Sibling Spillovers of Merit-Based Scholarships

Bogyung Kim*

September 3, 2026

Abstract

I study whether an older sibling's eligibility for Georgia's HOPE and Zell Miller Scholarships affects younger siblings' college enrollment. Using administrative data from a school district in the Metro Atlanta area, I use regression discontinuity designs around each scholarship's GPA eligibility threshold. HOPE eligibility increases younger siblings' college enrollment by 4.6 percentage points overall and 16 percentage points among low-income siblings, with especially large gains in access to four-year and moderately selective colleges. Zell eligibility, by contrast, leaves overall enrollment unchanged. Accounting for HOPE's within-family spillovers nearly doubles its estimated social return relative to recipient-based calculations, indicating that conventional evaluations understate the returns to merit-based aid.

Keywords: Merit-based Scholarship, Sibling Spillovers, College Enrollment

JEL Codes: I23, I26, J08

*Department of Economics, Andrew Young School of Policy Studies, Georgia State University. (Email: bkim74@student.gsu.edu). The author has no sources of research support, financial relationships, or other potential conflicts of interest to disclose. I am grateful to Jonathan Smith for his guidance and mentorship. The views in this paper are my own and do not necessarily reflect those of the anonymous public school district or the Georgia Policy Labs. I thank Seth Gershenson, Benjamin Marx, Tim Sass, and Daniel Kreisman, the 2026 Association for Education Finance & Policy meetings, and the 2026 Midwest Economic Association meetings for their valuable feedback and discussions, and Annick Simo for her assistance with data preparation. All remaining errors are my own.

1 Introduction

College students received $173 billion in grant aid in 2024–25 alone[1], and the returns to these investments are typically evaluated by tracking college success for the student who receives the aid. But what if financial aid generates benefits beyond the individuals who receive it? If aid changes the financial conditions, information constraints, or opportunities facing people connected to recipients, its effects may extend beyond the treated student and generate broader returns to educational investment. Understanding these spillovers is important for evaluating both the effectiveness of financial aid and the broader consequences of expanding college access.

One salient setting for such spillovers is the family. College investment decisions are closely tied to household resources. 66 percent of undergraduate students are financially dependent on their parents (Georgia Student Finance Commission, 2024), and aid awarded to one child can ease parental financial burdens (Bhargava et al., 2025) and potentially reshape educational investments across siblings. Families may also transmit information about college options. Younger siblings are more likely to attend the same college or pursue the same field of study as their older siblings (Aguirre and Matta, 2021; Altmejd et al., 2021; Goodman et al., 2019; Avdeev et al., 2024). These economic and informational linkages imply that a policy targeted at one student may affect the rest of the family. Yet despite extensive evidence on the effects of financial aid on recipients[2], little is known about their effects on other family members, particularly siblings.

In this paper, I study whether an older sibling's eligibility for Georgia's merit-aid scholarships, HOPE and Zell Miller Scholarships, affects a younger sibling's college enrollment. HOPE covers near-full tuition at eligible in-state institutions for students meeting a weighted GPA threshold of 3.0, while Zell covers full tuition for students meeting a GPA threshold of 3.7. HOPE increases eligible students' college enrollment and degree attainment, while Zell shifts enrollment towards in-state without improvement in attainment (Dynarski, 2000, 2002a; Cornwell et al., 2006; Dynarski, 2008; Kim, 2026). The substantial reduction in college costs under HOPE and Zell creates an opportunity to study whether financial aid benefits reach through the family.

I use student-level administrative data from a public school district in the Metro Atlanta area matched to National Student Clearinghouse college enrollment records. Using matched pairs of the two oldest siblings from the graduating cohorts 2012-2022, I exploit

[1] https://research.collegeboard.org/trends/student-aid/highlights

[2] For example, Deming and Dynarski (2010) summarizes studies evaluating federal and state programs, Dynarski and Scott-Clayton (2013) reviews studies on student financial aid programs, and Page and Scott-Clayton (2016) reviews postsecondary education policy in the United States.

each scholarship's sharp GPA cutoff that determines older siblings' eligibility and use a regression discontinuity design to examine younger siblings' college enrollment outcomes. This approach addresses sibling correlation because younger siblings' treatment variation arises solely from the older sibling's marginal eligibility. The RD design also mitigates the reflection problem (Manski, 1993, 2000), as the older sibling's eligibility at the GPA cutoff is determined before the younger sibling's college enrollment decisions and cannot be influenced by the younger sibling.

Older siblings' HOPE eligibility increases younger siblings' college enrollment by 4.6 percentage points. In particular, younger siblings are 7.5 percentage points more likely to enroll full-time, substantially exceeding the modest enrollment effect on direct recipients themselves (Kim, 2026). HOPE-eligible older siblings themselves do not shift toward full-time enrollment, since HOPE also covers part-time students. Yet the subsidy covers near-free tuition for HOPE-eligible older siblings and nothing for ineligible ones, and this gap appears to enable younger siblings to enroll more intensively when their older sibling qualifies for HOPE. Younger siblings are also more likely to enroll in in-state public colleges, where HOPE covers nearly all tuition. Since HOPE-eligible older siblings tend to choose in-state public colleges themselves (Kim, 2026), and younger siblings are 4.1 percentage points more likely to follow their older siblings to the same college, younger siblings are consequently more likely to enroll in in-state public colleges.

HOPE's positive spillovers are concentrated among younger siblings from low-income households, with low-income status proxied by whether students were ever eligible for free or reduced-price meals (FRPM)[3]. Younger siblings who were ever eligible for FRPM are 16 percentage points more likely to enroll in college, even more so for free-meal-eligible and persistently eligible FRPM siblings, with FRPM defined following Michelmore and Dynarski (2017). In particular, HOPE improves both college access and quality for low-income siblings. Younger siblings are 16.7 and 10.5 percentage points more likely to enroll in four-year and mid-tier selective institutions, respectively. The spillovers are especially large when low-income younger siblings attend high schools with low college enrollment rates, a setting where information about college-going may be more limited. In these information-constrained environments, older siblings' HOPE eligibility increases younger siblings' HOPE GPA and HOPE eligibility, and raises their probability of enrolling in HOPE-eligible in-state colleges by 25.9 percentage points.

However, this positive spillover does not extend to all merit-based aid. I find no

[3]Students in households with income below 185% of the federal poverty level qualify, and those receiving SNAP or TANF are automatically eligible for free or reduced-price meals. Additional information on FRPM eligibility criteria in Georgia is available at https://gadoe.org/snp/free-reduced-policy/.

significant effect of Zell Miller Scholarship eligibility on younger siblings' overall college enrollment, although eligibility shifts enrollment toward public colleges and reduces full-time enrollment. The absence of an enrollment effect may partly reflect the modest incremental subsidy provided by Zell. Because students who narrowly miss the Zell cutoff remain eligible for HOPE, which already covers 95 percent of tuition, the additional Zell premium may be too small to generate a meaningful positive spillover to younger siblings. Moreover, Zell-eligible older siblings are more likely to enroll in in-state colleges, but this shift is not accompanied by degree completion (Kim, 2026), potentially weakening the signal that could otherwise positively shape younger siblings' college choice. Consistent with this interpretation, Zell eligibility has no significant effect on younger siblings' in-state college enrollment, suggesting that the absence of a completion signal offsets whatever pull toward in-state options the older sibling's enrollment choice would otherwise generate, unlike the positive spillover observed under HOPE.

Zell's spillovers, like HOPE's, are concentrated among low-income siblings, but operate through a different channel. Rather than expanding college access, older siblings' Zell eligibility induces low-income younger siblings to substitute toward less costly forms of enrollment, shifting from full-time to part-time status and toward in-state public two-year colleges. Zell eligibility, moreover, does not increase younger siblings' enrollment in selective colleges. Because Zell encourages eligible students to choose in-state public institutions without improving persistence and graduation outcomes, families may revise their perceptions of attainable or desirable college pathways, narrowing the range of college options considered for younger siblings.

Two broad channels can explain the scholarships' spillovers to younger siblings: relaxed household budget constraints and within-family information transmission. Three alternative explanations are inconsistent with the evidence. A pure income effect, whereby a newly enrolled older sibling's added household expenses crowd out resources for younger siblings, would predict enrollment in lower-tuition colleges. Instead, younger siblings shift toward higher-tuition options. A sibling-discount mechanism is unlikely, since spillovers are larger among siblings separated by four or more years, who rarely overlap in college. And eligibility raises neither younger siblings' accelerated course-taking nor their academic achievement, ruling out a college-preparation channel.

The positive spillover effects of HOPE are largest among siblings with deeper and more persistent exposure to poverty, consistent with tuition savings from the HOPE program relaxing binding budget constraints. Information transmission also appears to matter in information-constrained environments, where an older sibling's scholarship availability increases younger siblings' HOPE eligibility and higher enrollment in

scholarship-eligible colleges. Among high-income families who are more likely to have unbinding budgets, the evidence still points to within-family information transmission. The shift toward less-selective colleges is consistent with older siblings' HOPE-induced changes in college choices reshaping younger siblings' expectations about appropriate college options. A similar pattern holds for the Zell Miller Scholarship, where Zell-eligible older siblings' no degree attainment has negatively influenced younger siblings' college choices. Overall, the two channels are not mutually exclusive, and the analysis does not allow a clean separation between them. The observed spillovers likely reflect the simultaneous operation of both channels, to varying degrees, across household contexts and scholarship designs.

Conventional cost-benefit analyses may understate HOPE's social return by focusing exclusively on direct recipients, since HOPE generates positive enrollment spillovers that reach beyond recipients. The program's direct fiscal cost reflects only the tuition subsidy paid to older, scholarship-eligible siblings. Younger siblings, who benefit indirectly, generate no additional direct tuition subsidy. Yet the wage premium associated with younger siblings' additional college degrees accrues as a social benefit, raising the program's true social return. Building on the Marginal Value of Public Funds (MVPF) framework of Hendren and Sprung-Keyser (2020), I extend the MVPF calculation in Kim (2026), which incorporates only the direct enrollment and completion effects of scholarship recipients. Incorporating the gains from younger siblings' increased in-state college enrollment raises the MVPF from 1.8 to 3.5 per dollar spent. These within-family spillovers therefore nearly double the estimated social return relative to conventional recipient-based evaluations.

The paper contributes to the literature on financial aid programs and sibling spillovers in higher education in three ways. First, financial aid's returns are not confined to the student who receives it. An older sibling's scholarship eligibility raises a younger sibling's own college enrollment, with spillovers concentrated among low-income families around the eligibility margin, even though earlier work raised concerns that HOPE disproportionately benefited higher-income students (Dynarski, 2000, 2002b, 2004). Prior evaluations of the HOPE Scholarship have measured the program's success by tracking recipients' enrollment, persistence, and completion (Dynarski, 2000, 2002a; Cornwell et al., 2006; Henry et al., 2004; Dynarski, 2008). Accounting for spillovers to siblings shows that its benefits extend beyond what these recipient-based measures capture.

Second, merit-based financial aid is itself a source of within-family educational spillovers. One child's scholarship availability changes an untreated sibling's own educational choices, extending existing evidence that older siblings shape younger siblings' choices through shared information, preferences, and family environments (Aguirre and

Matta, 2021; Altmejd et al., 2021; Goodman et al., 2019; Avdeev et al., 2024) to a financial-aid channel operating through both relaxed budget constraints and information transmission. The paper is most closely related to Jaramillo-Rojas and Sanchez (2026), who study sibling spillovers from a financial aid program in Colombia. I differ by examining pure merit-based scholarships in the United States using a regression discontinuity design around eligibility thresholds.

Finally, family spillovers are quantitatively important for evaluating the social return to public investment in higher education. Incorporating gains experienced by untreated younger siblings raises HOPE's estimated MVPF from 1.8 to 3.5 per dollar spent. Existing evaluations of merit-based scholarships, including MVPF calculations, focus almost exclusively on direct recipients (Hendren and Sprung-Keyser, 2020; Kim, 2026), which understates the program's true return to college access once these within-family spillovers are counted.

2 Background

2.1 HOPE and Zell Miller Scholarships

Georgia operates two statewide merit-based scholarships without need-based aid: the HOPE (Helping Outstanding Pupils Educationally) Scholarship and the Zell Miller Scholarship.[4] Established in 1993 and funded by lottery revenues, HOPE is among the earliest state-sponsored merit-based financial aid programs in the United States (Doyle, 2006), having awarded more than $15 billion to over 2.1 million students through the 2023–24 academic year.[5] The Zell Miller Scholarship was introduced in 2010–11 as a companion program covering full tuition for higher-achieving students. At the same time, HOPE shifted from covering full tuition to paying a fixed dollar amount per credit hour, which became partial coverage.

Both programs are available to Georgia residents who graduate from high school, have resided in Georgia for the 12 consecutive months before college enrollment, and enroll in an eligible in-state postsecondary institution. Neither program has an income requirement, making both purely merit-based. The weighted High School HOPE GPA determines academic eligibility. The HOPE GPA is a weighted average of core academic course grades computed by the Georgia Student Finance Commission (GSFC); AP, IB, and dual-enrollment grades of B through D receive an additional 0.5 weight. Students qualify

[4]Georgia introduced its first statewide need-based scholarship, the DREAMS Scholarship, in Fall 2026. See gafutures.org/dreams.

[5]Georgia Student Finance Commission, 2024.

for HOPE with a HOPE GPA of at least 3.0, while Zell requires a GPA of at least 3.7 together with a minimum SAT score of 1200 or an ACT score of 26. Students with a GPA below 3.0 are not eligible for either scholarship, while those between 3.0 and 3.7 remain eligible for HOPE but not Zell. Students can track their HOPE GPA on the GAFutures platform starting in tenth grade. GSFC announces the final HOPE GPA by June 30 following high school graduation. Although GSFC does not announce the final HOPE GPA until high school graduation, students can estimate it during 12th grade using their interim GPA through 11th grade and the official HOPE GPA calculation formula.[6] Beginning with the graduating class of 2016, GSFC introduced a rigor requirement (at least four credits of advanced coursework) to limit GPA inflation from lower-difficulty course-taking; 97.9 percent of graduates in the 2016–2023 cohorts satisfied this requirement.

The two scholarships cover tuition at eligible in-state colleges but differ in generosity at four-year public institutions. At four-year public institutions in the University System of Georgia (USG), Zell covers each institution's full tuition regardless of credit hours. HOPE pays a fixed dollar amount per credit hour, so its coverage rate varies across institutions, ranging from 78 to 98 percent of tuition. Appendix Figure A1 illustrates HOPE and Zell award amounts across USG institutions for students attempting 6 credit hours (part-time) and 12 credit hours (full-time). For full-time enrollees, the HOPE–Zell gap is relatively small in most colleges. However, at several higher-tuition institutions, HOPE covers only about 78 percent of tuition. At these institutions, the Zell premium reaches as much as $1,152 per semester, totaling up to $11,520 over a 120-credit degree for a full-time student. The Zell premium is smallest for students taking 15 credits per semester, as the HOPE award increases with the number of credits attempted (see Appendix Figure A2).

At two-year colleges in the Technical College System of Georgia (TCSG) and at the 34 eligible private institutions, HOPE and Zell provide the same award amount. At TCSG colleges, this flat award is approximately $1,600 per semester, which fully covers tuition (TCSG tuition is $107 per credit hour, or approximately $3,200 per year).[7] At eligible private colleges, the flat award is approximately $3,000 per semester. Both scholarships cover tuition only and do not pay mandatory fees or other educational expenses. Appendix Figure A2 shows tuition plus fees by USG institution; fees range from $320 to $818, with an average of $550 per semester. In addition, both are first-dollar awards and are not reduced by other financial aid sources.

Eligibility extends for 7 years from high school graduation for the graduating cohort of 2011–2018 and for 10 years from high school graduation for the graduating cohort

[6] For details on the GAFutures platform, see gafutures.org.

[7] Tuition and fee information for TCSG colleges is available at: https://www.tcsg.edu/parent-page/.

of 2019 or later. Once students complete the Free Application for Federal Student Aid (FAFSA), they are automatically considered for the scholarship; otherwise, they must submit a one-time online application through the Georgia Student Finance Application (GSFAPP). During college, recipients must maintain a cumulative college GPA of 3.0 for HOPE and 3.3 for Zell to remain eligible. The GSFC evaluates GPA at the 30-, 60-, and 90-credit-hour checkpoints, and students can gain, lose, and regain the scholarship. Students who fall below the Zell threshold but maintain a GPA of at least 3.0 remain eligible for HOPE funding. A full description of the eligibility criteria, renewal requirements, and institution-specific award amounts is provided in Appendix B.

2.2 Conceptual Framework

This section outlines the potential channels through which an older sibling's scholarship eligibility affects a younger sibling's college enrollment decision.

Relaxed Family Budget — The first set of mechanisms operates by relaxing household budget constraints when an older sibling is eligible for the aid. By covering nearly all tuition costs, the scholarship can free up household resources that would otherwise go toward the older sibling's college attendance. Financial aid awarded to one child can reduce parents' education-related borrowing (Bhargava et al., 2025), and parents can strategically allocate educational resources among their children, particularly when the household budget for educational investment is binding. The most direct channel is reallocating these savings toward the younger sibling's tuition or other college enrollment costs, which unambiguously increases the likelihood of college enrollment.

Families may also deploy scholarship-freed resources earlier in the younger sibling's educational trajectory, before college enrollment itself becomes relevant. By investing in more rigorous coursework, accelerated course-taking, tutoring, or other college-preparatory activities during high school, families can raise the younger sibling's probability of meeting college or scholarship eligibility thresholds. This pre-college investment channel thus operates indirectly, but still positively, on the younger sibling's college enrollment.

Knowledge Transmission — The intrafamily transmission of knowledge about college-going and scholarship eligibility plausibly shapes younger siblings' college decisions. When an older sibling enrolls through a merit-aid program, younger siblings and parents gain firsthand knowledge of eligibility requirements, eligible institutions, actual grant amounts, and the financial aid process and timing. This information may lower barriers

that often discourage first-generation and low-income students from pursuing higher education (Hoxby et al., 2013). Parents may also update their beliefs about college feasibility and affordability after observing the older child successfully navigate the process (Gurantz et al., 2020), making them more likely to encourage the younger sibling's enrollment. Beyond information about the college application or scholarship, older siblings can share their experiences at the specific colleges they attended and the factors that affected their utility, which may alter the set of college choices their younger siblings perceive as available. Older siblings may also serve as role models (Zajonc and Markus, 1975; Zajonc, 1976; Zang et al., 2023), raising the younger sibling's educational aspirations and normalizing college attendance as an attainable goal.

Older Sibling's College Enrollment — The last set operates through changes in older siblings' college enrollment behavior induced by their own HOPE eligibility. The income effect, if an older sibling's college enrollment crowds out a younger sibling's resources, arises because college attendance imposes substantial costs beyond tuition, including room and board, fees, and living expenses, that the scholarships do not cover. When scholarship eligibility pushes marginal older siblings to enroll who otherwise would not, households face new expenditures as younger siblings make their own enrollment decisions, potentially crowding out resources available to younger siblings. This channel operates in a negative direction for younger sibling enrollment and is most likely to bind in low-income households where budget constraints are tight.

The sibling discount through federal aid operates in the positive direction. Until the 2023–24 academic year, students with a sibling concurrently enrolled in college had their own federal aid eligibility increased.[8] This mechanism may incentivize a younger sibling's enrollment insofar as concurrent enrollment increases the federal aid available to the older sibling. This channel is likely stronger among sibling pairs with overlapping college enrollment windows and operates in a positive direction for younger sibling enrollment. Together, the income effect and the sibling discount capture two countervailing forces that arise when an older sibling's enrollment is itself the margin of response to HOPE.

3 Data

This study uses student-level administrative records from one large public school district in the metropolitan Atlanta area. The district is one of the top five largest districts in Georgia, comprising 106 schools serving more than 88,000 students in Academic Year

[8]The sibling discount was removed with the 2024–25 FAFSA simplification.

2025–26. I link high school records with matched sibling identifiers to postsecondary enrollment data from the National Student Clearinghouse (NSC).

3.1 High School Enrollment Data

The dataset covers high school graduating cohorts from 2012 through 2022 and includes 69,906 graduates. The data contains detailed information on scholarship eligibility, High School HOPE GPA, academic transcripts, enrollment histories, and student demographics. Academic transcripts include specific courses taken, letter or numeric grades, final high school HOPE GPA, and graduation status. The dataset includes demographic characteristics such as sex, race/ethnicity, English Learner status, disability status, and year-by-year eligibility for free or reduced-price meals, which I use as a proxy for socioeconomic disadvantage.

Academic eligibility for HOPE is based on the school district's official HOPE eligibility designation, which indicates whether a student qualifies and, for those who do not, records the reason for ineligibility (either failure to meet the rigor requirement or failure to meet the HOPE GPA threshold). The data do not directly measure Zell eligibility, which additionally requires a minimum SAT/ACT score. I therefore proxy eligibility using a sharp threshold: students with a HOPE GPA of at least 3.7 are classified as Zell-eligible. This proxy may misclassify students who meet the GPA threshold but lack a qualifying test score. This concern appears modest, however, as 98.92% of USG students from 2013–2019 with a HOPE GPA of at least 3.7 who ever attained the required SAT/ACT score received the Zell Miller Scholarship (Song and Rubenstein, 2024).

3.2 Matching Siblings

I identify sibling pairs by matching students who share the same last name and residential address in a given year among all students enrolled in the district between 2011 and 2022. This approach follows methods used in the sibling spillover literature with administrative data.[9] I exclude co-residing students with different last names, who may include cousins, step-siblings, or unrelated co-residents (Hunter et al., 1998; Gottfried and McGene, 2013). I further exclude students with incomplete or ambiguous address information to avoid false positives.[10]

[9]Recent studies of sibling spillovers using administrative data employ similar approaches, including those based on Florida school district data (Heissel, 2017; Karbownik and Özek, 2023), Philadelphia public schools (Gottfried and McGene, 2013), English administrative records (Nicoletti and Rabe, 2019, 2013), and College Board data (Goodman et al., 2015; Gurantz et al., 2020; Goodman et al., 2019).

[10]Some students living in apartment complexes lack unit numbers despite having otherwise complete addresses, making it difficult to verify co-residence at the household level. I classify addresses as either

Appendix Table A1 presents summary statistics for the only-child sample (students who were not matched with any other student based on the same last name and address) and the any-sibling sample (students who were matched with one or more other students). Among the 2011–2022 graduating cohort, 50.4 percent of students are matched with at least one sibling, and the average number of siblings is 2.3 students per household. While the matched-sibling sample yields false negatives and may differ from the unmatched sample in observable characteristics, these differences do not threaten internal validity or bias the estimated treatment effects.

After matching on name and address and assigning each matched group a family identifier, I compute birth-month gaps using students' birth year and month to measure age differences between siblings. Because I cannot distinguish twins' birth order, I randomly assign older- and younger-sibling flags for twin pairs. Of the 35,209 matched siblings, 1,696 are twins or triplets. I exclude from my main sample any sibling pairs born in the same year and month. As a robustness check, I relax the same-last-name restriction to include co-residing students with different last names, and I also run the regression including the twin sample.

3.3 National Student Clearinghouse and Supplemental Data

I link students to NSC postsecondary enrollment records. As of 2012, the NSC covers approximately 93% of U.S. postsecondary institutions and 95% of institutions in Georgia (Dynarski et al., 2015). The NSC provides detailed information on institutions attended, enrollment intensity, enrollment dates, majors for degree recipients, and degree attainment and timing.

The main outcomes include indicators for whether a student enrolls in any postsecondary institution within 16 months of high school graduation[11], whether the student enrolls in a Georgia institution, and whether the student enrolls in a four-year, full-time, or public institution. Because some students attend or transfer across multiple institutions, I focus on the first institution of enrollment after high school graduation.

The analysis further supplements the NSC records with institution-level data from the Integrated Postsecondary Education Data System (IPEDS) and 2009 Barron's college selectivity classifications to examine the effects of the scholarships on college selectivity

apartment complexes or single-family residences and retain only those with complete address information. Approximately 18.4% of student-year observations reside in apartment complexes, and 0.23% have incomplete address components.

[11] This definition follows the Georgia Office of Student Achievement's methodology for calculating college enrollment rates.

and tuition levels.[12] Using IPEDS data, I classify colleges into four selectivity tiers based on the 2015 average combined SAT Math and Evidence-Based Reading/Writing scores of enrolled students, using thresholds ranging from 900 to 1200 above, following Bueno et al. (2024).[13] These SAT thresholds correspond to broad categories of institutional selectivity in Georgia, where most public colleges fall between 900 and 1200 and only a few universities exceed 1200. I also use Barron's college selectivity classifications, defining selective colleges as those rated "Very Competitive Plus" or above (ratings of 1, 2, 3, and 4).

I use IPEDS data on in-state and out-of-state tuition and fees to examine whether younger siblings enroll in higher-cost institutions. I construct annual tuition measures by calculating institutional tuition distributions and defining indicators for institutions at or above the 25th, 50th, and 75th percentiles. Because tuition varies over time, institutions may fall into different categories from year to year. These quantiles are computed separately for all institutions and for Georgia institutions only.

3.4 Main Analysis Sample

In the main sibling sample, I limit the two oldest siblings to the first- and second-born children in households with two or three siblings.[14] Two siblings should be in their senior year so I can examine their post-graduation college-going decision. I exclude sibling pairs if younger siblings are too young to reach senior year or drop out of high school.

I restrict the older sibling analysis sample to high school graduates who resided in Georgia for at least 12 consecutive months before college enrollment, consistent with the residency requirements for both HOPE and Zell. Approximately 98% of graduates satisfy this criterion. I further restrict the sample to students who meet the academic rigor requirements for the 2016–2023 cohorts, so that variation in scholarship eligibility comes solely from the HOPE GPA. Approximately 97.9% of graduates meet this rigor requirement. Younger siblings are not required to meet the scholarship's residency or rigor requirements.

[12] Barron's selectivity ratings are available at: https://archive.nytimes.com/www.nytimes.com/interactive/2013/04/04/business/economy/economix-selectivity-table.html

[13] These thresholds correspond to national percentiles: 900 (29th), 1000 (48th), 1100 (69th), and 1200 (81st). See College Board (https://research.collegeboard.org/reports/sat-suite/understanding-scores/sat).

[14] The analysis focuses on the two oldest siblings because identifying spillover effects becomes more difficult when multiple older siblings may simultaneously influence outcomes. To maximize statistical power, I include households with up to three children, which account for 97.6% of the full matched-sibling sample.

