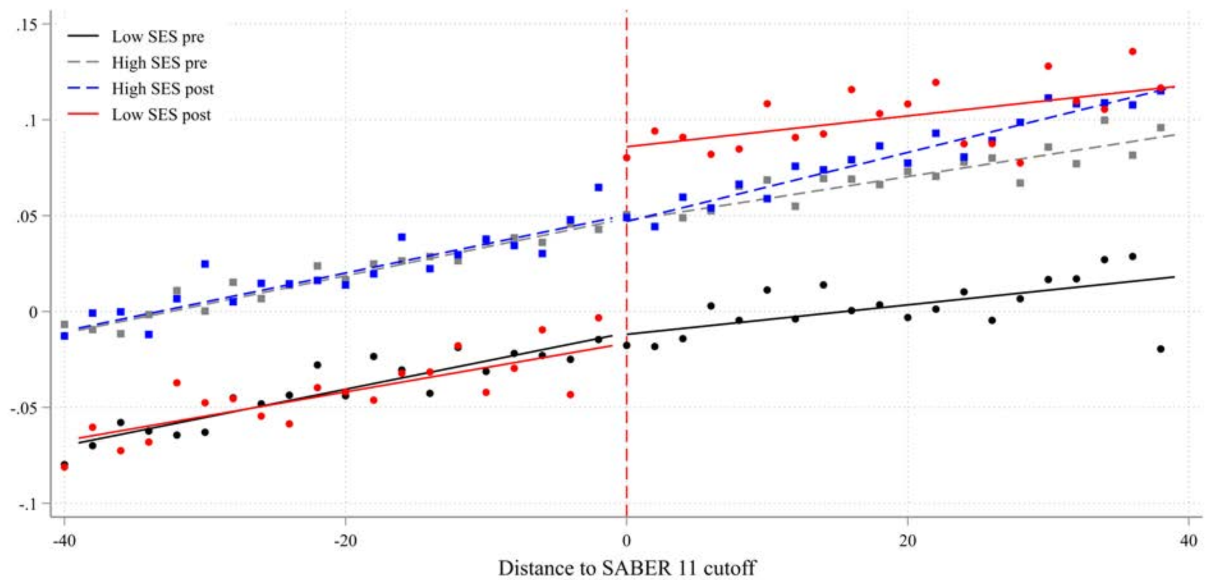
Appendix D details the estimated patterns and robustness checks, but here we briefly summarize the key findings. The estimated program value-added ($\hat{\delta}_p$) varies widely across programs and outcomes. HQ colleges excel in teaching skills, even when accounting for the exceptional abilities and privileged backgrounds of their students. Among these institutions, HQ *private* colleges demonstrate the highest "learning value-added." When focusing on earnings, attending any college increases earnings compared to never attending college. However, there is substantial dispersion in labor-market returns across colleges. HQ *private* colleges offer the highest "earnings value-added". In contrast, HQ *public* colleges exhibit low earnings value-added despite their high learning value-added. This result is consistent with Riehl et al. (2018), who discovered that Colombia's top *private* colleges are better for earnings, while top *public* colleges are more effective at teaching skills.

Next, we assess SPP's impact on learning value-added and earnings value-added by treating these $\hat{\delta}_p$s as outcome variables in the RD design. Figure VIII summarizes the main results. Panel A shows that before the policy, higher test scores predicted students' attendance in programs with high learning value-added. However, there is a significant socioeconomic gap, with high-SES students attending colleges that excel in teaching skills. This gap in college quality between equally performing low-SES students and high-SES students contributes to the socioeconomic gap in skill development found in Section 4.4. By redirecting students to HQ colleges, the policy improves learning value-added, eliminating these SES gaps and ultimately closing the skill development gap between high-SES and low-SES students.

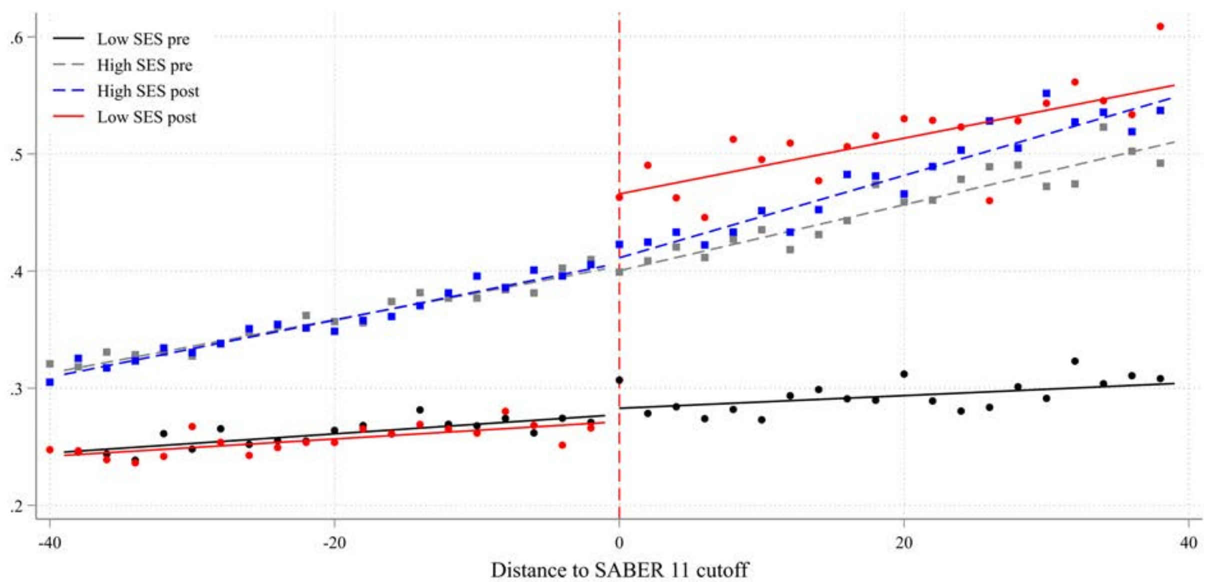
[16] Specifically, we include student demographics (sex, ethnic minority, third-degree polynomials of age, and an indicator for the exam year), household characteristics (size, socioeconomic stratum, parental educational attainment, and SISBEN score), and time-invariant high school characteristics (private indicator, calendar dummies, urban indicator). Additionally, we include leave-one-out mean socioeconomic stratum, parental education, SISBEN index, and SABER 11 test scores at the high school-cohort level.

Figure VIII: Reduced Socioeconomic Gaps in College Value-Added and Returns to Ability

(a) Learning Value-Added



(b) Earnings Value-Added



Notes: This figure illustrates that the policy improves equity by reducing the socioeconomic gap in college "learning value-added" in Panel A and "earnings value-added" in Panel B. Pre-policy, there was a gap in both learning value-added and earnings value-added between low-SES and high-SES students with similar high school test scores (in black and gray, respectively). Higher test scores improved learning value-added but not earnings value-added for low-SES students, as they could not afford HQ private colleges known for excelling in earnings value-added. The policy did not affect either measure of value-added for high-SES students (in blue). Instead, it promoted low-SES students into colleges with superior learning and earnings prospects (in red), eliminating the SES gaps and increasing the returns to ability for low-SES students. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), and PILA (MinSalud).

Table V: Impacts on Educational and Labor-Market Outcomes and College-Major "Value Added"

	College attainment				College exit test score		Labor-market outcomes			
	Any degree		Four-year degree				Employment		Earnings	
	Realized	Predicted	Realized	Predicted	Realized	Predicted	Realized	Predicted	Realized	Predicted
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
***Panel A:** SABER 11 is the running variable*										
Reduced form	0.032	0.010	0.062	0.027	0.096	0.099	0.029	0.028	0.231	0.203
	(0.013)	(0.004)	(0.016)	(0.004)	(0.022)	(0.008)	(0.013)	(0.003)	(0.041)	(0.014)
Observations	130,343	130,343	68,418	68,418	20,893	20,520	284,747	284,747	284,747	284,747
***Panel B:** SISBEN is the running variable*										
Reduced form	0.079	0.019	0.079	0.034	0.072	0.064	-0.031	0.014	0.152	0.179
	(0.026)	(0.007)	(0.022)	(0.006)	(0.042)	(0.014)	(0.026)	(0.005)	(0.089)	(0.029)
Observations	19,461	19,461	17,589	17,589	8,490	8,422	21,209	21,209	21,209	21,209

Notes: This table compares the reduced-form estimates on educational and labor-market outcomes with those predicted by college-major "value-added" using an RD design. Outcomes, available for college-major combinations with at least 10 students, are measured within seven years from high school in Columns (1) through (4), within five years from high school in Columns (5) and (6), and nine years after high school in Columns (7) through (10). The dependent variable is the realized outcome in odd columns and the predicted outcome based on "value-added" in even columns. Columns (1) and (2) include only students who attended college, while Columns (3) through (6) focus on those who attended four- or five-year programs. By contrast, Columns (7) through (10) include all individuals—graduates, dropouts, and those who never attended any program—expressing "value-added" relative to students without any college experience. Columns (9) and (10) express outcomes in multiples of the monthly minimum wage, with zeros for individuals not formally employed. See Appendix D and the notes under Table I for other details. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), SABER T&T (Icfes), and PILA (MinSalud).

Additionally, Panel B of Figure VIII shows that, before the reform, SES strongly correlates with earnings value-added, with a significant difference between low-SES and high-SES students. High-SES students attend colleges that offer high-paying job opportunities, while low-SES students do not. Interestingly, test scores improve earnings value-added for high-SES students *but not for low-SES students*, whose earnings value-added remains constant even with high test scores. These differential returns to ability likely arise because low-SES students cannot afford HQ private colleges, which excel in earnings value-added, and opt for HQ public institutions, which struggle to enhance students' earnings. Financial aid enables low-SES students to afford these high earnings value-added HQ private colleges, leveling the playing field and increasing their returns to ability.

Lastly, Table V compares actual outcomes with those predicted by program value-added. The effect on college graduation test scores, employment, and earnings is similar to that predicted based on value-added. However, the likelihood that targeted students earn a college degree is triple that predicted by value-added, suggesting that changes in the type of programs pursued by students cannot explain the large observed attainment effect. Instead, SPP's substantial incentive for degree completion likely plays an important role in the high college completion rates.

5 Efficiency

While SPP recipients benefit from attending HQ colleges both absolutely and relative to high-SES students, the policy may unintentionally worsen outcomes for high-SES students and other nonrecipients. To address this concern, this section evaluates the overall effects of SPP on all students by examining its impact on all high school test takers, comparing outcomes across cohorts, high school test scores, and SES.

Specifically, since the policy expanded HQ enrollment for low-SES students in the top test-score decile, it could crowd out *non*recipients from HQ colleges; namely, high-SES students in the top test-score decile and students below the top test-score decile. To examine this, we analyze the outcomes of approximately 1.7 million students who took the high school graduation exam in fall 2012, 2013, and 2014, spanning the period before and after the policy. We employ a DD approach, comparing outcomes across the distribution of SABER 11 scores separately for low- and high-SES students using the following OLS regression:

$$y_{idt} = \alpha + \gamma_t + \delta_d + \sum_{k=6, k \neq \{1,5\}}^{10} \beta_k \cdot 1(d = k) \times 1(t = 2014) + \epsilon_{idt} \quad (2)$$

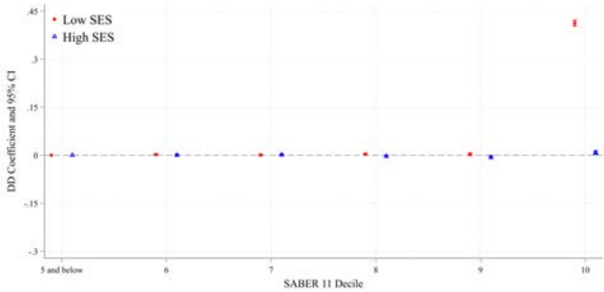
where y_{idt} is the outcome for individual i taking SABER 11 in year t and scoring in decile d, γ_t are the cohort fixed effects, δ_d are the SABER 11 decile indicators (with deciles 1 through 5 as the omitted category, as they are unlikely to be admitted by HQ colleges), and ϵ_{idt} is the individual-specific error term. The β_ks are the coefficients of interest and represent the difference in outcomes between students in test-score decile k and those in the bottom half of test scores (the omitted category) before and after the policy. Thus, β_{10} for low-SES students captures the direct effect of the policy, while β_{10} for high-SES students and β_6 through β_9 capture the "spillover" effects. The identifying assumption is that trends would be similar in the absence of the policy. The parallel trends using 2013 as a placebo support this assumption (Figure A.10).

Figures IX through XI plot the β_k coefficients and 95% confidence intervals from Specification (2) for various outcomes for low-SES students (in red) and high-SES students (in blue). Figure IX focuses on college attendance: Panels A to D report impacts on immediate college enrollment separately by college type, and Panel E examines overall enrollment within six years of high school. Figure X presents impacts on the likelihood of earning a bachelor's degree from an HQ college and the college graduation exam score, while Figure XI presents effects on labor-market outcomes nine years after high school.

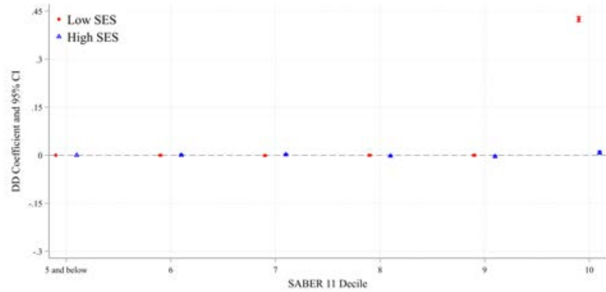
The DD results align with the RD analysis for high-achieving low-SES students (in red, decile 10). The policy significantly increases their enrollment in HQ colleges, particularly HQ private colleges, while slightly decreasing enrollment in LQ colleges; overall, their college enrollment expands (Figure IX). Since HQ colleges add more value, the policy improves value-added for students (Figure A.12). Consequently, they develop greater skills and perform significantly better in the college graduation exam (Figure X). Additionally, these students thrive in HQ colleges, with a nearly 30 p.p. increase in the likelihood of earning a bachelor's degree from these institutions. By attending colleges that excel in placing their students in high-paying jobs, their later-life earnings significantly increase (Figure XI). Again, the consistency between RD and DD estimates suggests that the policy's effects extend beyond students near the eligibility cutoffs to those at the top of the test score distribution.

Figure IX: No Crowding-Out Effects from HQ Colleges

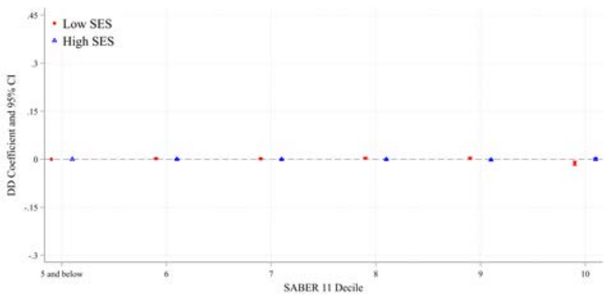
(a) HQ Enrollment



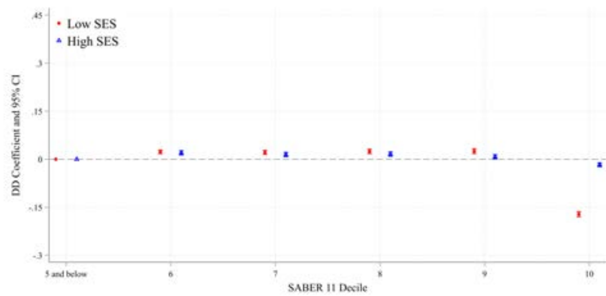
(b) HQ Private Enrollment



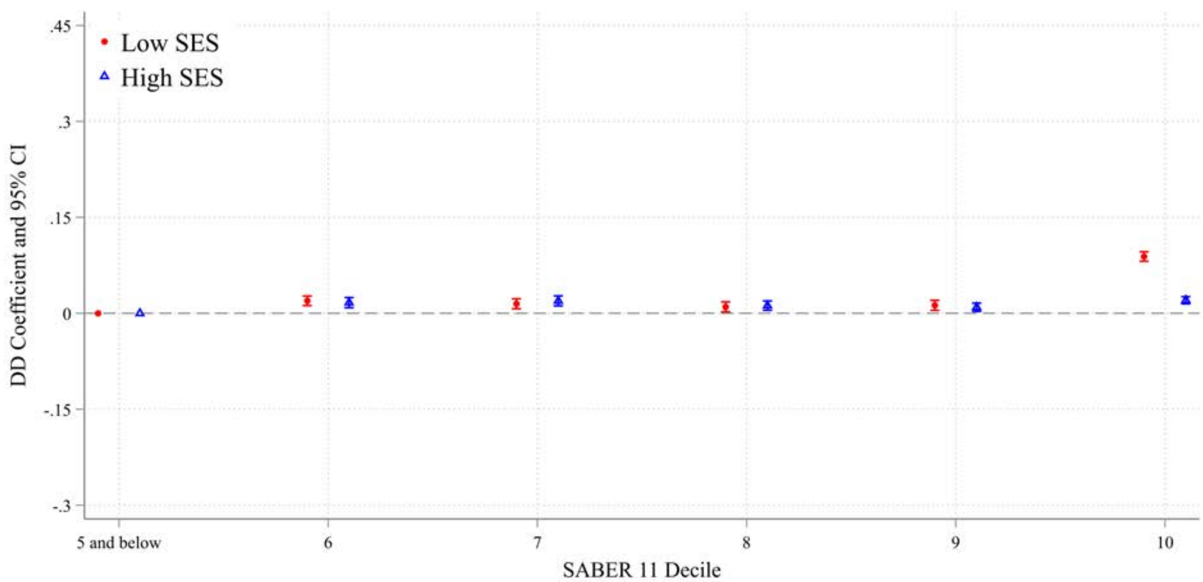
(c) HQ Public Enrollment



(d) LQ Enrollment



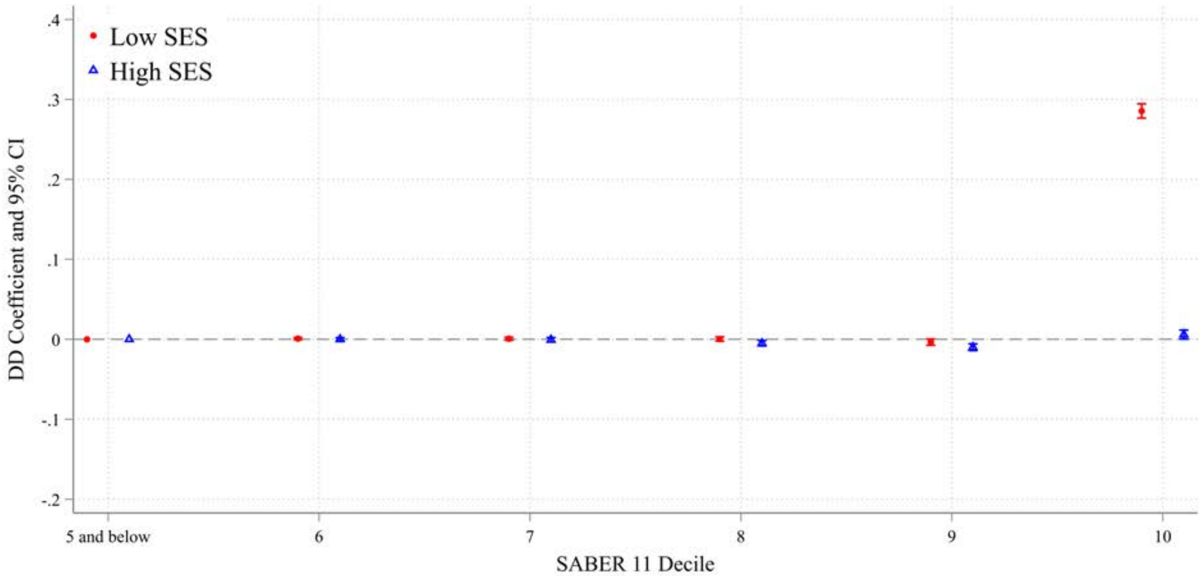
(e) Any Enrollment Within Six Years of High School



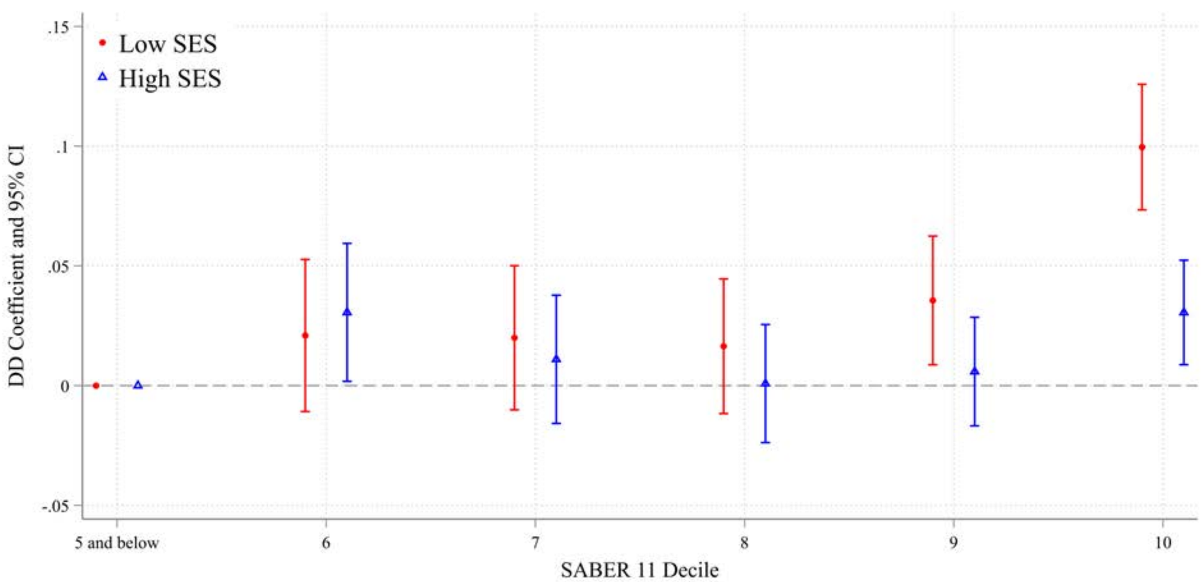
Notes: This figure displays the DD coefficients and their 95% confidence intervals from Specification (2), indicating the overall effect of the policy on college enrollment and quality for low-SES students (in red) and high-SES students (in blue). Each panel corresponds to a different outcome: immediate enrollment in HQ colleges (A), HQ *private* colleges (B), HQ *public* colleges (C), LQ colleges (D), and *any* college within six years of high school (E). Financial aid did not displace nonrecipients from HQ colleges; additionally Figure A.12 shows that their college "value-added" was unaffected. HQ private colleges expanded capacity and LQ colleges admitted lower-performing applicants to fill the vacant seats, improving enrollment for the entire cohort. Figure A.10 provides support for the parallel trends assumption, using the 2013 cohort as a placebo. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SNIES (MEN).