3.5 Summary Statistics

Column 1 of Table 1 reports summary statistics for baseline characteristics and college enrollment outcomes for the full student sample. Among all graduates, 39 percent of students are Black, 45 percent were ever eligible for free or reduced-price meals (FRPM), and the mean HOPE GPA is 3.052. Compared with statewide averages in Georgia[15], the racial composition of the sample is similar, and the shares of English Learners and students with disabilities are also comparable to statewide figures. However, the proportion of FRPM-eligible students in the sample is lower than the statewide average of 64 percent. Overall, 76 percent of students enroll in college after graduating from high school, exceeding Georgia's statewide rate of 64.4 percent.[16]

Column 2 of Table 1 presents summary statistics for the sibling sample, focusing on the first- and second-born children in households with two or three siblings. Relative to the full sample, the sibling sample has a higher proportion of Asian and White students and a lower proportion of Black students. About 35.5 percent are ever eligible for FRPM, and the mean HOPE GPA is slightly higher at 3.15. Students in the sibling sample are also more likely to enroll in college (82 percent) and somewhat more likely to attend in-state institutions (58.7 percent).

Columns 3 and 4 of Table 1 report summary statistics for older siblings within the optimal bandwidth around the HOPE and Zell cutoffs, respectively. Compared with the HOPE RD sample, students near the Zell cutoff are more likely to be female, Asian, and White, and substantially less likely to be FRPM-eligible. College enrollment rates are high in both RD samples. Approximately 90 percent of those near the HOPE cutoff and 95.5 percent of those near the Zell cutoff enroll in college. Students near the Zell cutoff are considerably more likely to enroll in selective colleges, with roughly 70 percent attending institutions where the average SAT score exceeds 1200, and 63 percent attending a selective college under Barron's rating.

4 Empirical Strategy

Estimating the effects of the HOPE and Zell Miller Scholarships on college outcomes is challenging because scholarship-eligible students are systematically different from scholarship-ineligible students. For example, high-achieving students are more likely to qualify for scholarships and enroll in college, which may reflect differences in

[15]Student and school demographic data for Georgia are obtained from the Governor's Office of Student Achievement: https://gosa.georgia.gov/report-card-dashboards-data/report-card/contents-report-card/student-and-school-demographics.

[16]Governor's Office of Student Achievement, 2024–25.

parental investment, aspirations, and motivation.

Identifying sibling spillover effects of the scholarships presents additional challenges beyond estimating the direct effects on recipients. Siblings share both observed and unobserved characteristics that influence academic achievement and postsecondary enrollment, including family resources, parental preferences, neighborhood environments, and inherent cognitive skills (Black and Devereux, 2011). Moreover, siblings interact closely with one another, often more so than with their peers at school (Duncan et al., 2001). In educational settings, older siblings may influence younger siblings' academic achievement (Karbownik and Özek, 2023), college and major choice (Aguirre and Matta, 2021; Altmejd et al., 2021), and field of study in higher education (Avdeev et al., 2024). These interactions raise concerns discussed in the peer effects literature, including the reflection problem (Manski, 1993, 2000), whereby the outcomes of one sibling may simultaneously influence and be influenced by the outcomes of the other.

I use a regression discontinuity design based on the older sibling's sharp scholarship eligibility at the GPA threshold to address these empirical challenges. I compare younger siblings whose matched older siblings narrowly miss the GPA threshold with those whose older siblings narrowly meet it (Imbens and Lemieux, 2008), since these older-sibling groups are comparable except for GPA-based HOPE eligibility. This approach helps isolate spillover effects from older to younger siblings because the younger siblings' treatment variation arises solely from the older sibling's GPA. The RD design also mitigates the reflection problem, as the older sibling's marginal eligibility at the GPA cutoff is determined before and cannot be influenced by the younger sibling's college enrollment decisions.

4.1 Regression Discontinuity Design

I implement a sharp regression discontinuity design to estimate local average treatment effects. The RD design is sharp because none of the older siblings just below each cutoff are academically eligible for the scholarship, while those just above the cutoff are all academically eligible. I estimate reduced-form RD specifications that relate older siblings' scholarship eligibility to younger siblings' college enrollment outcomes.

$$Y^{y}_{istf} = \alpha_0 + \alpha_1 Above^{o}_{istf} + \alpha_2 D^{o}_{istf} + \alpha_3 Above^{o}_{istf} \times D^{o}_{istf} + \Omega X^{y}_{istf} + \psi_s + \delta_t + \epsilon_{istf}, \quad (1)$$

where Y^{y}_{istf} denotes the main outcomes of interest, college enrollment and choice, for younger siblings y in sibling pair f who belong to high school s in graduating cohort

t. $Above^{o}_{istf}$ equals one if the older sibling's HOPE GPA is at or above the cutoff (3.0 for HOPE and 3.7 for Zell). α_1 captures the intent-to-treat estimate of the effect of the older sibling's scholarship eligibility on the younger sibling's college enrollment outcomes. D^{o}_{istf} measures the distance of the older sibling's GPA from the relevant threshold. The interaction term $Above^{o}_{istf} \times D^{o}_{istf}$ allows for different linear trends on either side of the cutoff. X^{y}_{istf} includes the younger sibling's demographic characteristics, including gender, race/ethnicity, free or reduced-price meal eligibility, English learner status, and disability status. The specification includes high school and graduating cohort fixed effects, ψ_s and δ_t, respectively. Standard errors are clustered at the family level. I set the RD bandwidth to 0.3 around the HOPE cutoff and 0.25 around the Zell cutoff (Imbens and Kalyanaraman, 2012), based on optimal bandwidth selection using the on-time college enrollment outcome.

4.2 Validity Checks for RD Design

The validity of the RD design relies on the assumption that older siblings on either side of the cutoff are comparable and do not differ systematically, except for treatment assignment. To assess this, I examine covariate balance at both the HOPE and Zell cutoffs by testing whether observable characteristics, including gender, race/ethnicity, FRPM eligibility, English learner status, and disability status, vary smoothly around the thresholds. As shown in Appendix Table A2 and Appendix Table A3, and graphically in Appendix Figure A3 and Appendix Figure A4, most covariates appear balanced at both cutoffs. However, the regression estimates for the female indicator at the HOPE cutoff show a marginally significant difference with a nontrivial magnitude. While this pattern could reflect potential sorting near the cutoff, it may also arise by chance given the number of covariates examined. To mitigate this concern, all main specifications include controls for these baseline characteristics.

Another key assumption of the RD design is that the running variable is continuous at the cutoff. Visual inspection, however, reveals notable heaping at whole- and half-point GPA values around the HOPE cutoff, while the distribution around the Zell cutoff appears relatively smooth. Appendix Figure A5 Panel A shows heaping at every 0.5 point, including the HOPE cutoff of 3.0, and this pattern is similarly evident in the FRPM subgroups shown in Panels B (FRPM-eligible group) and C (FRPM non-eligible group). Although such heaping could raise concerns about manipulation, it likely reflects the mechanical construction of the HOPE GPA, which converts numeric grades into discrete letter grades on a four-point scale and applies a 0.5-point weight to AP, IB, and Dual Enrollment courses. Prior studies have documented similar patterns in both high school

and college GPAs (Bettinger et al., 2019; Bhargava et al., 2025; Barreca et al., 2016; Ost et al., 2018). As suggested by Ost et al. (2018), Appendix Figure A6 presents a simulated GPA distribution whose heaping pattern closely resembles that observed in the real GPA distribution, which is consistent with the heaping being driven largely by the mechanical construction of GPA rather than by intentional manipulation.

I examine the density of the running variable after excluding observations exactly at the cutoff, following Scott-Clayton and Schudde (2020). After removing students with a HOPE GPA exactly equal to 3.0, the density appears smooth around the threshold with no statistically significant discontinuity (Appendix Figure A5 Panel E). In contrast, both visual inspection and the formal density test show no evidence of bunching around the Zell cutoff (Appendix Figure A7). To further address heaping concerns, I implement a Donut RD design that separately excludes students with a HOPE GPA exactly equal to 3.0 and those with a HOPE GPA exactly equal to 3.7 (Barreca et al., 2016; Schudde and Scott-Clayton, 2016; Ost et al., 2018), and estimate specifications that incorporate trends-in-heaps for the HOPE cutoff, controlling for indicators of heaped GPA values and their interactions with a quadratic function of distance from the cutoff, as in Zimmerman (2014); Barreca et al. (2016).

Related to the continuity assumption, students should not be able to manipulate their running variable precisely around the cutoff. Several institutional features of the HOPE GPA calculation likely limit the scope for such manipulation. The GSFC centrally calculates HOPE GPAs using official transcripts submitted directly by accredited high schools. GSFC updates students' 9th-, 10th-, and 11th-grade HOPE GPAs each fall, and high schools must submit transcript data by September 1. As a result, students enter senior year with a GSFC-verified interim GPA based on completed core coursework, although the official final HOPE GPA is not issued until graduation. Because the HOPE GPA is a credit-weighted average of four years of core coursework, students could, in principle, use their interim GPA and remaining senior-year coursework to calculate the grades needed to reach the 3.0 threshold using the same formula GSFC uses.

In practice, however, students have limited scope to change their cumulative GPA during senior spring. Students take an average of 2.86 core courses during senior spring, accounting for 11 percent of their cumulative core coursework. Thus, with 89 percent of their cumulative core coursework already completed, a relatively small share of remaining coursework limits students' ability to precisely manipulate their cumulative GPA with one or two additional courses. In the robustness section, I test students' rigor-course taking around the cutoff in each grade to examine whether students are more or less likely to take additional coursework that could affect their HOPE GPA at the margin.

5 Results

5.1 Younger Sibling's College Enrollment

The older sibling's HOPE eligibility increases younger siblings' enrollment in college by 4.6 percentage points (Column 2 of Table 2), 5.8 percent relative to the control mean. Panel A of Figure 1 visually supports this finding, showing a clear upward discontinuity at the 3.0 GPA cutoff. This spillover effect exceeds the direct effect of HOPE eligibility on the eligible student's own college enrollment, estimated at 2.7 percentage points (Kim, 2026).

HOPE eligibility also increases younger siblings' probability of enrolling full-time by 7.5 percentage points, equivalent to a 10.7 percent increase relative to the control mean (Column 2 of Table 2). This effect is notably larger than the estimated direct effect of HOPE eligibility on recipients' own full-time enrollment (Kim, 2026), suggesting that the mechanisms underlying spillovers differ from those driving recipients' own enrollment intensity. Because HOPE subsidizes tuition in proportion to the number of credit hours attempted, both full-time and part-time students receive financial aid. Consequently, the program provides relatively weak incentives to increase recipients' enrollment intensity by switching from part-time to full-time, and its direct effect on full-time enrollment is expected to be modest. By contrast, relative to older siblings who receive no HOPE funding, the substantial tuition subsidy can potentially ease financial constraints, enabling younger siblings to enroll full-time. Alternatively, younger siblings may update their expectations about the affordability of full-time attendance after observing their older sibling's experience. Panel B of Figure 1 illustrates a positive spillover effect at the cutoff.

The spillover effects of HOPE extend beyond college attendance to younger siblings' institutional choices. Older siblings' HOPE eligibility increases younger siblings' in-state college enrollment by 7.5 percentage points (13.7 percent) and public college enrollment by 5.8 percentage points (7.5 percent) (Columns 4 and 6 of Table 2). Panels C and D of Figure 1 visually support positive enrollment effects at in-state and public institutions. One possible explanation is that younger siblings follow their older siblings' college choices. Younger siblings tend to follow their older siblings' same college if older siblings are marginally eligible for HOPE by 4.1 percentage points, though the effect is less precisely estimated (Appendix Table A4, Column 1). Because HOPE eligibility shifts older siblings toward in-state public colleges (Kim, 2026), younger siblings may subsequently enroll at those institutions.

The spillover effects of the Zell Miller Scholarship offer a different perspective on how merit-based scholarships affect siblings. Unlike HOPE, Zell does not affect younger

siblings' overall college attendance. Column 1 of Table 2 shows a null effect on overall enrollment, with a control mean substantially higher, at 92 percent. Panel A of Figure 2 shows no visible jump in overall enrollment at the Zell cutoff, consistent with this null result. Instead, Zell shifts enrollment from full-time to part-time status (Table 2 Columns 2-3), reducing full-time enrollment by 4.5 percentage points (5.2 percent) while increasing part-time enrollment by 4.8 percentage points. Panel B of Figure 2 illustrates this shift, showing a downward discontinuity in full-time enrollment at the cutoff. These null-to-negative effects likely reflect the older sibling's own college experience under Zell. Zell-eligible students disproportionately enroll in in-state public colleges without corresponding gains in graduation, and this less-than-successful experience may spill over to shape younger siblings' enrollment choices.

This same mechanism appears to extend to where younger siblings choose to enroll. The older sibling's Zell eligibility does not lead younger siblings toward in-state options. Column 4 of Table 2 shows a null effect on in-state college enrollment. Panel C of Figure 2 similarly shows no visible jump in in-state enrollment at the cutoff. Zell-eligible older siblings' null completion experience may narrow younger siblings' in-state options rather than expand them. Still, Zell-eligible younger siblings shift toward public colleges by 6.0 percentage points, suggesting that siblings may opt for less expensive options while remaining enrolled in college. Panel D of Figure 2 shows the corresponding upward discontinuity in public college enrollment at the cutoff.

5.2 Younger Sibling's College Choice by Selectivity

Older siblings' HOPE eligibility does not increase younger siblings' four-year college enrollment, nor does it increase younger siblings' enrollment in moderately selective institutions where average SAT scores are 900–1100 (Table 3 Panel A). But HOPE reduces enrollment in highly selective institutions, defined as colleges with average SAT scores of 1200 or higher or under Barron's ranking of selective colleges (Columns 6-7 of Table 3). Younger siblings are 7.4 percentage points (32 percent) less likely to enroll in average SAT 1200+ colleges, or 4.2 percentage points (27.5 percent) less likely in Barron's selective colleges. If older siblings are eligible for HOPE, they are more likely to choose lower-cost in-state public institutions and less likely to enroll in highly selective colleges (Kim, 2026); younger siblings may follow those enrollment decisions. The limited number of highly selective institutions in Georgia may further reinforce this pattern. Consistent with these estimates, Figure 3 shows no discernible discontinuity in enrollment at colleges with average SAT scores between 900 and 1100 (Panels B-D), but a clear negative discontinuity at institutions with average SAT scores of 1200 or higher and selective college (Panels E-F).

The pattern is similar for the Zell cutoff. Older siblings' Zell eligibility does not increase younger siblings' four-year college enrollment, nor does it increase enrollment in moderately selective institutions with average SAT scores between 900 and 1100 (Table 3 Panel B). However, Zell eligibility reduces younger siblings' enrollment in highly selective institutions. Younger siblings are 6.0 percentage points (12.8 percent) less likely to enroll in colleges with average SAT scores of 1200 or higher, though the corresponding estimate for Barron's selective colleges (-4.9 percentage points, 12.6 percent) is not statistically significant. Figure 4 visually supports no impacts in enrollment at colleges with average SAT scores between 900 and 1100 (Panels B-D), but a clear negative discontinuity at institutions with average SAT scores of 1200 or higher (Panel E). These results are broadly consistent with the HOPE spillover pattern, suggesting that older siblings' eligibility for either scholarship shifts younger siblings' enrollment away from highly selective institutions, mirroring older siblings' own tendency to choose lower-cost in-state institutions when eligible for merit-based aid (Kim, 2026).

5.3 Sibling Spillovers by Family Income

The sibling spillover effects differ markedly by socioeconomic status. Table 4 presents heterogeneous treatment effects by family income, with low-income status proxied by ever having been eligible for Free or Reduced-Price Meals (FRPM) during K–12 enrollment. By construction, low-income students are underrepresented near the merit-based scholarship cutoffs relative to higher-income students. Nevertheless, Panel A of Table 4 shows that older siblings' HOPE benefit is concentrated among younger siblings who are ever FRPM eligible. HOPE eligibility increases college enrollment among low-income younger siblings by 16.0 percentage points and makes them 20.1 percentage points more likely to enroll full-time (Column 2). Because HOPE eligibility primarily affects the extensive margin of college attendance among low-income older siblings (Kim, 2026), an older sibling's transition to college with financial support may substantially influence younger siblings' own enrollment decisions. Panels A and B in Figure 5 visually support different patterns by income status, where FRPM siblings solely drive the positive enrollment effects. Low-income younger siblings become 19.1 percentage points more likely to enroll in in-state and public institutions (Columns 5 and 7 of Table 4), suggesting that when they do enroll, they choose in-state public colleges. Panels C and D of Figure 5 illustrate these patterns, showing clear upward discontinuities in enrollment outcomes for ever-FRPM siblings at the HOPE cutoff, while never-FRPM siblings exhibit little response, consistent with their already high baseline enrollment rates.

College choice responses are also more pronounced among low-income families,

with HOPE eligibility shifting younger siblings toward better quality postsecondary options. Panel A of Table 5 shows that low-income younger siblings are 16.7 percentage points (30.3 percent) more likely to enroll in four-year colleges. It also increases younger siblings' attending moderately selective institutions when their older siblings are marginally HOPE-eligible, with no effect on highly selective colleges. Thus, HOPE eligibility pushes low-income younger siblings toward higher-intensity, higher-quality college options, without trading off college selectivity. In contrast, higher-income younger siblings are 4.6 percentage points less likely to enroll in four-year colleges. They are also less likely to attend selective institutions overall, with enrollment in highly selective colleges declining by 9.5 percentage points (29.7 percent). Panel A of Figure 7 illustrates this divergence: ever-FRPM siblings exhibit large positive gains in four-year college enrollment at the cutoff, whereas never-FRPM siblings display a modest negative discontinuity. Similar patterns emerge for college selectivity, as shown in Panels B-D of Figure 7, and a negative jump is only shown among never-FRPM siblings for highly selective colleges (Panels E-F).

One potential explanation for the negative spillover effects among higher-income families is that HOPE eligibility shifts older siblings away from out-of-state or private institutions, where they might otherwise enroll, and toward in-state public colleges (Kim, 2026). This shift in the older sibling's college choice may then influence the set of institutions younger siblings consider. Observing an older sibling attend an in-state public college with HOPE support may anchor families' expectations around similar institutions, even when they could afford more selective alternatives. Alternatively, families may revise their beliefs about the returns to college selectivity after observing the older sibling's experience at a HOPE-eligible institution, reducing the perceived value of investing in a more selective college for the younger sibling. Consequently, the older sibling's HOPE-induced enrollment decision may have downstream effects on younger siblings' college choices, potentially narrowing rather than expanding their institutional choices.

The sibling spillover of Zell is also concentrated among low-income families, primarily shifting college choice rather than expanding college access. Table 4 Panel B shows that college enrollment among ever-FRPM siblings is not responsive to older siblings' Zell eligibility. Figure 6 Panel A shows that ever-FRPM-eligible siblings have a lower rate of college enrollment than never-FRPM siblings, but neither group responds to older siblings' marginal eligibility for Zell. Rather than expanding access, low-income younger siblings tend to enroll in less expensive college options overall. Table 4 Panel B, Column 2, shows that ever-FRPM siblings shift 19.8 percentage points from full-time to part-time enrollment. Siblings also shift toward in-state public two-year colleges, mostly TCSG colleges, where sticker tuition is substantially lower than at four-year colleges (Columns

4 and 6 of Table 4 and Column 2 of Table 5). Figure 6 Panels B–D visually confirm that these effects come solely from siblings who were ever eligible for FRPM.

Zell eligibility does not lead younger siblings to enroll in selective colleges for both low- and high-income students. Table 5 Panel B, Columns 3–6, show that the estimates for selective college enrollment are negative, though not statistically significant, indicating that younger siblings of Zell-eligible older siblings tend to shift toward less selective colleges overall relative to siblings of non-Zell-eligible older siblings. Figure 8 Panels B–D show that ever-FRPM-eligible siblings are particularly less likely to enroll in mid-tier selective colleges, while Panels E–F show that never-FRPM siblings are less likely to enroll in highly selective colleges. One interpretation of this shift toward less expensive college choices is that younger siblings, or their parents, update their expectations based on the older sibling's college experience and then choose colleges for the younger sibling accordingly. Because Zell encourages recipients to choose in-state public institutions without improving persistence and graduation outcomes, families may revise their perceptions of attainable or desirable college pathways, narrowing the range of college options considered for younger siblings.

5.4 Robustness Checks

I conduct additional analyses to assess the robustness of the main findings across alternative specifications. First, I re-estimate the RD model under two alternative specifications: one that excludes student demographic covariates, and one that applies a triangular kernel that places greater weight on observations closer to the cutoff. As shown in the first and second rows of Appendix Table A5 for HOPE and Appendix Table A6 for Zell, both approaches yield estimates broadly consistent in magnitude with the main results for both the full sibling sample and subsamples by family income. Next, I re-estimate the regressions excluding observations at the exact cutoff using a Donut RD design to address concerns about GPA heaping, following Barreca et al. (2011, 2016). These estimates are reported in the third row of Appendix Table A5 for HOPE and Appendix Table A6 for Zell across all college enrollment outcomes. The Donut RD yields point estimates in a similar magnitude to the baseline results, with standard errors generally comparable to or slightly larger than those in the baseline for both the full sample and subsamples by family income. I also implement the Trends-in-Heaps approach for the HOPE cutoff, following Barreca et al. (2016) and Zimmerman (2014), to further examine potential bias from nonrandom heaping at the HOPE cutoff. This specification incorporates indicator variables for heaped GPA values and interacts them with a quadratic function of distance from the cutoff, allowing for level shifts at heaped points and flexible slopes near the

threshold. As shown in the fourth row of Appendix Table A5, the resulting estimates are broadly similar in magnitude and statistical significance to the main estimates.

Next, I assess the estimates' sensitivity to alternative bandwidth choices by estimating the models with both narrower and wider bandwidths than the optimal bandwidth, under both local linear and quadratic specifications. As shown in Appendix Figure A8 for HOPE and Appendix Figure A9 for Zell, the local linear estimates remain broadly stable across bandwidth choices, whereas the quadratic estimates exhibit larger standard errors. The overall patterns remain qualitatively similar across specifications, suggesting that the main findings are reasonably robust to alternative bandwidth choices and functional forms.

As a falsification test, I implement a placebo cutoff test by estimating the model at every 0.05-point increment from 2.6 to 3.4, holding the bandwidth fixed across specifications. The largest and statistically significant discontinuities occur at the true cutoff, whereas estimates at placebo cutoffs are generally smaller and not statistically significant (see Appendix Figure A10 for HOPE and Appendix Figure A11 for Zell). This pattern supports the interpretation that the estimated effects are driven by the policy-relevant cutoff rather than arbitrary features of the GPA distribution.

Finally, I examine whether older siblings near the eligibility threshold adjust their course-taking behavior in ways that could mechanically affect their HOPE GPA, addressing concerns about potential manipulation around the cutoff.[17] Specifically, I regress the number of AP, IB, Dual Enrollment, and other rigor-related courses taken on marginal eligibility status for students in 10th, 11th, and 12th grades. I do not detect statistically significant differences in course-taking patterns within the main RD sample across grades, providing limited evidence of systematic manipulation around the HOPE GPA threshold. Corresponding estimates are reported in Appendix Table A7.

6 Mechanisms and Heterogeneous Analysis

6.1 Mechanisms

Which mechanisms could explain the positive enrollment spillovers of an older sibling's HOPE eligibility on a younger sibling? The evidence provides little support for several alternative explanations. The spillovers are unlikely to be driven solely by the older sibling's college attendance. The "Income Effect" channel holds that marginal older

[17] Ideally, one could use the intermediate HOPE GPA as the running variable to assess whether effects persist before senior year. In practice, estimates using intermediate GPA measures are imprecise, limiting their usefulness for this purpose.

siblings enroll in college because of their own HOPE eligibility, increasing household spending on the older sibling's tuition and potentially crowding out resources available to younger siblings. This is unlikely to be the driving mechanism. Younger siblings do not shift toward lower-priced colleges, even among low-income siblings (Appendix Table A8). The "Sibling Discount" channel, under which households receive larger federal financial aid when multiple children are enrolled in college concurrently, can be ruled out based on the larger spillover effects observed among siblings separated by four or more years, when overlap in college attendance is less likely (see Panel A of Appendix Figure A12). The evidence also does not support a pre-college investment channel. If scholarship-induced savings were invested in younger siblings' academic preparation, participation in AP, IB, or dual-enrollment coursework might increase. Yet Appendix Table A9 shows largely null effects on both participation and course intensity across all income groups.

The evidence points to a relaxation of household budgets as one of the key mechanisms behind HOPE's positive spillover effects on college enrollment, particularly for financially constrained families. Following Michelmore and Dynarski (2017), I classify FRPM-eligible younger siblings as either persistently eligible throughout high school or eligible only for free meals. Panel A of Appendix Table A10 shows that spillover effects are largest among students experiencing deeper or more persistent poverty. Consistent with this pattern, the effects are strongest for students attending high-poverty high schools (Panel B of Appendix Table A10). Positive enrollment gains are also larger in three-child households than in two-child households, although the estimates are less precise (Panel A of Appendix Table A12), consistent with larger benefits from relaxing household budget constraints when limited resources must be shared among more children.

Budget relaxation, however, does not fully explain the results. Low-income households also tend to have less access to information about college and financial aid, making within-family information transmission another plausible mechanism. I examine heterogeneity in the information environment of the younger sibling's high school. Among low-income students attending high schools with high college enrollment rates and relatively more college-related information, older siblings' HOPE eligibility increases college enrollment without improving HOPE GPA or scholarship eligibility (see Panel A of Appendix Table 6). Since academic preparation and scholarship attainment remain unchanged, these results suggest that students may already have adequate information about college preparation and scholarship requirements, and were instead constrained by financial resources.

In contrast, among low-income students attending high schools with low college enrollment rates, where access to college-related information is more limited, an older

sibling's HOPE eligibility substantially increases younger siblings' own HOPE GPA and scholarship eligibility (see Panel B of Appendix Table 6). These findings suggest that older siblings' HOPE eligibility plays a central role in conveying information about scholarship requirements and application procedures, thereby improving younger siblings' scholarship eligibility. Although younger siblings have a higher probability of being HOPE eligible, they are still not more likely to take accelerated courses, which could otherwise improve their overall chances of college enrollment (Columns 6-8 in Panel B of Appendix Table 6). Overall, household budget relaxation appears to operate broadly among low-income families, while information transmission matters where the local information environment is weak. Spillover effects are largest in schools with the lowest baseline college-going rates (Appendix Table A13). Although overall enrollment is larger among siblings separated by four or more years, positive spillovers on scholarship-eligible college enrollment are concentrated among siblings separated by fewer than four years (See Panel A of Appendix Figure A12), who are more likely to exchange up-to-date information and influence one another's college decisions (Whiteman et al., 2011; Avdeev et al., 2024).

The evidence supports an information channel among high-income households, where financial constraints are less likely to bind. HOPE eligibility reduces younger siblings' four-year college enrollment and enrollment at selective institutions, without affecting overall college enrollment. Because HOPE induces some high-achieving older siblings to attend in-state public and less-selective colleges, younger siblings may revise their college aspirations and application decisions based on their older siblings' firsthand experiences. A similar pattern holds for Zell spillovers, where Zell-eligible older siblings' lack of degree attainment has negatively influenced younger siblings' college options.

Finally, I examine whether spillovers depend on the older sibling's college success. Using second-semester persistence as the proxy for early college success, younger siblings still show positive but substantially small enrollment effects when the older sibling does not persist into the second semester (Appendix Table A14).[18] Compared to older siblings

[18]Younger siblings' college enrollment decisions may also be shaped by the older sibling's college outcomes beyond initial enrollment. However, estimating spillover effects as a function of the older sibling's college success, persistence, and completion presents identification challenges. The older sibling's college outcomes may be influenced by the younger sibling's college enrollment, particularly in narrower age-gap pairs, where siblings are more likely to be simultaneously college-aged. In addition, the older sibling's persistence is endogenous to scholarship retention, which, in turn, depends on academic performance. For example, households with higher educational aspirations may systematically produce older siblings who both retain their scholarships and persist through college, confounding any estimated relationship with younger siblings' outcomes. To mitigate these identification challenges, I focus on the older sibling's second-semester persistence during the first year of college as a more cleanly identified measure of early college success. Second-semester persistence is not contingent on scholarship retention policy, as the academic performance checkpoint for renewal occurs at the end of the academic year rather than at the semester level. Moreover, the second semester of the older sibling's first year occurs sufficiently early that the younger

who persisted into their second semester of college, spillover effects among younger siblings of older siblings who dropped out remain positive but not statistically significant. This suggests that older siblings' early college persistence matters for younger siblings' college enrollment decisions. Overall, the economic and information channels are not mutually exclusive. Although the available data cannot fully disentangle relaxed household budgets from family-level information learning, the combined evidence is consistent with spillovers operating through both relaxed household budgets and within-family information transmission.

6.2 Additional Heterogeneity

Appendix Table A15 presents spillover effects by the gender composition of siblings. Overall, spillover effects are somewhat larger among mixed-gender sibling pairs than among same-gender pairs.[19] Among mixed-gender pairs, Panel A in Appendix Figure A13 shows the largest effects for older sister–younger brother pairs. This pattern might reflect either stronger information transmission from older sisters or differential parental resource allocation across sons and daughters, although the available data do not allow us to distinguish between these explanations. Spillover effects on college selectivity, however, do not exhibit a systematic pattern across sibling gender compositions (Panel C in Appendix Figure A13).

Spillover effects also vary across demographic groups. Panel A of Appendix Figure A14 shows that the positive spillover effects of HOPE are particularly pronounced among Black and Hispanic siblings. These groups have relatively low baseline college enrollment rates, suggesting that within-family spillovers may matter most when barriers to college attendance are greater. In contrast, Panel B shows that Zell eligibility is associated with lower enrollment in four-year, full-time, and selective colleges among Black and Hispanic students, despite little effect on overall college attendance. This pattern mirrors the broader Zell results, suggesting the scholarship primarily shifts college choice rather than expanding access. Together, these additional heterogeneity analyses reinforce the main findings: HOPE effects are concentrated among historically underserved pop-

sibling is unlikely to have made consequential college-going decisions yet, mitigating the threat of reverse causality.

[19]The existing sibling spillover literature often finds stronger effects among same-gender siblings, consistent with social learning through closer identification (Nicoletti and Rabe, 2019; Joensen and Nielsen, 2018; Dahl et al., 2024). In the present setting, however, gender differences are difficult to interpret because parental allocation of educational resources may vary by children's gender and interact with household financial constraints (Karbownik and Myck, 2017). Since the estimated spillovers are concentrated among low-income families, these channels cannot be cleanly separated. The results are therefore presented descriptively rather than as evidence for a particular mechanism.

ulations, whereas Zell spillovers mainly influence the types of colleges younger siblings choose to attend.

7 Welfare Analysis

I evaluate the social return to the HOPE Scholarship using the Marginal Value of Public Funds (MVPF) framework of Hendren and Sprung-Keyser (2020), which measures the ratio of a marginal student's willingness to pay (WTP) for additional education to the net fiscal cost of providing the scholarship. A conventional recipient-based MVPF captures only the direct earnings gains accruing to scholarship recipients. However, if recipients' increased educational attainment induces younger siblings to enroll in college, ignoring these positive externalities will understate the program's full social return.

I extend the standard MVPF framework to incorporate sibling spillovers. On the benefit side, I augment the recipient's WTP with the expected earnings gains of younger siblings whose college enrollment the recipient's scholarship induces, assuming the recipient internalizes their siblings' welfare. On the cost side, I account for the additional state appropriations associated with siblings' enrollment, net of the fiscal externality from increased state tax revenue. The scholarship cost itself remains unchanged, as HOPE is awarded only to the recipient.

The baseline MVPF, which captures only direct recipient benefits, is \$1.81 per dollar spent (Kim, 2026). Incorporating sibling spillovers raises the estimated MVPF to \$3.54, roughly double relative to the conventional recipient-based estimate. The sibling channel accounts for approximately 44 percent of the extended return of investment, underscoring that intrahousehold spillovers are a quantitatively meaningful component of the program's social return. Appendix D provides the full derivation and decomposition of HOPE's extended welfare analysis.

8 Conclusion and Policy Implications

This paper shows that the benefits of merit-based financial aid extend beyond the students who receive it, and that these spillovers depend on scholarship design. Using administrative data linking K-12 records from a large school district in metropolitan Atlanta to National Student Clearinghouse enrollment records, I estimate sibling spillover effects by exploiting the GPA eligibility cutoffs for the HOPE and Zell Miller Scholarships in a regression discontinuity design. An older sibling's HOPE eligibility increases younger siblings' overall college enrollment, showing that the program's benefits extend to other household members. Zell eligibility, by contrast, leaves younger siblings' overall enroll-

ment unchanged and instead shapes their college choice, shifting them toward less costly enrollment options.

For both scholarships, spillover effects concentrate among low-income families, while high-income families do not respond to aid available to one child. Among low-income households, an older sibling's HOPE eligibility increases younger siblings' enrollment at higher-quality postsecondary options, consistent with relaxed household budget constraints. Exposure to an older sibling's scholarship experience also shapes younger siblings' own likelihood of qualifying for HOPE, particularly where college-related information at school is limited. Zell eligibility, however, shifts low-income younger siblings toward part-time enrollment and lower-cost institutions rather than expanding their access, partially explained by the absence of a completion gain among Zell-eligible older siblings and the relatively small tuition premium Zell offers over HOPE.

Conventional cost-benefit analyses typically consider only the outcomes of direct recipients and therefore may substantially understate the social returns to financial aid. Accounting for spillovers to younger siblings nearly doubles the estimated social return to HOPE relative to recipient-based estimates. Because these spillovers are concentrated among low-income households at the eligibility margin, positive enrollment spillovers also help offset longstanding concerns that HOPE disproportionately benefits higher-income students. More broadly, the findings suggest that financial aid policies can influence educational investment at the household level rather than solely at the individual level, and that a scholarship's design and its effect on recipients' own outcomes shape whether those effects extend to siblings. Incorporating family spillovers into policy evaluation therefore provides a more complete assessment of the returns to public investment in higher education.

References

Aguirre, J. and J. Matta (2021). Walking in your footsteps: Sibling spillovers in higher education choices. *Economics of Education Review 80*, 102062.

Altmejd, A., A. Barrios-Fernández, M. Drlje, J. Goodman, M. Hurwitz, D. Kovac, C. Mulhern, C. Neilson, and J. Smith (2021). O brother, where start thou? sibling spillovers on college and major choice in four countries. *The Quarterly Journal of Economics 136*(3), 1831–1886.

Avdeev, S., N. Ketel, H. Oosterbeek, and B. Van Der Klaauw (2024). Spillovers in fields of study: Siblings, cousins, and neighbors. *Journal of Public Economics 238*, 105193.

Barreca, A. I., M. Guldi, J. M. Lindo, and G. R. Waddell (2011). Saving babies? revisiting the effect of very low birth weight classification. *The quarterly journal of economics 126*(4), 2117–2123.

Barreca, A. I., J. M. Lindo, and G. R. Waddell (2016). Heaping-induced bias in regression-discontinuity designs. *Economic inquiry 54*(1), 268–293.

Bartik, T. J., B. Hershbein, and M. Lachowska (2016). The merits of universal scholarships: Benefit-cost evidence from the kalamazoo promise. *Journal of Benefit-Cost Analysis 7*(3), 400–433.

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

Bhargava, P., S. E. Black, J. T. Denning, R. W. Fairlie, and O. Gurantz (2025). A family affair: The effects of college on parent and student finances. Technical report, National Bureau of Economic Research.

Black, S. E. and P. J. Devereux (2011). Recent developments in intergenerational mobility. *Handbook of labor economics 4*, 1487–1541.

Bueno, C., L. Page, and J. Smith (2024). Assessing atlanta's placed-based college scholarship. *AERA Open 10*, 23328584241287459.

Cornwell, C., D. B. Mustard, and D. J. Sridhar (2006). The enrollment effects of merit-based financial aid: Evidence from georgia's hope program. *Journal of Labor Economics 24*(4), 761–786.

Dahl, G. B., D.-O. Rooth, and A. Stenberg (2024). Intergenerational and sibling spillovers in high school majors. *American Economic Journal: Economic Policy 16*(3), 133–173.

Deming, D. and S. Dynarski (2010). College aid. In *Targeting investments in children: Fighting poverty when resources are limited*, pp. 283–302. University of Chicago Press.

Doyle, W. R. (2006). Adoption of merit-based student grant programs: An event history analysis. *Educational evaluation and policy analysis 28*(3), 259–285.

Duncan, G. J., J. Boisjoly, and K. Mullan Harris (2001). Sibling, peer, neighbor, and schoolmate correlations as indicators of the importance of context for adolescent development. *Demography 38*, 437–447.

Dynarski, S. (2000). Hope for whom? financial aid for the middle class and its impact on college attendance. *National tax journal 53*(3), 629–661.

Dynarski, S. (2002a). The behavioral and distributional implications of aid for college. *American Economic Review 92*(2), 279–285.

Dynarski, S. (2002b). The consequences of merit aid.

Dynarski, S. (2004). The new merit aid. In *College choices: The economics of where to go, when to go, and how to pay for it*, pp. 63–100. University of Chicago Press.

Dynarski, S. (2008). Building the stock of college-educated labor. *Journal of human resources 43*(3), 576–610.

Dynarski, S. and J. Scott-Clayton (2013). Financial aid policy: Lessons from research.

Dynarski, S. M., S. W. Hemelt, and J. M. Hyman (2015). The missing manual: Using national student clearinghouse data to track postsecondary outcomes. *Educational Evaluation and Policy Analysis 37*(1_suppl), 53S–79S.

Georgia Student Finance Commission (2024, December). Georgia college completion grant program: Patterns and trends – fiscal year 2024. Technical report, Georgia Student Finance Commission.

Goodman, J., M. Hurwitz, C. Mulhern, and J. Smith (2019). O brother, where start thou? sibling spillovers in college enrollment. Technical report, National Bureau of Economic Research.

Goodman, J., M. Hurwitz, J. Smith, and J. Fox (2015). The relationship between siblings' college choices: Evidence from one million sat-taking families. *Economics of Education Review 48*, 75–85.

Gottfried, M. A. and J. McGene (2013). The spillover effects of having a sibling with special educational needs. *The Journal of Educational Research 106*(3), 197–215.

Gurantz, O., M. Hurwitz, and J. Smith (2020). Sibling effects on high school exam taking and performance. *Journal of Economic Behavior & Organization 178*, 534–549.

Heissel, J. A. (2017). Teenage motherhood and sibling outcomes. *American economic review 107*(5), 633–637.

Hendren, N. and B. Sprung-Keyser (2020). A unified welfare analysis of government policies. *The Quarterly journal of economics 135*(3), 1209–1318.

Henry, G. T., R. Rubenstein, and D. T. Bugler (2004). Is hope enough? impacts of receiving and losing merit-based financial aid. *Educational Policy 18*(5), 686–709.

Hoxby, C., S. Turner, et al. (2013). Expanding college opportunities for high-achieving, low income students. *Stanford Institute for Economic Policy Research Discussion Paper 12*(014), 7.

Hunter, A. G., J. L. Pearson, N. S. Ialongo, and S. G. Kellam (1998). Parenting alone to multiple caregivers: Child care and parenting arrangements in black and white urban families. *Family Relations 47*(4), 343–353.

Imbens, G. and K. Kalyanaraman (2012). Optimal bandwidth choice for the regression discontinuity estimator. *The Review of economic studies 79*(3), 933–959.

Imbens, G. W. and T. Lemieux (2008). Regression discontinuity designs: A guide to practice. *Journal of econometrics 142*(2), 615–635.

Jaramillo-Rojas, E. and F. Sanchez (2026). Beyond recipients: Sibling spillovers of college financial aid.

Joensen, J. S. and H. S. Nielsen (2018). Spillovers in education choice. *Journal of Public Economics 157*, 158–183.

Karbownik, K. and M. Myck (2017). Who gets to look nice and who gets to play? effects of child gender on household expenditures. *Review of Economics of the Household 15*(3), 925–944.

Karbownik, K. and U. Özek (2023). Setting a good example?: Examining sibling spillovers in educational achievement using a regression discontinuity design. *Journal of Human Resources 58*(5), 1567–1607.

Kim, B. (2026). The role of georgia's hope scholarship on college enrollment, persistence, and completion. Unpublished manuscript.

Manski, C. F. (1993). Identification of endogenous social effects: The reflection problem. *The review of economic studies 60*(3), 531–542.

Manski, C. F. (2000). Economic analysis of social interactions. *Journal of economic perspectives 14*(3), 115–136.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of econometrics 142*(2), 698–714.

Michelmore, K. and S. Dynarski (2017). The gap within the gap: Using longitudinal data to understand income differences in educational outcomes. *AERA Open 3*(1), 2332858417692958.

Nicoletti, C. and B. Rabe (2013). Inequality in pupils' test scores: How much do family, sibling type and neighbourhood matter? *Economica 80*(318), 197–218.

Nicoletti, C. and B. Rabe (2019). Sibling spillover effects in school achievement. *Journal of Applied Econometrics 34*(4), 482–501.

Ost, B., W. Pan, and D. Webber (2018). The returns to college persistence for marginal students: Regression discontinuity evidence from university dismissal policies. *Journal of Labor Economics 36*(3), 779–805.

Page, L. C. and J. Scott-Clayton (2016). Improving college access in the united states: Barriers and policy responses. *Economics of Education Review 51*, 4–22.

Ribar, D. and R. Rubenstein (2021). Dynamics of merit-based scholarships in georgia. *GPL Reports 8*, –.

Schudde, L. and J. Scott-Clayton (2016). Pell grants as performance-based scholarships? an examination of satisfactory academic progress requirements in the nation's largest need-based aid program. *Research in Higher Education 57*, 943–967.

Scott-Clayton, J. and L. Schudde (2020). The consequences of performance standards in need-based aid: Evidence from community colleges. *Journal of Human Resources 55*(4), 1105–1136.

Song, Y. and R. Rubenstein (2024). How does reducing merit-aid generosity and certainty affect college choices? evidence from georgia's hope scholarship. *Research in Higher Education 65*(1), 1–41.

Whiteman, S. D., S. M. McHale, and A. Soli (2011). Theoretical perspectives on sibling relationships. *Journal of family theory & review 3*(2), 124–139.

Zajonc, R. B. (1976). Family configuration and intelligence: Variations in scholastic aptitude scores parallel trends in family size and the spacing of children. *Science 192*(4236), 227–236.

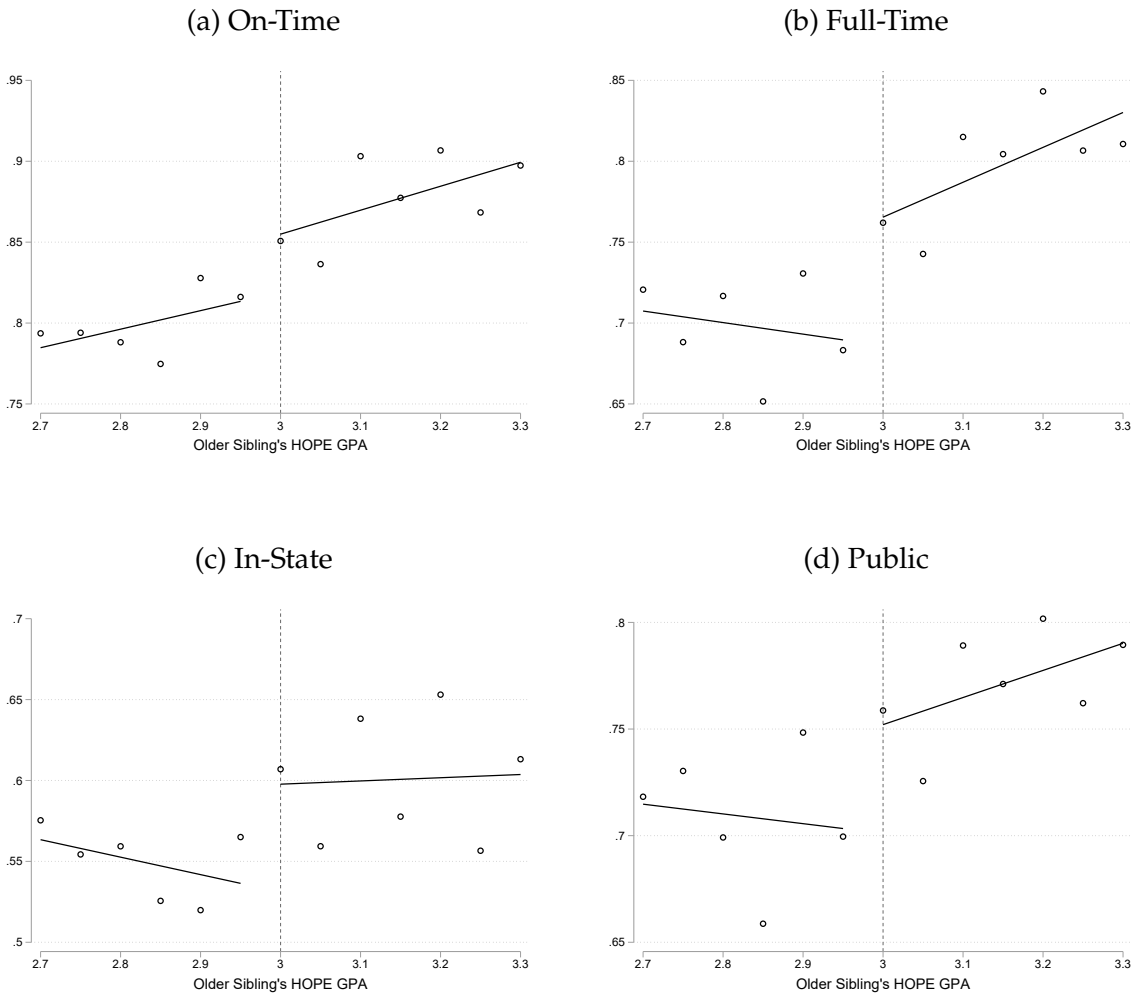
Zajonc, R. B. and G. B. Markus (1975). Birth order and intellectual development. *Psychological review 82*(1), 74.

Zang, E., P. L. Tan, and P. J. Cook (2023). Sibling spillovers: Having an academically successful older sibling may be more important for children in disadvantaged families. *American Journal of Sociology 128*(5), 1529–1571.

Zimmerman, S. D. (2014). The returns to college admission for academically marginal students. *Journal of Labor Economics 32*(4), 711–754.

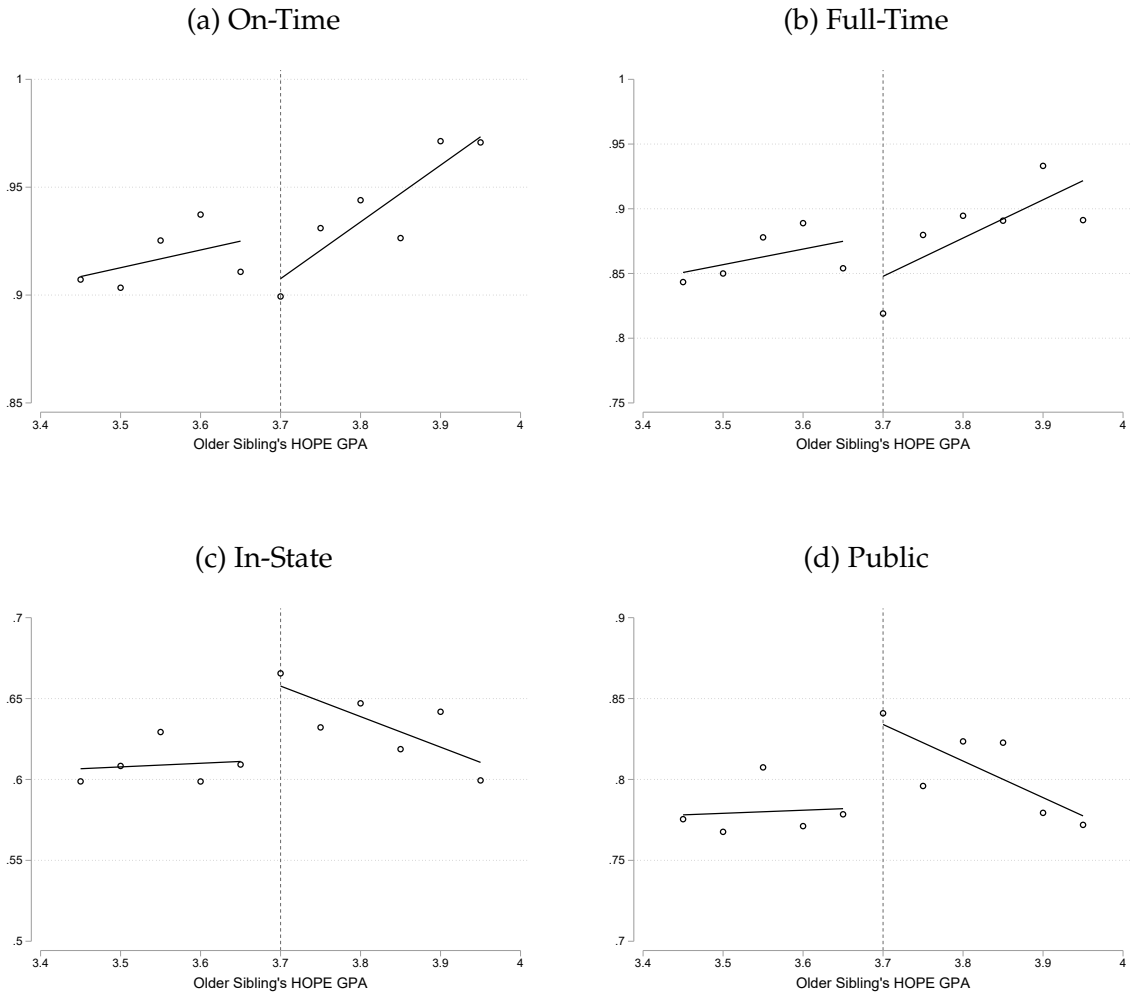
Figures

Figure 1: Sibling Spillover Effects on College Enrollment: HOPE Scholarship



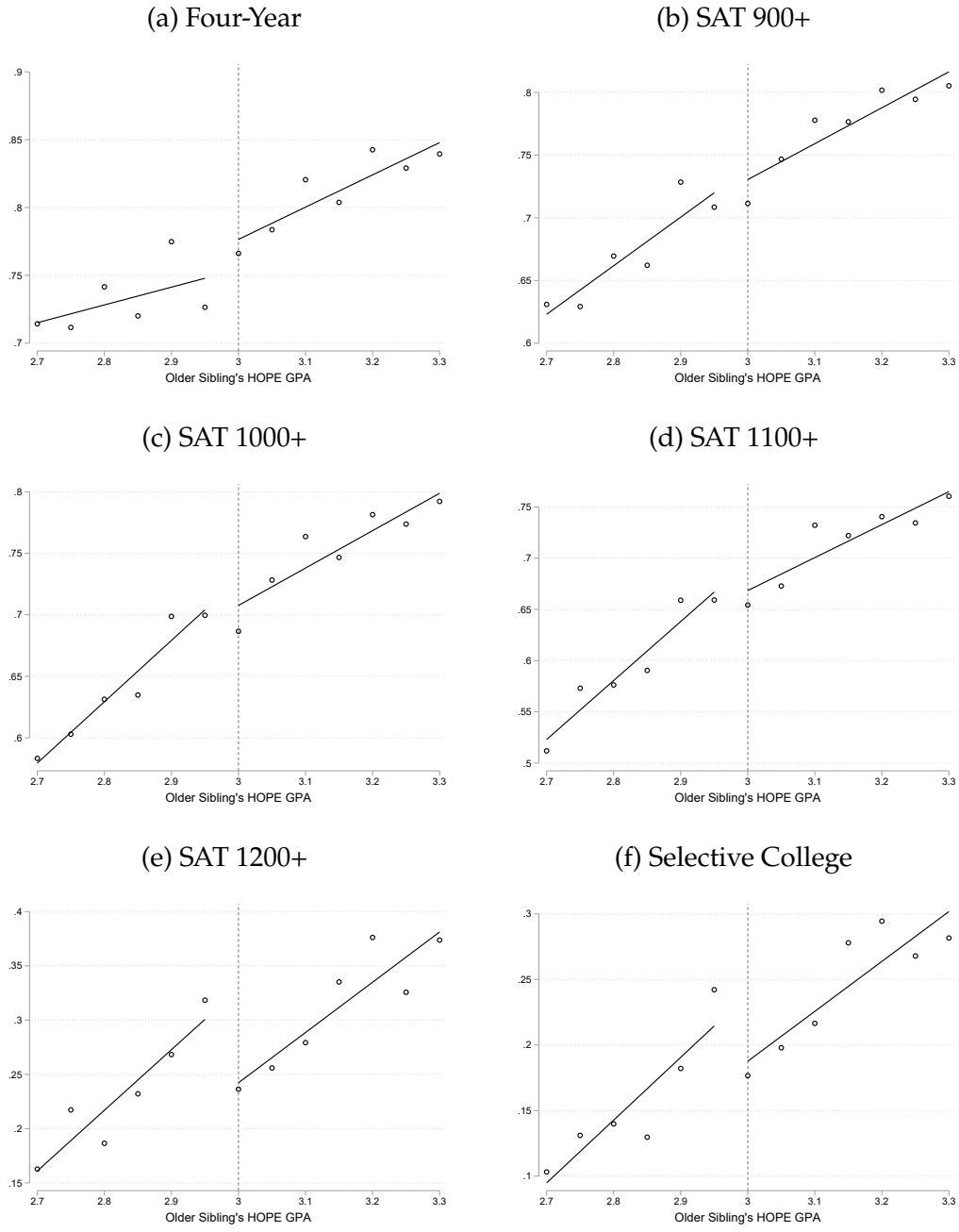
Source: National Student Clearinghouse.
Note: Each panel presents regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 2: Sibling Spillover Effects on College Enrollment: Zell Miller Scholarship