Figure X: No Compromised Instructional Quality

(a) No Adverse Effect on Nonrecipients' B.A. Attainment from HQ Colleges



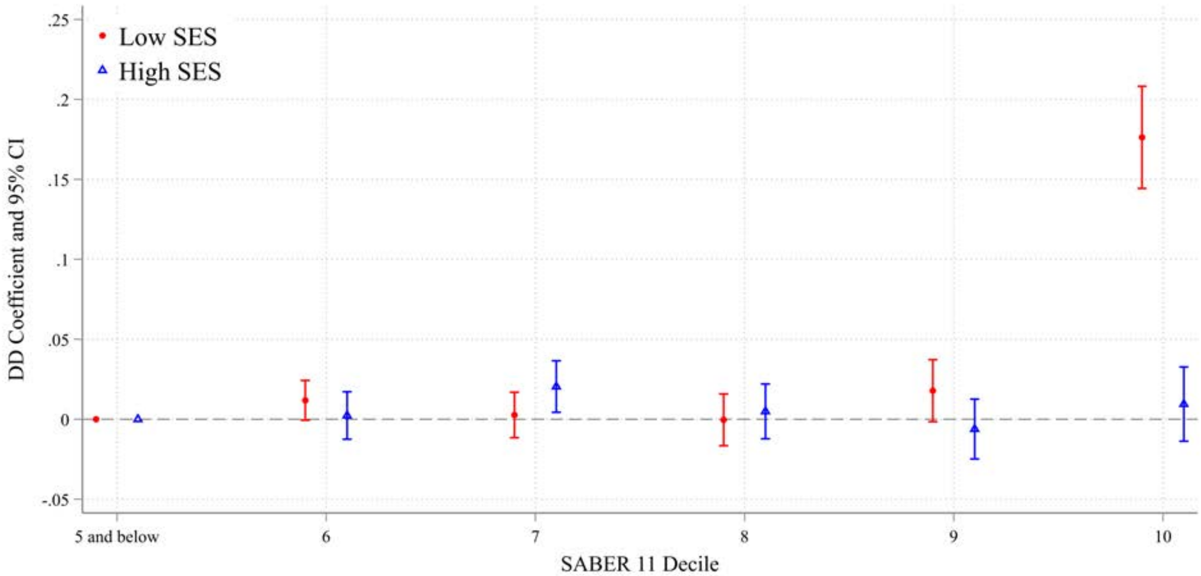
(b) No Adverse Effect on Nonrecipients' College Learning



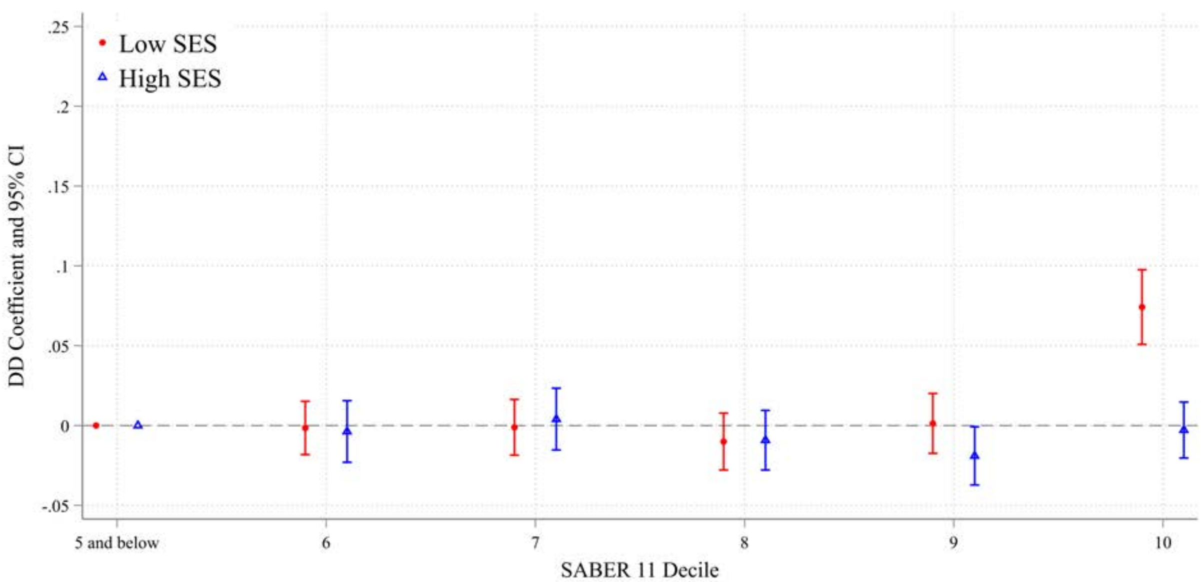
Notes: This figure plots the DD coefficients and their 95% confidence intervals from Specification (2). Panel A illustrates the overall impact of the policy on bachelor's degree attainment from HQ colleges, proxied by completing SABER PRO within seven years after high school. The policy did not affect nonrecipients' likelihood of earning a bachelor's degree from an HQ college. Panel B illustrates the overall effect on students' performance in Colombia's college graduation exam, SABER PRO. The reform did not hinder nonrecipients' learning performance. Figure A.10 provides support for the parallel trends assumption, using the 2013 cohort as a placebo. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

Figure XI: No Adverse Effects on Nonrecipients' Labor-Market Outcomes

(a) Earnings



(b) Log Earnings



Notes: This figure plots the DD coefficients and their 95% confidence intervals from Specification (2), representing the impact on nonrecipients' formal labor-market outcomes nine years after high school completion. The outcome in Panel A is earnings (measured in multiples of the monthly minimum wage and including zeros) and log earnings in Panel B. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Crucially, the DD results show that the policy did not displace other students from

HQ colleges, adversely affect the quality of their education, or negatively impact their later-life earnings. First, as SPP recipients chose HQ private colleges over LQ ones, these institutions filled vacancies with less qualified applicants, expanding overall college enrollment for high school students below the top test-score decile (Figure IX).[17]

For high-SES students in the top test-score decile, who directly compete for HQ admission with SPP recipients, the DD results also reveal no adverse effects (in blue, decile 10). This is largely because HQ private colleges increased their available seats to meet the higher demand. For instance, the University of Los Andes, Colombia's top HQ private college, received nearly double the number of undergraduate applications for the spring 2015 term—the first academic semester following the announcement of SPP—compared to the spring 2014 term. It enrolled about 1,880 new undergraduate students in spring 2015 compared to about 1,370 in spring 2014, a 37% increase. Similar expansions occurred at other HQ private colleges, which on average expanded their incoming cohorts by about 50% immediately following the SPP policy (Panel A of Figure A.11). Although the supply did not expand one-to-one, Figure VIII showed that the fallback option for high-SES high-achievers was still a high value-added college. As a result, their college value-added was not adversely affected (Figure A.12).[18]

Critics of expanding elite colleges often worry about potential downsides, such as compromised instructional quality and diminished degree value. However, our findings show no such adverse effects. Specifically, Figure X indicates no detrimental impacts on instructional quality. We can reject negative effects on high-SES high-achievers' performance in the college graduation exam and their likelihood of earning an HQ degree.[19] Furthermore, Figure XI shows no negative impacts on labor-market outcomes: the point estimate is close to zero and the confidence intervals are narrow. These results suggest that the expansion of elite colleges did not negatively affect incumbent students.

In summary, the policy expanded low-SES students' attendance in elite colleges without negatively affecting other students. Both equity and efficiency improved overall.

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[17] The departure of SPP recipients from LQ colleges had minimal impact on their class size and student quality (Figure A.11), partly because their numbers were small relative to the overall student body.

[18] Interestingly, there was no coordination between the government and colleges to manage the surge of SPP applicants, yet the rapid expansion faced little controversy. There was no discernible price increase (Figure A.13), likely due to legal constraints from Law 30/1992 and Decree 110/1994. Per-student expenditures and the number of instructors at HQ private institutions did not immediately increase (Figures A.14 and A.15). However, starting in 2016, HQ private colleges appear to have hired more instructors.

[19] One reason for the lack of adverse impacts is that peer quality was not compromised, even with larger cohorts. Since HQ private colleges became more selective by admitting a smaller share of applicants, the average test scores of incoming students slightly increased (Panel B of Figure A.11).

6 Social Welfare

Despite the large benefits of elite education, there are also large costs associated with funding it. We conduct a prospective cost-benefit analysis using the concept of the MVPF. This analysis compares the SPP policy's impact on projected lifetime earnings to the overall program costs, specifically focusing on the ratio of program benefits among beneficiaries to the net costs incurred by the government (Hendren and Sprung-Keyser, 2020).

Projecting Lifetime Earnings. To project lifetime earnings impacts, we make several assumptions. First, we assume an average age of 18 one year after graduating high school, based on the average age of 17 when taking the SABER 11 exam (Table A.2). Second, we assume a retirement age of 60, consistent with Colombia's current retirement age (57 for women and 62 for men). Third, we estimate the lifetime earnings profile of those affected by the policy using population average trajectory based on the 2019 *Gran Encuesta Integrada de Hogares* (GEIH), Colombia's main employment and earnings survey.[20] Fourth, we use the RD-IV estimates one to nine years after high school from Table VI, treating censored observations as zeros.[21] As in Hendren and Sprung-Keyser (2020), we project year nine's percentage earnings gain forward throughout the lifecycle, assuming a constant percentage earnings impact over time starting from nine years after high school. Fifth, we convert monthly earnings to annual earnings by multiplying by 12 and adjusting for inflation using the consumer price index. Finally, we discount all earnings gains by 3% back to the time of initial expenditure. Overall, Column (2) of Table VI shows that financial aid is expected to increase discounted lifetime earnings by 106,616,818 pesos (US$26,317) for each SPP recipient at the test-score cutoff and 53,103,325 pesos (US$13,108) at the poverty cutoff.

Estimating Direct and Indirect Costs. Following Angrist et al. (2021), we consider direct and indirect costs separately. Direct costs, D, refer to the government's expenditure on SPP, including average educational expenses per full-time student (transferred to colleges) and living stipends (transferred to recipients). We observe these costs for eight years using ICETEX data. Direct costs for barely-ineligible students are zero in Column (3), since none receive SPP. Column (4) of Table VI presents SPP's effect on D, reflecting the average government expenditure on SPP recipients.

[20] We drop individuals who are inactive in the labor force, outside municipal cores (*cabeceras municipales*), younger than 18, older than 60, or without a high school diploma.

[21] The estimated earnings gains and losses using SABER 11 as the running variable are statistically significant. However, when using SISBEN as the running variable, we take a conservative approach by assuming no impact in years two and five after high school, as these estimates are not statistically significant at the 10% level (Table VI).

Table VI: Discounted Lifetime Benefits and Costs of the SPP Program and the MVPF

Years	Annual earnings		D		COA	
after high school completion	Mean control (1)	RD-IV estimate (2)	Mean control (3)	RD-IV estimate (4)	Mean control (5)	RD-IV estimate (6)
Panel A: *SABER 11 is the running variable*						
1	522,165	0	0	18,257,454	5,311,419	12,664,607
2	1,369,055	-976,490	0	16,759,373	4,658,679	11,972,460
3	2,088,497	-1,551,065	0	17,032,044	5,040,030	11,710,351
4	2,687,626	-1,625,722	0	16,590,188	4,824,965	11,560,652
5	3,569,471	-764,852	0	12,073,093	4,084,697	7,928,068
6	4,527,913	636,308	0	2,129,217	3,380,575	-1,112,891
7	6,699,796	2,698,883	0	91,497		
8	9,637,938	4,159,375	0	0		
9	11,855,965	4,042,448				
Lifetime		106,616,818		78,405,492		51,990,114
WTP / Costs		164,765,115		58,148,297		31,732,918
MVPF				2.83		5.19
Panel B: *SISBEN is the running variable*						
1	298,735	-63,879	101,772.40	19,760,594	7,267,511	11,713,720
2	982,772	-385,277†	123,458.40	18,526,184	6,437,731	11,305,575
3	1,715,449	-987,520	88,917.05	18,827,600	6,549,258	11,476,811
4	2,152,267	-937,483	127,681.50	18,130,208	6,546,151	11,018,587
5	3,313,710	94,182†	104,438.50	13,314,483	5,618,322	7,118,844
6	5,075,030	1,480,321	43,933.55	2,130,551	4,243,228	-1,972,712
7	8,946,551	2,895,006	14,224.82	406,497		
8	13,135,464	3,880,164	0	74,204		
9	16,470,084	2,542,354				
Lifetime		53,103,325		86,154,055		48,214,891
WTP / Costs		129,167,748		76,064,423		38,125,260
MVPF				1.70		3.39

Notes: This table presents the IV estimates on annual earnings, D_i, and COA_i, as described in the main text, one to nine years following high school graduation using an RD design. Lifetime earnings and costs are discounted back to year one at a rate of 3%. Willingness to pay and costs assume that incremental earnings are subject to a 19% tax rate. Columns (1), (3), and (5) present the average outcomes for the control group. In Column (3) of Panel A, D_i is zero because no student received SPP without meeting the SABER 11 requirement. Conversely, in Panel B, it is positive but relatively small because a few students received SPP without meeting the SISBEN condition. † denotes not statistically significant at the 10% level. See the main text and the notes under Table I for other details. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SPP (ICETEX), institutional financial accounts and balance sheets (MEN), and PILA (MinSalud).

However, *non*recipients also generate costs for the government when they attend public colleges, as their tuition is subsidized by taxpayer-funded transfers from the central government. We account for this cost using the total cost of attendance (COA), considering all students who enroll in any public college. Unlike D, COA includes the government's spending on nonrecipients attending *any* public institution.[22] (For nonrecipients attending private institutions, we assume their tuition covers all educational expenses, resulting in no additional cost to the government.) To observe enrollment, we use SNIES data, available for six years after high school. Column (6) of Table VI showcases the additional educational expenditure incurred by the government due to SPP. SPP increased per-student educational expenditure due to its direct costs, by increasing college duration (moving students from short-cycle programs to four- or five-year degree programs), and by shifting recipients to more expensive institutions, as we demonstrated earlier. We discount D and COA back to year one at an annual rate of 3%.

The statistics in Table VI show the difference between D and COA. D is 78,405,492 pesos (US$19,353) at the test-score cutoff and 86,154,055 pesos (US$21,266) at the poverty cutoff since the latter students are more likely to attend college and choose more expensive institutions. When considering the total costs of attendance (COA) for both recipients and nonrecipients, the marginal increase in educational spending decreases to 51,990,114 pesos (US$12,833) at the test-score cutoff and 48,214,891 pesos (US$11,901) at the poverty cutoff because the control group opts for public colleges, incurring additional costs for the government captured in COA but not in D.

The MVPF. In our analysis, the earnings gains after taxes and transfers represent the willingness to pay for compliers. The discounted lifetime earnings gains are US$26,317 at the test-score cutoff and US$13,108 at the poverty cutoff. Assuming a tax and transfer rate of 19%, the total willingness to pay is calculated by summing the post-tax and post-transfer earnings gains with the value of the transfer (D) for individuals who do not change their behavior. Table VI shows a willingness to pay of 164,765,115 pesos (US$40,670) at the test-score cutoff and 129,167,748 pesos (US$31,883) at the poverty cutoff.

Assuming a 19% tax rate on incremental earnings reduces the government's program costs by the same amount as the reduction in total willingness to pay. Based on Table VI, the direct costs of financial aid (D) are 58,148,297 pesos (US$14,353) at the test-score

[22] We use ICETEX data for educational expenditures per full-time student at HQ public colleges. For LQ public colleges, we use expenditure data from financial accounts and balance sheets reported to Colombia's Ministry of Education. For institutions that do not disclose average educational expenses, such as SENA, we use the average expenses of full-time students enrolled in similar degree types (associate or bachelor's), institution types (private or public), and college quality (high or low). Our calculation of COA excludes expenses for books, supplies, housing, transportation, and the varying marginal costs of educating students with different levels of academic support.

cutoff and 76,064,423 pesos (US$18,775) at the wealth cutofff. This implies an MVPF of 2.8 at the test-score cutoff and and 1.7 at the poverty cutoff. When considering the impact on marginal educational spending (COA), the MVPF nearly doubles to 5.2 and 3.4, indicating that each dollar of public spending on the SPP program generates $5.20 and $3.40 of private benefits, respectively. The SPP program exhibits higher MVPFs compared to other cost-effective financial aid programs targeting college-bound high school students discussed in Hendren and Sprung-Keyser (2020) and Angrist et al. (2021).[23]

And yet our analysis likely underestimates the MVPF for several reasons. First, we do not account for future economic gains from increasing returns to degrees from elite universities and expanding graduate education. We also overlook potential non-pecuniary benefits of education, like improved health and lower crime (Cutler and Lleras-Muney, 2008; Lance, 2011; Lochner and Moretti, 2004), and reduced public spending on healthcare and criminal justice.

7 Conclusions

This paper has studied the role of elite colleges in promoting upward mobility by analyzing a groundbreaking financial aid reform in Colombia that enabled academically successful low-SES students to attend elite universities. We used multiple complementary identification strategies and leveraged stringent program eligibility criteria and nationwide administrative microdata to estimate long-term impacts on educational and labor-market outcomes. Our findings show that improving low-SES students' attendance in high-quality colleges promotes upward economic mobility, both in absolute and relative terms, and enhances social welfare.

If the SPP policy is to serve as a guide for other countries, two key features are worth noting. First, it was designed to push recipients into better-resourced, high-quality institutions with superior career prospects, resulting in a substantial quality upgrade. More modest impacts can be expected from policies that do not improve college quality or target institutions with low returns. Crucially, quality upgrading is facilitated in our setting because policymakers and students can observe institutional quality, colleges admit students based on academic credentials, and low-SES students' test scores meet the criteria for high-quality colleges. Conversely, quality upgrading may be more challenging if institutional quality is difficult to assess, elite colleges' admissions

[23] For instance, SPP surpasses the MVPF of Nebraska's STBF program (1.75), Michigan's HAIL Scholarship (1.30), Wisconsin's Scholars Grant program (1.43), Ohio's Pell Grants (2.49), Pell Grants to adults (2.18), Tennessee's HOPE Scholarship (1.86), and Kalamazoo's Promise program (1.93).

practices disadvantage low-SES students, or few low-SES students have sufficiently high test scores (Chetty et al., 2023, 2020).