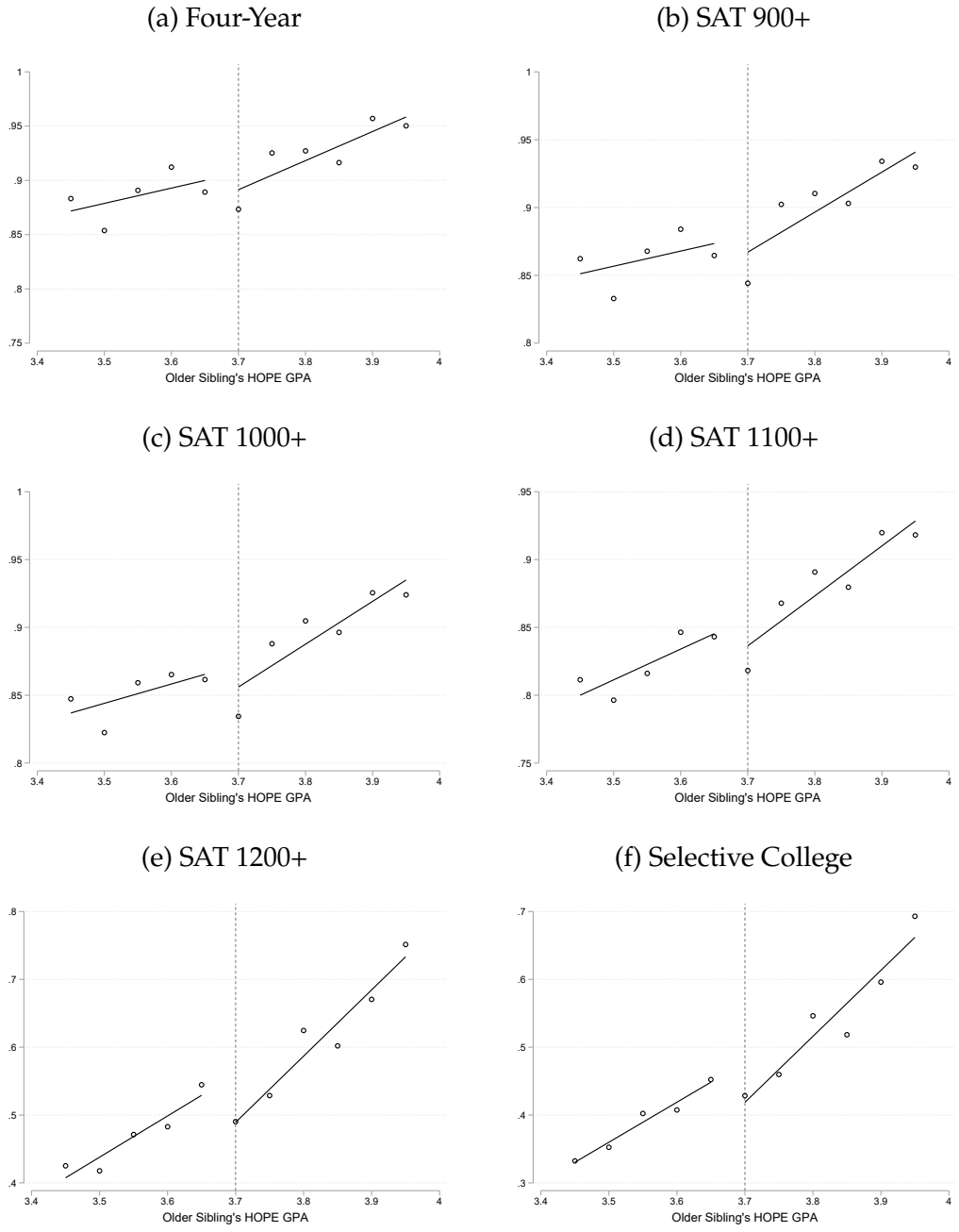
Source: National Student Clearinghouse.
Note: Each panel presents regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 3: Sibling Spillover Effects on College Enrollment by Selectivity: HOPE Scholarship



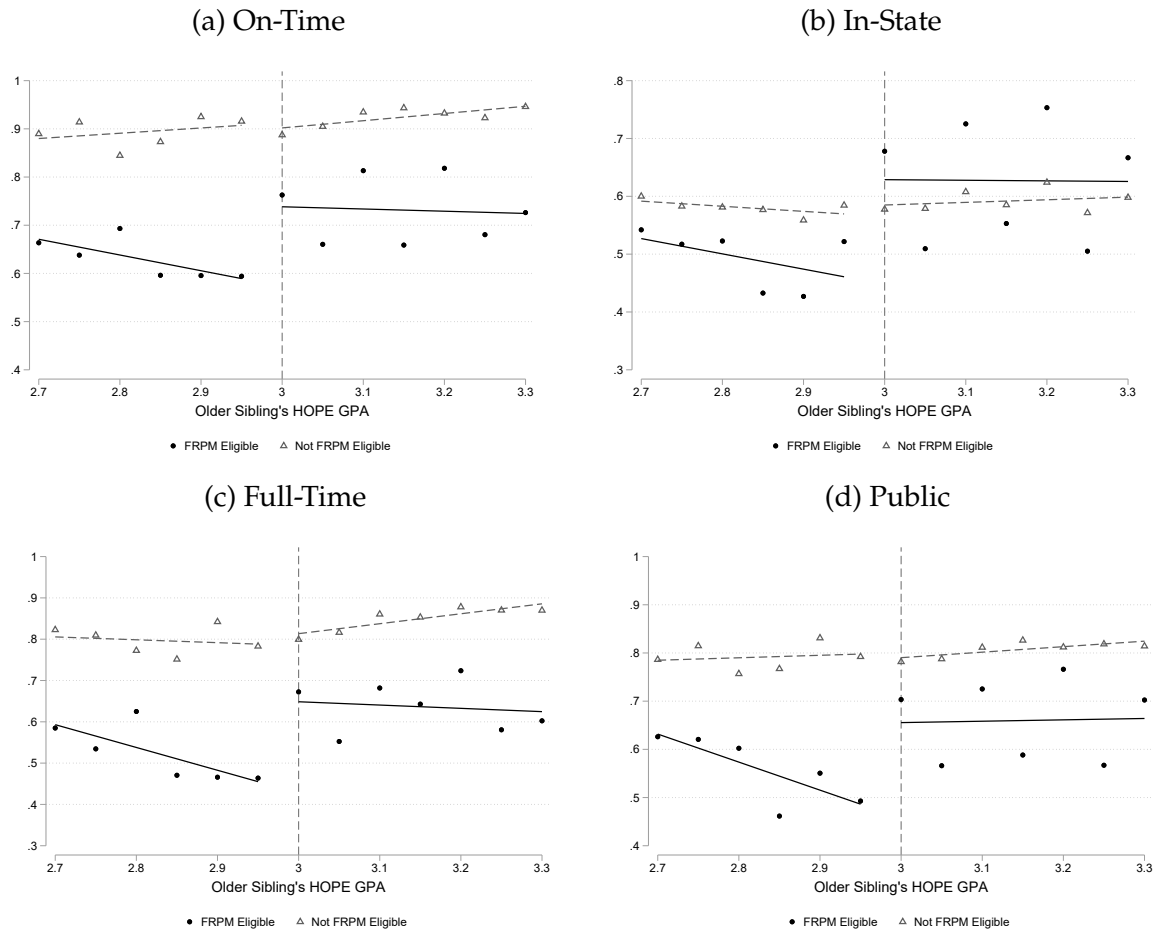
Source: National Student Clearinghouse.
Note: Each panel presents regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 4: Sibling Spillover Effects on College Enrollment: Zell Miller Scholarship



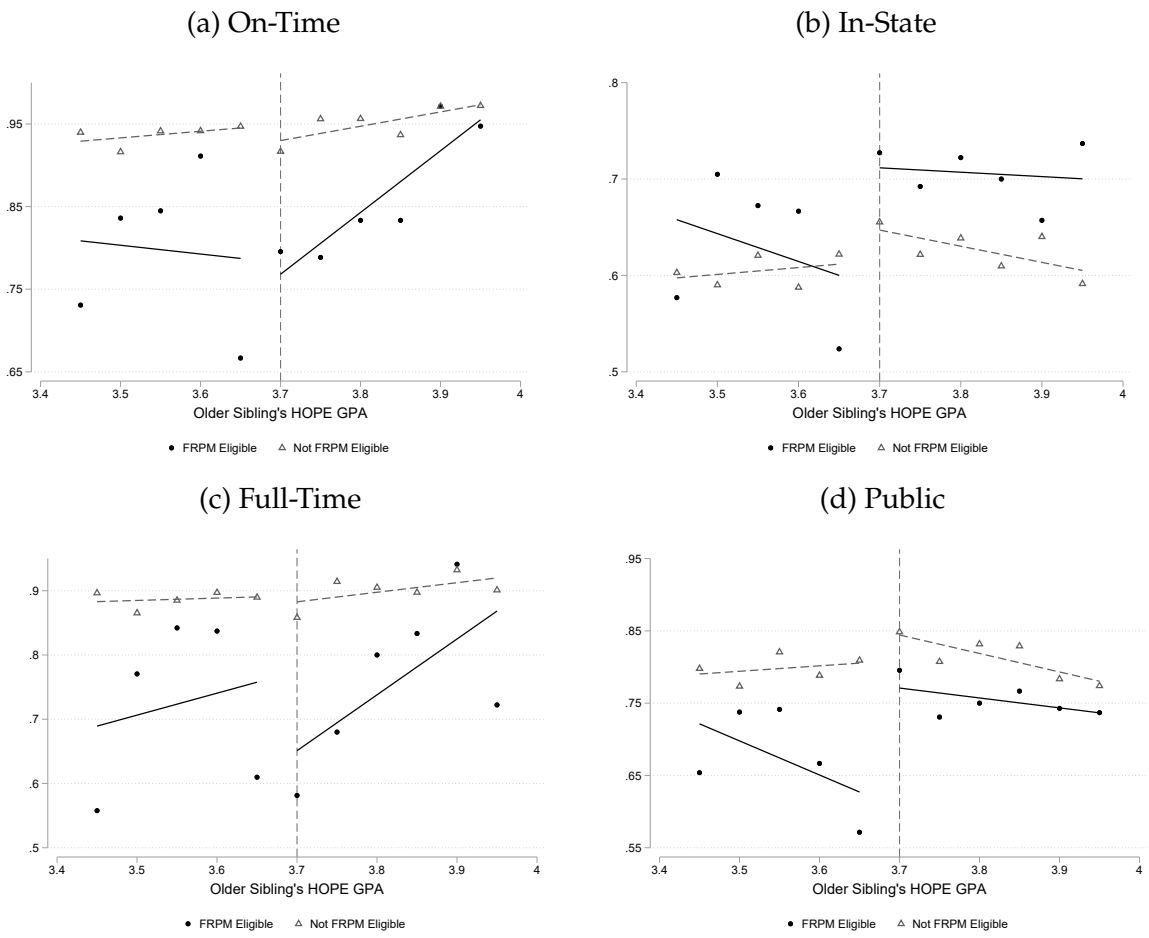
Source: National Student Clearinghouse.
Note: Each panel presents regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 5: Sibling Spillover Effects on College Enrollment by FRPM: HOPE Scholarship



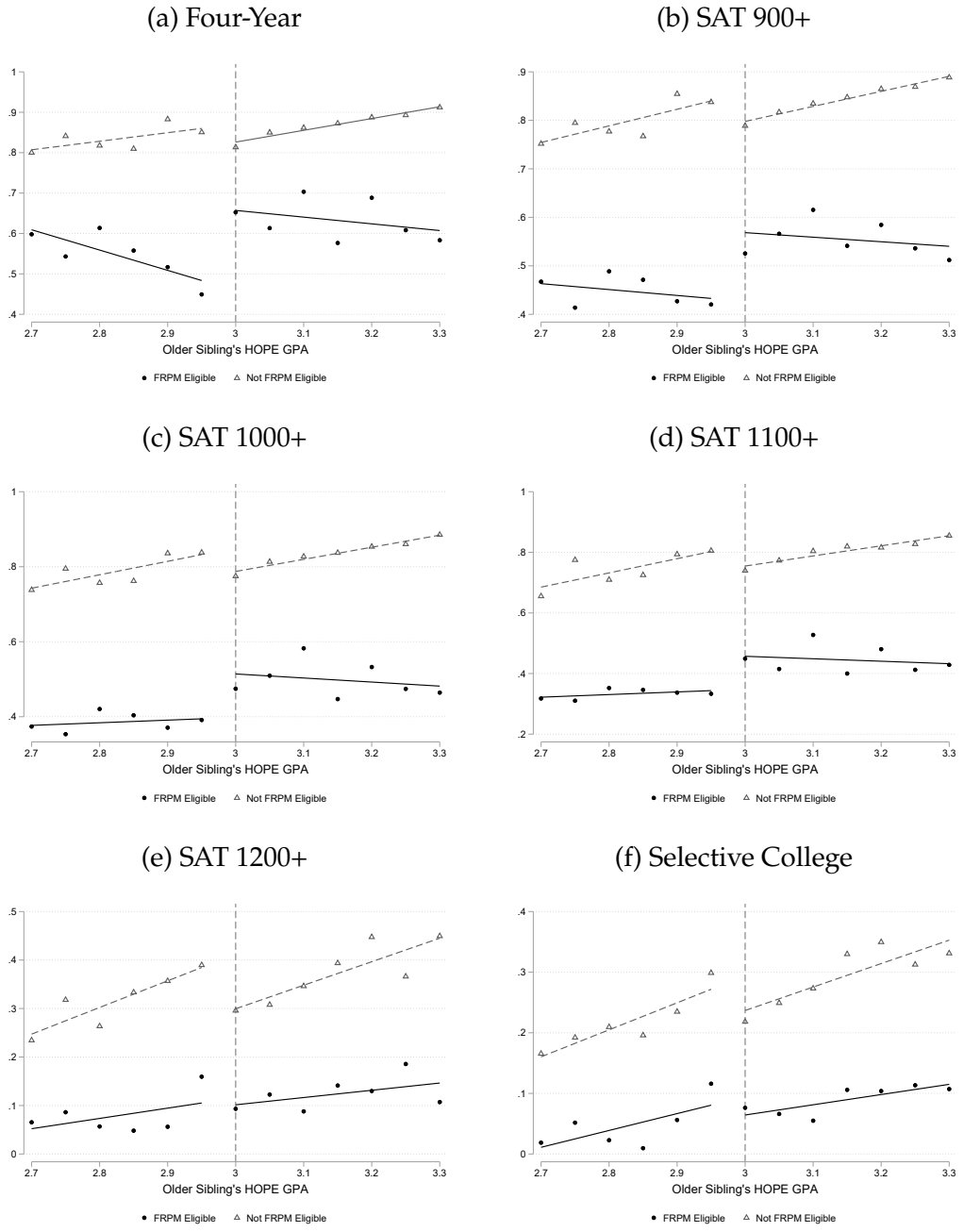
Source: National Student Clearinghouse.
Note: Each panel displays regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes, stratified by ever FRPM eligibility. "FRPM Eligible" indicates students who were at any point eligible for free or reduced-price meals during K–12 enrollment, while "Not FRPM Eligible" indicates students who were never eligible. The sibling sample consists of the two oldest siblings in households with two or three children, where the older sibling resided in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 6: Sibling Spillover Effects on College Enrollment by FRPM: Zell Miller Scholarship



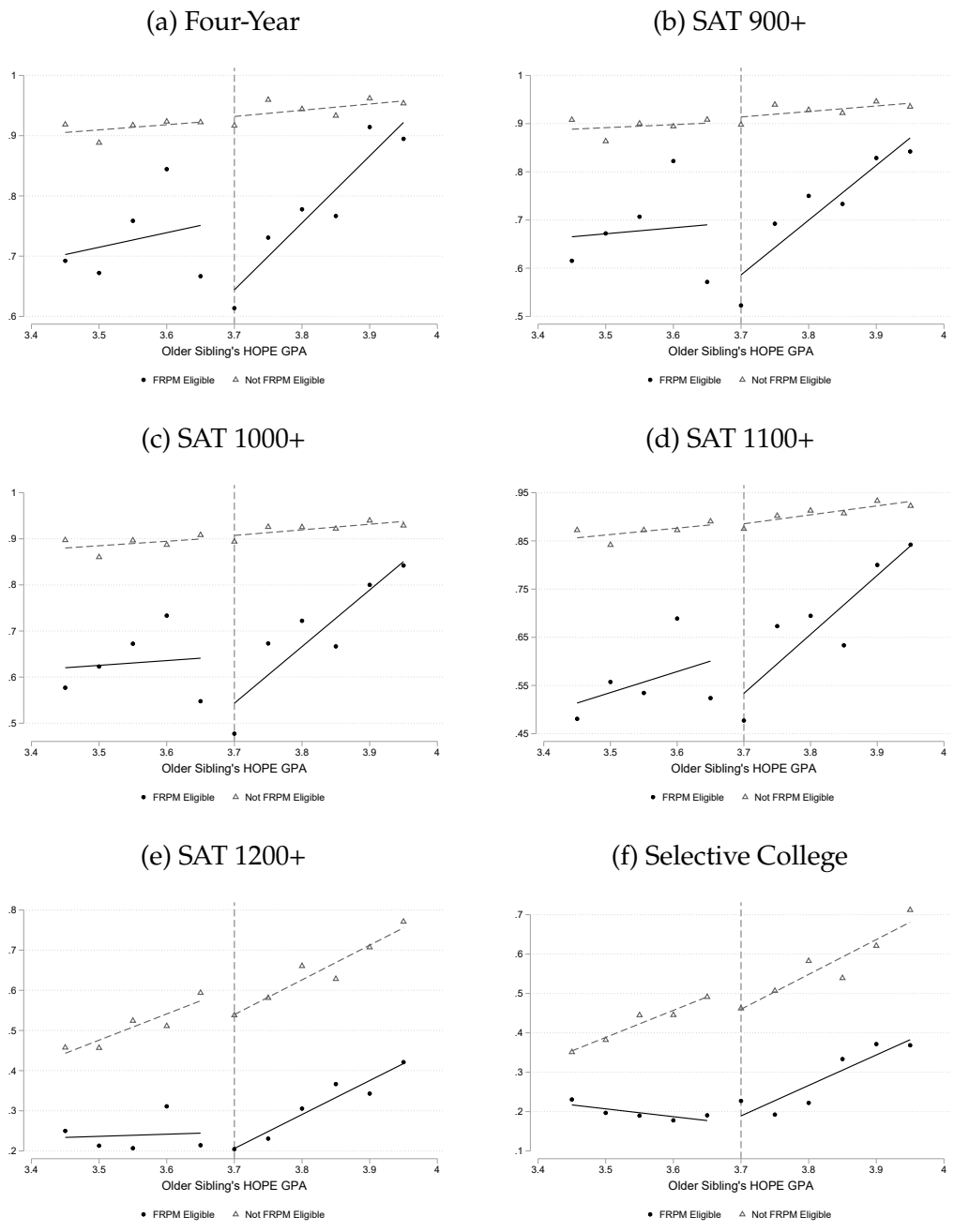
Source: National Student Clearinghouse.
Note: Each panel displays regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes, stratified by ever FRPM eligibility. "FRPM Eligible" indicates students who were at any point eligible for free or reduced-price meals during K–12 enrollment, while "Not FRPM Eligible" indicates students who were never eligible. The sibling sample consists of the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 7: Sibling Spillover Effects on College Enrollment by Selectivity: HOPE Scholarship



Source: National Student Clearinghouse.
Note: Each panel presents regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Figure 8: Sibling Spillover Effects on College Enrollment by Selectivity: Zell Miller Scholarship



Source: National Student Clearinghouse.
Note: Each panel presents regression discontinuity estimates of the effect of an older sibling's HOPE Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before enrolling in college and met the academic rigor requirements.

Tables

Table 1: Summary Statistics for High School Graduates, 2012–2022

	Full Sample		Oldest Two Siblings		HOPE RD		Zell RD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline Characteristics								
Female	0.518	0.500	0.504	0.500	0.476	0.499	0.583	0.493
Asian	0.114	0.318	0.135	0.341	0.099	0.299	0.248	0.432
Black	0.394	0.489	0.285	0.452	0.254	0.435	0.086	0.280
Hispanic	0.110	0.312	0.102	0.302	0.094	0.292	0.061	0.239
White	0.374	0.484	0.468	0.499	0.545	0.498	0.603	0.489
Other Races	0.039	0.193	0.039	0.194	0.039	0.194	0.037	0.188
Ever Free/Reduced-Price Meal	0.455	0.498	0.355	0.479	0.296	0.457	0.129	0.335
Student with Disability	0.152	0.359	0.162	0.369	0.139	0.346	0.095	0.293
English Learner	0.103	0.303	0.094	0.291	0.084	0.278	0.067	0.250
High School HOPE GPA	3.052	0.599	3.147	0.574	3.026	0.171	3.696	0.146
Number of Siblings	1.672	0.797	2.178	0.383	2.180	0.385	2.174	0.379
College Enrollment								
Enroll On-Time	0.762	0.426	0.818	0.386	0.904	0.295	0.955	0.207
Enroll In-State	0.557	0.497	0.587	0.492	0.615	0.487	0.674	0.469
Enroll Four-Year	0.687	0.464	0.755	0.430	0.841	0.365	0.952	0.214
Enroll Full-Time	0.674	0.468	0.737	0.440	0.823	0.381	0.916	0.277
Enroll Public	0.668	0.471	0.716	0.451	0.787	0.409	0.800	0.400
College Selectivity								
Enroll Avg SAT 900+	0.620	0.485	0.703	0.457	0.797	0.402	0.940	0.238
Enroll Avg SAT 1000+	0.576	0.494	0.671	0.470	0.765	0.424	0.933	0.251
Enroll Avg SAT 1100+	0.529	0.499	0.630	0.483	0.703	0.457	0.919	0.273
Enroll Avg SAT 1200+	0.255	0.436	0.324	0.468	0.216	0.412	0.704	0.457
Enroll Selective Colleges	0.200	0.400	0.261	0.439	0.131	0.338	0.627	0.484
N	69,906		25,828		3,847		3,339	

Source: National Student Clearinghouse and Integrated Postsecondary Education Data System.
Note: The full sample (Column 1) includes all graduates from public high schools in a Metro Atlanta district across the 2012–2022 cohorts. The "Oldest Two Siblings" sample (Column 2) consists of first- and second-born students among families with one or two siblings enrolled in the same school district. The "HOPE RD" sample (Column 3) is restricted to older siblings who resided in Georgia for at least 12 consecutive months prior to college enrollment, satisfied academic rigor requirements, and fall within a 0.3 GPA bandwidth around the 3.0 HOPE eligibility cutoff. The "Zell RD" sample (Column 4) applies the same residency and academic rigor restrictions, using a 0.25 GPA bandwidth around the 3.7 Zell Miller eligibility cutoff.

Table 2: Sibling Spillovers of Merit-Based Scholarships on College Enrollment

		Intensity		Georgia		Sector	
	(1) Enroll	(2) Full-Time	(3) Part-Time	(4) In-State	(5) Out-of-State	(6) Public	(7) Private
Panel A: Sibling Spillovers of HOPE							
Older GPA ≥ 3.0	0.046**	0.080**	-0.041	0.075***	-0.034	0.053*	-0.013
	(0.023)	(0.032)	(0.029)	(0.027)	(0.022)	(0.029)	(0.021)
$\bar{Y}$	0.799	0.698	0.135	0.548	0.288	0.709	0.127
N	3,847	3,790	3,790	3,847	3,847	3,847	3,847
Panel B: Sibling Spillovers of Zell							
Older GPA ≥ 3.7	-0.020	-0.045*	0.048**	0.020	-0.017	0.060**	-0.057**
	(0.018)	(0.023)	(0.019)	(0.033)	(0.032)	(0.027)	(0.024)
$\bar{Y}$	0.918	0.863	0.071	0.609	0.326	0.780	0.154
N	3,337	3,294	3,294	3,337	3,337	3,337	3,337

Source: National Student Clearinghouse.
Note: This table reports the main regression discontinuity estimates of the effects of HOPE and Zell Miller Scholarship eligibility on younger siblings' college enrollment outcomes. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. First-stage F-statistics are reported in brackets. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Sibling Spillovers of Merit-Based Scholarships on College Choice By Selectivity

	Sector		College Selectivity				Barron's
	(1) Four-Year	(2) Two-Year	(3) SAT 900+	(4) SAT 1000+	(5) SAT 1100+	(6) SAT 1200+	(7) Selective
Panel A: Sibling Spillovers of HOPE							
Older GPA ≥ 3.0	0.025	0.017	0.000	-0.008	-0.017	-0.074**	-0.042*
	(0.025)	(0.020)	(0.026)	(0.026)	(0.027)	(0.027)	(0.025)
$\bar{Y}$	0.732	0.111	0.672	0.642	0.596	0.231	0.153
N	3,847	3,847	3,847	3,847	3,847	3,847	3,847
Panel B: Sibling Spillovers of Zell							
Older GPA ≥ 3.7	-0.013	0.021	-0.013	-0.018	-0.018	-0.060*	-0.049
	(0.020)	(0.014)	(0.022)	(0.022)	(0.023)	(0.033)	(0.033)
$\bar{Y}$	0.886	0.051	0.863	0.823	0.823	0.468	0.389
N	3,337	3,337	3,337	3,337	3,337	3,337	3,337

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: This table reports the main regression discontinuity estimates of the effects of HOPE and Zell Miller Scholarship eligibility on younger siblings' college choice, by institutional selectivity. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Sibling Spillovers of Merit-Based Scholarships on College Enrollment by Ever Free or Reduced Price Meal Eligibility Status

		Intensity		Georgia		Sector	
	(1) Enroll	(2) Full	(3) Part	(4) In-State	(5) Out-of-State	(6) Public	(7) Private
Panel A: Sibling Spillovers of HOPE							
Ever FRPM	0.160***	0.201***	-0.050	0.191***	-0.044	0.191***	-0.044
	(0.052)	(0.054)	(0.044)	(0.057)	(0.042)	(0.055)	(0.038)
	0.632	0.527	0.158	0.494	0.194	0.564	0.124
N	1,145	1,129	1,129	1,145	1,145	1,145	1,145
Never FRPM	-0.013	0.011	-0.030	0.016	-0.035	-0.023	0.004
	(0.023)	(0.031)	(0.025)	(0.039)	(0.037)	(0.032)	(0.026)
	0.895	0.798	0.122	0.579	0.342	0.793	0.128
N	2,698	2,657	2,657	2,698	2,698	2,698	2,698
Panel B: Sibling Spillovers of Zell							
Ever FRPM	-0.028	-0.204**	0.198**	0.176*	-0.183**	0.204**	-0.204***
	(0.074)	(0.086)	(0.090)	(0.095)	(0.076)	(0.089)	(0.068)
	0.808	0.732	0.098	0.640	0.192	0.684	0.148
N	439	430	430	439	439	439	439
Never FRPM	-0.021	-0.021	0.025	-0.002	0.006	0.043	-0.039
	(0.018)	(0.023)	(0.019)	(0.036)	(0.035)	(0.029)	(0.026)
	0.936	0.886	0.066	0.603	0.349	0.797	0.155
N	2,896	2,862	2,862	2,896	2,896	2,896	2,896

Source: National Student Clearinghouse.

Note: This table reports regression discontinuity estimates of the effect of HOPE and Zell Miller Scholarship eligibility on younger siblings' college enrollment, separately by students' ever Free or Reduced-Price Meal (FRPM) eligibility during K–12. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling lived in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. First-stage F-statistics are reported in brackets. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Sibling Spillovers of Merit-Based Scholarships on College Choice by Selectivity by Ever FRPM Status

	Sector		College Selectivity				Barron's
	(1) Four-Year	(2) Two-Year	(3) SAT 900+	(4) SAT 1000+	(5) SAT 1100+	(6) SAT 1200+	(7) Selective
Panel A: Sibling Spillovers of HOPE							
Ever FRPM	0.167***	-0.012	0.126**	0.108**	0.105**	-0.022	-0.025
	(0.053)	(0.042)	(0.054)	(0.054)	(0.053)	(0.034)	(0.030)
$\bar{Y}$	0.551	0.145	0.449	0.384	0.332	0.075	0.042
N	1,145	1,145	1,145	1,145	1,145	1,145	1,145
Never FRPM	-0.046*	0.027	-0.061**	-0.064**	-0.077**	-0.095**	-0.048
	(0.028)	(0.022)	(0.029)	(0.030)	(0.031)	(0.037)	(0.033)
$\bar{Y}$	0.836	0.092	0.800	0.790	0.747	0.320	0.217
N	2,698	2,698	2,698	2,698	2,698	2,698	2,698
Panel B: Sibling Spillovers of Zell							
Ever FRPM	-0.119	0.138**	-0.133	-0.137	-0.091	-0.057	-0.001
	(0.082)	(0.060)	(0.088)	(0.088)	(0.088)	(0.080)	(0.076)
$\bar{Y}$	0.732	0.104	0.684	0.636	0.560	0.236	0.196
N	439	439	439	439	439	439	439
Never FRPM	0.002	0.002	0.007	-0.000	-0.007	-0.061*	-0.056
	(0.019)	(0.014)	(0.021)	(0.022)	(0.024)	(0.036)	(0.037)
$\bar{Y}$	0.913	0.042	0.894	0.889	0.869	0.508	0.422
N	2,896	2,896	2,896	2,896	2,896	2,896	2,896

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: This table reports regression discontinuity estimates of the effect of HOPE and Zell Miller Scholarship eligibility on younger siblings' college choice by institutional selectivity, separately by students' ever Free or Reduced-Price Meal (FRPM) eligibility during K–12. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Impacts of the HOPE Scholarship on College Outcomes by High School Among FRPM Eligible Siblings

	College Enrollment			HOPE Outcomes		HS Course Taking		
	Enroll	In-State	Selective	HOPE GPA	HOPE Eligible	AP	IB	Dual
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: High College Enrollment High School								
Older GPA $\geq$ 3.0	0.090	0.107	-0.061	-0.094	-0.053	0.051	-0.004	-0.003
	(0.079)	(0.094)	(0.066)	(0.098)	(0.002)	(0.072)	(0.026)	(0.045)
$\bar{Y}$	0.771	0.574	0.080	2.870	0.431	0.181	0.016	0.037
N	441	441	441	441	441	441	441	441
Panel B: Low College Enrollment High School								
Older GPA $\geq$ 3.0	0.208***	0.259***	-0.011	0.100	0.183**	-0.101*	0.008	-0.027
	(0.072)	(0.078)	(0.031)	(0.084)	(0.078)	(0.059)	(0.009)	(0.024)
$\bar{Y}$	0.610	0.482	0.027	2.795	0.345	0.256	0.003	0.021
N	607	607	607	607	607	607	607	607

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

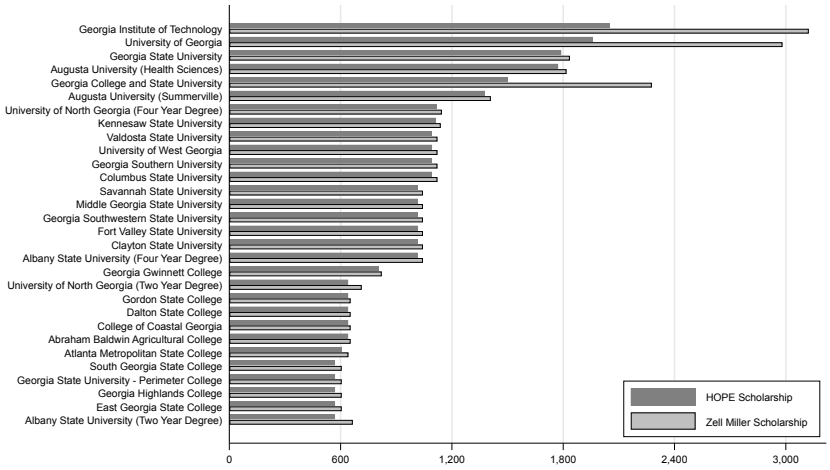
Note: This table reports regression discontinuity estimates of the effects of HOPE Scholarship eligibility on younger siblings' college enrollment and scholarship-related outcomes among low-income households. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements, and younger siblings were free- or reduced-price meal-eligible. Estimates are based on optimal bandwidth calculations with a bandwidth of 0.3. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include younger siblings' demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as graduating-cohort and college fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Appendices

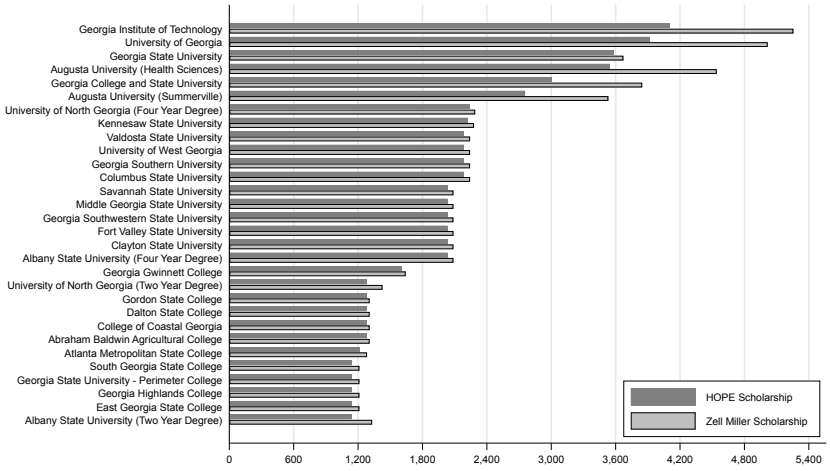
A Supplementary Figures and Tables

Figure A1: Scholarship Award Amounts by Institution in the University System of Georgia

(a) 6 Credit Hours

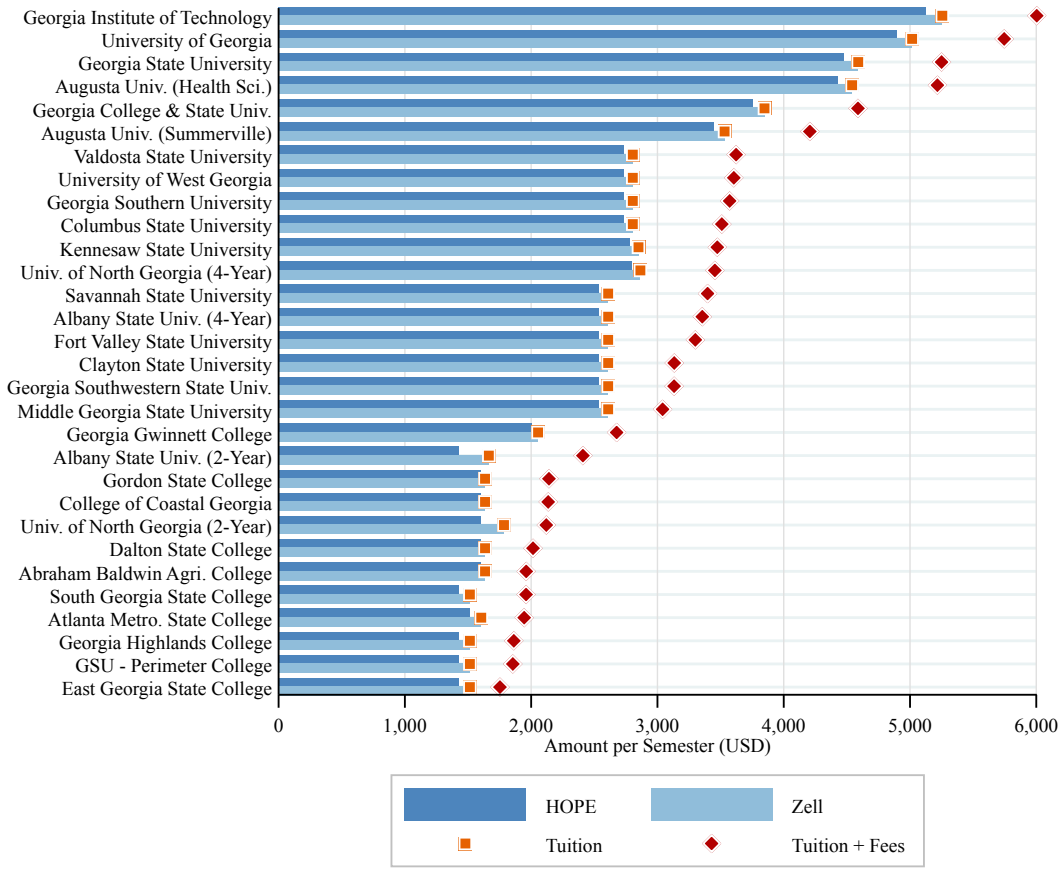


(b) 12 Credit Hours



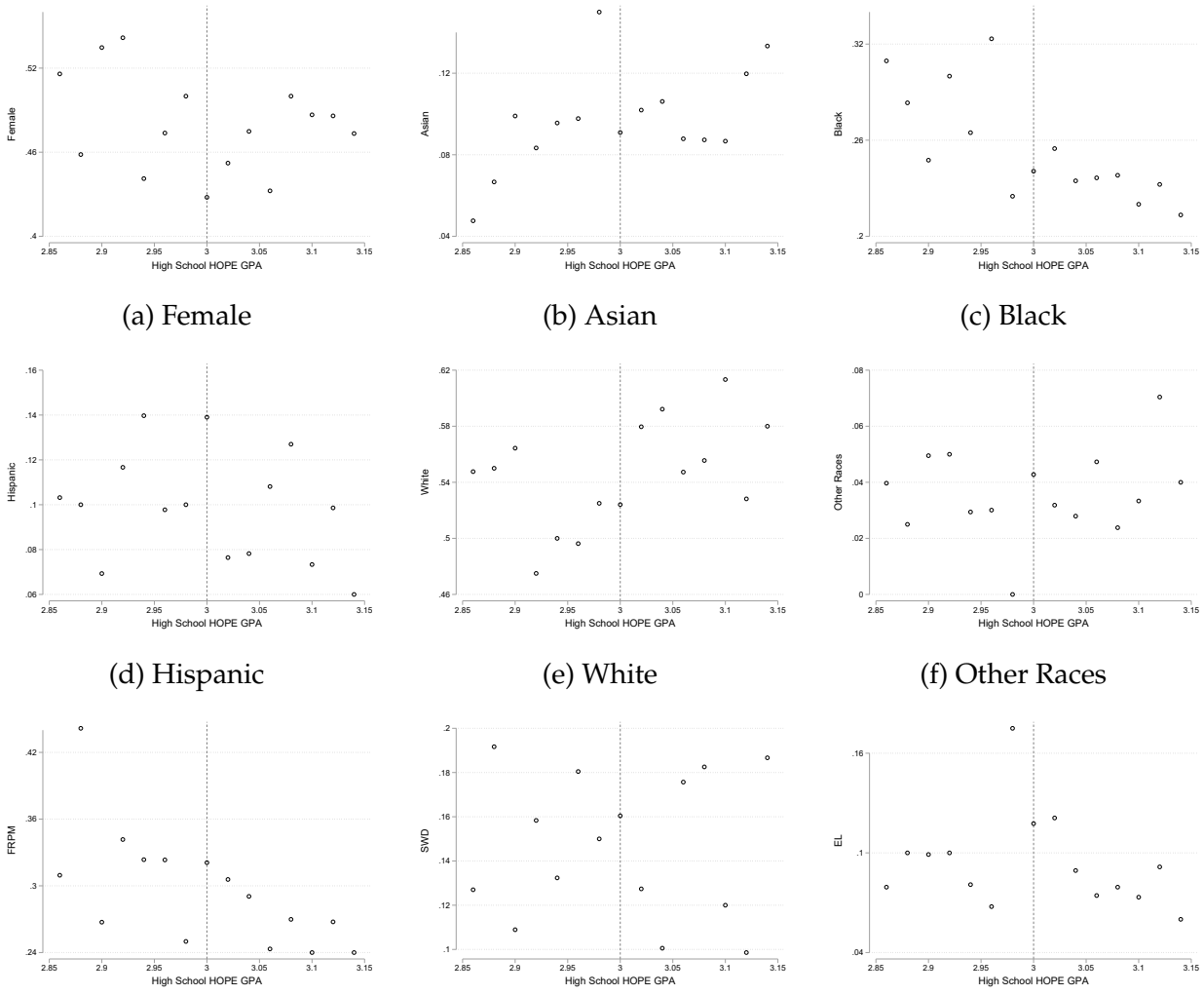
Source: Georgia Student Finance Commission (2025)
Note: Panel A shows the award amounts at University System of Georgia institutions for students attempting 6 credit hours, and Panel B shows the award amounts for students attempting 12 credit hours in Fiscal Year 2025.

Figure A2: HOPE and Zell Miller Scholarship Amount Differences



Source: Georgia Student Finance Commission (FY 2025) and University System of Georgia (https://www.usg.edu/fiscal-affairs/tuition-and-fees/)
Note: The figure plots scholarship amounts for HOPE Scholarship and Zell Miller Scholarship recipients enrolled in Fall 2025 with 15 credit hours at institutions within the University System of Georgia. "Tuition" includes tuition only, while "Tuition + Fees" includes both tuition and fees for one academic semester in Fall 2025. The Zell Miller award equals tuition, whereas neither scholarship covers fees.

Figure A3: Covariate Balance Check by Student Demographics for HOPE Cutoff



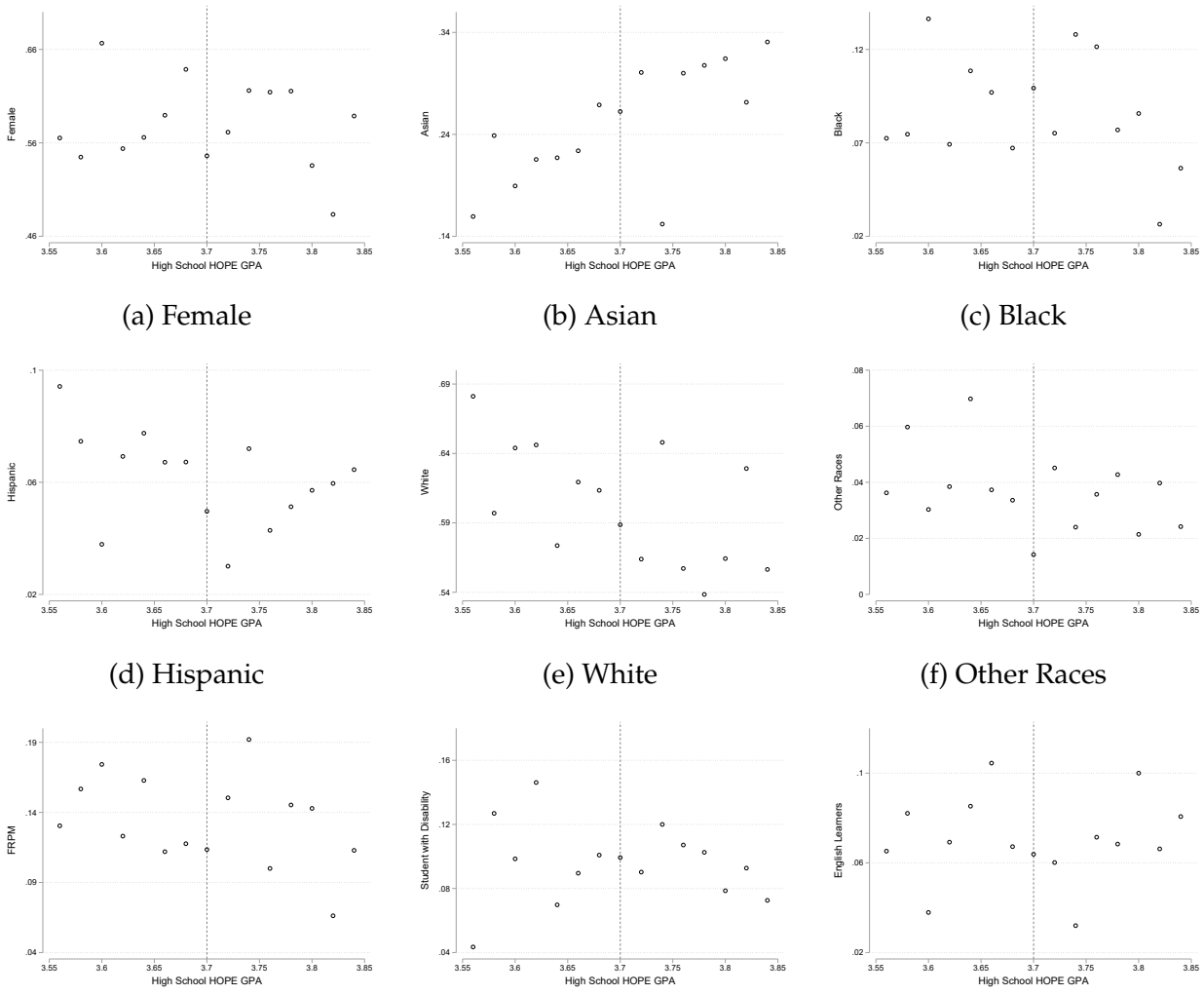
(a) Female (b) Asian (c) Black

(d) Hispanic (e) White (f) Other Races

(g) FRPM (h) SWD (i) EL

Note: Each figure shows the share of students in each demographic subgroup by HOPE GPA bins around the 3.0 eligibility cutoff, marked by a vertical dotted line. The sample includes older siblings who graduated from Metro Atlanta public school districts between 2012 and 2022 and were continuously enrolled in high school during the 12 months before graduation.

Figure A4: Covariate Balance Check by Student Demographics for Zell Miller Cutoff



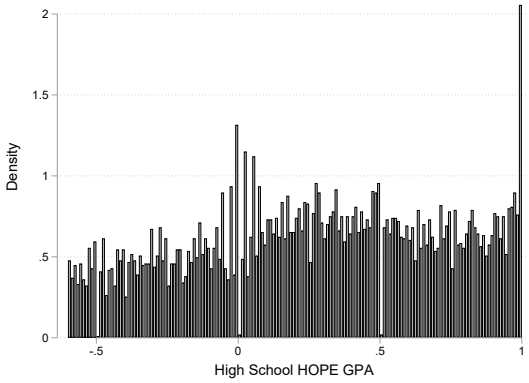
(a) Female (b) Asian (c) Black

(d) Hispanic (e) White (f) Other Races

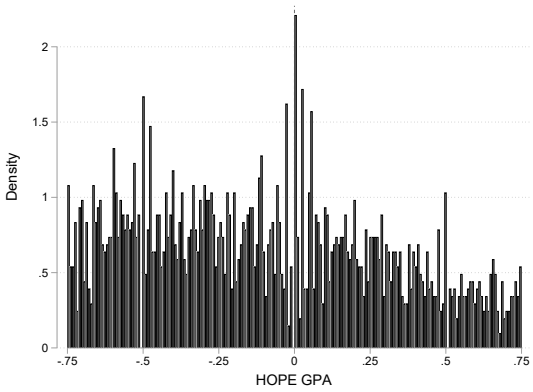
(g) FRPM (h) SWD (i) EL

Note: Each figure shows the share of students in each demographic subgroup by HOPE GPA bins around the 3.7 eligibility cutoff, marked by a vertical dotted line. The sample includes older siblings who graduated from Metro Atlanta public school districts between 2012 and 2022 and were continuously enrolled in high school during the 12 months before graduation.

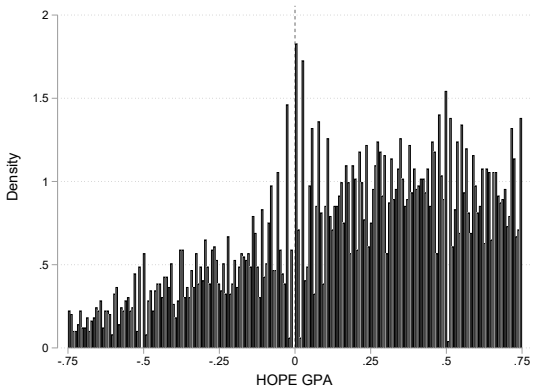
Figure A5: GPA Density Histograms



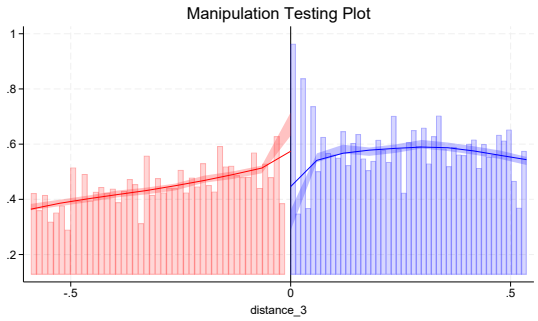
(a) HOPE GPA Density



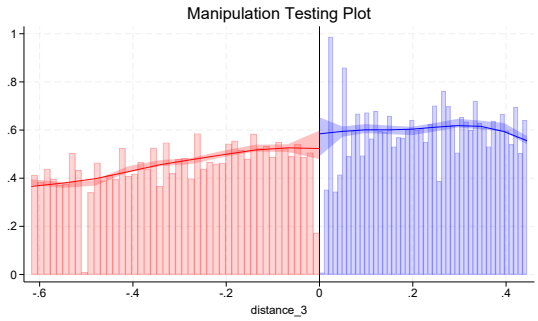
(b) GPA Density Among FRPM



(c) GPA Density Among Non-FRPM



(d) Density Test with 3.0 Cutoff

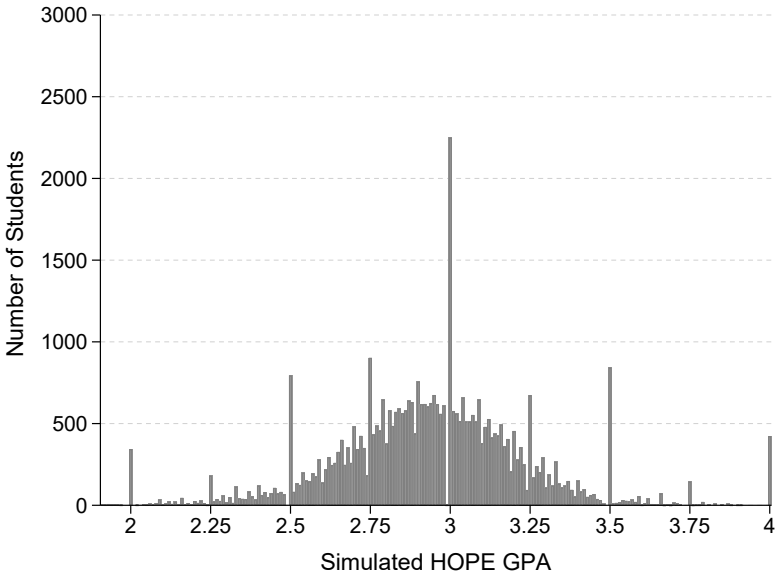


(e) Density Test without 3.0 Cutoff

Note: The graphs display density histograms of students' high school HOPE GPAs around the HOPE cutoff of 3.0 for the full sample (Panel A), students who were ever eligible for Free or Reduced-Price Meals (FRPM) (Panel B), and students who were never eligible for FRPM (Panel C). Panel D presents the density test, including observations at the 3.0 GPA cutoff, following McCrary (2008), while Panel E presents the density test, excluding observations at the cutoff. The sample consists of high school graduates from the 2012–2022 cohorts who resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements.