Second, SPP expanded low-SES students' access to elite colleges without changing admission practices, which continued to be based primarily on test scores. This explains the lack of academic 'mismatch' for low-SES students and the absence of adverse effects on nonrecipients' educational and labor-market outcomes. However, caution should be exercised when extrapolating these findings to policies that expand access through changing admissions practices, especially if they lower the quality of the admitted class. Additionally, social welfare may be compromised if a policy expanding collge access for some groups leads other groups to be crowded out from those institutions.

Future research could investigate how elite colleges enhance students' labor-market outcomes by examining their impact on social and professional networks and job search behavior. Additionally, the benefits of attending elite colleges likely extend beyond the labor market, encompassing key outcomes like health, life satisfaction, and family formation. Exploring how college quality influences these non-pecuniary aspects is an important avenue for future research.

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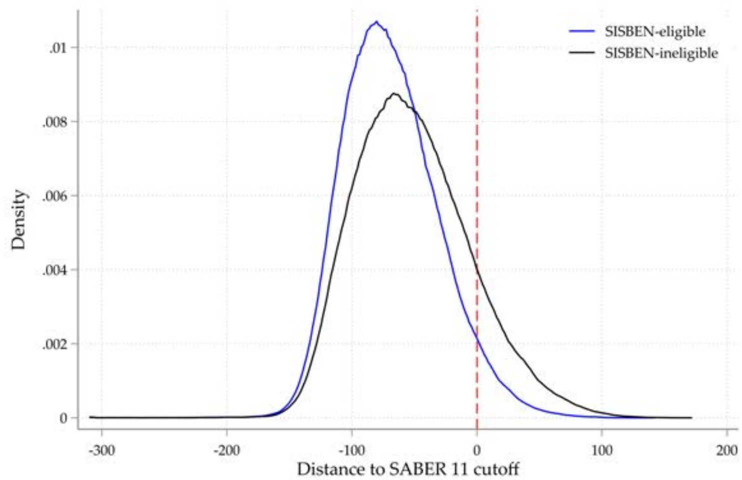
Online Appendix

Appendix A Additional Figures and Tables

Figure A.1: The Distribution of SABER 11 Test Scores for Low-SES and High-SES Students

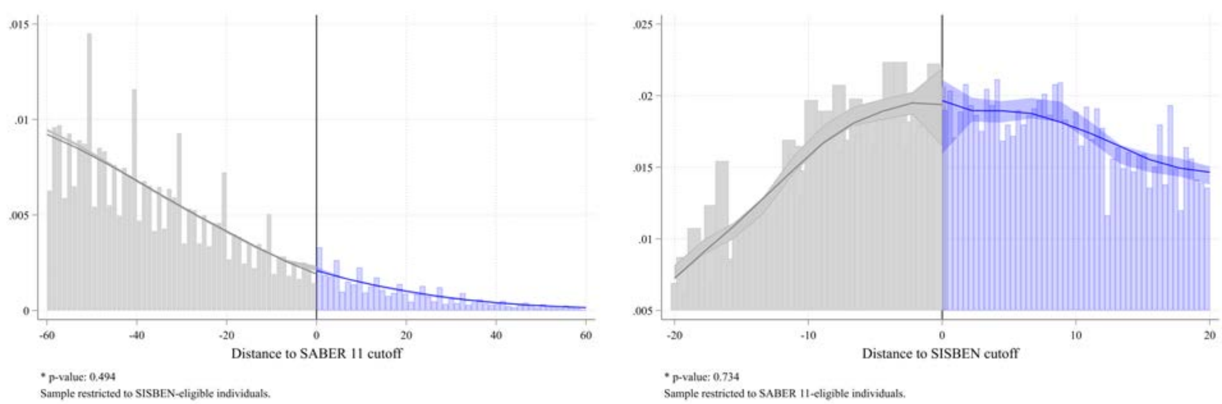


Notes: The figure plots the distribution of SABER 11 test scores separately for students who are low-SES and high-SES based on their SISBEN score. The red dashed line marks SPP's SABER 11 test-score cutoff. *Sources:* Authors' calculations based on SABER 11 (Icfes) and SISBEN (DNP).

Figure A.2: Manipulation Testing based on Density Discontinuity

(a) SABER 11 as the running variable

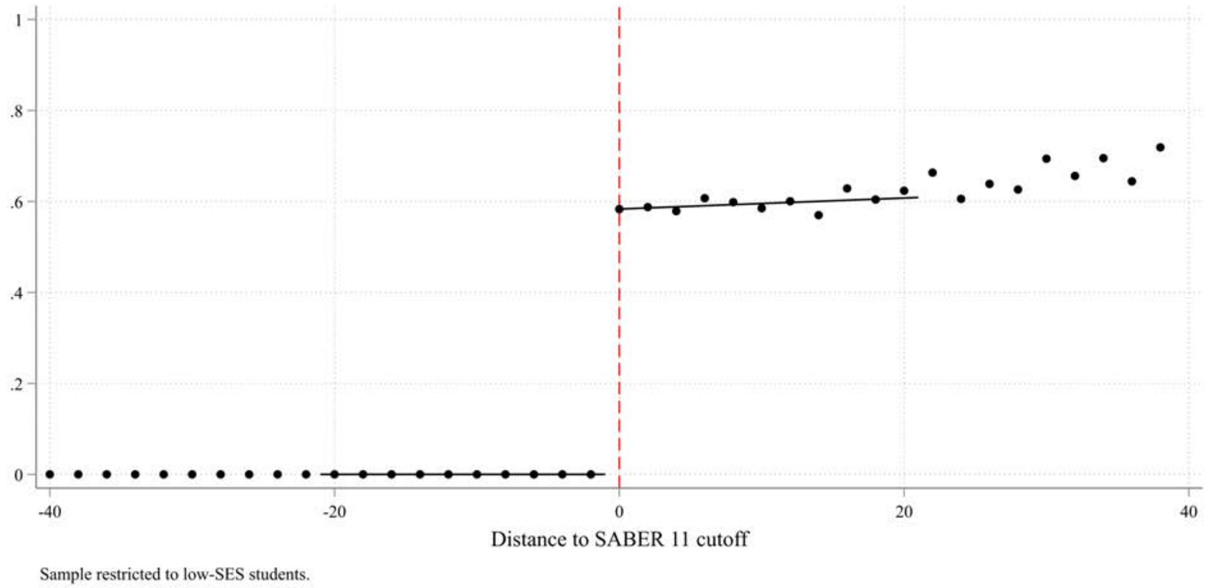
(b) SISBEN as the running variable



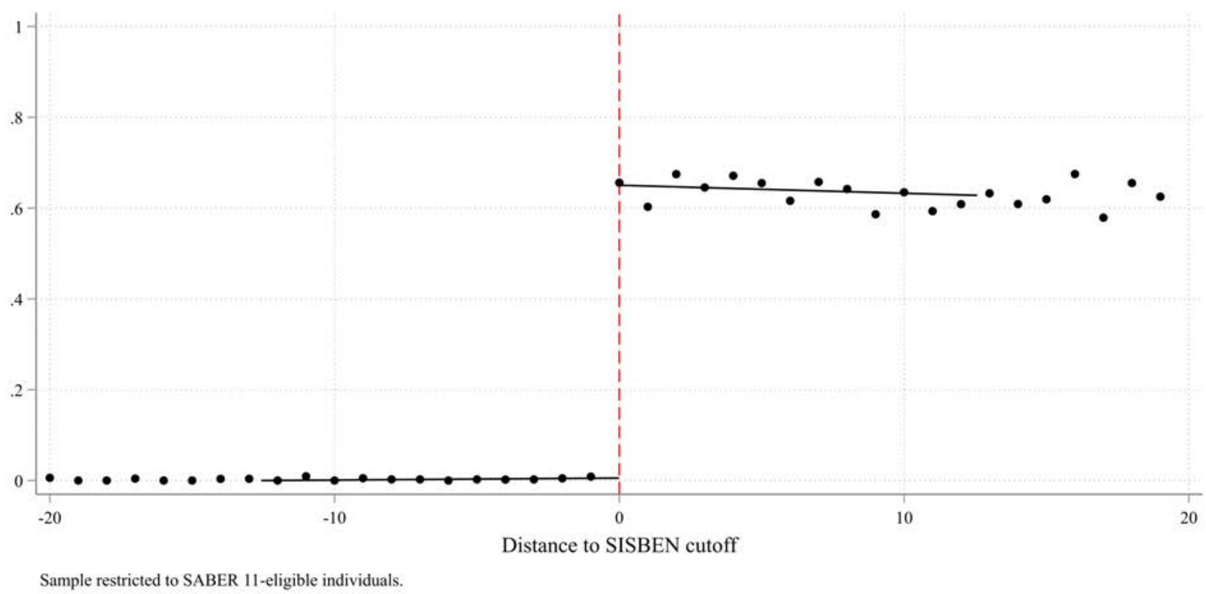
Notes: This figure tests for manipulation of the running variable based on density discontinuity using package rddensity (Cattaneo et al., 2018). Panel A restricts the sample to low-SES individuals. Panel B restricts the sample to merit-eligible individuals. *Sources:* Authors' calculations based on SABER 11 (Icfes) and SISBEN (DNP).

Figure A.3: Discontinuity in the Probability of Receiving SPP Financial Aid

(a) Merit-Based Eligibility

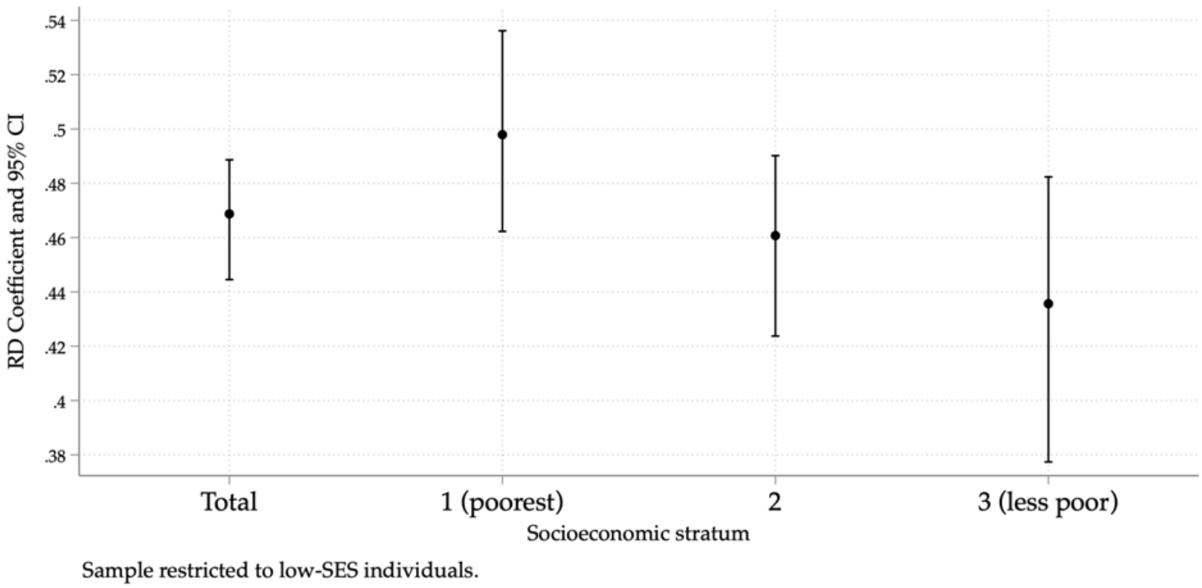


(b) Need-Based Eligibility



Notes: The figures plot the take-up rate, that is, the probability of receiving SPP financial aid program as a function of the distance to the SABER 11 (Panel A) and SISBEN (Panel B) eligibility cutoffs, restricting the sample to SES- and test score-eligible students, respectively. The probability of being a SPP recipient increases from 0% to 58.3% using SABER 11 as the running variable (Panel A) and from 0% to 64.5% using SISBEN as the running variable (Panel B). Sample average within bin. The line is plotted for the optimal bandwidth (Cattaneo et al., 2014). *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and ICETEX.

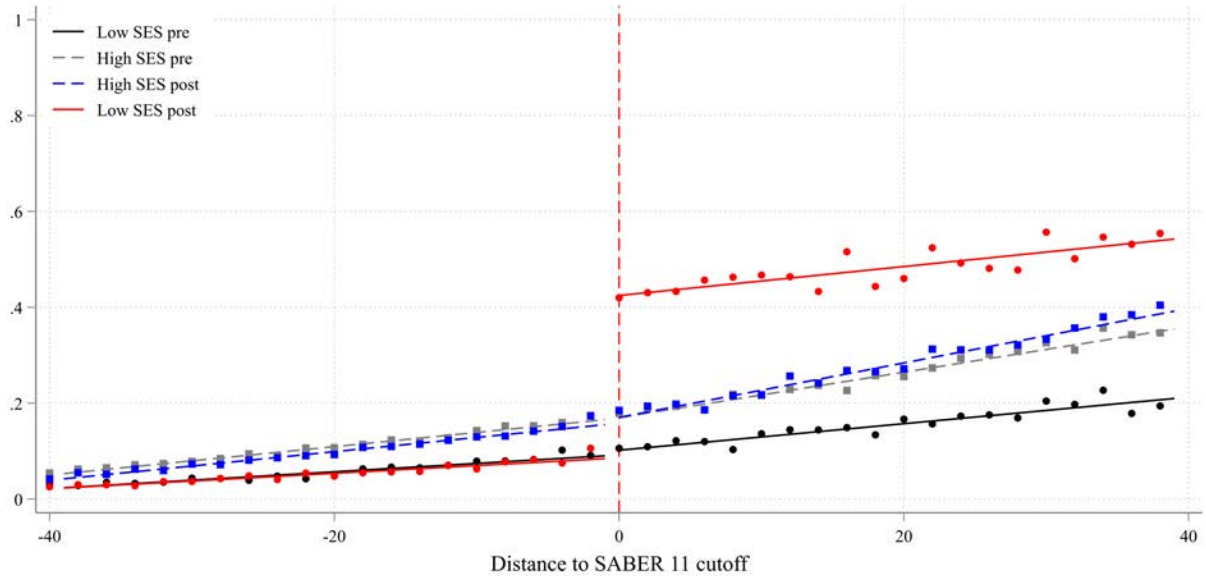
Figure A.4: The Effect of Financial Aid on HQ Enrollment by SES (Test Score Cutoff)



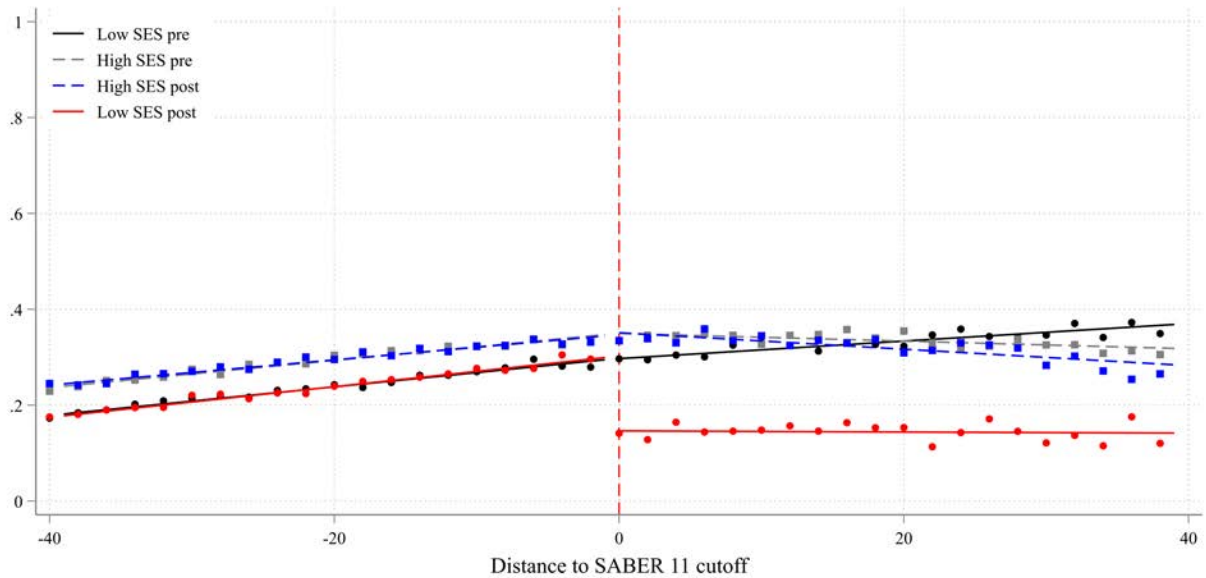
Notes: This figure compares the reduced-form RD coefficient and 95% confidence intervals by socioeconomic status. The running variable is the SABER 11 test score, and the outcome is the likelihood of attending an HQ college immediately after high school. The sample is restricted to SISBEN-eligible individuals. The term "socioeconomic stratum" refers to Colombia's socioeconomic stratification system (*estratos*), which categorizes households based on their affluence using neighborhood and dwelling characteristics. Stratum 1 corresponds to the poorest households. More than 99% of SISBEN-eligible individuals belong to strata 1, 2, and 3. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SNIES (MEN).