Figure A6: Simulated GPA Density Histograms

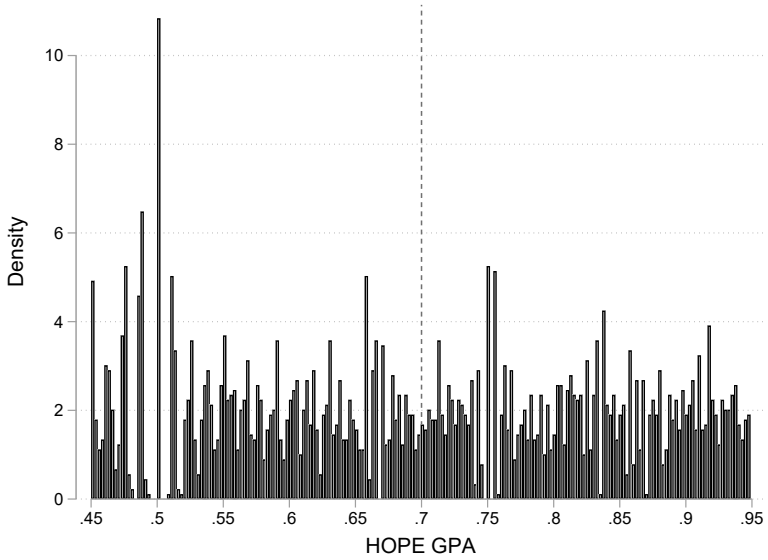
(a) HOPE GPA Density



Note: The graphs display simulated density histograms of students' high school HOPE GPA. The sample includes high school graduates from the 2012–2022 cohorts who resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements.

Figure A7: Zell Miler Scholarship Cutoff Running Variable Density Test

(a) Zell Cutoff



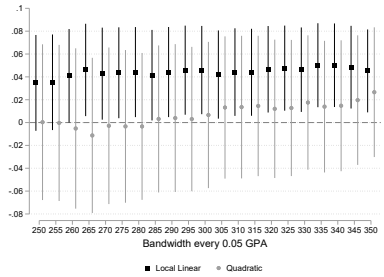
(b) Density Test (McCrary, 2008) at Zell Cutoff



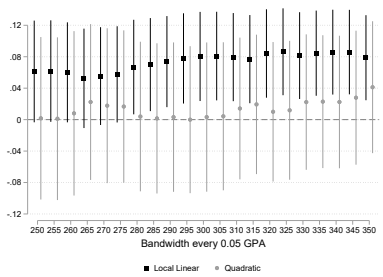
Note: The graphs display density histograms of students' high school HOPE GPAs around the Zell cutoff of 3.7 for the full sample (Panel A). Panel B presents the density test, including observations at the 3.7 GPA cutoff, following McCrary (2008). The sample consists of high school graduates from the 2012–2022 cohorts who resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements.

Figure A8: Different Bandwidth HOPE Cutoff for Younger Sibling's College Enrollment

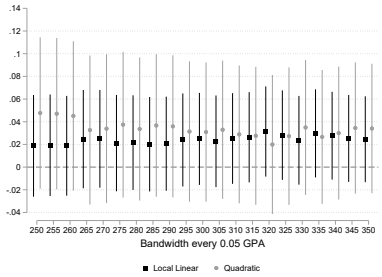
(a) On Time



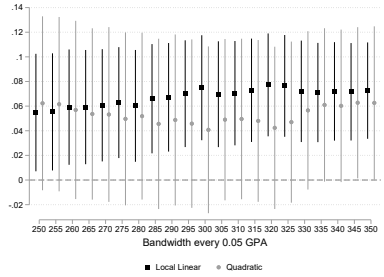
(b) In-State



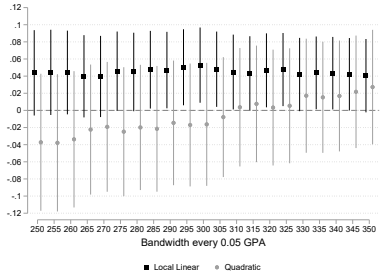
(c) Four-Year



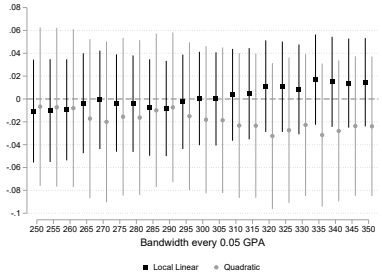
(d) Full-Time



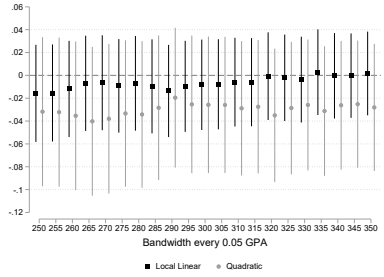
(e) Public



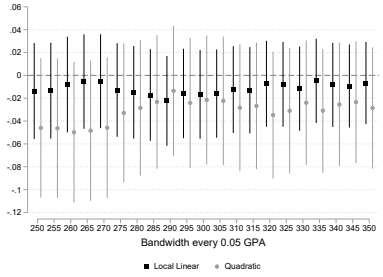
(f) SAT 900+



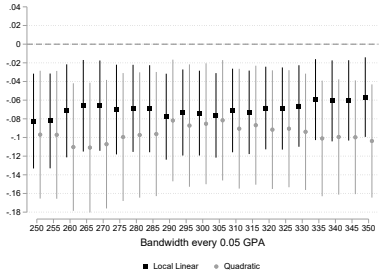
(g) SAT 1000+



(h) SAT 1100+



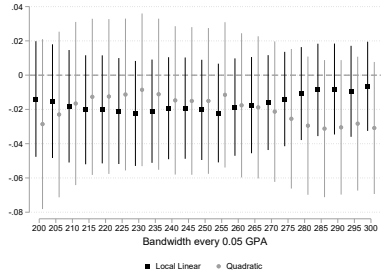
(i) SAT 1200+



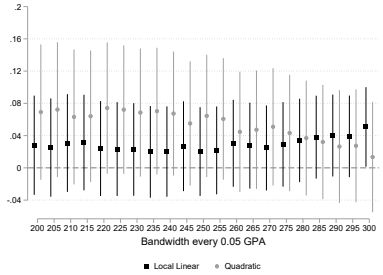
Source: National Student Clearinghouse.
Note: Each panel presents sensitivity analyses using alternative RD bandwidths, with both local linear and quadratic specifications shown. The figures report point estimates and 95 percent confidence intervals from models estimated over bandwidths ranging from 0.25 to 0.35 GPA in 0.05 increments around the cutoff; "300" indicates the optimal bandwidth of 0.3. The sample includes the two oldest siblings in households with two or three children, in which the older sibling resided in Georgia for at least 12 months before graduation and met academic rigor requirements. All specifications control for student demographics (sex, race/ethnicity, ever eligibility for free or reduced-price meals, English Learner status, and disability status) and include high school and graduating cohort fixed effects. Standard errors are clustered at the sibling-identifier level.

Figure A9: Different Bandwidth Zell Miller Cutoff for Younger Sibling's College Enrollment

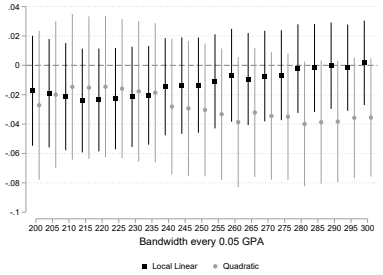
(a) On Time



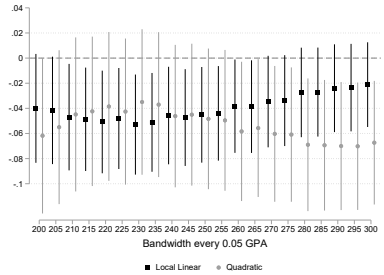
(b) In-State



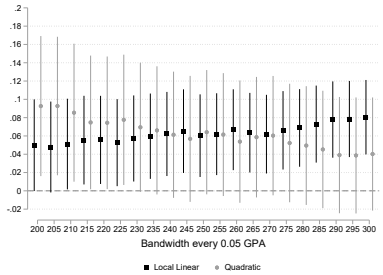
(c) Four-Year



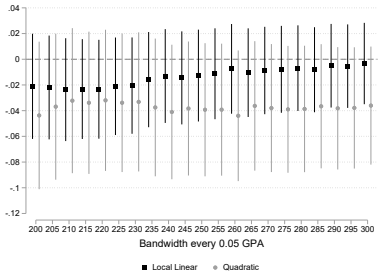
(d) Full-Time



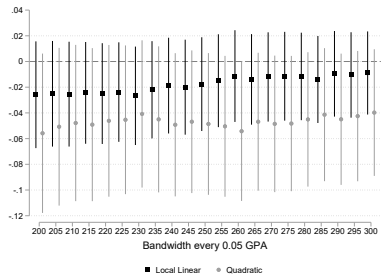
(e) Public



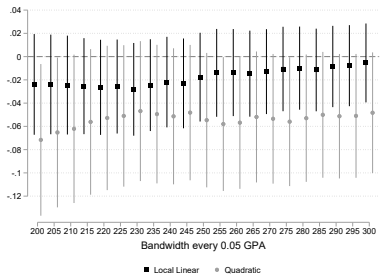
(f) SAT 900+



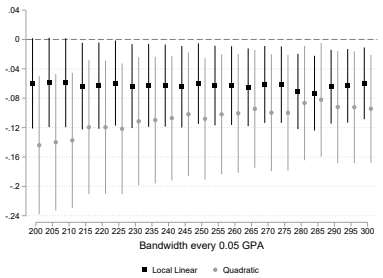
(g) SAT 1000+



(h) SAT 1100+

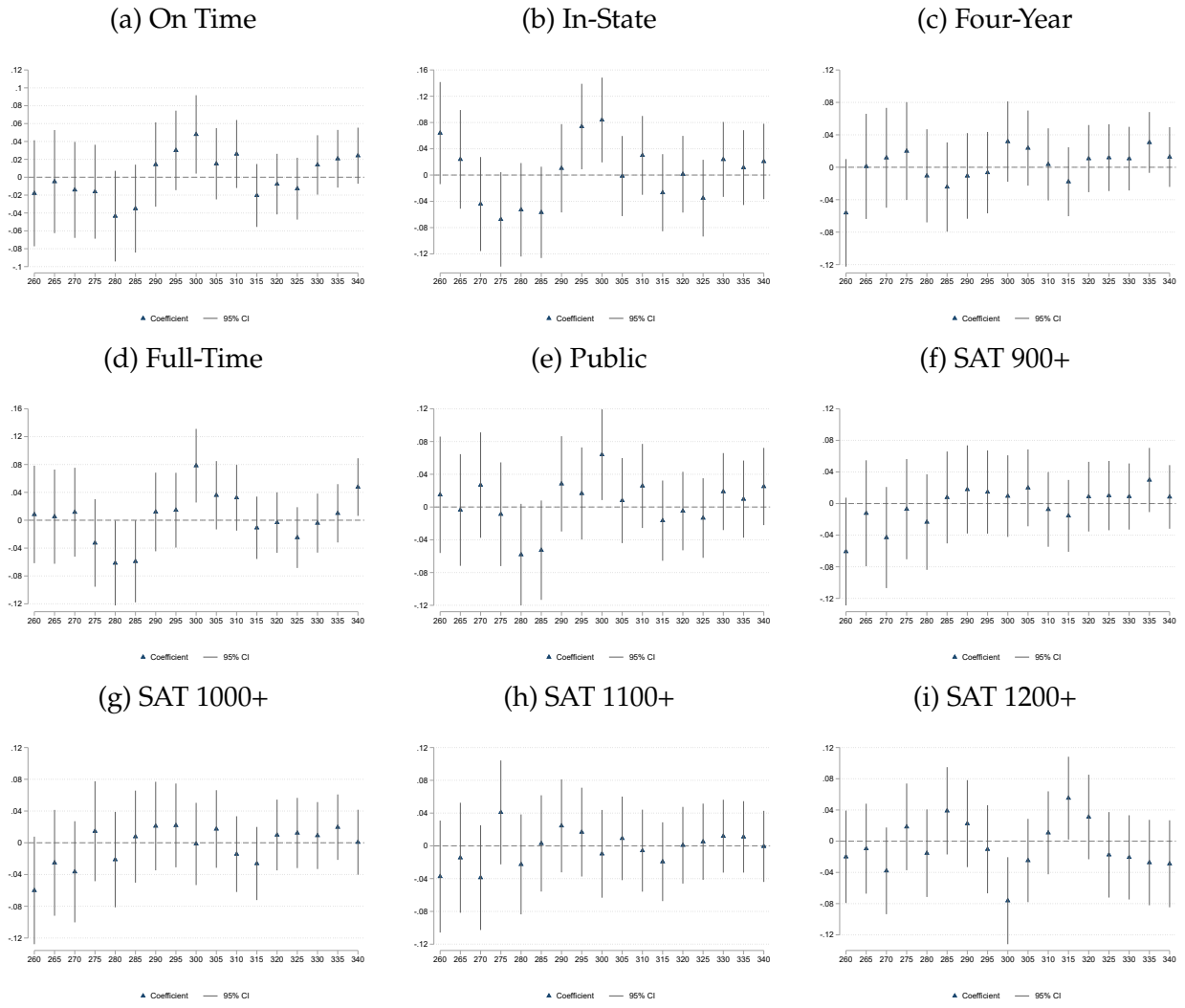


(i) SAT 1200+



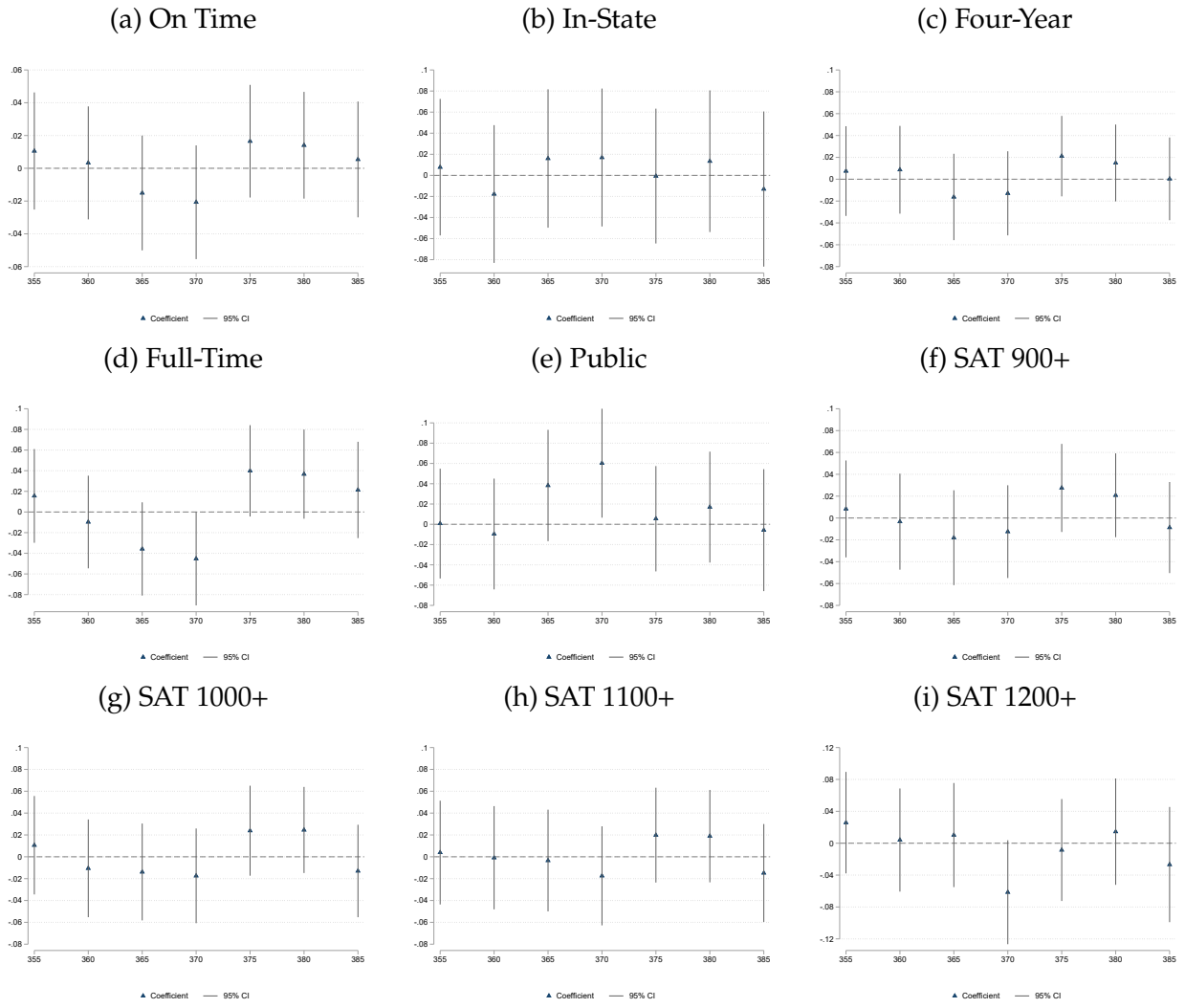
Source: National Student Clearinghouse.
Note: Each panel presents sensitivity analyses using alternative RD bandwidths, with both local linear and quadratic specifications shown. The figures report point estimates and 95 percent confidence intervals from models estimated over bandwidths ranging from 0.2 to 0.3 GPA in 0.05 increments around the cutoff; "250" indicates the optimal bandwidth of 0.25. The sample includes the two oldest siblings in households with two or three children, where the older sibling lived in Georgia for at least 12 months before graduation and met academic rigor requirements. All specifications control for student demographics (sex, race/ethnicity, ever eligibility for free or reduced-price meals, English Learner status, and disability status) and include high school and graduating cohort fixed effects. Standard errors are clustered at the sibling-identifier level.

Figure A10: Falsification Test for Random Cutoff - HOPE



Note: Each coefficient represents the estimated sibling spillover effect at a placebo cutoff. The younger sibling sample includes the oldest two siblings in two- or three-child households, whose older siblings resided in Georgia for at least 12 months before graduation and met academic rigor requirements. College enrollment data come from the National Student Clearinghouse. All models control for student demographics (sex, race/ethnicity, eligibility for free or reduced-price meals, English Learner status, and disability status) and include high school-by-cohort fixed effects. Standard errors are clustered at the sibling-identifier level.

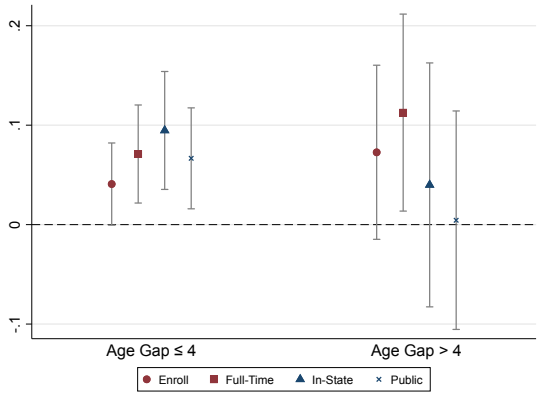
Figure A11: Falsification Test for Random Cutoff - ZELL



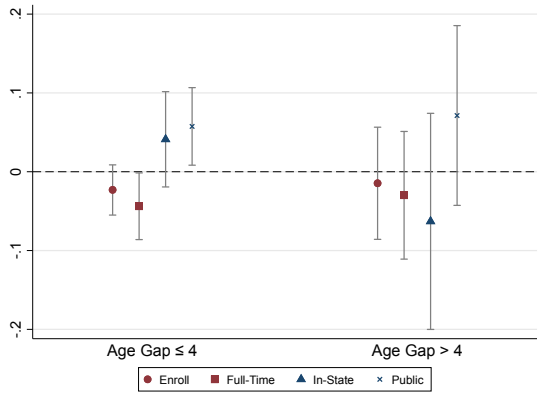
Note: Each coefficient represents the estimated sibling spillover effect at a placebo cutoff. The younger sibling sample includes the oldest two siblings in two- or three-child households, whose older siblings resided in Georgia for at least 12 months before graduation and met academic rigor requirements. College enrollment data come from the National Student Clearinghouse. All models control for student demographics (sex, race/ethnicity, eligibility for free or reduced-price meals, English Learner status, and disability status) and include high school-by-cohort fixed effects. Standard errors are clustered at the sibling-identifier level.

Figure A12: Heterogeneous Effects of the HOPE and Zell Miller Scholarship on College Enrollment by Age Gap

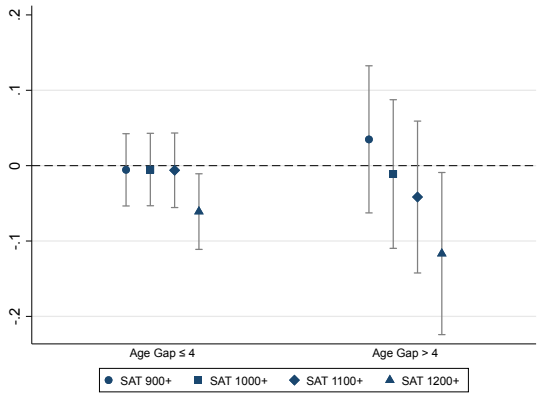
(a) HOPE



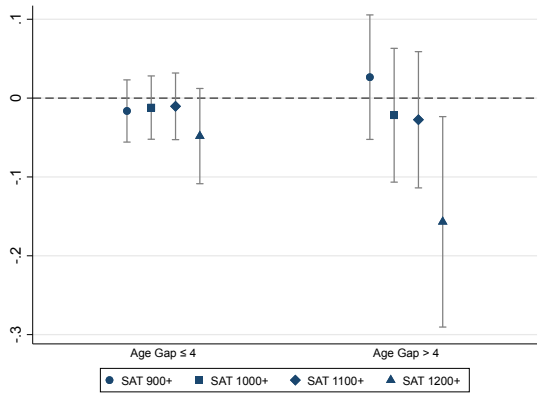
(b) Zell Miller



(c) HOPE - College Choice



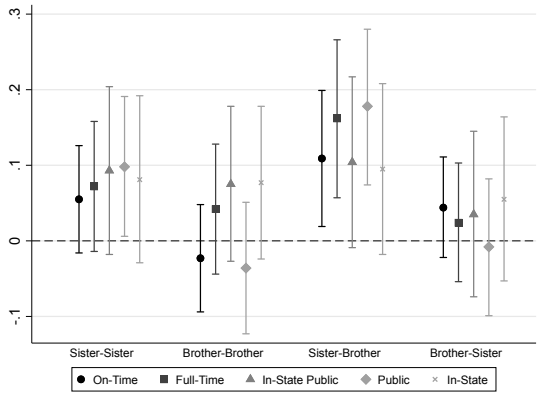
(d) Zell Miller - College Choice



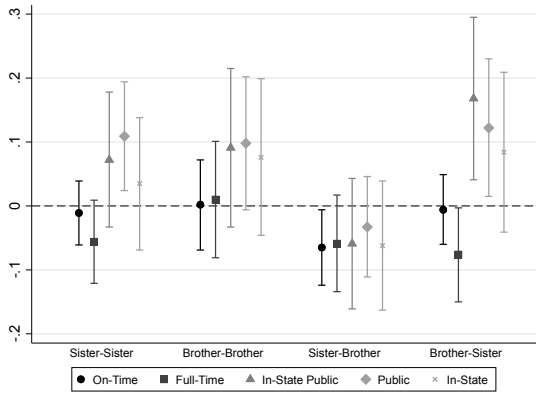
Source: National Student Clearinghouse (NSC).
Note: Each figure reports regression discontinuity coefficients for the effect of scholarship eligibility on younger siblings' college enrollment by siblings' age gap, for HOPE in Panel A and Zell in Panel B. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements. Estimates use optimal bandwidths of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects.

Figure A13: Heterogeneous Effects of the HOPE and Zell Miller Scholarship on College Enrollment by Sibling Gender Composition

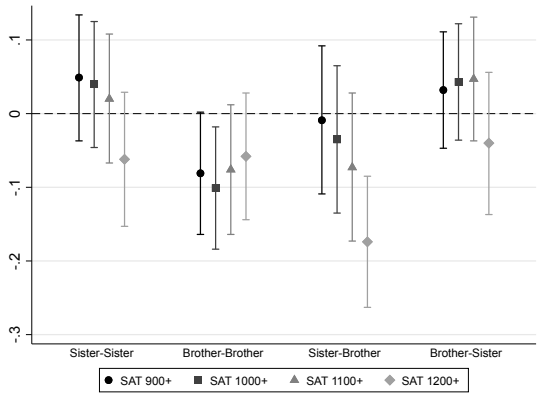
(a) HOPE



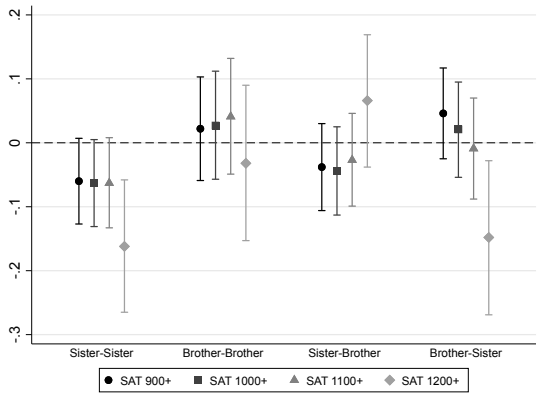
(b) Zell Miller



(c) HOPE - College Choice



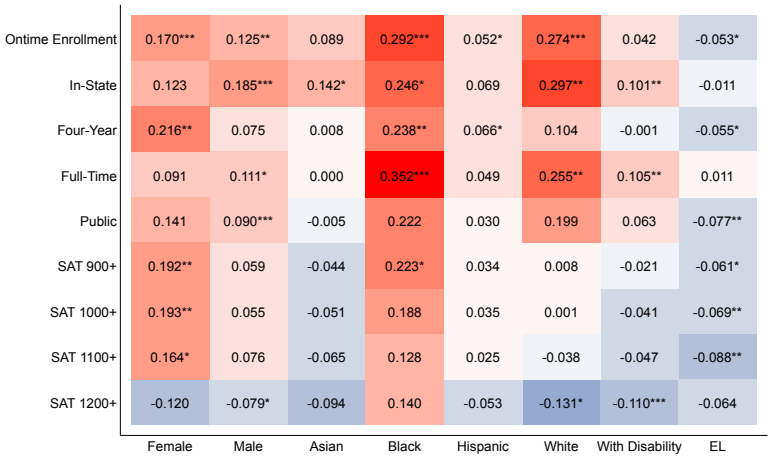
(d) Zell Miller - College Choice



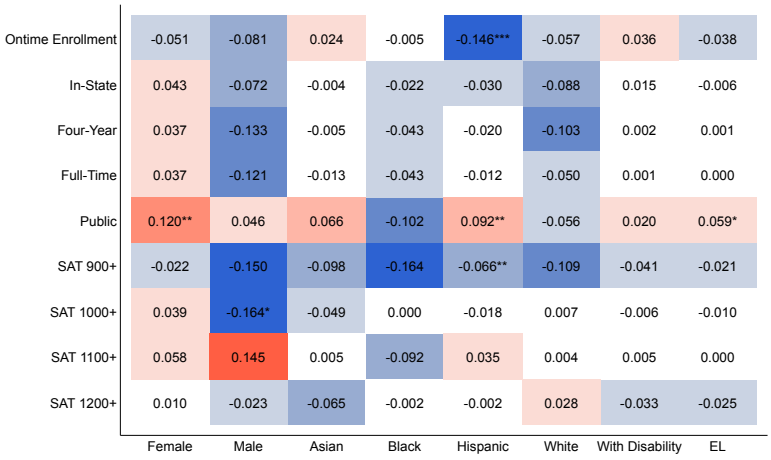
Source: National Student Clearinghouse (NSC).
Note: Each figure reports regression discontinuity coefficients for the effect of scholarship eligibility on younger siblings' college enrollment by siblings' gender composition, for HOPE in Panel A and Zell in Panel B. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements. Estimates use optimal bandwidths of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects.