Figure A.5: Bachelor's Degree Attainment by College Quality (Test Score Cutoff)

(a) High Quality



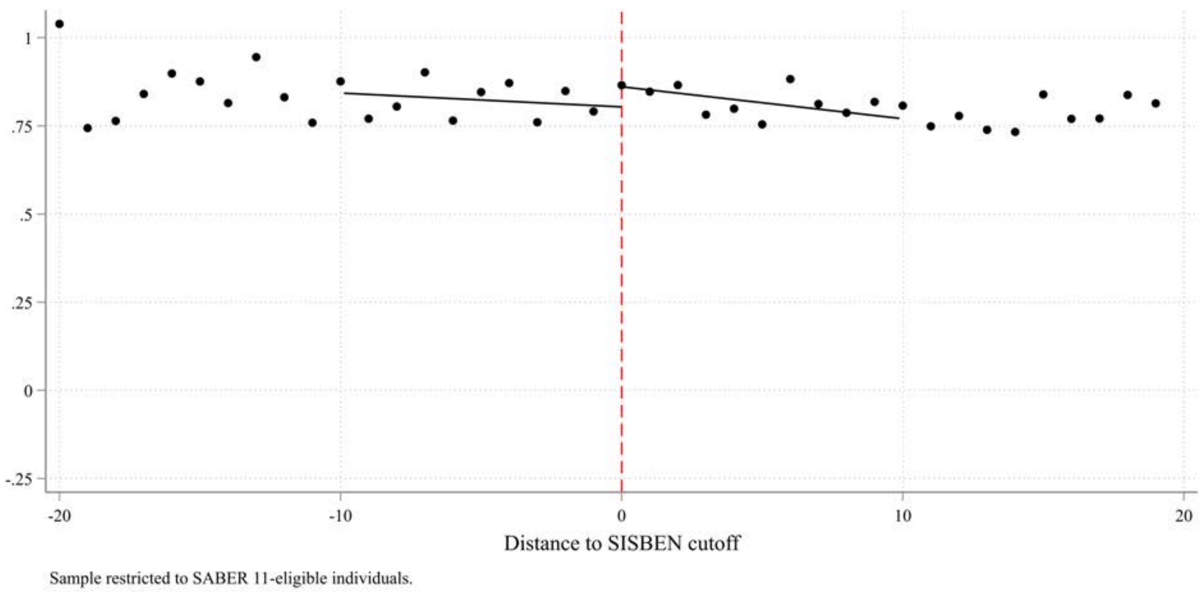
(b) Low Quality



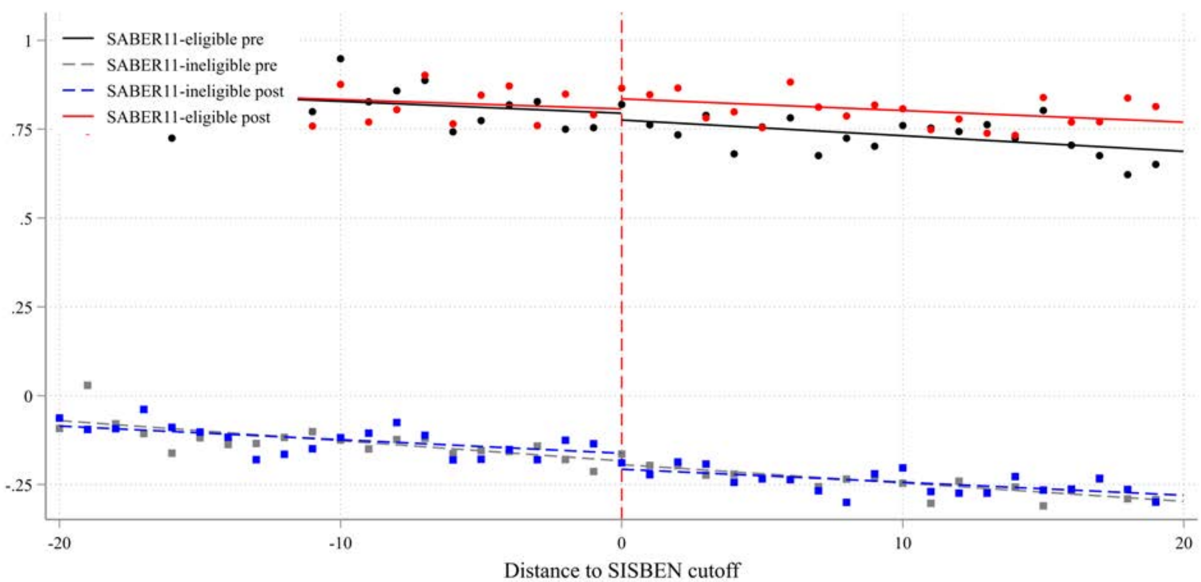
Notes: The figures decompose bachelor's degree attainment (proxied by taking the SABER PRO exam) by high- and low-quality colleges in Panels A and B, respectively. The figures show the equity implications of expanding financial aid by comparing low-SES students from 2014 (in red) and three placebo series: SISBEN-eligible and SISBEN-ineligible students from 2012 and 2013, before the SPP program (in black and gray, respectively) and SISBEN-ineligible students in 2014 (in blue). SISBEN-ineligible students are those whose SISBEN score is above SPP's eligibility cutoff and those without a SISBEN score. Table II reports the reduced-form estimates. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

Figure A.6: Standardized College Exit Test Score Within Five Years

(a) Wealth Cutoff



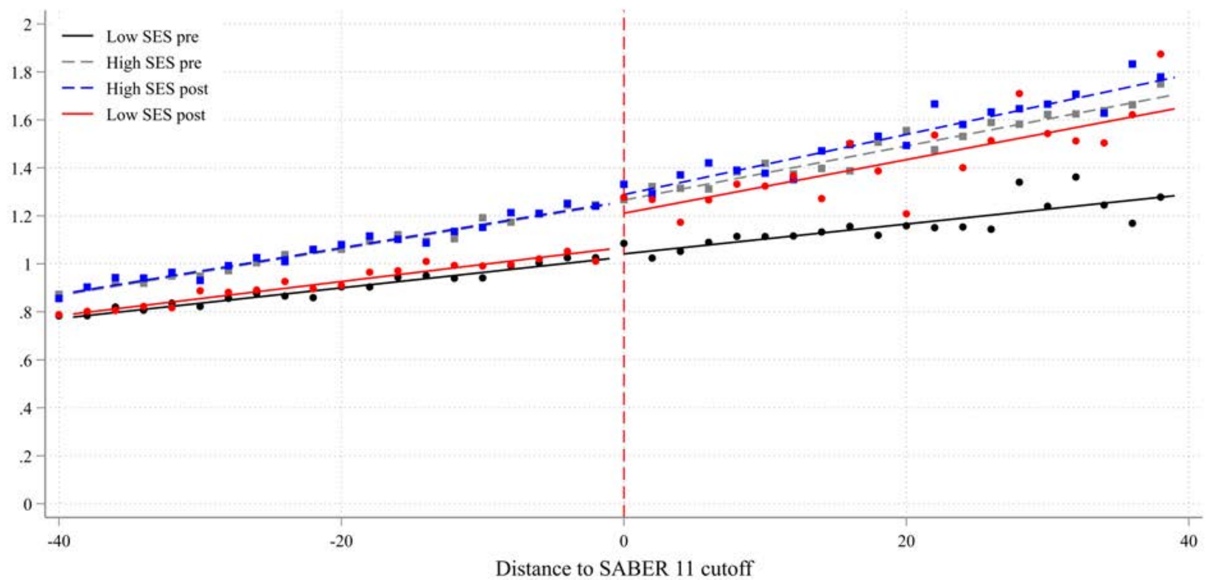
(b) Placebo



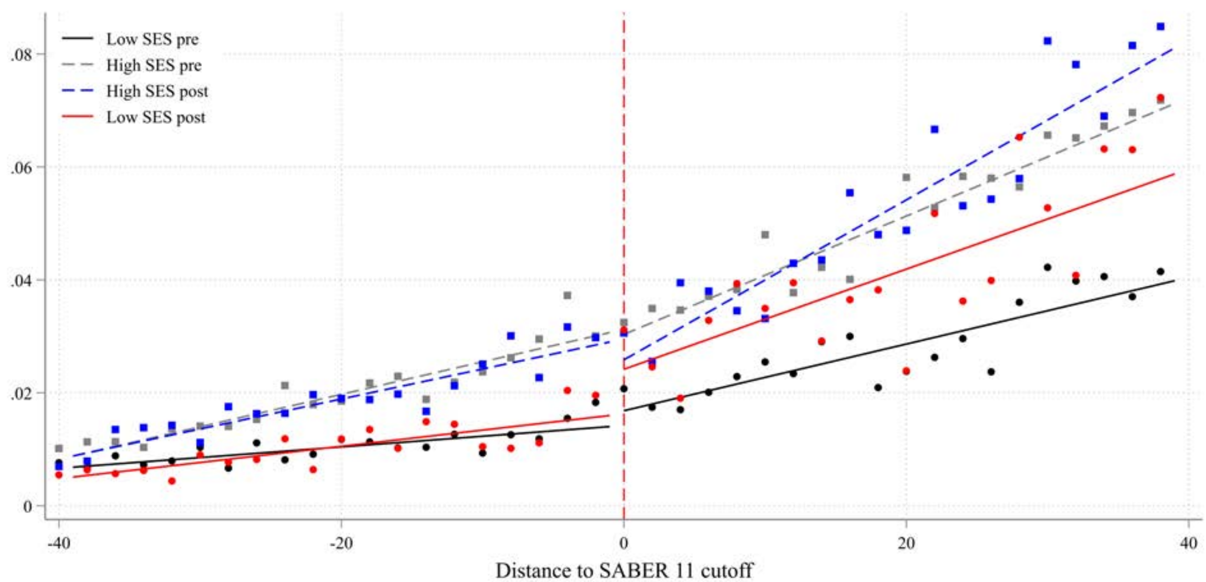
Notes: The figures plot students' performance in Colombia's mandatory standardized college exit exam, SABER PRO, within five years from high school completion as a function of the distance to the poverty cutoff. Panel A restricts the sample to merit-eligible students (Table A.4 reports the reduced-form estimate). Panel B compares that series (in red) with several placebo series: SABER 11-eligible and SABER 11-ineligible students in 2012 and 2013 (in black and gray, respectively), and SABER 11-ineligible students in 2014 (in blue). *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

Figure A.7: Impacts on Earnings Equity Including 2012 in the Comparison Group

(a) Monthly Earnings



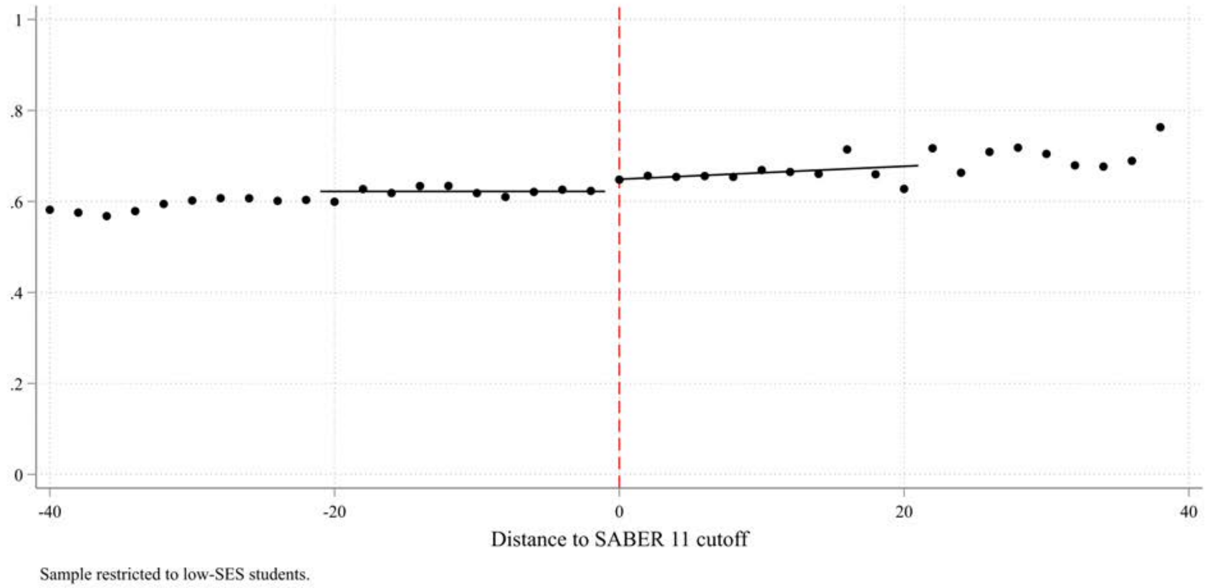
(b) Top 1% of Earnings



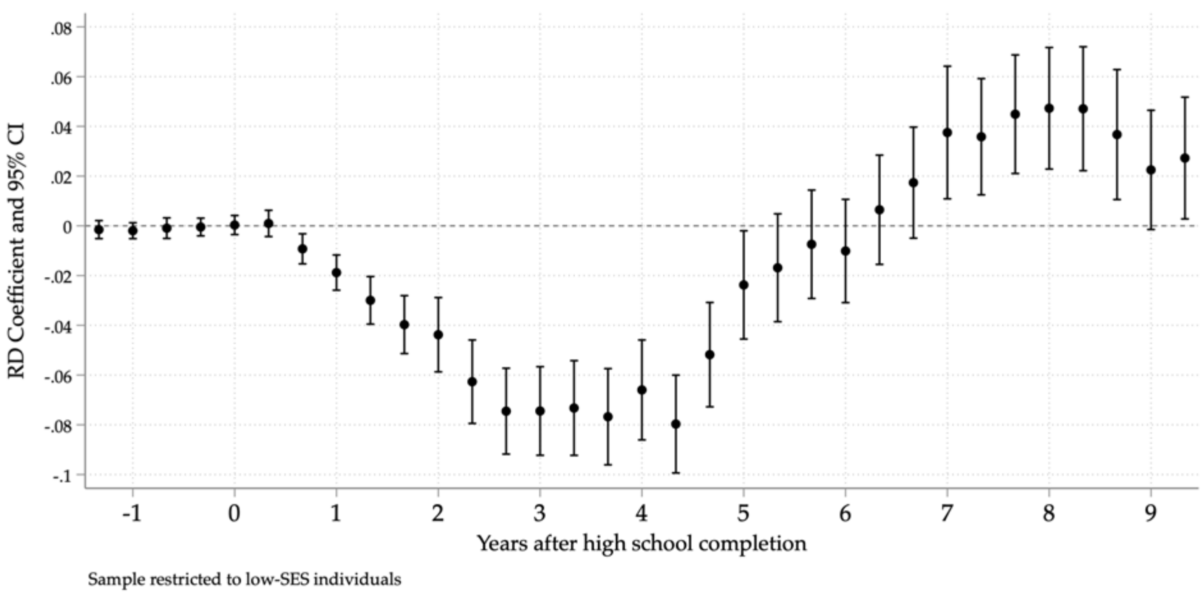
Notes: This figure reproduces VII including the 2012 cohort in the comparison group. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Figure A.8: Formal Employment (Test Score Cutoff)

(a) Nine Years After High School



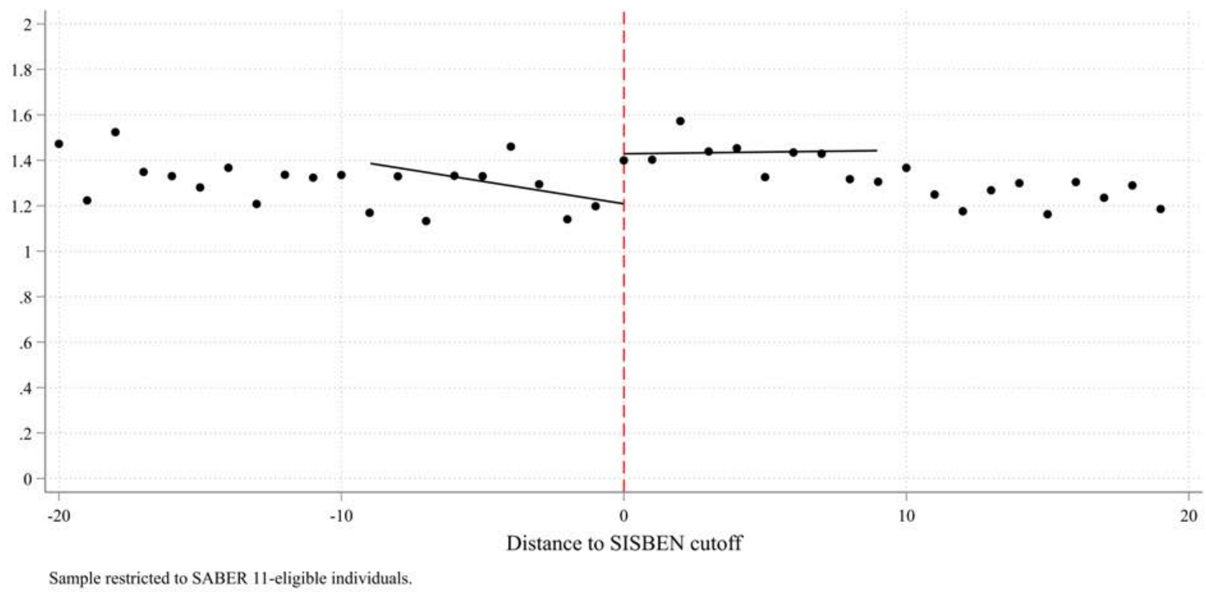
(b) The Dynamics of the Employment Effect



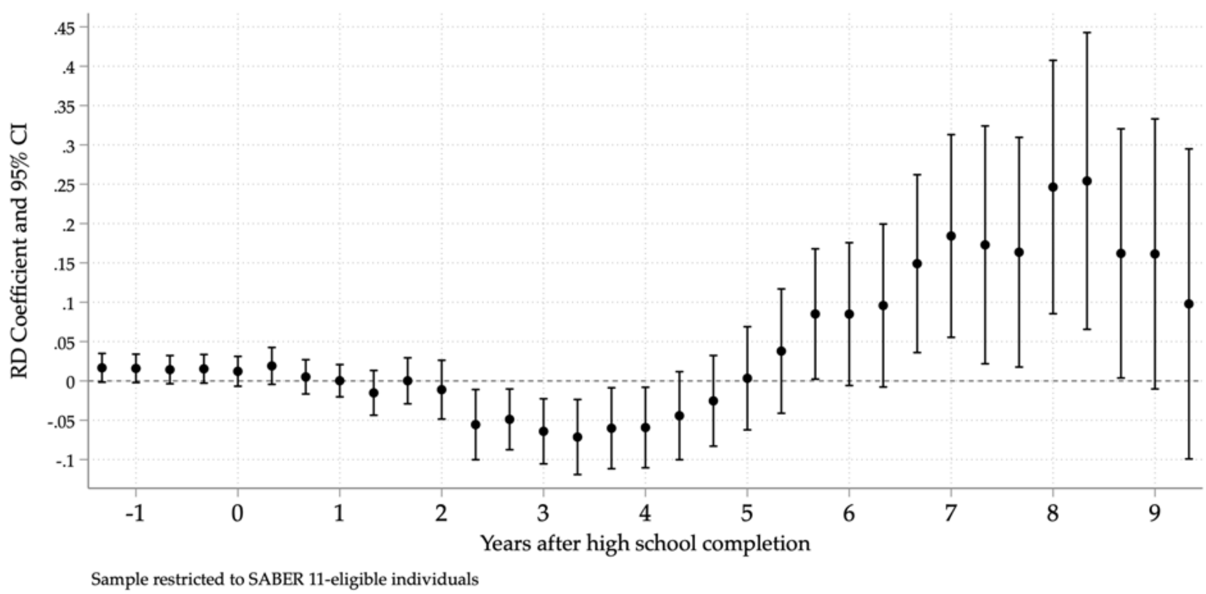
Notes: Panel A plots low-SES students' probability of formal employment nine years after high school completion as a function of the distance to the test-score cutoff. Table IV reports the reduced-form estimate. Panel B plots the RD coefficient over time using triannuel information. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Figure A.9: Earnings (Wealth Cutoff)

(a) Nine Years after High School Completion



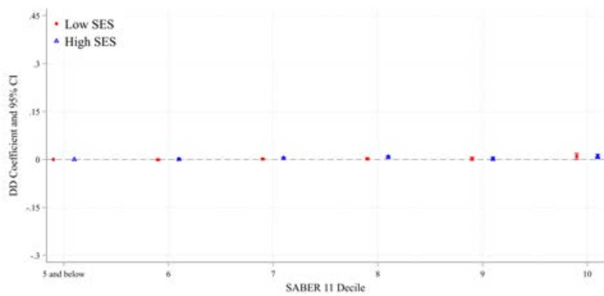
(b) The Dynamics of the Earnings Effect



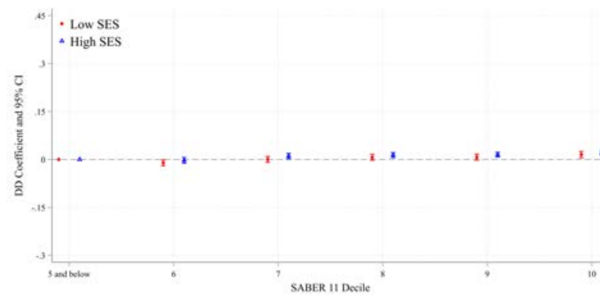
Notes: Panel A plots individuals' formal earnings (expressed as multiples of the monthly minimim wage) nine years after high school completion as a function of the distance to the poverty cutoff (for merit-eligible students). Individuals without formal employment are assigned zero earnings. Panel B plots the RD coefficient over time using triannuel information. Table IV reports the reduced-form estimates.
Sources: Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Figure A.10: DD Placebo Using the Fall 2013 Cohort

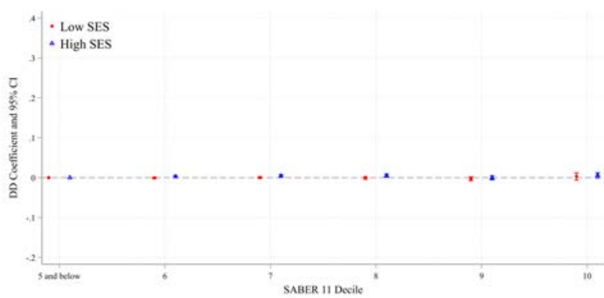
(a) Immediate Enrollment in HQ Colleges



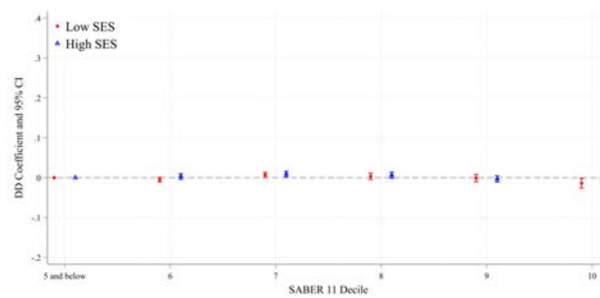
(b) Any College Within Six Years



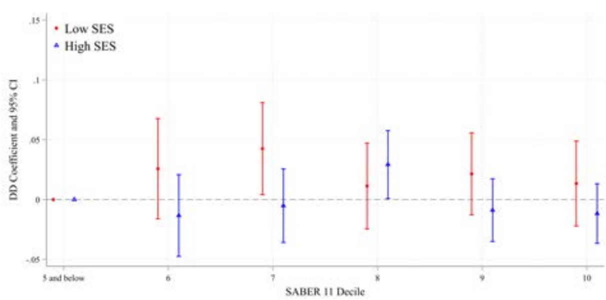
(c) Bachelor's Attainment in HQ Colleges



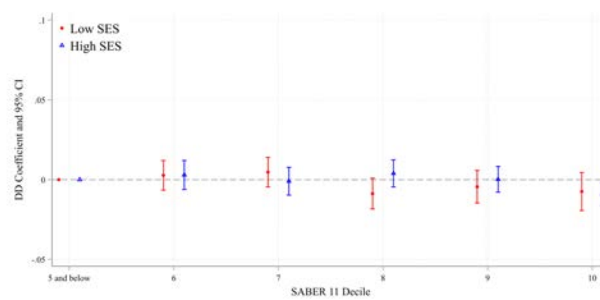
(d) Any Bachelor's Degree Attainment



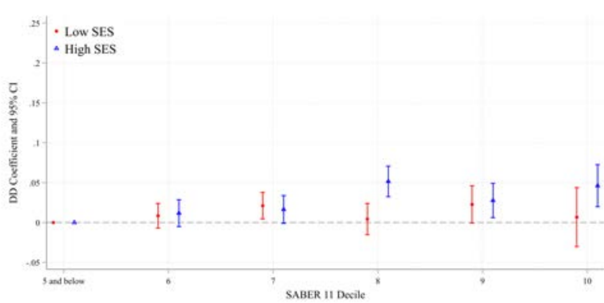
(e) Learning



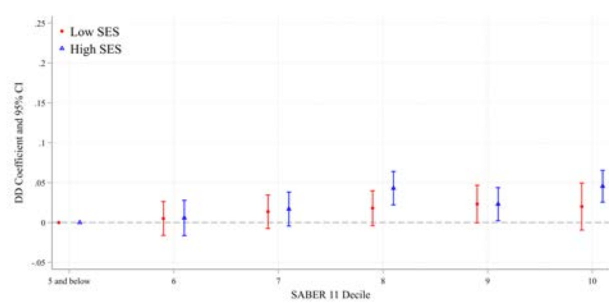
(f) Employment



(g) Earnings



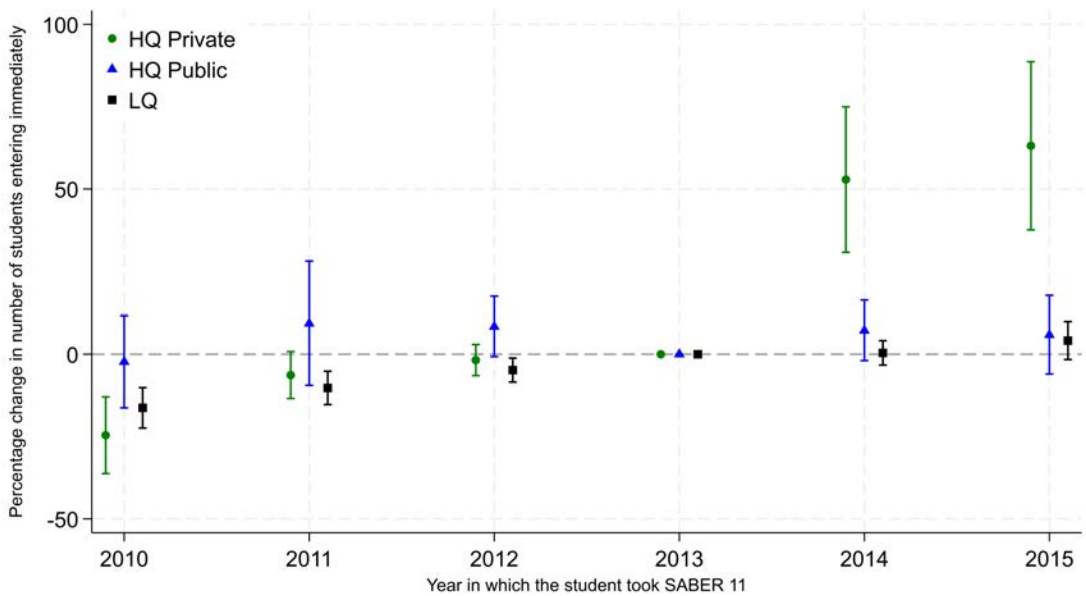
(h) Log earnings



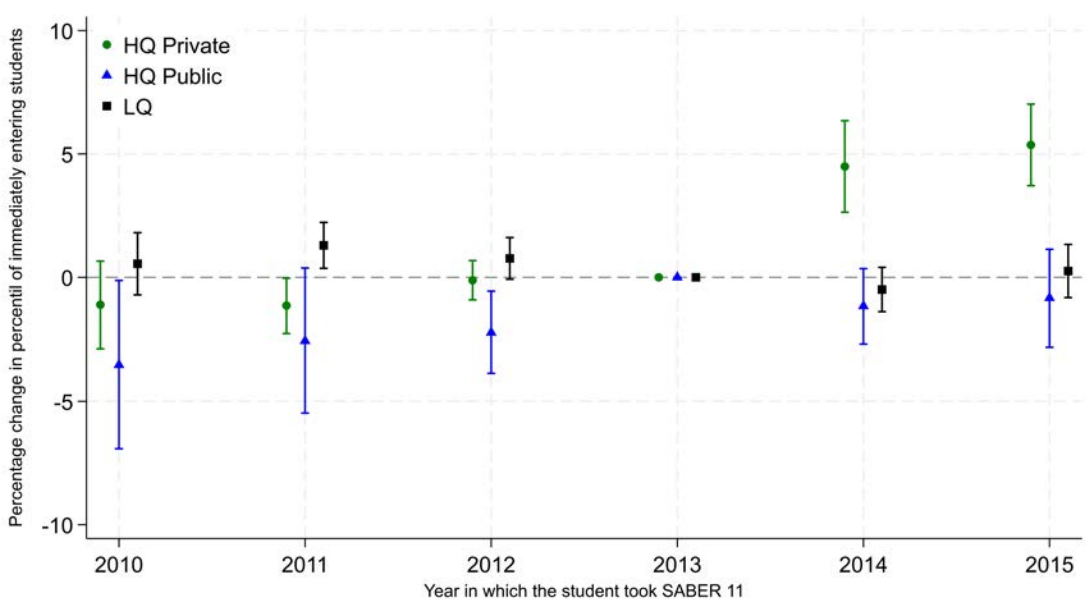
Notes: This figure reports the placebo results from comparing outcomes for the 2013 and 2012 cohorts using Specification (2). The outcome is immediate HQ enrollment in Panel A, any college enrollment within six years in Panel B, taking SABER PRO in an HQ college within seven years in Panel C, taking SABER PRO from any college in Panel D, the SABER PRO scores within five years in Panel E, employment nine years later in Panel F, earnings (in multiples of the minimum wage, including zeros) in Panel G, and log earnings in Panel H. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), and PILA (MinSalud).

Figure A.11: Changes in Cohort Size and Student Ability Before and After the Expansion of Financial Aid by College Type

(a) Cohort Size



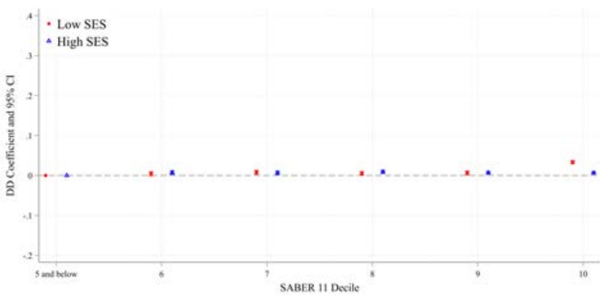
(b) Entering Students' SABER 11 Score



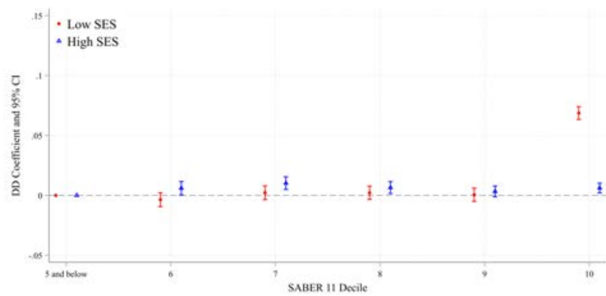
Notes: This figure compares outcomes across SABER 11 cohorts from the fall semesters of 2010 to 2015. The coefficients are relative to the college-specific mean for the 2013 cohort and averaged by college type. The sample is restricted to colleges with at least 200 students entering in 2013. In Panel A, the outcome is the number of students who immediately accessed a given college after high school. Following the 2014 financial aid expansion, the cohort size increased by approximately 50% for HQ *private* colleges, but not for HQ *public* college or LQ colleges. In Panel B, the outcome is the average SABER 11 percentile of entering students. The average percentile increased by 5% at HQ *private* colleges, while there was no change for other college types. *Sources:* Authors' calculations based on SABER 11 (Icfes) and SNIES (MEN).

Figure A.12: The Impact on College-Major "Value Added"

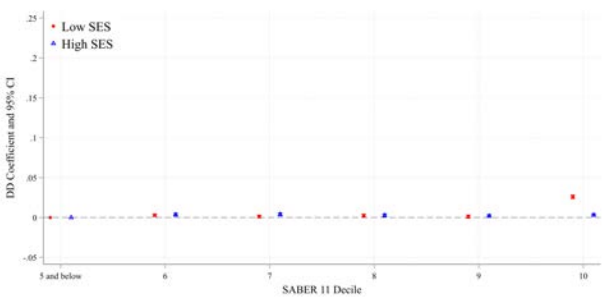
(a) Bachelor's Graduation Fixed Effect



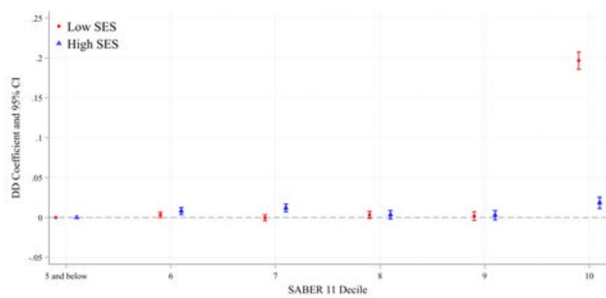
(b) Learning Fixed Effect



(c) Employment Fixed Effect

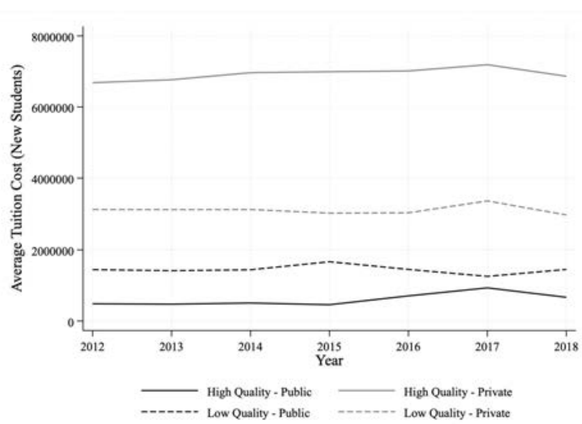


(d) Earnings Fixed Effect



Notes: This figure plots the β_k coefficients and 95% confidence intervals from Specification (2) when the outcome is the bachelor's graduation fixed effect in Panel A, the learning fixed effect in Panel B, the employment fixed effect in Panel C, and the earnings fixed effect in Panel D, as described in Appendix D. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), and PILA (MinSalud).

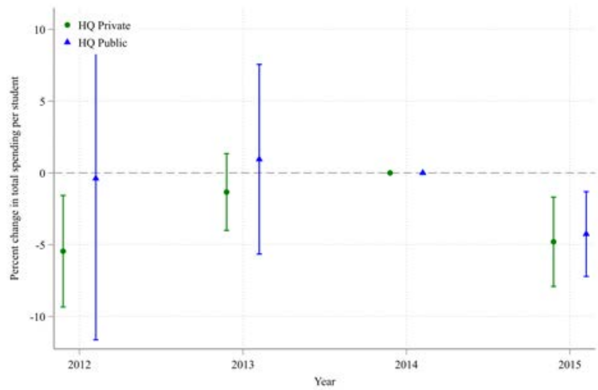
Figure A.13: Tuition Fees by College Type



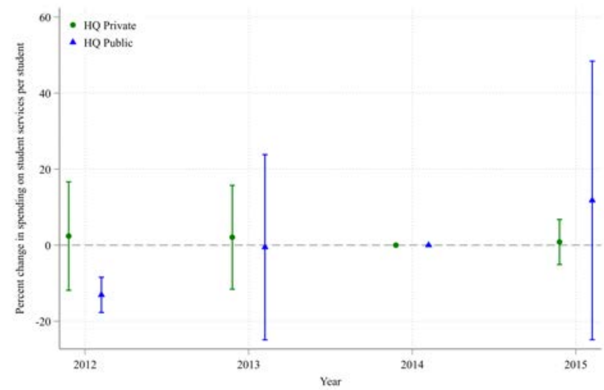
Notes: This figure plots the average annual tuition fee (in constant pesos) for new undergraduate students between 2012 and 2018 by college type. The sample is restricted to colleges reporting tuition fees for at least five years. *Sources:* Authors' calculations based on SNIES (MEN).

Figure A.14: Per Student Spending Before and After the SPP Policy

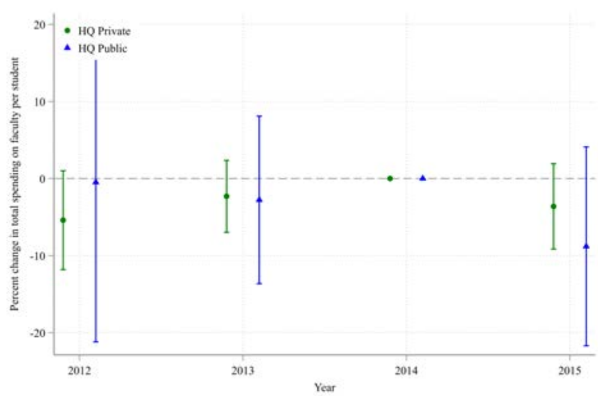
(a) Total spending



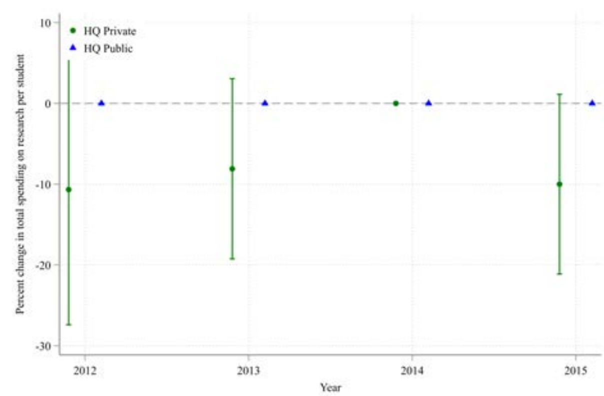
(b) Spending on student services



(c) Spending on instruction



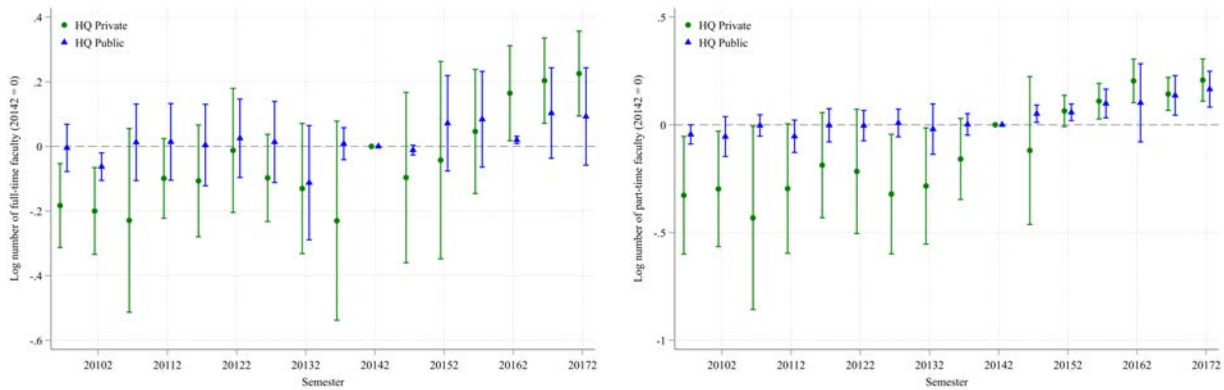
(d) Spending on research



Notes: This figure compares expenses across college types. Panel A reports total expenses (in constant pesos), while Panels B, C, and D show the type of expense. Annual information on institutional expenses is available only for a subsample of colleges. The sample is balanced from 2012 to 2015. For total expenses, the sample includes 16 HQ private colleges and 8 HQ public colleges, but fewer institutions report expense type. The coefficients are relative to the college-specific mean for 2014 and averaged by college type. Since the SPP policy was announced in October 2014 and recipients began attending college in spring 2015, 2014 is considered the base year. *Sources:* Authors' calculations based on institutional financial accounts and balance sheets (MEN).

Figure A.15: Number of Instructors Before and After the SPP Policy

(a) All full-time instructors (b) All part-time instructors



Notes: This figure compares the log number of full-time and part-time instructors. The coefficients are relative to the college-specific mean for the second semester of 2014 and averaged by college type. Since the SPP policy was announced in October 2014 and recipients began attending college in 2015-1, 2014-2 is considered the base semester. *Sources:* Authors' calculations based on SNIES (MEN).

Table A.1: Baseline Characteristics by College Type

	High quality		Low quality	
	Private (1)	Public (2)	Private (3)	Public (4)
SABER 11 score	303.1	293.3	259.0	261.9
(Standardized) SABER 11 score	1.77	1.44	0.30	0.40
(Standardized) SABER PRO score	0.50	0.27	-0.18	-0.15
Graduation rate (%)	75.1	66.6	59.3	60.2
Faculty with PhD (%)	11.9	15.2	1.9	2.4
Program length (in semesters)	9.2	9.6	9.2	9.4
Sticker price of tuition (in min wages)	17.7	6.4	8.1	3.7
Public spending per student (in min wages)		14.5		8.5
N students	50,642	60,704	214,203	267,636
N college campuses	21	16	207	79
N colleges	20	13	181	66

Notes: This table reports descriptive statistics by college type. The information is based on high school exit test takers from the fall 2012 and 2013 cohorts who ever accessed college within six years from high school completion. *Sources:* Authors' calculations based on SABER 11 (Icfes), SABER PRO (Icfes), SNIES (MEN), and institutional financial accounts and balance sheets (MEN).