Figure A14: Heterogeneous Effects of the HOPE Scholarship by Younger Sibling Demographics

(a) HOPE



(b) Zell Miller



Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: Each figure reports regression discontinuity coefficients for the effect of scholarship eligibility on younger siblings' college enrollment by younger siblings' demographic characteristics, for HOPE in Panel A and Zell in Panel B. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements. Estimates use optimal bandwidths of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors are clustered at the sibling level. All specifications include high school and graduating-cohort fixed effects.

Table A1: Summary Statistics for High School Graduates by Household Units, 2012-2022

	Only Child		Any Siblings		Older Siblings		Younger Siblings	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline Characteristics								
Female	0.529	0.499	0.508	0.499	0.496	0.500	0.508	0.500
Asian	0.101	0.302	0.126	0.332	0.167	0.344	0.136	0.343
Black	0.501	0.500	0.288	0.453	0.279	0.448	0.279	0.449
Hispanic	0.118	0.323	0.101	0.301	0.101	0.302	0.100	0.299
White	0.271	0.444	0.476	0.499	0.474	0.499	0.473	0.499
Other Races	0.038	0.192	0.039	0.194	0.039	0.194	0.040	0.195
Ever Free/Reduced-Price Meal	0.552	0.497	0.360	0.480	0.346	0.476	0.350	0.477
Student with Disability	0.136	0.343	0.168	0.374	0.151	0.358	0.174	0.379
English Learner	0.112	0.316	0.093	0.291	0.095	0.294	0.090	0.286
High School HOPE GPA	2.942	0.609	3.153	0.572	3.132	0.571	3.179	0.569
Number of Siblings	1.000	0.000	2.334	0.613	2.178	0.382	2.178	0.382
College Enrollment								
Enroll On-Time	0.706	0.456	0.818	0.386	0.829	0.377	0.810	0.392
Enroll In-State	0.527	0.499	0.586	0.493	0.599	0.490	0.571	0.495
Enroll Four-Year	0.619	0.486	0.754	0.431	0.767	0.423	0.749	0.433
Enroll Full-Time	0.608	0.488	0.739	0.439	0.753	0.431	0.728	0.445
Enroll Public	0.621	0.485	0.715	0.451	0.719	0.449	0.711	0.453
College Selectivity								
Enroll Avg SAT 900+	0.537	0.499	0.702	0.451	0.714	0.452	0.702	0.457
Enroll Avg SAT 1000+	0.481	0.500	0.670	0.470	0.683	0.465	0.672	0.470
Enroll Avg SAT 1100+	0.427	0.495	0.628	0.483	0.637	0.481	0.634	0.482
Enroll Avg SAT 1200+	0.190	0.392	0.320	0.467	0.341	0.474	0.316	0.465
Enroll Selective Colleges	0.142	0.349	0.256	0.437	0.276	0.447	0.255	0.436
N	34,697		35,209		12,631		12,631	

Source. National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note. The “Only Child" sample (Column 1) consists of students with no matched siblings in public high schools within a single Metro Atlanta district, covering graduating cohorts from 2012 to 2022. The “Any Siblings" sample (Column 2) includes students who are matched with at least one sibling. The “Older Siblings" sample (Column 3) is restricted to older siblings who graduated, resided in Georgia for at least 12 consecutive months prior to college enrollment, and satisfied the scholarship residency and rigor requirements. The “Younger Siblings" sample (Column 4) includes younger siblings whose older siblings meet these residency and rigor eligibility criteria.

Table A2: Covariate Balance Check by Ever FRPM Status at HOPE Scholarship Cutoff

	(1) Female	(2) Asian	(3) Black	(4) Hispanic	(5) White	(6) Other Races	(7) FRPM Eligible	(8) Student With Disability	(9) English Learners
Panel A. All Younger Siblings									
GPA $\geq$ 3.0	-0.065**	-0.003	-0.015	0.008	0.015	-0.000	0.005	-0.012	0.025
	(0.031)	(0.018)	(0.020)	(0.020)	(0.028)	(0.011)	(0.023)	(0.022)	(0.017)
N	3,847	3,847	3,847	3,847	3,847	3,847	3,847	3,847	3,847
$\bar{Y}$	0.464	0.081	0.317	0.107	0.488	0.036	0.366	0.151	0.097
Panel B. FRPM Eligible Siblings									
GPA $\geq$ 3.0	-0.049	0.037	-0.016	0.020	-0.020	0.002		0.015	0.078*
	(0.057)	(0.023)	(0.045)	(0.044)	(0.036)	(0.023)		(0.031)	(0.042)
N	1,145	1,145	1,145	1,145	1,145	1,145		1,145	1,145
$\bar{Y}$	0.557	0.042	0.630	0.194	0.122	0.042		0.101	0.198
Panel C. Non-FRPM Eligible Siblings									
GPA $\geq$ 3.0	-0.075*	-0.020	-0.017	0.001	0.036	-0.000		-0.018	0.004
	(0.039)	(0.026)	(0.022)	(0.018)	(0.034)	(0.013)		(0.029)	(0.016)
N	2,698	2,698	2,698	2,698	2,698	2,698		2,698	2,698
$\bar{Y}$	0.411	0.104	0.136	0.056	0.699	0.033		0.179	0.039

Note: The sample includes oldest children from households with two or three children who graduated from high school, resided in Georgia for at least 12 consecutive months prior to college enrollment, and satisfied the scholarship rigor requirements. Panel A reports estimates from regressions of demographic characteristics on an indicator for scholarship eligibility using the full older-sibling RD sample. Panel B restricts the sample to FRPM-eligible siblings, while Panel C restricts to non-FRPM-eligible siblings. The regression uses a bandwidth of 0.3 GPA points around the 3.0 HOPE cutoff, based on the optimal bandwidth procedure. Standard errors (in parentheses) are clustered at the high school HOPE GPA level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3: Covariate Balance Check by Ever FRPM Status at Zell Miller Scholarship Cutoff

	(1) Female	(2) Asian	(3) Black	(4) Hispanic	(5) White	(6) Other Races	(7) FRPM Eligible	(8) Student With Disability	(9) English Learners
Panel A. All Younger Siblings									
GPA ≥ 3.7	-0.037	0.023	0.021	-0.018	-0.036	-0.016	0.004	0.007	-0.005
	(0.034)	(0.027)	(0.015)	(0.017)	(0.029)	(0.013)	(0.020)	(0.021)	(0.018)
N	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586	3,586
$\bar{Y}$	0.583	0.208	0.101	0.071	0.617	0.044	0.141	0.104	0.072
Panel B. FRPM Eligible Siblings									
GPA ≥ 3.7	-0.079	0.049	0.017	-0.049	-0.063	0.006	-	0.027	-0.035
	(088)	(0.068)	(0.070)	(0.071)	(0.075)	(0.042)		(0.051)	(0.082)
N	457	457	457	457	457	457		457	457
$\bar{Y}$	0.669	0.180	0.389	0.180	0.255	0.059		0.079	0.234
Panel C. Non-FRPM Eligible Siblings									
GPA ≥ 3.7	-0.032	0.017	0.024*	-0.012	-0.033	-0.018	-	0.004	-0.002
	(0.037)	(0.028)	(0.014)	(0.016)	(0.032)	(0.013)		(0.022)	(0.016)
N	3,127	3,127	3,127	3,127	3,127	3,127		3,127	3,127
$\bar{Y}$	0.569	0.212	0.053	0.053	0.676	0.042		0.108	0.046

Note: The sample includes oldest children from households with two or three children who graduated from high school, resided in Georgia for at least 12 consecutive months prior to college enrollment, and satisfied the scholarship rigor requirements. Panel A reports estimates from regressions of demographic characteristics on an indicator for scholarship eligibility using the full older-sibling RD sample. Panel B restricts the sample to FRPM-eligible siblings, while Panel C restricts to non-FRPM-eligible siblings. The regression uses a bandwidth of 0.25 GPA points around the 3.7 Zell cutoff, based on the optimal bandwidth procedure. Standard errors (in parentheses) are clustered at the high school HOPE GPA level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4: Sibling Spillovers of HOPE Scholarship on College Enrollment

	Same College (1)	Same Major (2)	Same College Same Major (3)
Panel A: HOPE			
Older GPA ≥ 3.0	0.041	0.080	0.141**
	(0.034)	(0.077)	(0.067)
$\bar{Y}$	0.329	0.161	0.077
N	3,114	519	464
Panel B: Zell Miller			
Older GPA ≥ 3.7	0.022	-0.097	-0.031
	(0.035)	(0.070)	(0.068)
$\bar{Y}$	0.407	0.274	0.148
N	3,000	682	612

Source: National Student Clearinghouse.
Note: This table reports the regression discontinuity estimates of the effects of HOPE and Zell Miller Scholarship eligibility on younger siblings' same college choice outcomes. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.4 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as graduating-cohort and college fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A5: Alternative Specifications for Robustness Test: Sibling Spillovers of HOPE

	On-Time	GA College	Full-Time	Four-Year	Public	SAT 900+	SAT 1000+	SAT 1100+	SAT 1200+
All Younger Siblings									
No Controls	0.041*	0.080**	0.070**	0.018	0.051*	-0.007	-0.015	-0.023	-0.079***
	(0.023)	(0.032)	(0.028)	(0.027)	(0.028)	(0.028)	(0.028)	(0.029)	(0.028)
Triangular	0.030	0.050	0.058**	0.023	0.028	-0.010	-0.020	-0.023	-0.080***
	(0.025)	(0.036)	(0.030)	(0.028)	(0.031)	(0.028)	(0.029)	(0.029)	(0.031)
Donut	0.037	0.066*	0.063**	0.022	0.046	-0.007	-0.010	-0.018	-0.077***
	(0.024)	(0.034)	(0.028)	(0.026)	(0.029)	(0.027)	(0.028)	(0.028)	(0.029)
Trends in Heap	0.036	0.078**	0.058**	0.016	0.058**	-0.014	-0.016	-0.019	-0.074**
	(0.023)	(0.034)	(0.028)	(0.026)	(0.029)	(0.028)	(0.028)	(0.029)	(0.030)
FRPM Eligible Siblings									
No Controls	0.169***	0.214***	0.209***	0.171***	0.214***	0.134**	0.118**	0.120**	-0.018
	(0.054)	(0.058)	(0.056)	(0.057)	(0.057)	(0.058)	(0.057)	(0.057)	(0.035)
Triangular	0.155***	0.146**	0.199***	0.187***	0.160***	0.113*	0.090	0.088	-0.033
	(0.057)	(0.062)	(0.059)	(0.058)	(0.060)	(0.059)	(0.058)	(0.058)	(0.037)
Donut	0.139**	0.162***	0.076***	0.158***	0.158***	0.117**	0.117**	0.113*	-0.009
	(0.055)	(0.061)	(0.058)	(0.056)	(0.059)	(0.058)	(0.058)	(0.057)	(0.038)
Trends in Heap	0.114**	0.161***	0.137**	0.121**	0.159***	0.090	0.095	0.100*	-0.016
	(0.055)	(0.062)	(0.058)	(0.058)	(0.060)	(0.059)	(0.059)	(0.058)	(0.039)
Non-FRPM Eligible Siblings									
No Controls	-0.017	0.016	0.005	-0.054*	-0.024	-0.068**	-0.072**	-0.086***	-0.106***
	(0.023)	(0.039)	(0.031)	(0.028)	(0.032)	(0.030)	(0.030)	(0.032)	(0.037)
Triangular	-0.033	-0.004	-0.009	-0.054*	-0.042	-0.070**	-0.073**	-0.077**	-0.093**
	(0.025)	(0.043)	(0.034)	(0.030)	(0.035)	(0.032)	(0.032)	(0.034)	(0.041)
Donut	-0.016	0.009	0.004	-0.047	-0.019	-0.066**	-0.069**	-0.080**	-0.104***
	(0.024)	(0.041)	(0.032)	(0.029)	(0.033)	(0.031)	(0.031)	(0.033)	(0.038)
Trends in Heap	-0.008	0.028	0.014	-0.037	-0.002	-0.062**	-0.065**	-0.073**	-0.098**
	(0.023)	(0.041)	(0.032)	(0.028)	(0.033)	(0.030)	(0.031)	(0.033)	(0.039)

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).
Note: This table reports an alternative specification regression of the effect of HOPE Scholarship eligibility on younger siblings' college enrollment. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 around the HOPE cutoff. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include high school and graduating-cohort fixed effects. The donut RD specification excludes observations with a GPA of 3.0. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6: Alternative Specifications for Robustness Test: Sibling Spillovers of Zell

	(1) On-Time	(2) GA College	(3) Full-Time	(4) Four-Year	(5) Public	(6) SAT 900+	(7) SAT 1000+	(8) SAT 1100+	(9) SAT 1200+
All Younger Siblings									
No Controls	-0.021	0.027	-0.046*	-0.016	0.056**	-0.016	-0.022	-0.023	-0.066*
	(0.018)	(0.034)	(0.024)	(0.020)	(0.028)	(0.022)	(0.023)	(0.024)	(0.034)
Triangular	-0.020	0.033	-0.050*	-0.020	0.064**	-0.023	-0.029	-0.033	-0.078**
	(0.020)	(0.036)	(0.026)	(0.022)	(0.030)	(0.024)	(0.025)	(0.026)	(0.037)
Donut	-0.022	0.001	-0.045	-0.008	0.049	0.001	-0.001	-0.003	-0.047
	(0.021)	(0.039)	(0.027)	(0.023)	(0.032)	(0.025)	(0.026)	(0.027)	(0.039)
FRPM Eligible Siblings									
No Controls	-0.029	0.184*	-0.207**	-0.124	0.206**	-0.139	-0.142	-0.094	-0.064
	(0.077)	(0.094)	(0.088)	(0.085)	(0.090)	(0.090)	(0.090)	(0.088)	(0.081)
Triangular	0.044	0.220**	-0.124	-0.099	0.247**	-0.104	-0.126	-0.113	-0.109
	(0.084)	(0.104)	(0.093)	(0.090)	(0.100)	(0.095)	(0.095)	(0.094)	(0.084)
Donut	-0.091	0.184*	-0.314***	-0.127	0.166	-0.124	-0.106	-0.039	-0.039
	(0.086)	(0.108)	(0.100)	(0.097)	(0.102)	(0.103)	(0.105)	(0.105)	(0.095)
Non-FRPM Eligible Siblings									
No Controls	-0.019	0.004	-0.019	0.002	0.036	0.006	-0.002	-0.009	-0.063*
	(0.018)	(0.036)	(0.024)	(0.019)	(0.029)	(0.022)	(0.022)	(0.024)	(0.037)
Triangular	-0.029	0.008	-0.032	-0.006	0.042	-0.004	-0.012	-0.020	-0.076*
	(0.019)	(0.039)	(0.026)	(0.022)	(0.031)	(0.024)	(0.025)	(0.026)	(0.040)
Donut	-0.017	-0.024	-0.011	0.004	0.031	0.014	0.007	-0.004	-0.052
	(0.020)	(0.042)	(0.027)	(0.021)	(0.034)	(0.024)	(0.025)	(0.027)	(0.043)

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).
Note: This table reports alternative specification regression for robustness test of the effect of Zell Miller Scholarship eligibility on younger siblings' college enrollment. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.25 around each Zell cutoff. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include high school and graduating-cohort fixed effects. The donut RD specification excludes observations with GPAs between 3.69 and 3.71. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A7: High School Course Taking Behavior by HOPE Eligibility

	HOPE				Zell Miller			
	Rigor (1)	AP (2)	IB (3)	Dual (4)	Rigor (5)	AP (6)	IB (7)	Dual (8)
Ever During HS		-0.016	-0.001	0.004		-0.001	0.001	0.030
		(0.025)	(0.004)	(0.016)		(0.020)	(0.005)	(0.026)
$\bar{Y}$	1.00	0.62	0.02	0.14	1.00	0.73	0.03	0.35
During 10th	0.001	-0.027	-	-	-0.077	-0.018	-	-
	(0.103)	(0.031)	-	-	(0.117)	(0.042)	-	-
$\bar{Y}$	3.49	0.32	0.00	0.00	5.32	0.57	0.00	0.00
Druing 11th	-0.162	-0.071	-0.008	-0.012	-0.104	-0.065	0.003	0.045
	(0.115)	(0.072)	(0.015)	(0.012)	(0.129)	(0.105)	(0.023)	(0.034)
$\bar{Y}$	5.50	1.30	0.06	0.02	5.74	2.04	0.09	0.07
During 12th	-0.095	-0.042	-0.029	0.014	-0.054	0.002	0.022	0.057
	(0.099)	(0.084)	(0.020)	(0.049)	(0.147)	(0.114)	(0.029)	(0.086)
$\bar{Y}$	4.53	1.42	0.07	0.37	4.32	1.89	0.11	0.86
N	11,885	11,885	11,885	11,885	6,155	6,155	6,155	6,155

Note: The sample includes high school graduates from the 2012–2017 cohorts who resided in Georgia for at least 12 consecutive months prior to enrolling in college and met the academic rigor requirements. The regression discontinuity bandwidth is set to the optimal calculation of 0.3 for HOPE and 0.25 for Zell based on the on-time college enrollment outcome variable. All specifications control for student demographics (sex, race/ethnicity, ever eligibility for free or reduced-price meals, English Learner status, and disability status) and include high school-by-cohort fixed effects. Each column represents a separate regression. $\bar{Y}$ denotes the control mean. Standard errors are clustered at the HOPE GPA level presented in the parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table A8: Younger Siblings' Enrollment by Institution Annual Sticker Tuition Quantile

	All Institutions			In-State Institutions		
	(1) ≥ 25th	(2) ≥ 50th	(3) ≥ 75th	(4) ≥ 25th	(5) ≥ 50th	(6) ≥ 75th
Panel A. HOPE						
Older GPA ≥ 3.0	-0.022	-0.022	-0.050*	0.068**	-0.011	0.003
	(0.031)	(0.029)	(0.026)	(0.032)	(0.023)	(0.011)
N	3,847	3,847	3,847	3,847	3,847	3,847
Older GPA ≥ 3.0 × FRPM	0.019	-0.021	-0.014	0.189***	-0.015	-0.012
	(0.051)	(0.042)	(0.035)	(0.056)	(0.036)	(0.022)
N	1,145	1,145	1,145	1,145	1,145	1,145
Older GPA ≥ 3.0 × Non FRPM	-0.041	-0.017	-0.058*	0.002	-0.012	0.009
	(0.038)	(0.037)	(0.035)	(0.039)	(0.030)	(0.013)
N	2,698	2,698	2,698	2,698	2,698	2,698
Panel B. Zell Miller						
Older GPA ≥ 3.7	-0.048	-0.052	-0.057*	0.007	-0.035	-0.028**
	(0.031)	(0.032)	(0.031)	(0.034)	(0.032)	(0.012)
N	3,337	3,337	3,337	3,337	3,337	3,337
Older GPA ≥ 3.7 × FRPM	-0.188*	-0.249**	-0.188**	0.099	-0.040	-0.059*
	(0.092)	(0.079)	(0.073)	(0.100)	(0.073)	(0.034)
N	439	439	439	439	439	439
Older GPA ≥ 3.7 × Non FRPM	-0.032	-0.029	-0.042	-0.004	-0.033	-0.025
	(0.033)	(0.035)	(0.034)	(0.037)	(0.035)	(0.012)
N	2,896	2,896	2,896	2,896	2,896	2,896

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: This table reports regression discontinuity estimates of the effect of HOPE Scholarship eligibility on younger siblings' college choice by institutional sticker tuition by students' ever Free or Reduced-Price Meal (FRPM) eligibility during K–12. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever disability status, and ever FRPM status for full sample), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A9: Sibling Spillover Effects on High School Coursetaking by Subgroup

	HOPE GPA	HOPE Eligible	Any AP	Any IB	Any Dual	Max Rigor
Panel A: HOPE						
Older GPA ≥ 3.0	-0.016	-0.003	-0.006	-0.002	-0.009	-0.042
	(0.031)	(0.030)	(0.025)	(0.006)	(0.017)	(0.321)
N	3,703	3,847	3,847	3,847	3,847	3,201
Older GPA ≥ 3.0 × FRPM	0.025	0.078	-0.032	0.003	-0.010	-0.316
	(0.063)	(0.054)	(0.043)	(0.011)	(0.023)	(0.653)
N	1,048	1,145	1,145	1,145	1,145	875
Older GPA ≥ 3.0 × Non FRPM	-0.042	-0.040	0.014	-0.004	-0.011	-0.423
	(0.035)	(0.036)	(0.031)	(0.007)	(0.022)	(0.368)
N	2,653	2,698	2,698	2,698	2,698	2,322
Panel B: Zell Miller						
Older GPA ≥ 3.0	-0.043	-0.039*	-0.029	-0.005	-0.014	-0.665**
	(0.027)	(0.023)	(0.026)	(0.007)	(0.020)	(0.309)
N	3,295	3,337	3,337	3,337	3,337	2,769
Older GPA ≥ 3.0 × FRPM	-0.120	-0.064	-0.019	-0.032	-0.005	-0.163
	(0.098)	(0.093)	(0.070)	(0.025)	(0.043)	(0.949)
N	429	439	439	439	439	355
Older GPA ≥ 3.0 × Non FRPM	-0.030	-0.036	-0.034	-0.000	-0.017	-0.751**
	(0.027)	(0.023)	(0.028)	(0.007)	(0.022)	(0.322)
N	2,864	2,896	2,896	2,896	2,896	2,413

Note: This table reports regression discontinuity estimates of the sibling spillover effects of HOPE Scholarship eligibility on younger siblings' high school course-taking outcomes. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell Miller around each GPA cutoff. Subgroups are defined by younger siblings' Free or Reduced-Price Meal (FRPM) eligibility status. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A10: Impacts of the HOPE Scholarship on College Outcomes by Measures of Socioeconomic Status

	Enroll (1)	In-State (2)	Full-Time (3)	Four-Year (4)	Public (5)	SAT 1000+ (6)	SAT 1200+ (7)
Panel A: By FRPM							
Persistently	0.181***	0.192***	0.218***	0.167***	0.201***	0.103*	-0.021
	(0.055)	(0.061)	(0.057)	(0.056)	(0.059)	(0.057)	(0.035)
N	1,026	1,026	1,013	1,026	1,026	1,026	1,026
Free Only	0.169***	0.200***	0.218***	0.171***	0.200***	0.097*	-0.027
	(0.055)	(0.059)	(0.056)	(0.055)	(0.058)	(0.056)	(0.035)
N	1,061	1,061	1,048	1,061	1,061	1,061	1,061
Panel B: By High School Poverty							
Bottom Tercile	0.012	0.001	0.031	0.009	0.014	-0.014	-0.117***
	(0.027)	(0.047)	(0.036)	(0.034)	(0.039)	(0.036)	(0.044)
N	1,777	1,777	1,749	1,777	1,777	1,777	1,777
Middle Tercile	0.022	0.105*	0.033	-0.026	0.039	-0.046	-0.051
	(0.039)	(0.060)	(0.049)	(0.044)	(0.049)	(0.046)	(0.054)
N	1,227	1,227	1,209	1,227	1,227	1,227	1,227
Top Tercile	0.159**	0.213***	0.242***	0.158***	0.209***	0.072	-0.023
	(0.067)	(0.074)	(0.069)	(0.067)	(0.073)	(0.069)	(0.044)
N	696	696	686	696	696	696	696

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: This table reports regression discontinuity estimates of the effects of HOPE Scholarship eligibility on younger siblings' college enrollment outcomes, separately by ever FRPM eligibility subgroup (Panel A) and by terciles of the high school-level FRPM student share (Panel B). The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculation of 0.3 around the HOPE GPA cutoff of 3.0. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A11: Impacts of the Zell Miller Scholarship on College Outcomes by Measures of Socioeconomic Status

	Enroll (1)	In-State (2)	Public (3)	Full-Time (4)	Four-Year (5)	SAT 1000+ (6)	SAT 1200+ (7)
Panel A: By FRPM							
Persistently	-0.007	0.279**	0.293***	-0.178*	-0.086	-0.120	-0.103
	(0.083)	(0.105)	(0.101)	(0.098)	(0.093)	(0.098)	(0.085)
N	366	366	366	358	366	366	366
Free Only	-0.021	0.218**	0.234**	-0.223**	-0.111	-0.122	-0.078
	(0.083)	(0.103)	(0.099)	(0.094)	(0.090)	(0.096)	(0.082)
N	376	376	376	368	376	376	376
Panel B: By High School Poverty							
Bottom Tercile	0.000	0.035	0.105***	-0.013	0.009	0.007	-0.054
	(0.020)	(0.042)	(0.034)	(0.026)	(0.023)	(0.026)	(0.043)
N	2,065	2,065	2,065	2,046	2,065	2,065	2,065
Middle Tercile	-0.016	-0.022	0.035	-0.044	0.010	0.020	-0.028
	(0.030)	(0.063)	(0.051)	(0.045)	(0.034)	(0.039)	(0.065)
N	959	959	959	943	959	959	959
Top Tercile	-0.111	0.086	-0.084	-0.259**	-0.175*	-0.236**	-0.126
	(0.095)	(0.119)	(0.107)	(0.105)	(0.095)	(0.104)	(0.095)
N	269	269	269	261	269	269	269