Table A.2: Baseline Covariate Balance Test around SPP Eligibility Threshold

	Running variable					
	SABER 11			SISBEN		
	Mean (1)	RD Coeff. (2)	p-value (3)	Mean (4)	RD Coeff. (5)	p-value (6)
SABER 11 percentile				95.287	0.143	0.345
Wealth percentile (including missing SISBEN)	31.765	-0.494	0.209			
Took the Saber 11 test as a student	0.970	0.006	0.109	0.984	-0.007	0.467
Female	0.469	-0.011	0.316	0.443	0.002	0.877
Age	16.608	-0.018	0.628	16.355	0.073	0.582
Ethnic minority	0.037	0.001	0.835	0.024	0.016	0.060
Employed	0.044	0.002	0.739	0.045	-0.008	0.349
Family size	4.599	-0.039	0.386	4.385	-0.137	0.041
Mother's education: primary	0.252	-0.012	0.213	0.130	0.003	0.909
Mother's education: secondary	0.502	-0.011	0.446	0.476	-0.056	0.048
Mother's education: T&T	0.135	0.002	0.837	0.185	-0.005	0.815
Mother's education: professional	0.111	0.021	0.006	0.209	0.055	0.008
Father's education: primary	0.342	-0.005	0.620	0.181	0.015	0.729
Father's education: secondary	0.429	-0.001	0.754	0.450	-0.062	0.020
Father's education: T&T	0.104	0.002	0.649	0.174	-0.008	0.516
Father's education: professional	0.122	0.007	0.407	0.196	0.056	0.013
Household SES: Stratum 1	0.341	0.000	0.823	0.128	-0.013	0.303
Household SES: Stratum 2	0.461	-0.017	0.205	0.506	0.005	0.873
Household SES: Stratum 3	0.183	0.011	0.285	0.333	0.005	0.823
Household SES: Stratum 4	0.009	0.006	0.017	0.020	0.009	0.305
Household SES: Stratum 5	0.003	0.001	0.632	0.007	-0.003	0.476
Household SES: Stratum 6	0.001	-0.001	0.224	0.001	0.000	0.746
School hours: Full day	0.197	-0.004	0.702	0.291	0.025	0.207
School hours: Morning	0.614	0.000	0.955	0.541	-0.033	0.180
School hours: Evening	0.008	0.002	0.596	0.006	0.001	0.815
School hours: Afternoon	0.173	0.000	0.925	0.156	0.016	0.342
School hours: Weekends	0.008	0.003	0.444	0.008	-0.007	0.041
Private school	0.170	0.001	0.934	0.304	0.058	0.012
School schedule: A	0.999	0.000	0.798	0.997	0.000	0.864
School schedule: B	0.001	0.000	0.982	0.000	0.001	0.455
School schedule: Other	0.001	0.000	0.515	0.002	-0.002	0.464
Floor: cement/ gravel/ brick	0.433	-0.014	0.161	0.263	0.005	0.706
Floor: wood, board, wooden plank	0.039	0.002	0.613	0.039	0.014	0.167
Floor:polished wood, tile, marble, carpet	0.500	0.010	0.261	0.688	-0.009	0.659
Floor: land, sand	0.027	0.001	0.773	0.009	0.000	0.857
Family has internet	0.589	0.019	0.136	0.782	0.003	0.771
Family has a laptop	0.732	0.002	0.865	0.878	0.030	0.039
Family has a car	0.172	0.013	0.235	0.260	0.060	0.014
Family has a cellphone	0.943	0.010	0.074	0.944	0.024	0.034
Student resides: Urban	0.862	-0.008	0.355	0.936	-0.005	0.739
School location: Urban	0.917	-0.006	0.540	0.965	-0.005	0.554
Joint F-Stat (p-value, LB on bandwidth)		0.470			0.168	
Joint F-Stat (p-value, UB on bandwidth)		0.703			0.176	

Notes: This table plots the reduced-form coefficient from an RD specification where the outcome is a baseline characteristic and the running variable is either SABER 11 test scores in Columns (1)–(3) or SISBEN poverty index in Columns (4)–(6). The sample is restricted to SISBEN-eligible individuals in Columns (1)–(3) and SABER 11-eligible individuals in Columns (4)–(6). Columns (1) and (4) present control means, Columns (2) and (5) present conventional coefficients, and Columns (3) and (6) present p-values based on conventional standard errors. The last two rows report the p-value from a joint significance test using all baseline characteristics and small or large bandwidths: $\pm$ 20 or 40 test score units in Column (2) and $\pm$ 7 or 15 household wealth units in Column (5). All results are estimated with package rdrobust (Cattaneo et al., 2014). *Sources:* Authors' calculations based on SABER 11 (Icfes) and SISBEN (DNP).

Table A.3: Baseline Covariate Balance Test around SPP Eligibility Threshold Conditional on Taking SABER PRO Within Five Years

	Running variable					
	SABER 11			SISBEN		
	Mean (1)	RD Coeff. (2)	p-value (3)	Mean (4)	RD Coeff. (5)	p-value (6)
SABER 11 percentile				95.554	0.191	0.267
Wealth percentile (including missing SISBEN)	32.310	0.081	0.751			
Took the Saber 11 test as a student	0.973	0.018	0.003	0.992	-0.001	0.912
Female	0.602	-0.029	0.212	0.493	0.044	0.249
Age	16.345	-0.079	0.133	16.258	-0.151	0.098
Ethnic minority	0.031	-0.005	0.421	0.022	0.012	0.321
Employed	0.030	0.008	0.315	0.034	-0.003	0.726
Family size	4.641	-0.115	0.075	4.336	-0.060	0.441
Mother's education: primary	0.205	0.001	0.792	0.106	0.006	0.912
Mother's education: secondary	0.475	-0.004	0.759	0.476	-0.082	0.066
Mother's education: T&T	0.153	0.000	0.850	0.208	0.001	0.882
Mother's education: professional	0.164	0.004	0.593	0.198	0.091	0.024
Father's education: primary	0.293	0.004	0.990	0.192	-0.024	0.355
Father's education: secondary	0.417	0.013	0.785	0.422	-0.047	0.371
Father's education: T&T	0.137	-0.006	0.989	0.157	0.023	0.450
Father's education: professional	0.155	-0.011	0.785	0.219	0.062	0.124
Household SES: Stratum 1	0.337	-0.031	0.143	0.113	-0.018	0.389
Household SES: Stratum 2	0.442	0.018	0.579	0.544	-0.022	0.535
Household SES: Stratum 3	0.194	0.019	0.277	0.322	0.020	0.506
Household SES: Stratum 4	0.017	0.004	0.406	0.024	0.020	0.191
Household SES: Stratum 5	0.003	0.000	0.759	0.000	0.002	0.448
Household SES: Stratum 6	0.001	-0.001	0.154	0.001	-0.001	0.886
School hours: Full day	0.237	-0.014	0.443	0.345	0.009	0.706
School hours: Morning	0.623	-0.027	0.251	0.540	-0.069	0.110
School hours: Evening	0.002	0.001	0.632	0.000	-0.001	0.142
School hours: Afternoon	0.134	0.037	0.019	0.112	0.066	0.041
School hours: Weekends	0.004	0.003	0.510	0.007	-0.006	0.360
Private school	0.220	-0.032	0.084	0.323	0.056	0.116
School schedule: A	1.000	-0.002	0.068	1.000	0.000	0.256
School schedule: B	0.000	0.001	0.125	0.000	0.000	0.177
School schedule: Other	0.000	0.001	0.207	0.000	0.000	0.000
Floor: cement/ gravel/ brick	0.431	-0.046	0.043	0.258	-0.004	0.875
Floor: wood, board, wooden plank	0.030	0.002	0.755	0.048	0.007	0.686
Floor:polished wood, tile, marble, carpet	0.516	0.037	0.087	0.681	-0.003	0.947
Floor: land, sand	0.023	0.005	0.467	0.016	-0.008	0.313
Family has internet	0.645	0.015	0.528	0.764	0.065	0.073
Family has a laptop	0.796	-0.014	0.382	0.909	0.015	0.523
Family has a car	0.212	-0.017	0.438	0.303	0.014	0.620
Family has a cellphone	0.955	0.005	0.507	0.932	0.040	0.039
Student resides: Urban	0.895	-0.025	0.069	0.932	0.014	0.480
School location: Urban	0.932	-0.014	0.290	0.975	-0.021	0.158
Joint F-Stat (p-value, LB on bandwidth)		0.000			0.000	
Joint F-Stat (p-value, UB on bandwidth)		0.025			0.000	

Notes: This table plots the reduced-form coefficient from an RD specification where the outcome is a baseline characteristic and the running variable is either SABER 11 test scores in Columns (1)–(3) or SISBEN poverty index in Columns (4)–(6). Unlike in Table A.2, the sample is restricted to individuals who took the SABER PRO exam within five years from high school completion. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

Table A.4: Reduced-Form Estimates on Other Educational Outcomes

	Years of undergrad. study	Time to bachelor's degree attainment					Any graduate study	College exam score if taken within…	
		Any college	High quality college			Low quality college			
			Any	Private	Public			Five years	Seven years
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
***Panel A:** SABER 11 is the running variable*									
Reduced form	0.758	-0.125	-0.213	0.122	-0.146	0.060	0.005	0.096	0.056
	(0.063)	(0.038)	(0.076)	(0.125)	(0.104)	(0.074)	(0.002)	(0.021)	(0.019)
Mean control	3.319	5.213	5.272	4.914	5.468	5.194	0.008	0.423	0.448
Observations	297,279	22,476	8,796	6,472	2,324	13,680	297,279	23,059	41,430
BW loc. poly.	18.96	25.41	22.94	17.95	27.28	22.12	29.91	26.53	24.86
Effect obs. control	15,683	3,986	763	207	590	2,650	30,526	4,491	7,350
Effect obs. treat	8,796	5,342	4,178	3,187	590	737	11,339	4,576	6,186
***Panel B:** SISBEN is the running variable*									
Reduced form	0.507	-0.190	-0.238	0.022	-0.092	0.006	0.016	0.057	0.033
	(0.113)	(0.062)	(0.081)	(0.114)	(0.127)	(0.113)	(0.007)	(0.040)	(0.035)
Mean control	3.836	5.234	5.254	4.936	5.406	5.221	0.016	0.804	0.843
Observations	22,552	10,691	8,251	6,301	1,950	2,440	22,552	9,047	13,694
BW loc. poly.	7.94	9.17	8.98	8.80	9.43	14.62	9.37	9.89	10.03
Effect obs. control	3,421	1,365	641	255	401	1,014	4,011	1,320	2,359
Effect obs. treat	3,385	2,227	1,943	1,607	316	424	4,024	1,969	2,804

Notes: This table presents the reduced-form estimates on educational outcomes using an RD design. Column (1) reports the effects on the total years in undergraduate studies and assigns zeros for people who do not attend any undergraduate program within six years from high school. Columns (2)–(6) report effects on the number of years to obtain a bachelor's degree (proxied by taking the SABER PRO exam within seven years from high school), restricting the sample to students who attend college immediately after high school. Column (7) reports the effects on the likelihood of attending any graduate program within six years from high school. Finally, Columns (8) and (9) report effects on the SABER PRO test score for exams taken within five and seven years from high school completion, respectively. See the notes under Table I for other details. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), and SABER PRO (Icfes).

Table A.5: Reduced-Form Estimates on Other Labor-Market Outcomes

	Type of employment		Days	Conditional on working							Time
				Days	In 13	Firm size					to first
	Employee	Independent	worked	worked	largest cities	No. of employees	Micro	Small	Medium	Large	formal job
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
***Panel A:** SABER 11 is the running variable*											
Reduced form	0.020	0.002	0.904	0.247	0.031	456.25	-0.045	-0.002	0.012	0.034	-0.460
	(0.013)	(0.003)	(0.368)	(0.232)	(0.011)	(196.68)	(0.015)	(0.011)	(0.011)	(0.018)	(0.145)
Mean control	0.532	0.025	15.706	25.35	0.702	1671.90	0.262	0.171	0.143	0.422	3.980
Observations	297,279	297,279	297,279	149,356	149,356	149,140	149,140	149,140	149,140	149,140	32,586
BW loc. poly.	21.52	33.24	21.57	31.67	38.22	20.90	19.12	28.27	25.46	18.68	29.20
Effect obs. control	18,948	37,647	18,948	20,589	28,297	11,111	10,274	17,998	15,190	9,748	5,539
Effect obs. treat	9,489	12,061	9,489	7,822	8,491	6,130	5,928	7,448	6,995	5,801	2,999
***Panel B:** SISBEN is the running variable*											
Reduced form	0.003	-0.002	0.119	0.291	0.046	-236.970	-0.036	0.048	0.015	-0.011	-0.409
	(0.023)	(0.011)	(0.605)	(0.503)	(0.024)	(325.52)	(0.028)	(0.022)	(0.020)	(0.025)	(0.244)
Mean control	0.581	0.049	18.473	26.12	0.763	2203.17	0.286	0.140	0.118	0.456	3.486
Observations	22,552	22,552	22,552	15,652	15,652	15,535	15,535	15,535	15,535	15,535	5,624
BW loc. poly.	10.19	8.67	11.80	8.73	8.52	11.73	8.24	8.29	8.52	12.79	10.05
Effect obs. control	4,315	3,723	4,893	2,641	2,578	3,409	2,459	2,482	2,547	3,625	806
Effect obs. Treat	4,374	3,724	5,028	2,665	2,586	3,530	2,486	2,495	2,571	3,770	1,260

Notes: This table presents the reduced-form estimates of the effect of financial aid on labor-market outcomes eight years after high school completion using an RD design. Columns (1) and (2) indicate whether the individual is employed as a wage earner or an independent contractor. Column (3) reports the effects on the number of days formally employed and assigns zeros for people with no formal employment. Columns (4)–(10) restrict the sample to individuals who are formally employed eight years after high school. Column (11) reports the effects on the time to first formal job, measured in periods of four months since college graduation according to SNIES. See the notes under Table I for other details.
Sources: Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), and PILA (MinSalud).

Table A.6: Reduced-Form Estimates on Employment Sector

	Conditional on working												
	Agriculture	Mining and quarrying	Manufacturing	Electricity, gas, water supply	Construction	Trade, transport, accomodation, food	Information and communication	Finance and insurance	Real estate	Professional, scientific, technical, admin	Public admin, eduction, health, social work	Arts, entertainment, other service	Extra-territorial orgs
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
***Panel A:** SABER 11 is the running variable*													
Reduced form	-0.004	0.001	-0.002	0.007	0.002	-0.008	0.008	0.010	0.000	-0.007	-0.006	0.000	-0.001
	(0.004)	(0.003)	(0.008)	(0.003)	(0.006)	(0.010)	(0.007)	(0.005)	(0.002)	(0.014)	(0.010)	(0.007)	(0.001)
Mean control	0.02	0.01	0.07	0.00	0.06	0.16	0.06	0.03	0.00	0.37	0.15	0.07	0.00
Observations	149,356												
BW loc. poly.	30.92	23.15	25.34	24.98	33.05	32.41	30.49	29.35	38.36	29.46	30.94	30.22	20.97
Effect obs. control	19,849	13,574	15,234	14,223	22,938	21,742	19,849	18,756	28,297	18,756	19,849	19,849	11,149
Effect obs. treat	7,734	6,700	7,011	6,821	8,055	7,935	7,734	7,555	8,491	7,555	7,734	7,734	6,144
***Panel B:** SISBEN is the running variable*													
Reduced form	0.010	0.001	-0.005	-0.003	0.006	-0.010	0.035	-0.011	0.007	0.005	-0.025	-0.006	-0.002
	(0.006)	(0.004)	(0.013)	(0.005)	(0.012)	(0.016)	(0.018)	(0.010)	(0.006)	(0.025)	(0.019)	(0.015)	(0.001)
Mean control	0.01	0.004	0.069	0.010	0.041	0.127	0.072	0.041	0.004	0.405	0.146	0.069	0.001
Observations	15,652												
BW loc. poly.	13.02	10.39	10.70	7.99	9.31	12.28	7.79	10.18	7.64	12.63	9.84	9.76	8.71
Effect obs. control	3,726	3,114	3,182	2,421	2,820	3,580	2,342	3,061	2,308	3,655	2,958	2,930	2,639
Effect obs. treat	3,853	3,158	3,251	2,425	2,851	3,689	2,361	3,093	2,315	3,759	3,003	2,974	2,662

Notes: This table presents the reduced-form estimates of the effect of financial aid eligibility on employment sector for individuals who are formally employed nine years after high school completion using an RD design. See the notes under Table I for other details. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and PILA (MinSalud).

Appendix B Robustness to RD Bandwidth Selection

Table B.1: Robustness to RD Bandwidth Selection: Test Score Cutoff

	Baseline		75% of baseline		125% of baseline		150% of baseline		200% of baseline	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: *Enrollment within six years of high school completion*										
Any	0.096	0.010	0.092	0.011	0.097	0.009	0.096	0.008	0.094	0.007
HQ	0.437	0.009	0.435	0.010	0.438	0.008	0.439	0.008	0.445	0.007
HQ Private	0.473	0.010	0.473	0.011	0.475	0.009	0.475	0.008	0.474	0.008
HQ Public	-0.039	0.008	-0.043	0.009	-0.038	0.007	-0.038	0.006	-0.036	0.006
LQ	-0.337	0.012	-0.336	0.014	-0.339	0.011	-0.340	0.010	-0.344	0.008
Associate	-0.121	0.009	-0.113	0.010	-0.127	0.008	-0.132	0.007	-0.139	0.006
Bachelor's	0.213	0.012	0.202	0.014	0.221	0.011	0.227	0.010	0.231	0.009
Panel B: *Bachelor's degree attainment within seven years of high school completion*										
Any	0.156	0.014	0.148	0.016	0.163	0.012	0.167	0.011	0.176	0.010
HQ	0.323	0.011	0.317	0.013	0.328	0.010	0.331	0.010	0.335	0.009
HQ Private	0.344	0.009	0.339	0.010	0.346	0.008	0.348	0.008	0.349	0.007
HQ Public	-0.016	0.006	-0.018	0.007	-0.015	0.005	-0.013	0.005	-0.012	0.004
LQ	-0.162	0.009	-0.164	0.010	-0.159	0.008	-0.158	0.007	-0.154	0.006
Panel C: *Bachelor's degree exam score*										
Within 5 years	0.096	0.021	0.104	0.024	0.093	0.019	0.093	0.017	0.092	0.015
Within 7 years	0.056	0.019	0.060	0.021	0.049	0.017	0.048	0.015	0.051	0.014
Panel D: *Labor-market outcomes nine years after high school completion*										
Employment	0.027	0.013	0.029	0.015	0.023	0.011	0.020	0.010	0.013	0.009
Earnings (in min. wages)	0.206	0.039	0.217	0.044	0.196	0.035	0.187	0.032	0.170	0.028
Earnings (in ln)	0.110	0.027	0.124	0.031	0.106	0.024	0.101	0.022	0.089	0.020
Percentile rank	3.605	1.070	3.950	1.234	3.231	0.959	2.974	0.879	2.437	0.771
Top 25%	0.045	0.013	0.055	0.015	0.040	0.011	0.038	0.010	0.032	0.009
Top 1%	0.010	0.003	0.009	0.004	0.009	0.003	0.009	0.003	0.008	0.003
Panel E: *Other outcomes*										
SPP beneficiary	0.583	0.009	0.583	0.010	0.581	0.009	0.580	0.008	0.577	0.007

Notes: This table presents the reduced-form effect of program eligibility on the main outcomes of interest using the SABER 11 test score as the running variable and restricting the sample to low-SES students. Columns (1) and (2) report the conventional local linear RD estimates and standard errors estimated with package rdrobust (Cattaneo et al., 2014), while the remaining columns report use smaller or larger bandwidths. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), and PILA (MinSalud).