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: This table reports regression discontinuity estimates of the effects of Zell Miller Scholarship eligibility on younger siblings' college enrollment outcomes, separately by ever FRPM eligibility subgroup (Panel A) and by terciles of the high school-level FRPM student share (Panel B). The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculation of 0.25 around the Zell Miller GPA cutoff of 3.7. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A12: Sibling Spillovers of HOPE Scholarship by Subgroup Analysis

	Enroll	In-State	Full-Time	Four-Year	Public	SAT 900+	SAT 1000+	SAT 1100+	SAT 1200+
Panel A: HOPE									
2-Child Household	0.041	0.090**	0.081**	0.030	0.061**	-0.002	-0.015	-0.025	-0.079**
	(0.025)	(0.036)	(0.030)	(0.028)	(0.031)	(0.029)	(0.029)	(0.030)	(0.030)
N	3,152	3,152	3,105	3,152	3,152	3,152	3,152	3,152	3,152
3-Child Household	0.059	0.077	0.051	-0.007	0.011	-0.013	0.001	0.002	-0.057
	(0.054)	(0.077)	(0.063)	(0.060)	(0.066)	(0.063)	(0.064)	(0.068)	(0.065)
N	692	692	682	692	692	692	692	692	692
Panel B: Zell Miller									
2-Child Household	-0.018	0.014	-0.033	-0.007	0.072**	-0.003	-0.010	-0.009	-0.047
	(0.020)	(0.036)	(0.025)	(0.022)	(0.029)	(0.024)	(0.024)	(0.025)	(0.036)
N	2,757	2,757	2,726	2,757	2,757	2,757	2,757	2,757	2,757
3-Child Household	-0.014	0.049	-0.054	-0.044	0.034	-0.047	-0.046	-0.044	-0.091
	(0.041)	(0.090)	(0.058)	(0.047)	(0.077)	(0.055)	(0.055)	(0.060)	(0.088)
N	579	579	567	579	579	579	579	579	579

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).
Note: This table reports the regression discontinuity estimates of the effects of HOPE Scholarship eligibility on younger siblings' college enrollment by household size. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. First-stage F-statistics are reported in brackets. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A13: Impacts of the HOPE and Zell Miller Scholarships on College Outcomes by High School College Enrollment Rate

	Enroll (1)	In-State (2)	Public (3)	Full-Time (4)	Four-Year (5)	SAT 1000+ (6)	SAT 1200+ (7)
				Panel A: HOPE			
Top Tercile	0.016	0.000	0.013	0.041	0.020	0.005	-0.095**
	(0.027)	(0.046)	(0.038)	(0.036)	(0.036)	(0.035)	(0.042)
N	1,899	1,899	1,899	1,864	1,899	1,899	1,899
Middle Tercile	0.021	0.110**	0.072	0.014	-0.014	-0.065	-0.058
	(0.037)	(0.053)	(0.045)	(0.044)	(0.041)	(0.044)	(0.047)
N	1,476	1,476	1,476	1,455	1,476	1,476	1,476
Bottom Tercile	0.144*	0.220**	0.174***	0.270***	0.101	0.091	-0.062
	(0.078)	(0.082)	(0.082)	(0.078)	(0.076)	(0.074)	(0.044)
N	557	557	557	550	557	557	557
				Panel B: Zell Miller			
Top Tercile	0.007	0.047	0.136***	-0.014	0.018	0.023	-0.009
	(0.020)	(0.043)	(0.035)	(0.027)	(0.023)	(0.026)	(0.043)
N	2,011	2,011	2,011	1,988	2,011	2,011	2,011
Middle Tercile	-0.045	-0.042	-0.046	-0.051	-0.021	-0.028	-0.127**
	(0.029)	(0.059)	(0.047)	(0.042)	(0.034)	(0.040)	(0.060)
N	1,072	1,072	1,072	1,059	1,072	1,072	1,072
Bottom Tercile	-0.097	0.061	-0.065	-0.260**	-0.189*	-0.221*	-0.152
	(0.107)	(0.134)	(0.117)	(0.120)	(0.110)	(0.113)	(0.100)
N	210	210	210	203	210	210	210

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).

Note: This table reports regression discontinuity estimates of the effects of HOPE Scholarship eligibility (Panel A) and Zell Miller Scholarship eligibility (Panel B) on younger siblings' college enrollment outcomes, by terciles of the high school college enrollment rate. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. HOPE estimates are based on the optimal bandwidth calculation of 0.3 around the HOPE GPA cutoff of 3.0; Zell Miller estimates are based on the optimal bandwidth calculation of 0.25 around the Zell Miller GPA cutoff of 3.7. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A14: Sibling Spillovers of HOPE Scholarship by Subgroup Analysis

	Enroll	In-State	Full-Time	Public	Four-Year	SAT 900+	SAT 1000+	SAT 1100+	SAT 1200+
Panel A: HOPE									
2nd Semester Persisted	0.040*	0.077**	0.079***	0.044	0.016	-0.004	-0.005	-0.018	-0.080**
	(0.023)	(0.034)	(0.028)	(0.029)	(0.026)	(0.028)	(0.028)	(0.029)	(0.030)
N	3,428	3,428	3,373	3,428	3,428	3,428	3,428	3,428	3,428
2nd Semester Drop-out	0.014	0.013	0.013	0.045	0.022	-0.029	-0.052	-0.023	-0.024
	(0.093)	(0.100)	(0.094)	(0.095)	(0.090)	(0.088)	(0.088)	(0.084)	(0.053)
N	417	417	415	417	417	417	417	417	417
Panel B: Zell Miller									
2nd Semester Persisted	-0.033*	0.002	-0.043*	0.044	-0.023	-0.016	-0.021	-0.021	-0.065*
	(0.017)	(0.033)	(0.023)	(0.027)	(0.019)	(0.020)	(0.021)	(0.022)	(0.033)
N	3,371	3,371	3,327	3,371	3,371	3,371	3,371	3,371	3,371
2nd Semester Drop-out	-0.026	0.060	-0.398**	-0.002	-0.190	-0.153	-0.255	-0.297	-0.146
	(0.129)	(0.225)	(0.166)	(0.134)	(0.189)	(0.191)	(0.176)	(0.190)	(0.215)
N	98	98	96	98	98	98	98	98	98

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).
Note: This table reports regression discontinuity estimates of the effects of HOPE Scholarship eligibility on younger siblings' college enrollment, by older siblings' second-semester drop-out status. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling resided in Georgia for at least 12 consecutive months prior to graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. First-stage F-statistics are reported in brackets. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A15: Sibling Spillovers of HOPE Scholarship by Gender Composition

	Enroll	In-State	Full-Time	Four-Year	Public	SAT 900+	SAT 1000+	SAT 1100+	SAT 1200+
Panel A: HOPE									
Same Gender	0.014	0.079*	0.052	0.005	0.028	-0.019	-0.034	-0.033	-0.033
	(0.031)	(0.045)	(0.037)	(0.034)	(0.038)	(0.036)	(0.036)	(0.037)	(0.038)
N	1,955	1,955	1,938	1,955	1,955	1,955	1,955	1,955	1,955
Mixed Gender	0.077**	0.081*	0.092**	0.039	0.082**	0.017	0.010	-0.007	-0.106**
	(0.033)	(0.047)	(0.039)	(0.037)	(0.041)	(0.038)	(0.038)	(0.039)	(0.040)
N	1,892	1,892	1,852	1,892	1,892	1,892	1,892	1,892	1,892
Panel B: Zell Miller									
Same Gender	-0.000	0.056	-0.023	-0.024	0.106**	-0.022	-0.020	-0.014	-0.103**
	(0.024)	(0.048)	(0.032)	(0.029)	(0.039)	(0.031)	(0.032)	(0.033)	(0.048)
N	1,663	1,663	1,642	1,663	1,663	1,663	1,663	1,663	1,663
Mixed Gender	-0.040	-0.009	-0.070**	-0.002	0.027	-0.004	-0.017	-0.021	-0.019
	(0.026)	(0.048)	(0.033)	(0.027)	(0.039)	(0.030)	(0.031)	(0.033)	(0.047)
N	1,672	1,672	1,650	1,672	1,672	1,672	1,672	1,672	1,672

Source: National Student Clearinghouse (NSC) and Integrated Postsecondary Education Data System (IPEDS).
Note: This table reports the regression discontinuity estimates of the effects of HOPE Scholarship eligibility on younger siblings' college enrollment by sibling gender composition. The sibling sample consists of the two oldest siblings from households with two or three children, where the older sibling lived in Georgia for at least 12 consecutive months before graduation and met the academic rigor requirements. Estimates are based on the optimal bandwidth calculations of 0.3 for HOPE and 0.25 for Zell around each GPA cutoff. First-stage F-statistics are reported in brackets. Standard errors, reported in parentheses, are clustered at the sibling level. All specifications include demographic controls (sex, race/ethnicity, ever English Learner status, ever eligibility for Free or Reduced-Price Meals, and ever disability status), as well as high school and graduating-cohort fixed effects. Each column represents a separate regression. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

B Details for HOPE and Zell Miller Scholarships

This appendix provides a comprehensive overview of the eligibility requirements and award structures for the HOPE and Zell Miller Scholarships. Both programs are restricted to students enrolled in institutions within the University System of Georgia (USG), the Technical College System of Georgia (TCSG), and eligible in-state private postsecondary institutions as defined by the Georgia Student Finance Commission (GSFC).

Eligibility and Residency

Both scholarships require Georgia residency; students must have resided in Georgia for at least 12 consecutive months before college enrollment and must graduate from an eligible Georgia public high school. The High School HOPE GPA and the completion of a rigorous curriculum determine initial academic eligibility. As summarized in Table B1, the HOPE Scholarship requires a minimum HOPE GPA of 3.0 in high school. The Zell Miller Scholarship has more stringent requirements, including a minimum HOPE GPA of 3.7 and a qualifying standardized test score (at least 1200 on the SAT Math/ERW or 26 on the ACT). Neither program imposes an income requirement; both operate as purely merit-based forms of financial aid.

Rigor Requirement

Starting with the graduating class of 2016, Georgia implemented a rigor requirement to discourage students from selecting easier coursework to inflate their HOPE GPA. Seniors graduating after May 2016 were required to complete at least 3 credits in advanced academic courses; those graduating after May 2017 were required to complete at least 4 credits. Eligible rigor courses include AP, IB, and dual enrollment courses, as well as designated advanced courses in core subjects.[20]

Maintenance Requirements

Continued receipt of both scholarships depends on satisfactory academic progress. HOPE recipients must maintain a cumulative college GPA of at least 3.0, while Zell Miller recipients must maintain a cumulative GPA of at least 3.3. Compliance is evaluated at credit-hour checkpoints of 30, 60, and 90 attempted hours and at the conclusion of each spring semester. Students who fall below the Zell Miller maintenance threshold but

[20]The full list of rigor courses as of school year 2024–25 is available at: https://www.gafutures.org/media/apofcfmn/rigor-list-september-2025.pdf.

remain above 3.0 may revert to HOPE funding. While students can lose scholarships at these checkpoints, they may regain eligibility at subsequent 30-hour intervals if their GPA returns to the required level (Ribar and Rubenstein, 2021). Eligibility for both programs expires after a fixed time window: students who first received either scholarship between summer 2011 and spring 2019 faced a seven-year limit, while those who first received either scholarship in summer 2019 or later face a ten-year limit.

Table B1: Eligibility and Maintenance Requirements: HOPE vs. Zell Miller

Requirement	**HOPE Scholarship**	**Zell Miller Scholarship**
GA Residency	12 months prior to enrollment	12 months prior to enrollment
HOPE GPA	Minimum 3.0	Minimum 3.7
Standardized Test	None required	1200 SAT (ERW + Math) or 26 ACT
Academic Rigor	4 credits from approved rigor list	4 credits from approved rigor list
Maintenance GPA	Minimum 3.0 college GPA	Minimum 3.3 college GPA
Checkpoints	End of Spring; 30, 60, 90 attempted hours	End of Spring; 30, 60, 90 attempted hours

Source: Georgia Student Finance Commission (GSFC).

Award Structure

Both scholarships are applied as first-dollar awards, covering tuition before other grants or scholarships, and both exclude mandatory fees. Award amounts scale with credit hours and vary significantly by institutional type. At USG institutions, award amounts vary by institution. The HOPE Scholarship typically covers 95 to 100 percent of tuition for students enrolled in 15 credit hours, whereas the Zell Miller Scholarship covers 100 percent of tuition regardless of credit-hour load. In contrast, for TCSG and private institutions, both programs provide fixed-dollar awards that scale with enrollment intensity but remain uniform across all participating schools. For students at private institutions such as Emory University, both awards represent only a small fraction of total tuition costs. The difference between the two awards varies by institution. Currently, 12 of the 30 USG institutions maintain distinct award tiers for the two programs. For a student enrolled in 12 credit hours, this disparity ranges from a minimum of $24 to a maximum of $1,051.20 per semester, with a system-wide average difference of $173 per semester.

C Additional Details on Data Construction

High School Administrative Records

This appendix provides more details on data and variable constructions. The main dataset used in this study is based on administrative records from an anonymous public school district in Atlanta, Georgia, covering graduating cohorts from 2012 to 2022. Using school enrollment data (available from the 2003-04 through the 2023–24 school years), I define graduation status based on the exit date and withdrawal codes recorded during students' final year of high school (12th grade). Students who withdraw from the school system in 12th grade with the withdrawal reason coded as "High school graduation" and a non-missing withdrawal date are classified as high school graduates. Based on this definition, 89.56 percent of 12th-grade students are identified as graduating from high school.

Eligibility for the HOPE Scholarship requires students to have resided in Georgia for at least 12 consecutive months before college enrollment. I construct the residency eligibility indicator using entry codes and entry dates from the school enrollment data. Students who enter the school system during the 12th-grade school year after September 1 with entry reasons coded as "Entered from another state or U.S. territory," "Entered from another country," or "Entered from another state or country" are classified as not meeting the residency requirement for the scholarship. Information on eligibility for rigor requirements, final HOPE GPA, and final HOPE eligibility status is obtained directly from administrative records provided by the school district.

Student demographic characteristics are defined using the first available record in the student-year panel dataset. Student-year panel data is available from the 2003-04 through the 2023–24 school years. Race and ethnicity are categorized into five mutually exclusive groups: Black, White, Hispanic, Asian, and Other (Other includes American Indian, Pacific Islander, and students reporting multiple races). The free or reduced-price meal (FRPM) indicator identifies students who were eligible for the program in any observed school year. Disability status and English learner status are defined as indicators for students who were ever identified as participating in a special education program or classified as having limited English proficiency during the observation period.

Sibling Matching

Sibling identifiers are constructed from administrative records provided by a school district covering school years 2011–2024. Student records are linked across years using a unique student identifier and residential address information. Four household linkage

measures are available, differing in the strictness of the matching criteria.

The primary sibling identifier links students who share the same last name and residential address, including apartment unit number when applicable. Three alternative identifiers relax these criteria by allowing missing apartment unit numbers, ignoring unit numbers within apartment complexes, or matching students with different last names residing at the same address. The latter identifier primarily captures extended-family households and is used only for robustness analyses.

The analysis sample consists of high school graduates from the 2012–2022 cohorts who can be linked to the cleaned sibling file. Students are grouped according to the primary household identifier, and household size is calculated as the number of linked siblings. Within each household, siblings are ranked by date of birth to determine birth order. The age gap between adjacent siblings is computed from birth dates. Sibling pairs with implausibly small positive age gaps (less than 9 months) are excluded from age-gap analyses, while siblings who share the same birth date are classified as twins.

The main analysis focuses on households with two or three siblings and examines spillover effects from the oldest sibling to the second-born sibling. Accordingly, I define outcome variables only for second-born siblings in households linked through the primary sibling identifier.

NSC Data Details

The National Student Clearinghouse reports enrollment coverage of approximately 93 percent nationwide and 94.8 percent in Georgia as of Fall 2011 (Dynarski et al., 2015). Coverage is particularly high for institution types most relevant for this study: more than 99 percent for public four-year colleges and approximately 96 percent for public two-year colleges. Because most students in this sample enroll in these institution types (91 percent in four-year institutions and 86.2 percent in public colleges), the likelihood of missing enrollment records is minimal. As a result, NSC coverage is unlikely to pose a significant concern for this analysis.

The NSC data include multiple records per student because enrollment information is reported at the term level, and additional records may appear when students transfer institutions or change enrollment intensity. To construct the analysis dataset, I collapse the NSC records into a student–institution-level dataset. Institution characteristics are assigned based on the first record associated with each student–institution pair.

Outcome Variable Construction

I define on-time college enrollment for students matched to the NSC data who enroll in any postsecondary institution in the United States. Using the college start date and high school graduation date, I construct indicators for enrollment within specific time windows after high school graduation. Overall, 83.78 percent of students in the sample ever enroll in college after graduating from high school, 80.21 percent enroll within 16 months, and 77.82 percent enroll within 12 months. Indicators for enrollment in in-state, four-year, full-time, public institutions, as well as enrollment by institutional selectivity, are defined by the first institution attended after high school graduation, regardless of timing.

Persistence measures are constructed based on college enrollment timing. I define two semesters per academic year: fall and spring. Students who are enrolled in October are classified as enrolled in the fall semester, while those enrolled in March are classified as enrolled in the spring semester. Using this classification, I count the number of consecutive semesters a student remains enrolled at the same institution. Second-semester persistence is defined as enrollment for more than one consecutive semester. Because students may begin college in either the fall or spring semester, second-semester persistence means appearing in the following spring term for students who initially enroll in the fall, or in the following fall term for students who initially enroll in the spring.

D Cost-Benefit Analysis

I compute the MVPF following Hendren and Sprung-Keyser (2020). For marginal students, WTP equals the expected increase in lifetime earnings induced by the program, adjusted for federal and state income taxes.[21] Appendix Table D1 reports the baseline calculation for direct recipients. Below, I detail the extended calculation that incorporates sibling spillovers.

Extending Willingness to Pay.

The extended WTP adds the younger sibling's expected gain in earnings to the recipient's own. I compute the sibling's earnings gain analogously to the baseline calculation, multiplying the IV-estimated college completion effect by the net present value of the college wage premium, adjusted for federal and Georgia state income taxes.[22] Specifically:

$$\Delta \text{WTP}^{\text{Sibling}}_{\text{In-State}} = \hat{\beta}^{\text{Sibling}}_{\text{completion}} \times \text{NPV(Wage Premium)} \times (1 - \tau_{\text{fed}} - \tau_{\text{state}}) \tag{2}$$

where

$$\hat{\beta}^{\text{Sibling}}_{\text{completion}} = 0.080 \times 0.51 = 0.041$$

is the estimated effect of older siblings' receipt of scholarships on younger siblings' in-state college completion, computed by multiplying the IV-estimated enrollment effect of 0.080 by Georgia's six-year graduation rate of 51%.[23] NPV(Wage Premium) = \$779,580 is the present discounted value of the college wage premium, and $(1 - 0.189 - 0.0499) = 0.7611$ is the after-tax retention factor. This yields

$$\Delta \text{WTP}^{\text{Sibling}}_{\text{In-State}} = \$24{,}326.87$$

The extended WTP for in-state college completion is therefore:

$$\text{WTP}_{\text{In-State}} = \underbrace{\$24{,}027.64}_{\text{Direct}} + \underbrace{\$24{,}326.87}_{\text{Sibling Spillover}} = \$48{,}354.51 \tag{3}$$

[21] This approach assumes that marginal students are fully informed about the returns to education and that non-pecuniary benefits (e.g., job amenities, health, civic engagement) are excluded from WTP. Including non-pecuniary benefits would increase the MVPF.

[22] I apply the same discount rate (3%), federal marginal tax rate (18.9%), and Georgia state tax rate (4.99%) as in the baseline calculation. I also use the same college wage premium from Bartik et al. (2016), maintaining the assumption that the marginal sibling enrollee faces the same average earnings returns as the broader college-going population. This is a simplification; if siblings of HOPE recipients differ systematically in their returns to college (e.g., due to parental education or income), the estimate would need to be adjusted accordingly.

[23] National Center for Education Statistics, Digest of Education Statistics, 2022.

Net Cost.

The sibling's enrollment does not create an additional direct cost for the HOPE program, since the scholarship is awarded only to the recipient. However, the state incurs additional indirect costs through increased public appropriations for younger siblings' enrollment. The net cost of the sibling spillover is:

$$\Delta\text{Net Cost}^{\text{Sibling}} = \underbrace{\hat{\beta}^{\text{Sibling}}_{\text{enroll}} \times A \times T}_{\text{Additional Appropriations}} - \underbrace{\hat{\beta}^{\text{Sibling}}_{\text{completion}} \times \text{NPV(Wage Premium)} \times \tau_{\text{state}}}_{\text{Fiscal Externality (State Tax Revenue)}} \quad (4)$$

where

$$\hat{\beta}^{\text{Sibling}}_{\text{enroll}} = 0.080$$

is the IV-estimated effect on younger siblings' in-state enrollment. The average state and local appropriations per student is \$6,201.40 (Delta Cost Project, 2012 dollars), and four years of college.[24] This yields additional public appropriations of $0.080 \times \$6{,}201.40 \times 4 = \$1{,}984.44$

Following Hendren and Sprung-Keyser (2020), I subtract the present value of additional state income tax revenue generated by younger siblings' increased earnings as a fiscal externality:

$$\text{FE}^{\text{Sibling}}_{\text{State}} = \hat{\beta}^{\text{Sibling}}_{\text{completion}} \times \text{NPV(Wage Premium)} \times \tau_{\text{state}} \quad (5)$$

The total net cost of the sibling spillover is therefore:

$$\Delta\text{Net Cost}^{\text{Sibling}}_{\text{In-State}} = \underbrace{\$1{,}984.44}_{\text{Additional Appropriations}} - \underbrace{\$1{,}594.94}_{\text{Fiscal Externality}} = \$389.50 \quad (6)$$

Extended MVPF.

The MVPF incorporating sibling spillovers is:

[24] As in the baseline, this calculation assumes constant returns to scale in university provision and that the per-student appropriation figure from the Delta Cost Project (2012 dollars) accurately proxies for the marginal cost of an additional enrollee. Note that appropriations are applied to the enrollment effect $\hat{\beta}^{\text{Sibling}}_{\text{enroll}}$, as public expenditures are incurred upon enrollment, while the fiscal externality is applied to the completion effect $\hat{\beta}^{\text{Sibling}}_{\text{completion}}$, as tax revenue accrues only upon degree completion and subsequent labor market entry.

$$\text{MVPF}_{\text{In-State}} = \frac{\text{WTP}_{\text{In-State}}}{\text{Net Cost}_{\text{In-State}}} = \frac{\$48{,}354.51}{\$13{,}663.91} = 3.54 \tag{7}$$

This represents an increase from the baseline estimate of 1.81 to 3.54, suggesting that omitting sibling spillovers meaningfully understates the social return to the HOPE Scholarship. Table D2 summarizes the calculation.

Table D1: Welfare Analysis and MVPF Calculation

	Any Four-Year	In-State Four-Year
Inputs		
College wage premium (BA-HS)	\$779,580	\$779,580
Impact of program on degree attainment	0.021	0.040
State tax rate	4.99%	4.99%
Federal marginal tax rate	18.9%	18.9%
Willingness to Pay (WTP)		
After-tax lifetime earnings gain per recipient	\$12,614.51	\$24,027.64
Program Costs		
Direct cost: Average Scholarship (4 years)	\$14,223	\$14,223
Behavioral response cost (net of private tuition)	-\$980	-\$980
State tax revenue (4.99% of earnings gain)	-\$1,556.04	-\$1,556.04
Indirect cost: Increased enrollment (state appropriations)	\$1,587.45	\$1,587.45
Total Net Cost	\$13,274.41	\$13,274.41
MVPF	0.95	1.81

Source: Kim (2026)
Notes: WTP is based on after-tax lifetime earnings gains using a federal marginal tax rate of 18.9% and a Georgia state tax rate of 4.99%. The college wage premium follows Table 3 of Bartik et al. (2016), with a discount rate of 3%. Behavioral response costs and the federal marginal tax rate follow Hendren and Sprung-Keyser (2020). I calculate indirect costs using Delta Cost Project data. All monetary values are in 2012 dollars.

Table D2: Welfare Analysis and MVPF Calculation with Sibling Spillovers

	Baseline	Spillover Add-on	With Spillovers
Inputs			
College wage premium (BA–HS)	$779,580	$779,580	$779,580
Recipient Degree Attainment	0.040	–	0.040
Sibling Degree Attainment	–	0.041	0.041
State Tax Rate	4.99%	4.99%	4.99%
Federal Marginal Tax Rate	18.9%	18.9%	18.9%
Willingness to Pay (WTP)			
After-Tax Earnings Gain (Recipient)	$24,027.64	–	$24,027.64
After-tax Earnings Gain (Sibling)	–	$24,326.87	$24,326.87
Total WTP	$24,027.64	$24,326.87	$48,354.51
Program Costs			
Direct cost: HOPE scholarship (4 years)	$14,223	–	$14,223
Behavioral response cost	–$980	–	–$980
State tax revenue (recipient)	–$1,556.04	–	–$1,556.04
State tax revenue (sibling)	–	–$1,594.94	–$1,594.94
Indirect cost: recipient enrollment	$1,587.45	–	$1,587.45
Indirect cost: sibling enrollment	–	$1,984.44	$1,984.44
Total Net Cost	$13,274.41	$389.50	$13,663.91
MVPF	1.81	–	3.54

Notes: The baseline column reproduces the estimates from Table D1. The "Spillover Add-on" reports the incremental contribution of younger-sibling effects. WTP for siblings is based on the IV estimate of the effect of the recipient's scholarship receipt on younger siblings' college enrollment, multiplied by the after-tax net present value of the college wage premium (Bartik et al. 2016, Table 3; 3% discount rate). Indirect costs for siblings are computed using per-student state appropriations from the Delta Cost Project. All dollar values are in 2012 dollars.