Table B.2: Robustness to RD Bandwidth Selection: Wealth Cutoff

	Baseline		75% of baseline		125% of baseline		150% of baseline		200% of baseline	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
***Panel A:** Enrollment within six years of high school completion*										
Any	0.049	0.016	0.059	0.019	0.052	0.014	0.055	0.013	0.058	0.012
HQ	0.358	0.020	0.351	0.022	0.365	0.018	0.368	0.016	0.369	0.015
HQ Private	0.470	0.017	0.464	0.020	0.476	0.016	0.477	0.015	0.474	0.013
HQ Public	-0.113	0.017	-0.113	0.020	-0.111	0.016	-0.110	0.014	-0.106	0.013
LQ	-0.302	0.021	-0.298	0.024	-0.304	0.019	-0.310	0.018	-0.309	0.015
Associate	-0.094	0.012	-0.094	0.014	-0.093	0.011	-0.092	0.010	-0.090	0.009
Bachelor's	0.143	0.019	0.149	0.022	0.148	0.017	0.148	0.016	0.151	0.014
***Panel B:** Bachelor's degree attainment within seven years of high school completion*										
Any	0.145	0.020	0.143	0.023	0.141	0.019	0.140	0.017	0.139	0.015
HQ	0.325	0.019	0.320	0.021	0.326	0.017	0.323	0.016	0.321	0.014
HQ Private	0.389	0.017	0.383	0.019	0.391	0.015	0.387	0.014	0.382	0.012
HQ Public	-0.066	0.015	-0.066	0.017	-0.065	0.013	-0.064	0.012	-0.060	0.011
LQ	-0.176	0.018	-0.173	0.020	-0.183	0.016	-0.185	0.015	-0.184	0.013
***Panel C:** Bachelor's degree exam score*										
Within 5 years	0.057	0.040	0.083	0.047	0.047	0.036	0.048	0.034	0.042	0.030
Within 7 years	0.033	0.035	0.048	0.040	0.029	0.031	0.032	0.029	0.031	0.025
***Panel D:** Labor-market outcomes nine years after high school completion*										
Employment	-0.013	0.024	-0.017	0.028	-0.010	0.022	-0.003	0.020	0.007	0.017
Earnings (in min. wages)	0.142	0.085	0.139	0.096	0.139	0.077	0.141	0.072	0.152	0.064
Earnings (in ln)	0.122	0.057	0.133	0.065	0.115	0.051	0.110	0.047	0.103	0.042
Percentile rank	1.336	1.718	0.850	1.974	1.912	1.556	2.272	1.434	2.802	1.262
Top 25%	0.043	0.024	0.049	0.028	0.043	0.022	0.045	0.020	0.043	0.018
Top 1%	-0.007	0.010	-0.010	0.012	-0.006	0.010	-0.006	0.009	-0.004	0.008
***Panel E:** Other outcomes*										
SPP beneficiary	0.645	0.015	0.637	0.017	0.648	0.013	0.647	0.012	0.645	0.010

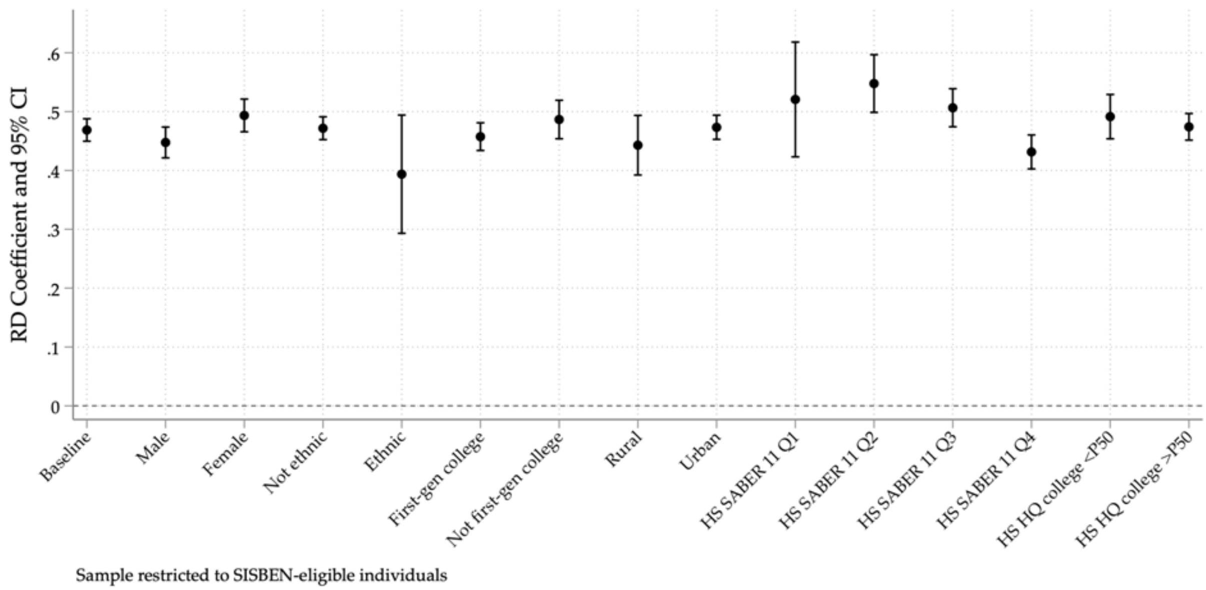
Notes: This table presents the reduced-form effect of program eligibility on the main outcomes of interest using the SISBEN wealth index as the running variable and restricting the sample to merit-eligible students. Columns (1) and (2) report the conventional local linear RD estimates and standard errors estimated with package rdrobust (Cattaneo et al., 2014), while the remaining columns report use smaller or larger bandwidths. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), and PILA (MinSalud).

Appendix C Heterogeneity

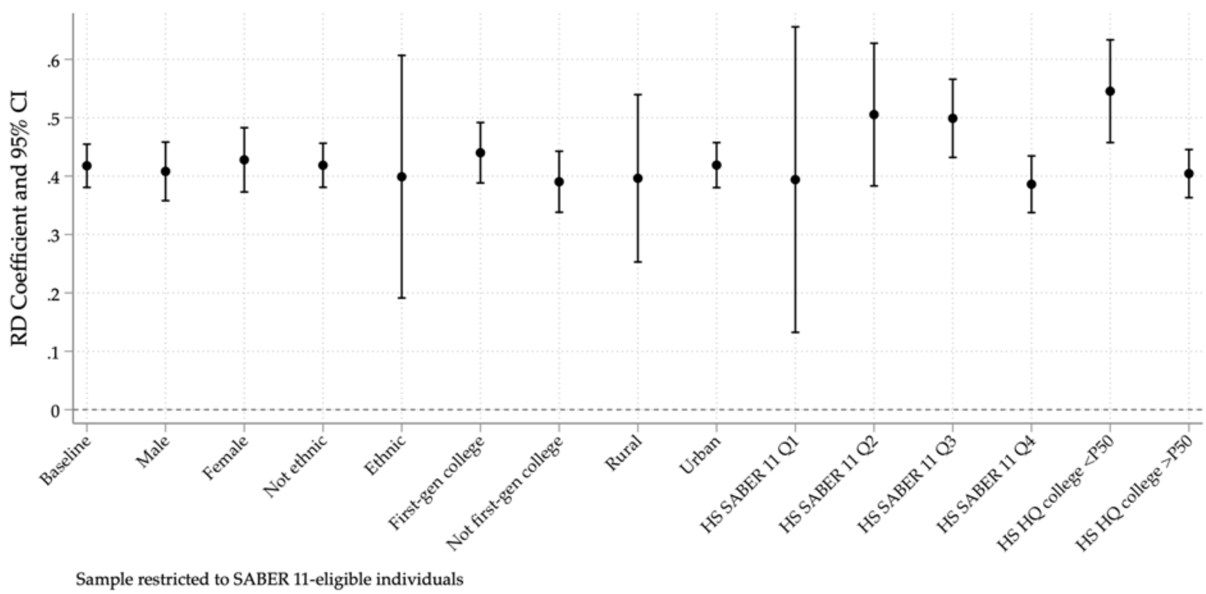
This section reports the heterogeneous treatment effects of financial aid on students' educational and labor-market outcomes. We compare the reduced-form effects of financial aid on HQ enrollment, HQ attainment, learning performance, and earnings nine years after high school. Figures C.1 to C.4 illustrate these effects by individual, household, and high school characteristics.

Figure C.1: Heterogeneous Effects in Immediate HQ Enrollment

(a) Test Score Cutoff



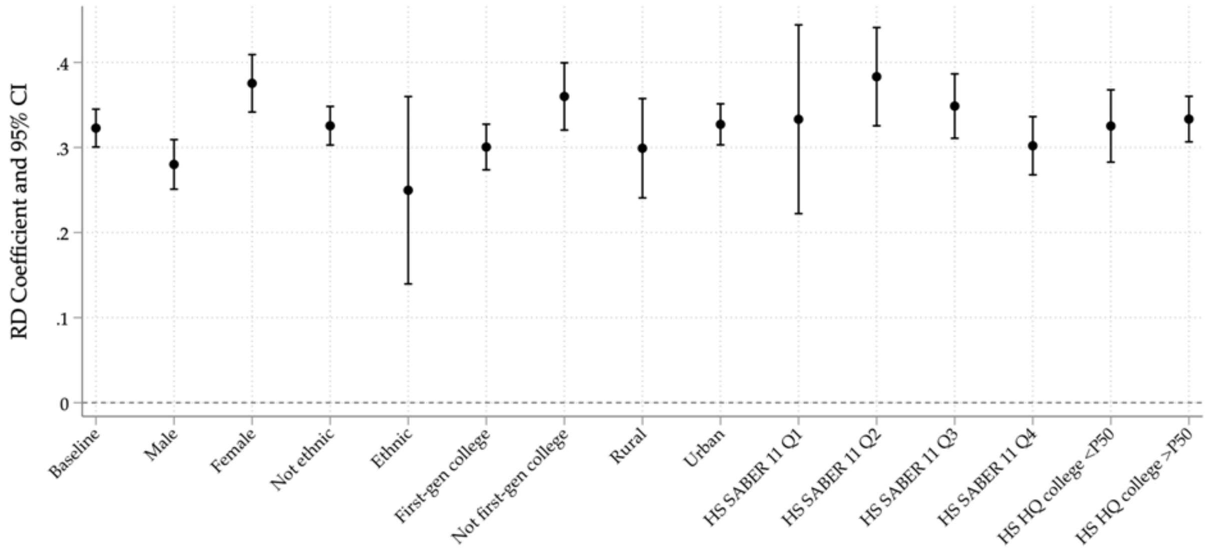
(b) Wealth Cutoff



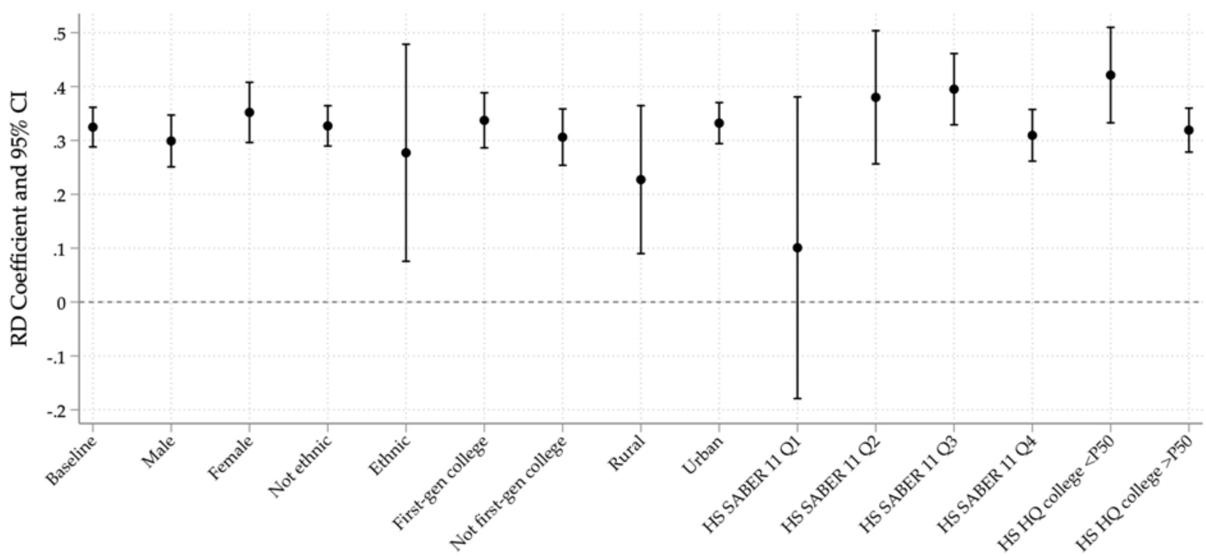
Notes: The figures plot the reduced-form RD coefficient and 95% confidence intervals on immediate access to an HQ college after high school completion. Panel A uses the SABER 11 test score as the running variable, restricting the sample to low-SES students. Panel B uses the SISBEN wealth index as the running variable, restricting the sample to merit-eligible students. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SNIES (MEN).

Figure C.2: Heterogeneous Effects in Earning a B.A. from an HQ College

(a) Test Score Cutoff



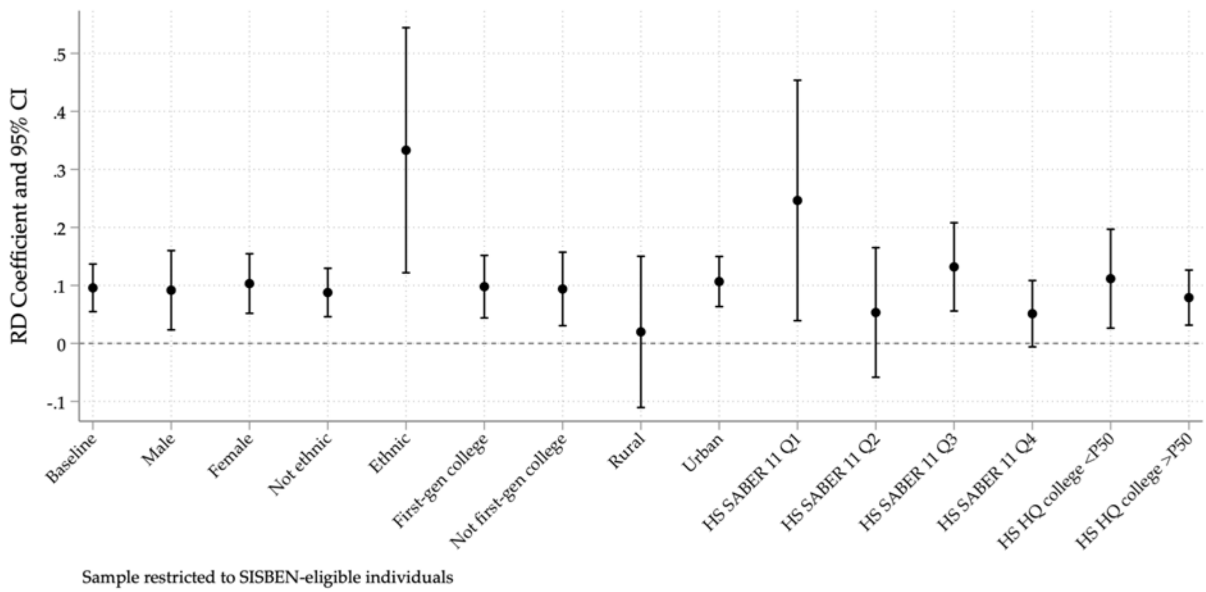
(b) Wealth Cutoff



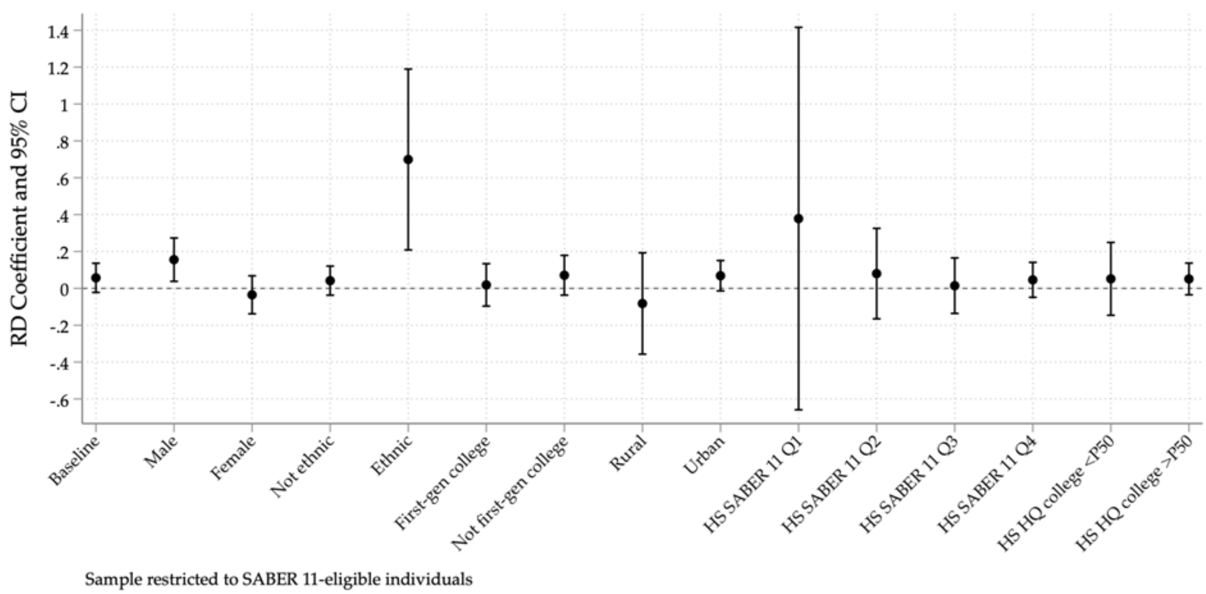
Notes: The figures plot the reduced-form RD coefficient and 95% confidence intervals on the likelihood of earning a bachelor's degree (proxied by taking the SABER PRO exam) from an HQ college within seven years from high school completion. Panel A uses the SABER 11 test score as the running variable, restricting the sample to low-SES students. Panel B uses the SISBEN wealth index as the running variable, restricting the sample to merit-eligible students. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), and SABER PRO (Icfes).

Figure C.3: Heterogeneous Effects in College Graduation Test Scores

(a) Test Score Cutoff



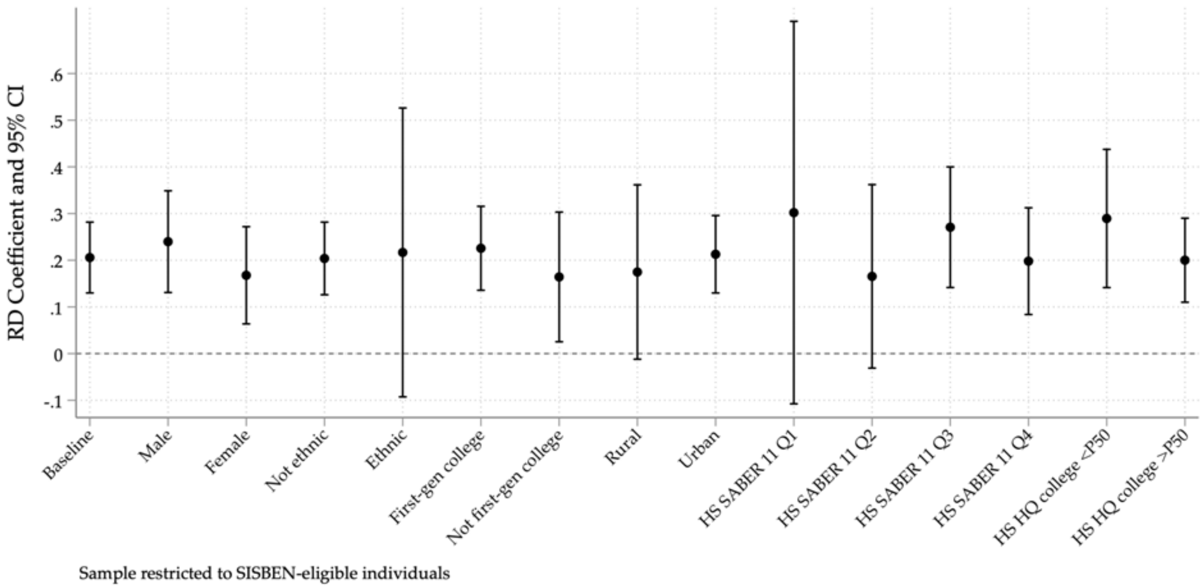
(b) Wealth Cutoff



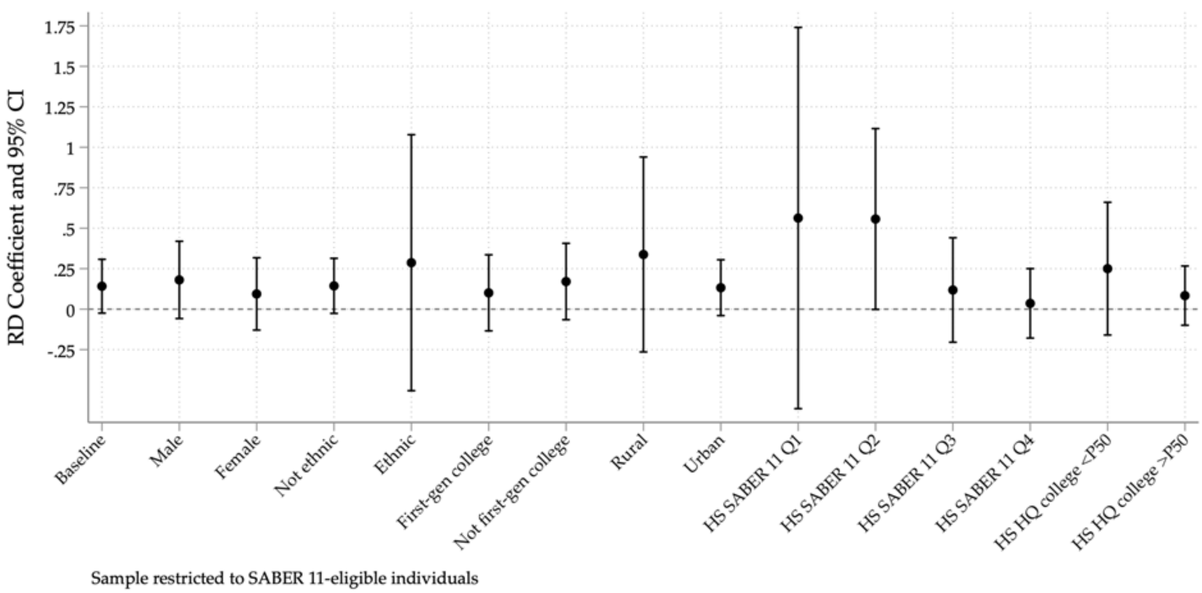
Notes: The figures plot the reduced-form RD coefficient and 95% confidence intervals on the standardized college exit test score for SABER PRO exams taken within five years from high school completion. Panel A uses the SABER 11 test score as the running variable, restricting the sample to low-SES students. Panel B uses the SISBEN wealth index as the running variable, restricting the sample to merit-eligible students.
Sources: Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), and SABER PRO (Icfes).

Figure C.4: Heterogeneous Effects in Earnings

(a) Test Score Cutoff



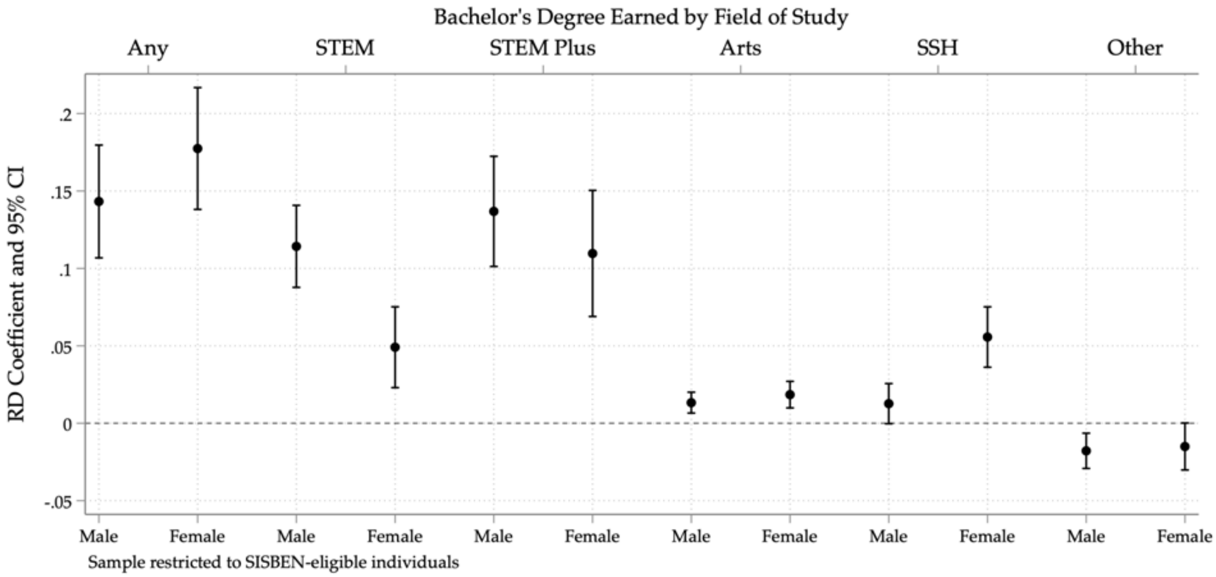
(b) Wealth Cutoff



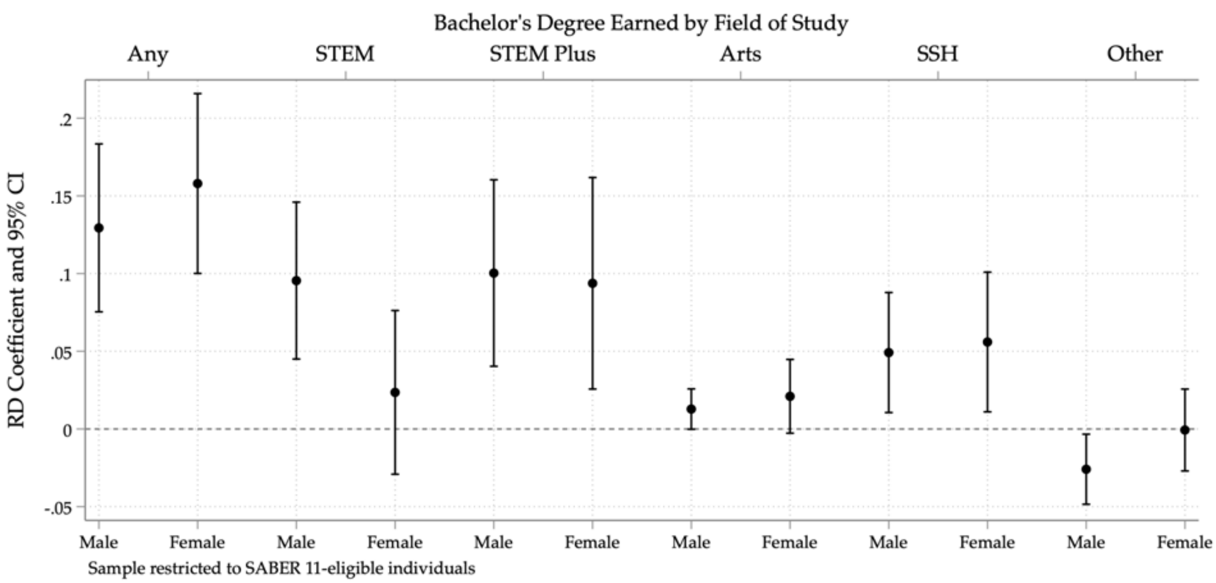
Notes: The figures plot the reduced-form RD coefficient and 95% confidence intervals on formal earnings nine years from high school completion. Earnings are expressed in multiples of the monthly minimum wage and include zeros for individuals without formal employment. Panel A uses the SABER 11 test score as the running variable, restricting the sample to low-SES students. Panel B uses the SISBEN wealth index as the running variable, restricting the sample to merit-eligible students. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), and PILA (MinSalud).

Figure C.5: Heterogeneous Effects in Earning a B.A. by Gender and Field of Study

(a) Test Score Cutoff



(b) Wealth Cutoff



Notes: The figures plot the reduced-form RD coefficient and 95% confidence intervals on the likelihood of earning a bachelor's degree (proxied by taking the SABER PRO exam) within seven years from high school completion by field of study and sex. Panel A uses the SABER 11 test score as the running variable, restricting the sample to low-SES students. Panel B uses the SISBEN wealth index as the running variable, restricting the sample to merit-eligible students. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), and SABER PRO (Icfes).

Appendix D Approximating College "Value-Added"

This section describes how we approximate college graduation, learning, and earning "value-added." We use student-level data from fall 2012 and 2013 test takers to estimate the fixed effects. These cohorts graduated from high school before Colombia introduced SPP. We predict the fixed effects from the following individual-level regression:

$$y_{i,t} = \alpha + \mathbf{X_i}'\Gamma + \delta_{j(i,t)} + \epsilon_{i,t} \tag{3}$$

where $y_{i,t}$ is the outcome for individual i taking the SABER 11 exam in semester t, $\mathbf{X}$ is a vector of baseline covariates, $\delta_{j(i,t)}$ are the college fixed effects based on the first institution attended, and $\epsilon_{i,t}$ is a student-specific error term. We focus on five main outcomes: (1) any degree attainment within seven years from high school, proxied by an indicator for taking the SABER PRO or SABER T&T exams, (2) bachelor's degree attainment within seven years from high school, proxied by an indicator for taking the SABER PRO exam, (3) the SABER PRO test score, (4) employment nine years after high school, and (5) earnings nine years after high school, measured in multiples of the monthly minimum wage.

When estimating the model at the college level, we drop students attending colleges with fewer than 50 students. This leaves us with 288 colleges. However, prospective students in Colombia apply to specific college-program pairs, and programs vary significantly in their selectivity. We, therefore, estimate the "value-added" contributions by more granular college-by-program cells to account for within-college variation across programs. Dropping cells with fewer than 10 students leaves us with 4,680 college-program cells.

Next, we examine how the estimated fixed effects for these models vary when progressively including a denser set of baseline covariates controlling for differential peer cohort qualities to obtain "value-added" college contributions purged of cohort effects:

- **Model A** controls for individual and household characteristics; specifically, students' age and SABER 11 score (using third-degree polynomials), sex, whether he or she self-identifies as an ethnic minority, household size, socioeconomic stratum, SISBEN score, missing SISBEN dummy, parental educational attainment, and a cohort indicator. These variables enable controlling for selection bias due to students' choices of colleges, fields, majors, and programs.

- **Model B** adds dummies for high school schedules, private institutions, and being located in an urban area.

- **Model C** includes the high school-by-cohort leave-one-out mean socioeconomic stratum, SABER 11 test scores, SISBEN score, and parental education.
- **Model D** adds the leave-one-out average SABER 11 score of the entering cohort in the college (or college-field, college-major, or college-program), which controls for a big part of the selection into colleges (Melguizo et al., 2017).
- **Model E** adds the leave-one-out mean socioeconomic strata and parental education of the cohort in the college (or college-field, college-major, or college-program), as students' outcomes might be influenced by the socioeconomic characteristics of their peers.
- **Model F** includes the leave-one-out mean SISBEN score of the cohort in the college (or college-field, college-major, or college-program).

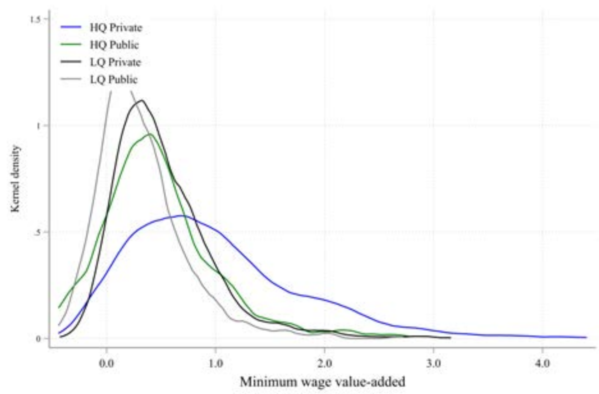
We begin by examining the impact of including baseline covariates on the estimated college fixed effects, using earnings realized nine years after high school as an example. Since we observe earnings for all students, including graduates, dropouts, and those who never attended any program within six years of high school, we express "value-added" relative to students without any college experience.

Figure D.1 compares the distributions of college fixed effects estimated using Models A through F, while Table D.1 displays the means by college type. A naive model that does not control for **X** suggests that HQ colleges typically have the earnings "value-added" than LQ colleges. However, HQ colleges admit students with exceptionally high test scores and privileged socioeconomic backgrounds. When we account for observable differences in Model A, such as baseline test scores and socioeconomic and demographic characteristics, the "earnings value-added" for HQ colleges decreases, indicating significant sorting of students across programs and college types. Furthermore, Models B through F include a more comprehensive set of baseline covariates, resulting in further reductions in "earnings value-added." This indicates that a significant portion of the earnings effect is explained by differences in individual, household, high school, and peer qualities across college-program combinations. While Model F controls for the fullest set of baseline characteristics, we will use Model C in the main text. According to Model C, HQ *private* colleges exhibit the highest earnings "value-added," while HQ *public* colleges demonstrate the lowest.

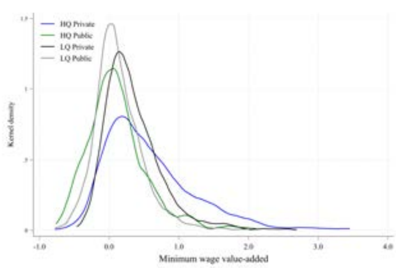
Table D.1 compares the college-program fixed effects for various outcomes and different models that control for different levels of baseline covariates. Lastly, Table V compares the impact on realized outcomes with those predicted by program "value-added." Table D.2 compares the reduced-form RD coefficients for various measures of college-program "value-added" using Models A through F.

Figure D.1: The Distribution of College Fixed Effects for Earnings By Baseline Controls

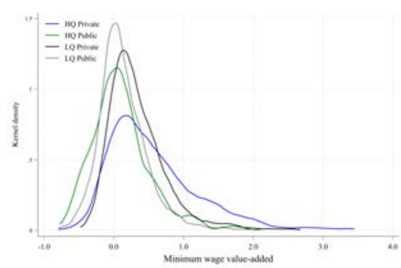
(a) No controls



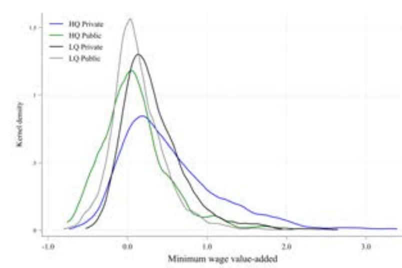
(b) Model A



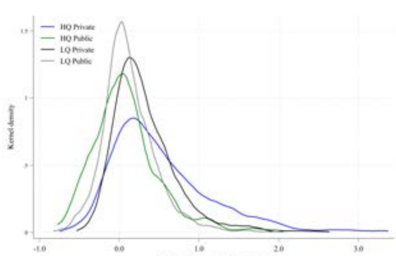
(c) Model B



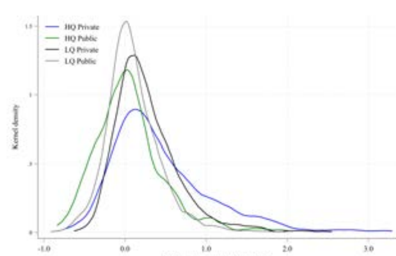
(d) Model C



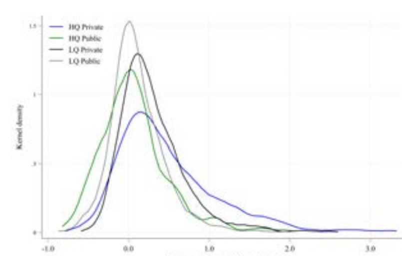
(e) Model D



(f) Model E



(g) Model F



Notes: The figure plots the distribution of college-program fixed effects $\hat{\delta}_{j(i,t)p(i,t)}$ estimated using Specification (1), where the outcome variable is formal earnings realized nine years after high school. The fixed effects are plotted separately by college type, and models A through F progressively add baseline covariates. Table D.1 reports the mean fixed effects by college type. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), and PILA (MinSalud).

Table D.1: Average College-Program Fixed Effects by College Type

	HQ		LQ	
	Private (1)	Public (2)	Private (3)	Public (4)
Any degree attainment				
No controls	0.1096338	-0.0264533	-0.0289904	0.0082143
A	0.0003675	-0.0861118	-0.0292636	0.0431771
B	-0.0037908	-0.0873261	-0.0302749	0.0450421
C	-0.0209266	-0.084777	-0.0304665	0.0479369
D	-0.0265392	-0.0890837	-0.0297445	0.0494454
E	-0.0632491	-0.0873613	-0.0355479	0.060895
F	-0.0565167	-0.0879912	-0.0337744	0.0583269
Bachelor's degree attainment				
No controls	0.1579373	-0.0139393	-0.0023276	-0.0673484
A	0.0435416	-0.0926699	0.0306171	-0.0293061
B	0.0374481	-0.0923576	0.0304803	-0.0262437
C	0.0249711	-0.0889505	0.0313625	-0.0231735
D	0.0198757	-0.0941887	0.0335907	-0.0218956
E	-0.0045684	-0.0889818	0.0328559	-0.0109935
F	-0.0032461	-0.0898727	0.0324204	-0.010487
SABER PRO score				
No controls	0.4800042	0.4346727	-0.2807942	-0.2001126
A	0.1473385	0.0642824	-0.0614152	-0.0865736
B	0.145081	0.0652571	-0.0613273	-0.08481
C	0.1477546	0.0623578	-0.0623334	-0.086158
D	0.1595686	0.0746607	-0.0704217	-0.0915826
E	0.1716952	0.0661475	-0.0727707	-0.1002205
F	0.1735344	0.0668698	-0.0723367	-0.1052437
Employment				
No controls	0.3141904	0.165846	0.2403796	0.1825502
A	0.1850969	0.0617958	0.1691395	0.1298286
B	0.1792379	0.0596115	0.1643712	0.1265696
C	0.159847	0.0541083	0.1600681	0.1250533
D	0.1469789	0.0427693	0.1545189	0.1204008
E	0.1279237	0.0331253	0.1410488	0.1124384
F	0.1495668	0.0426252	0.1547804	0.1177763
Earnings				
No controls	1.112215	0.5253565	0.5324563	0.3654337
A	0.6769815	0.1630107	0.3557076	0.2301551
B	0.6645264	0.1575745	0.346604	0.2248063
C	0.6278312	0.1493909	0.3384459	0.2219005
D	0.6145234	0.137626	0.3326911	0.2170742
E	0.524057	0.1020227	0.2826444	0.193963
F	0.5643386	0.1176898	0.3065366	0.2020921

Notes: This table presents the average college-by-program fixed effects by college type for different educational and labor-market outcomes estimated using Specification (3), weighted by the number of students in each cell. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), SABER T&T (Icfes), and PILA (MinSalud).

Table D.2: Robustness of Estimated Impact on College-Program "Value Added"

	Running variable					
	Panel A: SABER 11			**Panel B:** SISBEN		
	Coef.	SE	N	Coef.	SE	N
	(1)	(2)	(3)	(4)	(5)	(6)
Any degree attainment	0.032	(0.013)	130,343	0.079	(0.026)	19,461
Attainment VA: No controls	0.065	(0.004)	130,343	0.059	(0.008)	19,461
Attainment VA: A	0.020	(0.004)	130,343	0.031	(0.007)	19,461
Attainment VA: B	0.018	(0.004)	130,343	0.029	(0.007)	19,461
Attainment VA: C	0.010	(0.004)	130,343	0.019	(0.007)	19,461
Attainment VA: D	0.008	(0.004)	130,343	0.018	(0.007)	19,461
Attainment VA: E	-0.013	(0.004)	130,343	0.001	(0.007)	19,461
Attainment VA: F	-0.009	(0.004)	130,343	0.004	(0.007)	19,461
Bachelor's degree attainment	0.062	(0.016)	68,418	0.079	(0.022)	17,589
Bachelor's VA: No controls	0.079	(0.005)	68,418	0.066	(0.007)	17,589
Bachelor's VA: A	0.037	(0.004)	68,418	0.045	(0.006)	17,589
Bachelor's VA: B	0.033	(0.004)	68,418	0.042	(0.006)	17,589
Bachelor's VA: C	0.027	(0.004)	68,418	0.034	(0.006)	17,589
Bachelor's VA: D	0.026	(0.004)	68,418	0.034	(0.006)	17,589
Bachelor's VA: E	0.010	(0.004)	68,418	0.021	(0.006)	17,589
Bachelor's VA: F	0.011	(0.004)	68,418	0.023	(0.006)	17,589
SABER PRO score	0.055	(0.019)	35,479	0.020	(0.034)	12,476
SABER PRO score VA: No controls	0.201	(0.014)	35,364	0.084	(0.027)	12,454
SABER PRO score VA: A	0.083	(0.006)	35,364	0.041	(0.010)	12,454
SABER PRO score VA: B	0.081	(0.006)	35,364	0.040	(0.010)	12,454
SABER PRO score VA: C	0.081	(0.006)	35,364	0.043	(0.010)	12,454
SABER PRO score VA: D	0.083	(0.006)	35,364	0.044	(0.010)	12,454
SABER PRO score VA: E	0.102	(0.006)	35,364	0.060	(0.010)	12,454
SABER PRO score VA: F	0.107	(0.006)	35,364	0.061	(0.011)	12,454
Employment	0.029	(0.013)	284,747	-0.031	(0.026)	21,209
Employment VA: No controls	0.069	(0.004)	284,747	0.041	(0.007)	21,209
Employment VA: A	0.038	(0.003)	284,747	0.023	(0.006)	21,209
Employment VA: B	0.036	(0.003)	284,747	0.022	(0.006)	21,209
Employment VA: C	0.028	(0.003)	284,747	0.014	(0.005)	21,209
Employment VA: D	0.025	(0.003)	284,747	0.013	(0.005)	21,209
Employment VA: E	0.020	(0.003)	284,747	0.008	(0.005)	21,209
Employment VA: F	0.027	(0.003)	284,747	0.014	(0.005)	21,209
Earnings (in min wage)	0.231	(0.041)	284,747	0.152	(0.089)	21,209
Earnings VA: No controls	0.326	(0.017)	284,747	0.267	(0.035)	21,209
Earnings VA: A	0.223	(0.015)	284,747	0.197	(0.030)	21,209
Earnings VA: B	0.220	(0.014)	284,747	0.193	(0.029)	21,209
Earnings VA: C	0.203	(0.014)	284,747	0.179	(0.029)	21,209
Earnings VA: D	0.200	(0.014)	284,747	0.177	(0.029)	21,209
Earnings VA: E	0.171	(0.014)	284,747	0.152	(0.028)	21,209
Earnings VA: F	0.185	(0.014)	284,747	0.163	(0.029)	21,209

Notes: This table displays the reduced-form RD coefficients for different measures of college-program "value-added" using various baseline controls. *Sources:* Authors' calculations based on SABER 11 (Icfes), SISBEN (DNP), SNIES (MEN), SABER PRO (Icfes), SABER T&T (Icfes), and PILA (MinSalud).